Environmental Services

A SURVEY OF FALL SPAWNING FISH SPECIES IN WATERBODIES WITHIN THE INFLUENCE OF THE PROPOSED ALASKA HIGHWAY PIPELINE IN YUKON TERRITORY, 1977

Foothills Pipe Lines (South Yukon) Ltd.

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THE
ALASKA HIGHWAY
GAS PIPELINE PROJECT

Foothills Pipe Lines (South Yukon) Ltd.

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A Survey of Fall Spawning Fish Species in Waterbodies within the Influence of the Proposed Alaska Highway Pipeline in Yukon Territory, 1977

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1.0 Summary

Foothills Pipe Lines (Yukon) Ltd. have proposed the development of a natural gas pipeline that would traverse the southern section of Yukon Territory. The construction, maintenance and operation of this pipeline has the potential for impairment of aquatic environments.

An inventory of the fish fauna in selected watercourses within the influence of this proposed pipeline was conducted from August 20 to November 10, 1977. The purpose of this investigation was to document fishery utilization of the aquatic environment during the fall season. This program was designed to identify waterbodies which were used by fall spawning fish populations, and to identify migration times, routes and spawning areas as they relate to possible impact from the proposed pipeline. Potential fish overwintering areas in watercourses directly affected by the proposed pipeline alignment were also identified. These data will be used to supplement existing information on utilization and sensitive periods of fish fauna, to assess fully the impact of the proposed pipeline on the aquatic resource.

A summary of the results of this study are presented below.

Chinook and chum salmon were collected or observed in many waterbodies during this investigation. A summary of salmon utilization in regions within the influence of the proposed pipeline is presented in Table 1.

In the southern section of Yukon Territory, chinook salmon began arriving in spawning areas near the middle of August. Spawning activity peaked near the end of August in 1977.

Chum salmon were first detected near spawning sites in southern Yukon Territory on September 27, 1977. Numbers of fish in these areas increased on subsequent days and spawning activity appeared to peak about October 22, 1977.

In Bear Creek, Dolly Varden spawning activity began in early September when water temperatures were approximately 5.0°C. Areas which possessed suitable spawning substrate were found throughout the creek. Most spawning areas were small and no more than three Dolly Varden were observed in any of these regions. Many fish appeared to have migrated out of the region of this watercourse above the Alaska Highway. These fish may have moved to other spawning sites.

In Kluane Lake, lake trout spawning appeared to have occurred from mid-September to late October. No spawning areas were identified during this investigation.

TABLE 1

SUMMARY OF SALMON UTILIZATION OF REGIONS WITHIN
THE INFLUENCE OF THE PROPOSED ALASKA HIGHWAY PIPELINE

Waterbody	Location of Pipeline Crossing	Utilization
Koidern River	Mile 48.9	Chum salmon migration route.
Koidern River	Mile 63.0	Chum salmon migration route.
Swede Johnson Creek	Mile 94.1	Chum salmon spawning area, at mouth.
Quill Creek	Mile 100.3	Creek dry. Chum salmon spawning area, at mouth.
Burwash Creek	Mile 106.8	Chum salmon spawning area, at mouth.
Duke River	Mile 111.0	Chum salmon spawning area, at mouth.
Kluane River[4]		Chinook and chum salmon migration route and spawning area.
Kluane Lake[4]		Chum salmon migration route and spawning area.
Takhini River	Mile 240.9	Chinook salmon migration route.
Ibex River	Mile 248.1	Chinook salmon spawning area.
Ibex River	Miles 254.6 and 257.2	Chinook salmon spawning area, downstream.
Yukon River	Mile 286.0	Documented chinook salmon migration route[1].
Marsh Lake[4]		Documented chinook salmon migration route[1].
M'Clintock River	Mile 293.8	Documented chinook salmon migration route[1].
Teslin River	Mile 339.0	Chinook salmon migration route, and spawning area, downstream. Documented chum salmon spawning area, downstream[2].
Teslin Lake[4]		Chinook salmon migration route.
Nisutlin Bay	Mile 369.0	Chinook salmon migration route.
Morley River	Mile 391.5	Chinook salmon spawning area and documented migration route[3].
Swift River	Miles 430.7, 432.9 and 439.5	Chinook salmon spawning area, downstream.

[1] Brown *et al.* 1976, Walker 1976.

[2] Sweitzer 1974.

[3] Department of Environment 1973.

[4] These waterbodies are not traversed by the proposed pipeline.

The reproductive biology of lake and round whitefish was studied in stream and lake habitats. In Koidern River spawning occurred in pools in the upper reaches of this watercourse. Most pools were approximately 1.0 m deep. Spawning occurred in October at water temperatures of approximately 0.0 to 2.0°C. Spawning in Kluane Lake began in late October when surface water temperatures were approximately 1.5°C. Whitefish spawned along shore in approximately 3.0 m of water.

Broad whitefish were collected in Teslin Lake and Nisutlin Bay. No spawning areas were identified in these waterbodies. In early September, broad whitefish were reported to be congregating near spawning areas in Nisutlin River.

The reproductive biology of mountain whitefish was not studied during this investigation.

2.0 Introduction

Foothills Pipe Lines (Yukon) Ltd. retained Beak Consultants Limited (BEAK) to carry out a series of investigations to identify critical and major fish habitats in waters within the influence of the proposed Alaska Highway pipeline in Yukon Territory. Impacts on fish populations could result from pipeline construction. The purpose of the studies reported here was to document essential life history characteristics of important fish species, with emphasis on the reproductive process. All other data pertinent to fishery utilization, especially in regard to potential overwintering areas, were also recorded. These data augment that collected by BEAK in fall 1976, winter 1977, spring 1977 and summer 1977 studies and published by Foothills Pipe Lines (Yukon) Ltd. (1977 a,b,c,d).

This report is an interim presentation representing initial data analysis of the fall Alaska Highway investigation. A comprehensive presentation regarding the fishery resource in the proposed pipeline corridor will follow the completion of the 1977 program.

3.0 Terms of Reference

This fisheries program was designed to identify waterbodies which were used by fall spawning fish populations, and to identify migration times, routes and spawning areas, as they relate to the proposed pipeline corridor.

Chinook and chum salmon are considered to be the most economically important fish fauna in these drainages, and during this study emphasis was placed on the reproductive biology of these species. Ground crews examined many waterbodies in order to obtain accurate data on migration routes and times, and spawning sites utilized by chinook and chum salmon. Helicopter and fixed wing aerial surveys provided invaluable assistance during this aspect of the study. These data provide accurate information on chinook and chum salmon utilization of waterbodies within the influence of the proposed pipeline.

Fall spawning lake whitefish, round whitefish, lake trout and Dolly Varden populations were studied in representative waterbodies within the influence of the proposed pipeline. The data collected on these species will be extrapolated to watercourses not under surveillance during this program which contain populations of these fall spawning species.

4.0 Methods

This investigation was conducted from August 20 to November 10, 1977. The chinook salmon spawning run was studied by 3 two-man crews from August 20 to September 10, 1977. From September 10 to September 20, 1977, one biologist monitored the end of the chinook and the beginning of the chum salmon spawning run. One two-man crew documented the chum salmon run from September 20 to October 24, 1977. A further two-man crew was established on October 20 to monitor the end of the chum run. Information on all other fall spawning species was collected throughout this investigation. The field effort was completed on November 10, 1977.

Watercourses examined during this investigation were those which were utilized by fall spawning species, as determined from our previous investigations (Foothills Pipe Lines (Yukon) Ltd. 1977 a,b,c,d) and from the literature. Local residents also provided information on fall spawning fish populations in some areas. Chinook and chum salmon were studied in all areas within the influence of the proposed pipeline where documentation of utilization by these species was lacking.

Representative populations of lake whitefish, round whitefish, lake trout and Dolly Varden were examined in selected waterbodies. Results obtained during these studies will be applied to waterbodies which are inhabited by populations of these species but which were not studied during this investigation.

Observations were concentrated in the area of the proposed pipeline corridor. From one to thirty-three visits were made to the waterbodies under reconnaissance.

Sampling was designed to investigate the nature and extent of utilization by fall spawners. Stream substrates were sampled with a Surber sampler to establish the presence or absence of fish eggs. Fine-meshed fyke nets, termed fry traps in this report, were installed to sample moving waters for drifting eggs. These traps are described elsewhere. (Foothills Pipe Lines (Yukon) Ltd. 1977c).

The physical characteristics of the watercourse and the fish species being investigated dictated the methods employed to sample older age-classes of fish. Electrofishing was carried out with Smith-Root Type VII or Type VIII-A Electrofishers. In streams and rivers with velocities which were too great to wade in, only backwaters, pools and shorelines were sampled by this method. Electrofishing was occassionally carried out from a boat. Gillnets were generally set in the larger, deeper watercourses. If the waterbody was of suitable size, a gang of nets with 22.5-m (25-yd) sections each of 4-, 5-, 8-, 10- and 13-cm (1.5-, 2-, 3-, 4-, 5-in) stretched mesh were set for a

period of time as close to 24 hours as possible. On smaller watercourses, only sections of the gang were used. During the chinook and chum salmon investigations 17-cm (6.5-in) stretched mesh gillnets were also used. In streams and rivers where suitable substrate, water depth and water velocity existed, seining was carried out using 6-m (20-ft) or 13-m (40-ft) Common Sense 3-mm (1/8-in) bar minnow seines. Fine-mesh dipnets were used to collect fry in areas along shore. Angling was also used as a sampling technique. If the waterbody was sufficiently small and water visibility suitable to enable a visual reconnaissance, the watercourse was observed by walking the shoreline upstream and downstream of the proposed pipeline crossing. Sampling techniques, locations and durations were recorded for each watercourse and are presented in Appendix II of this report.

The sampling program was assisted by three aerial reconnaissance flights. Helicopter surveys were flown during the height of both the chinook and the chum salmon spawning periods to locate actual salmon spawning sites and to determine numbers of fish present. A fixed-wing survey was flown near the end of the chinook spawning run in an attempt to locate salmon carcasses.

Representative sub-samples of fish collected were weighted, measured and sexed. The reproductive condition of fish was recorded (i.e. immature, green, ripe, spent), stomach contents recorded or preserved and aging materials collected (scales, otoliths, fins). Whenever possible living fish were returned to the waterbody of origin. Species numbers and condition were recorded for specimens returned to the water. The generic names of fish referred to in this report are presented in Appendix I.

Temperatures were taken with hand-held mercury thermometers. In areas where spawning was recorded, the substrate was classified using terminology proposed by Hynes (1970) (Table 2).

The location of spawning areas was recorded on work maps. Spawning locations were identified through:

1) The presence of redds,
2) The presence of eggs in the substrate,
3) Direct observation of spawning behaviour,
4) The presence of territorial Dolly Varden or salmon, and
5) The presence of ripe, partially-spent and spent lake trout or whitefish.

TABLE 2

TERMINOLOGY FOR SUBSTRATE PARTICLE-SIZE ANALYSIS[1]

Name of Particle	Range of Size mm	in
Boulder	>256	>10.1
Cobble	64-256	2.5-10.1
Pebble	32-64	1.3-2.5
	16-32	0.6-1.3
Gravel	8-16	0.3-0.6
	4-8	0.2-0.3
	2-4	0.1-0.2
Very Coarse Sand	1-2	0.04-0.1
Coarse Sand	0.5-1	0.02-0.04
Medium Sand	0.25-0.5	0.01-0.02
Fine Sand	0.125-0.25	0.005-0.01
Very Fine Sand	0.0625-0.125	0.002-0.005
Silt	0.0039-0.0625	0.0002-0.002
Clay	<0.0039	<0.0002

[1] From Hynes (1970)

5.0 Results and Discussion

5.1 CHINOOK SALMON

Mature chinook salmon commence a migration from feeding areas in the Pacific Ocean to spawning areas in the Yukon River Drainage during late spring. Spawning occurs in many regions along the length of the Yukon River. In 1977, the first chinook was collected at Dawson on July 15, marking the beginning of the chinook spawning run in this area (Foothills Pipe Lines (Yukon) Ltd. 1977e). The first chinook passed through the fishway at the Whitehorse Rapids Dam on August 8, 1977. A total of 277 chinook passed through this fishway in 1977 (O. Sweitzer pers. comm.).

The identification of chinook spawning areas in the Upper Yukon Drainage has been the object of a variety of studies in the past (e.g. Department of Environment 1973; Brock 1976; Walker 1976). Chinook spawning areas which have been documented during these studies, as they relate to the proposed pipeline corridor, were examined for the presence of spawning chinook salmon. Those areas which were identified by BEAK as containing chinook salmon parr during the spring and summer surveys (Foothills Pipe Lines (Yukon) Ltd. 1977 c,d) were monitored for the presence of spawning adults. Other watercourses traversed by the proposed pipeline to which chinooks had access were also investigated.

5.1.1 White River (Mile 44.3)

The White River was investigated on August 24 and 29, 1977. No chinook salmon were observed or collected in the section of the river near the proposed crossing. During the helicopter survey of this watercourse, no chinooks were seen in the White River nor in any of the clear streams which enter the river upstream of the proposed crossing site. The lower reaches of the White River were used as a migration route by chinook salmon which utilized Kluane River. Utilization of the region of White River near the proposed corridor by chinook salmon was nil, although suitable substrate was present in that area. A high discharge rate and heavy silt load undoubtedly limited utilization of this region.

5.1.2 Koidern River (Miles 48.9 and 63.0)

The proposed pipeline crosses the Koidern River at two locations, and parallels the river for approximately 17.0 km. This watercourse was visited on August 24, 25, 26, 27, 29 and 30, 1977. No chinook salmon were collected or observed. No chinooks were seen during a helicopter reconnaissance of this river. At the time this survey was flown weather conditions were ideal and stream visibility was excellent. Many regions appeared to be suitable for salmon spawning although water levels were quite low in comparison with those regions in which spawning was observed.

No chinook salmon utilized the Koidern River during this investigation.

5.1.3 Donjek River (Mile 81.0)

No chinook salmon were observed in the Donjek River on August 24 or 30, 1977. This watercourse was very silty at the time of sampling and the potential utilization of this river by chinooks for spawning was judged to be poor. Chinook salmon utilized the lower reaches of Donjek River as a migration route to attain spawning areas in Kluane River.

5.1.4 Swede Johnson Creek (Mile 94.1)

Swede Johnson Creek was visually examined on August 23 and 24, 1977. No chinook salmon were observed during the ground and aerial surveys. The substrate of this creek was judged unsuitable for spawning as it consisted primarily of silt. Chinook salmon did not utilize Swede Johnson Creek during this study period.

5.1.5 Duke River (Mile 111.0)

An aerial reconnaissance of this river was conducted on August 24 and the river was visited on August 26 and 30, 1977. No chinook salmon were collected or observed. The Duke River was carrying a heavy silt load during this investigation and potential utilization of this watercourse by chinook salmon for spawning was judged unlikely.

5.1.6 Kluane River

The Kluane River was examined on August 24 and 28, 1977. Eight chinook salmon were seen in the river at the outlet of Kluane Lake during the helicopter reconnaissance. Numerous chinooks were seen in Tincup Creek, a tributary to Kluane River. Redds were also visible in this creek. Angling in Tincup Creek resulted in the capture of one chinook salmon parr.

Utilization of Kluane River by spawning chinook salmon did not appear to be extensive although locals reported that numerous fish spawned in this river in the past. Tincup Creek, a tributary to Kluane River was utilized by many chinooks for spawning. This creek is not within the influence of the proposed pipeline.

5.1.7 Kluane Lake

During this investigation it was observed that chinook salmon spawned only in rivers and streams. No chinook salmon were caught in Kluane Lake on August 22 or 26, 1977, and local residents reported that chinooks do no enter the lake. Chinook salmon spawned at the outlet of Kluane Lake but utilization of the lake proper has not been documented, nor is it anticipated.

5.1.8 Christmas Creek

The proposed pipeline crosses Boutellier Creek, a tributary to Christmas Creek at Pipeline Mile 158.8. Christmas Creek was investigated on August 21, 22 and 24, 1977. No chinook salmon were collected or observed in the creek or at the mouth of this watercourse in Kluane Lake. Beaver dams were present near the creek mouth and the substrate was judged unsuitable for spawning.

5.1.9 Takhini River (Mile 240.9)

The Takhini River was examined on August 22, 24 and 25, 1977. No chinook salmon were captured by gillnetting and only two salmon were observed during two helicopter surveys of this watercourse. On both aerial survey dates, conditions were ideal for a visual reconnaissance. Both fish were seen in an area upstream of the proposed crossing. Known chinook salmon spawning areas are located at the outlet of Kusawa Lake (Brown *et al.* 1976). These researchers also indicate that chinooks may spawn in the Takhini River downstream of the proposed crossing, near the confluence with the Yukon River. No such spawning area was observed.

The area near the proposed crossing was not used for spawning as the substrate consisted primarily of sand. Chinooks migrated past this site to spawning areas at the outlet of Kusawa Lake.

5.1.10 Ibex River (Miles 248.1, 254.6 and 257.2)

The Ibex River was investigated on August 21, 23, 24, 25 and September 5, 1977. No chinook salmon were collected but two were observed in Ibex River at the confluence of this watercourse with Arkell Creek. This site is immediately downstream of the first proposed crossing of Ibex River. The substrate in this area consisted of gravel to cobble-sized particles and appeared suitable for spawning. No chinooks were seen in Ibex River upstream of this region.

5.1.11 Wolf Creek (Mile 277.9)

Wolf Creek was examined on August 21, 23, 24, 26 and September 1, 1977. No adult chinook salmon were collected or observed. The substrate appeared to be suitable for spawning but logjams limited access to many regions of Wolf Creek. Brown *et al.* (1976) report that local residents conducted a domestic fishery for chinook salmon in Wolf Creek at the outlet of Coal Lake in recent times, but suggest that at present there is little or no spawning in this watercourse.

5.1.12 Cowley Creek (Mile 278.7)

Cowley Creek is a small tributary to Wolf Creek. This watercourse was visited on August 21, 24, 26 and September 1, 1977. No chinook salmon were seen or collected in this creek. Numerous beaver dams were present at the time of sampling and movement of chinook salmon would have been restricted. The substrate was judged unsuitable for spawning.

5.1.13 Yukon River (Mile 286.0)

In 1977, 277 chinook salmon passed through the fishway at the Whitehorse Rapids Dam (O. Sweitzer pers. comm.). The site of the proposed crossing on the Yukon River was not sampled. No chinook salmon were seen during an aerial reconnaissance of this area. Most fish move through this area and into

M'Clintock River. Others apparently move through Marsh Lake into the Tagish River system or spawn between the Yukon River outlet of Marsh Lake and Schwatka Lake (Brown *et al.* 1976; Walker 1976). Spawning populations of chinook salmon in these latter areas have not been documented. Fisheries and Marine Service, Whitehorse, reported that some chinook salmon may have spawned downstream of the Whitehorse Rapids Dam during 1977 (O. Sweitzer pers. comm.).

The region of the proposed crossing site on the Yukon river was used as a migration route. No spawning was observed in the Yukon River between Marsh and Schwatka Lakes during this survey.

5.1.14 Marsh Lake

Marsh Lake was not sampled during the height of the chinook salmon spawning run. Chinooks move through Marsh Lake into M'Clintock River and possibly into Tagish River (Brown *et al.* 1976; Walker 1976).

5.1.15 M'Clintock River (Mile 293.8)

Marsh Lake was sampled at the mouth of M'Clintock River on September 8, 1977, near the end of the chinook salmon spawning run. No chinook salmon were captured or observed. Chinooks move up the M'Clintock River and into Michie Creek for spawning (Brown *et al.* 1976; Walker 1976). No spawning has been reported in M'Clintock River, but its use as a migration route has been well documented. The silt substrate in the region of the proposed pipeline crossing precludes the use of this area for chinook spawning activity.

5.1.16 Teslin River (mile 339.0)

The Teslin River was investigated on August 23, 25, 27, September 4 and 7, 1977. Local residents reported that chinook salmon began moving into the region near the outlet of Teslin Lake about August 8, 1977. No sampling was done in this area but many chinooks which had been caught by domestic fishermen were examined. These fishermen reported that the 1977 chinook salmon spawning run was greater than in previous years and that approximately 600 salmon were harvested. An aerial survey of this region of the Teslin River revealed that numerous chinook salmon were present in this area. Major spawning grounds are present 1.6 km below Johnson's Crossing (Department of

Environment 1973), approximately 2.5 km downstream of the proposed crossing site. No chinook salmon were observed at the proposed crossing and the substrate in that region did not appear suitable for spawning. Chinooks migrated past this site into Teslin Lake, to reach spawning areas in the Upper Teslin Drainage.

5.1.17 Brooks Brook (Mile 343.9)

This stream was investigated on August 23, 27 and September 1, 1977. No chinook salmon were observed and no eggs were found in substrate samples. The substrate appeared suitable for spawning but the creek was much smaller than other watercourses in which spawning chinooks were observed.

5.1.18 Lone Tree Creek (Mile 356.0)

Lone Tree Creek was visited on August 24, 27 and September 2, 1977. No chinook salmon were observed. The substrate appeared suitable for spawning but numerous logjams downstream of the Alaska Highway would have restricted movement of fish into many of these areas. A rocky gorge 300 m upstream of the road was judged impassible to chinook salmon.

Lone Tree Creek was not utilized by chinook salmon during this investigation.

5.1.19 Ten Mile Creek (Mile 359.7)

This watercourse was investigated on August 23, 27 and September 1, 1977. No chinook salmon were observed, nor were any eggs collected in Surber samples. This creek was very shallow with a high discharge rate during this time period. Some areas of suitable spawning substrate were observed but were not utilized by chinooks during the study.

5.1.20 Fox Creek (Mile 365.2)

This creek was examined on August 24, 29 and September 2, 1977. No chinook salmon were observed. The substrate of this creek was silty in many regions and was judged unsuitable for spawning.

Fox Creek was not utilized by adult chinook salmon during this investigation.

5.1.21 Teslin Lake

Teslin Lake was investigated on September 5, 6 and 7, 1977. No chinook salmon were captured. Domestic fishermen reported catching chinooks near the village of Teslin in August. Chinooks migrate through the lake to spawning areas in Nisutlin River and its tributaries (Department of Environment 1973).

Teslin Lake was used as a migration route by chinook salmon.

5.1.22 Nisutlin Bay (Mile 369.0)

Chinook salmon move through Nisutlin Bay to spawning areas in Nisutlin River and some of its tributaries (Department of Environment 1973). This waterbody was sampled by gillnetting on August 25, 26, 27, 28, 29, 30, September 3 and 4, 1977. No chinook salmon were collected or observed. During the aerial reconnaissance one dead chinook was seen in the Nisutlin River approximately 9.0 km upstream of Nisutlin Bay. Known spawning areas are present farther upstream but these regions were not examined. No fish were seen in the lower reaches of the Wolf River.

Nisutlin Bay was used as a migration route by chinook salmon.

5.1.23 Hays Creek (Mile 380.3)

This stream was investigated on August 24, 29 and September 6, 1977. No chinook salmon were observed. The substrate consisted primarily of boulders and was judged unsuitable for spawning. This creek was shallower than those in which chinook spawning was observed.

Adult chinook salmon did not utilize Hays Creek during fall, 1977.

5.1.24 Strawberry Creek (Mile 383.3)

Strawberry Creek was visited on August 24, 29 and September 6, 1977. No chinook salmon were observed. A cobble and boulder substrate, logjams and a 40 to 50 cm drop at the Alaska Highway culvert would have restricted utilization of this watercourse.

5.1.25 Morley River (Mile 391.5)

The Morley River was examined on August 22, 23, 25, 28, 29, 30, 31, September 3 and 5, 1977. On the first date this watercourse was visited many chinook salmon were visible at the proposed crossing. Visits to this area on subsequent dates revealed that this region was used as a spawning area. Sixty-six live and six dead chinooks were seen during an aerial reconnaissance of the Morley River from the outlet of Morley Lake to Teslin Lake. Most of these fish were observed near the outlet of Morley Lake. Some chinook salmon apparently move past the proposed crossing site, as adult fish have been observed upstream at the outlet of Morris Lake (Department of Environment 1973).

The proposed pipeline crossing site on the Morley River was utilized as a spawning area and migration route by chinook salmon.

5.1.26 Smart River (Mile 407.0)

The Smart River was examined on August 25, 28, 31 and September 5, 1977. The substrate of this watercourse in the region of the proposed crossing consisted primarily of silt and was unsuitable for spawning. No chinook salmon were seen in the Smart River but three adults were observed near the confluence of the Smart and Swift Rivers.

Chinook salmon were not present in the Smart River during the fall, 1977 survey.

5.1.27 Logjam Creek (Mile 414.4)

This creek was visited on August 22, 28 and 31, 1977. No chinook salmon were observed. The substrate near the proposed crossing site consisted of cobbles and boulders and was unsuitable for spawning. A few areas with gravel substrate were observed downstream of the Alaska Highway but in all cases the water level in these areas was very low.

Logjam Creek was not utilized by adult chinook salmon during this investigation.

5.1.28 Swift River (Miles 430.7, 432.9 and 439.5)

This river was visited on August 22, 23, 25, 26, 28, 30, 31 and September 5, 1977. Areas exhibiting the best combinations of water depth, flow and gravel substrate were located between the outlet of Swan Lake and the confluence of the Smart and Swift Rivers. Chinook salmon have been observed spawning at the outlet of Swan Lake (Department of Environment 1973). Suitable spawning substrate was observed in many other areas but in most cases the water in these regions was very shallow. During the aerial reconnaissance of this river only three adult chinook salmon were seen. All were located near the confluence of the Swift and Smart Rivers. No chinooks were seen during three return visits to this area. On August 28, 1977, one chinook salmon was seen in the Swift River near the point where Logjam Creek joins this river. No salmon were observed on any other visit.

Chinook salmon did not utilize those regions of the Swift River near proposed crossing sites. Utilization of areas farther downstream for spawning appeared to be minimal.

5.2 CHUM SALMON

Chum salmon migrate from feeding areas in the Pacific Ocean to spawning areas in Yukon River Drainage in the fall of the year. In 1977 the first capture of a chum salmon ascending the Yukon River as far as Dawson occurred on August 4 (O. Sweitzer pers. comm.). This species was still moving through this area on October 25, 1977 (Foothills Pipe Lines (Yukon) Ltd. 1977e.).

Chum salmon migration routes and spawning grounds have been identified in several regions of Yukon River Drainage. Chums have been reported to ascend the Teslin River, and the Yukon River as far as Lake Laberge. Others move up the White and Donjek Rivers to spawning grounds in Kluane River and Kluane Lake (Sweitzer 1974, Brock 1976). Local residents reported observing a few chum salmon spawning in the Koidern River and also in the White River at the mouth of Miles Creek.

All known or reported chum salmon spawning areas within the influence of the proposed pipeline were examined during this investigation, as were many of the watercourses to which chum salmon had access.

5.2.1 White River (Mile 44.3)

The region of the White River near the proposed pipeline crossing was examined on eleven occassions from September 16 to November 5, 1977. No chum salmon were observed or collected in this locale. Local residents reported that chum salmon migrate past the proposed crossing site and spawn at the mouth of Miles Creek. Near the end of September the waters of the White River began to clear and areas which appeared suitable for spawning were observed. No chums were seen during a helicopter survey of the White River from two miles above Miles Creek to the mouth of the Koidern River. Changes in the water regime during winter months may preclude utilization of many regions of this river for spawning.

5.2.2 Koidern River (Miles 48.9 and 63.0)

This watercourse was investigated on twenty-seven occasions from September 16 to November 6, 1977. Three chum salmon were caught on October 3, 1977, in a gillnet set near the Alaska Highway bridge upstream of the first proposed crossing. One fish was released and the other two were analysed for size, sex and reproductive condition. Chums were next encountered in this river on October 19, 1977, in an area upstream of the second proposed crossing. On this date three chums and two redds were observed near km 1847 on the Alaska Highway. One dead chum was observed in this same area on October 22, and one live chum was seen here on October 25, 1977.

Very few chum salmon were collected or observed in the Koidern River during this investigation. Spawning did not occur near proposed crossing sites but the chums did migrate through these regions.

5.2.3 Edith Creek and Lake Creek (Miles 68.1 and 68.5)

Edith Creek and Lake Creek converge to form the Koidern River. These watercourses were investigated on September 18, 24, October 16, 27 and November 5, 1977. No chum salmon were observed. Chum salmon spawn in the Koidern River downstream of these creeks (Section 5.2.2). No chums utilized these headwater streams during this investigation, although suitable spawning substrate was visible in some regions of Lake Creek.

5.2.4 Donjek River (Mile 81.0)

This watercourse was examined on eleven occassions from September 15 to November 22, 1977. No chum salmon were collected or observed. The lower reaches of the Donjek River are utilized by chum salmon as a migration route but it appeared that all chums moved from the Donjek into the Kluane River.

The region of the Donjek River near the proposed pipeline crossing was not utilized by chum salmon during this investigation.

5.2.5 Swede Johnson Creek (Mile 94.1)

Swede Johnson Creek was visited on September 15, 18, October 1, 15 and 21, 1977. No chum salmon were observed in the creek proper but chum spawning areas were identified in Kluane River at the mouth of this creek (Section 5.2.8). Chum salmon did not move upstream into this creek but spawned in side channels near the mouth.

5.2.6 Burwash Creek (Mile 106.8)

Burwash Creek was examined on October 22, 1977. No fish were observed in the creek and it was noted that the mouth of this watercourse was frozen on this date. Two redds were located in Kluane River downstream of the mouth of Burwash Creek.

Burwash Creek was not utilized by chum salmon as a spawning area or migration route during fall, 1977.

5.2.7 Duke River (Mile 111.0)

This watercourse was examined on seven occassions from September 15 to October 22, 1977. No evidence of chum salmon utilization was found. Three chums were seen in Kluane River near the mouth of Duke River during the helicopter reconnaissance of this region (Section 5.2.8).

Chum salmon did not utilize the Duke River during this investigation.

5.2.8 Kluane River

Kluane River between the outlet of Kluane Lake and the mouth of Swede Johnson Creek was visited on seventeen occasions from September 15 to November 5, 1977. Chum salmon were first observed in Kluane River on September 27. On this date two chums were seen near the mouth of Quill Creek. Chums were first observed at the mouth of Swede Johnson Creek on October 1, but these fish must have arrived previous to this date as one fish was spent. Numbers of chum salmon increased rapidly in subsequent days. For example, on October 15, 521 live and 82 dead chum salmon were observed at the mouth of Swede Johnson Creek.

On October 22, during the aerial survey of Kluane River, 3,123 live and 432 dead chum salmon were observed in the region between the outlet of Kluane Lake and a point approximately 3.5 km downstream of the mouth of Swede Johnson Creek. On this date, conditions for a visual reconnaissance were excellent. This entire region was used for spawning as chums were visible in side channels and along the shores of the main river channel in most areas. Major concentrations of chums were seen at the outlets of Quill and Swede Johnson Creeks.

The Kluane River was an important spawning area for chum salmon. Other chums migrated through this area to spawning grounds in Kluane Lake.

5.2.9 Kluane Lake

Kluane Lake was investigated twenty-one times between September 23 and November 7, 1977. Residents of Burwash Landing reported catching chum salmon near the village on September 22. One chum was caught in a gillnet set in this area from September 26 to 27. Three more chums were collected in this region on September 28. Chum salmon were also caught or observed near the mouth of Slims River and in Christmas Bay.

Local residents reported that chum salmon spawn along the south-west shore of Kluane Lake from Destruction Bay to the lake outlet. Other reports indicated that chums have been caught near Slims River and along the north-east shore of the lake between Long Point and Cultus Creek.

Results indicated that chum salmon migrate through Kluane Lake. No spawning areas were located but ripe fish were collected near Burwash Landing and in the south-east corner of this lake near Slims River and Christmas Bay. Slims River and Boutellier Creek, a tributary to Christmas Creek, are crossed by the proposed pipeline.

5.2.10 Halfbreed Creek (Mile 119.1)

This watercourse was examined on October 18 and 31, 1977. No chum salmon were observed and it was noted that anchor ice was forming in many areas. The substrate in this creek was judged unsuitable for spawning.

Chum salmon did not move from Kluane Lake into this creek during fall, 1977.

5.2.11 Bocks Creek (Mile 128.3)

Bocks Creek was visited on October 17 and 31, 1977. No chum salmon were seen in the creek or in Kluane Lake at the mouth of this watercourse. On October 31 this creek was dry at the Alaska Highway and was beginning to freeze at the mouth.

Chum salmon did not utilize Bocks Creek during this investigation.

5.2.12 Silver Creek (Mile 154.8)

Silver Creek flows into the south-east corner of Kluane Lake between Slims River and Christmas Bay. Very little water was flowing in this creek on October 20 and the creek bed was dry near the Alaska Highway on October 31, 1977.

Chum salmon utilization of Silver Creek was nil.

5.2.13 Christmas Creek

Christmas Creek flows into the eastern end of Christmas Bay. Boutellier Creek, which is crossed by the proposed alignment at Pipeline Mile 158.8, converges with Christmas Creek. Christmas Creek was examined on October 10, 22, 27 and November 3, 1977. No chum salmon were observed in this creek but two chums were seen during the aerial reconnaissance of Christmas Bay. Both fish were located at the mouth of Christmas Creek.

5.2.14 Teslin River (Mile 339.0)

An aerial survey of the Teslin River from Roaring Bull Rapids to the confluence of the Teslin and Yukon Rivers was conducted on October 23, 1977. Suitable spawning habitat was seen in many areas but no chum salmon were observed. Spawning has been noted in this region in the past (Sweitzer 1974). The vicinity of the proposed pipeline crossing of the Teslin River was visited on October 24. No chum salmon were observed at this locale, or reported through interviews with the residents of the area.

5.3 DOLLY VARDEN

Little is known of the biology of Dolly Varden in Yukon Territory. In other parts of their range spawning occurs from September to November, primarily in streams (Scott and Crossman 1973). Spring and summer investigations revealed that the distribution of this species was widespread, but population densities were low (Foothills Pipe Lines (Yukon) Ltd. 1977 c,d). Bear Creek (Pipeline Mile 177.2) exhibited the heaviest utilization by this species. Bear Creek was chosen as a representative stream and the reproductive biology of Dolly Varden was studied in this watercourse. Results obtained in this study will be extrapolated to other watercourses containing populations of Dolly Varden.

5.3.1 Bear Creek (Mile 177.2)

Bear Creek was visited on August 21, September 7, 13, 14, 19 and 22, 1977. Water temperature ranged from 7.0 to 5.0°C during this period. The substrate of this creek consisted primarily of cobbles and boulders, but scattered areas of gravel were observed.

Ripe Dolly Varden were first collected in this watercourse on September 7. On subsequent visits redds were located and territorial Dolly Varden observed. Eggs were collected in Surber samples. Spawning activity appeared to be restricted to areas exhibiting gravel substrates.

During this investigation, Dolly Varden were studied in a region from the Alaska Highway crossing to a point approximately 6 km upstream. Spawning grounds were identified throughout this study area. Fish were not concentrated in any one region and at no time were more than three Dolly Varden observed near an area of gravel. Overall utilization of this region was low, as less than thirty individuals were observed on September 22. It is possible, however, that some Dolly Varden moved upstream or downstream to other spawning locations.

These results indicate that Dolly Varden spawning activity begins in mid-September when water temperatures fall to approximately 5.0°C. Spawning is restricted to regions exhibiting gravel substrates and spawning sites may be widespread in a watercourse.

5.4 LAKE TROUT

In Canada, lake trout spawn primarily in September or October, but throughout their range spawning may occur as early as July or as late as December. Lake trout usually spawn along rocky shores of lakes, but river spawning populations have been documented. The spawning period may be less than a week or longer than a month. Eggs develop over the winter and hatch the following spring (McPhail and Lindsey 1970, Scott and Crossman 1973, Machniak 1975).

During the summer survey lake trout were collected in Kluane Lake, Slims River, Takhini River, Louise Lake and Teslin Lake (Foothills Pipe Lines (Yukon) Ltd. 1977d). During this fall 1977 investigation, lake trout were caught in Kluane Lake, Louise Lake and Teslin Lake. Only one lake trout was collected in Louise Lake and data are insufficient for an accurate discussion of lake trout reproductive biology in this waterbody.

5.4.1 Kluane Lake

Numerous lake trout were caught by gillnetting in Kluane Lake between August 22 and November 7, 1977. Ripe specimens were collected in August, September and October. The first spent lake trout was captured on September 27, 1977. These results suggest that spawning occurred between mid-September and the end of October.

Gillnetting was conducted along the south shore of Kluane Lake between Burwash Landing and Christmas Bay. Nets were also set adjacent to an island near the mouth of Slims River. Lake trout were captured at all sampling locations, but spawning areas were not identified as such. Large numbers of this species were collected around the island situated near the mouth of Slims River and off the rocky point directly north of this island. Local residents reported that lake trout spawn in this region. Many lake trout were also collected near the mouth of Halfbreed Creek and along the south-east shore of the lake near Slims River. All lake trout collected in these two regions were either immature or spent and because lake trout generally disperse after spawning (Scott and Crossman 1973), these areas may not have been used as spawning areas.

Local residents also reported that lake trout spawn near the mouth of Congdon Creek, near Long Point and in an area between Long Point and Cultus Creek.

Kluane Lake is not crossed by the proposed pipeline but many streams which are tributary to this waterbody will be traversed. The results of this study indicate that lake trout may congregate near the mouths of these watercourses in the fall of the year.

5.4.2 Teslin Lake

Lake trout were captured in Teslin Lake on September 7 and 8, 1977. Of the nine specimens collected, one was immature and the other eight possessed well developed gonads. None of these fish was ripe. Analysis of the reproductive condition of the specimens collected suggested that spawning would begin near the end of September.

Conversations with local residents did not provide accurate information on the location of spawning grounds or the time of lake trout spawning. On September 3, one resident suggested that lake trout should be spawning at that time. Other residents however, stated that lake trout spawn in October in Teslin Lake. Entries in the Fisheries and Marine Service Lake and Stream Files read "Oct. 15, 1960 - Whitefish reported spawning in Teslin Lake, trout not spawning" and "Oct. 24, 1960 - Trout almost all spawned out". Lake trout spawning areas were reported to be situated at the outlet of Teslin Lake, and along the south-west shore of the lake, approximately 25 km south of the village of Teslin (D. Leskowski pers. comm.).

These data suggest that lake trout spawn from mid-September to the end of October in Teslin Lake. No spawning areas have been identified near the proposed crossing on Nisutlin Bay nor at the mouths of any of the streams tributary to Teslin Lake which are crossed by the proposed pipeline.

5.5 LAKE WHITEFISH

In northwest Canada and Alaska, lake whitefish spawning occurs in lakes or rivers from late summer to December (McPhail and Lindsey 1970). In the MacKenzie River, ripe and spent lake whitefish were caught in early October (Stein *et al.* 1973). Eggs develop over the winter and hatch the following spring (Scott and Crossman 1973).

Lake whitefish were collected or observed in eight waterbodies during this investigation. The status of the lake whitefish population in the White River cannot be accurately assessed as only one specimen was collected in this watercourse. Similarly, only one lake whitefish was observed in Kluane River. All other waterbodies examined during this study are listed below.

5.5.1 Koidern River (Miles 48.9 and 63.0)

The Koidern River was investigated on thirty-three occasions between August 24 and November 6, 1977. In late August it was noted that numerous lake whitefish were congregating in pools throughout this watercourse. Numerous fish were collected and analysed; all adults had well developed gonads. Near the end of September lake whitefish were observed in pools in the upper reaches of Koidern River. Most of these pools were approximately 1.0 m deep. Analysis of several specimens revealed that many lake whitefish were ripe at this time. One specimen, collected October 5, 1977, was spawned out. This fish had eggs (likely whitefish eggs) in its stomach. By the end of October almost all lake whitefish were spent. These data indicate that spawning occurred in October in Koidern River. Water temperatures in October ranged from 2.0 to 0.0°C.

During this investigation very few lake whitefish were collected near the first proposed crossing of the Koidern River and no spawning activity was evident in this region. Ripe, partially spent and spent lake whitefish were collected near the second proposed crossing and in regions upstream of this point. The results indicate that small numbers of lake whitefish spawn near the second crossing site and that numerous lake whitefish migrate through this region to spawning areas in the upper reaches of Koidern River.

5.5.2 Long's Creek and Wolf Creek (Mile 59.0)

Long's Creek flows into Wolf Creek near the proposed pipeline crossing. On August 25, 1977, numerous lake whitefish were visible in Wolf Creek below the Alaska Highway bridge, approximate 200 m downstream of the proposed crossing site. Eleven specimens were collected and analyzed; all were mature. Return visits to this watercourse in September revealed that the fish were still concentrated in pools below the Alaska Highway although a few were observed upstream near the crossing location. By the end of September these fish were in spawning condition. In early October, Wolf Creek began to freeze over and sampling proved difficult. It appeared that the lake whitefish which had been

present in pools below the road had moved out of the area. A local resident reported that the whitefish move upstream in one of these creeks to spawn near a lake (likely Wolf Lake).

No spawning was observed near the proposed crossing site and no eggs were collected in fry traps installed in that region. Lake whitefish appear to congregate in this area before moving to spawning sites in other regions of the drainage. These fish may have migrated upstream past the proposed crossing site on Wolf Creek.

The whitefish in this region were heavily exploited by domestic fishermen during the time when the fish were congregating in pools.

5.5.3 Kluane Lake

Lake whitefish were caught by gillnetting in Kluane Lake between August 22 and November 7, 1977. The first ripe lake whitefish was collected on October 10 and the first spawned out specimen was caught on October 30. These results suggest that lake whitefish spawning activity began in Kluane Lake in late October. Surface water temperatures during the spawning period were approximately 1.5°C.

Lake whitefish were collected at all sampling locations in Kluane Lake. Large numbers of this species appeared to be present at the mouth of Halfbreed Creek and in the south-east portion of the lake near the mouth of Slims River. Both regions were utilized for spawning, as ripe, partially spent and spent fish were collected in both areas. As well, some lake whitefish collected at the mouth of Halfbreed Creek had been eating what were judged to be whitefish eggs. The depth of the water in regions where spawning occurred was approximately 3.0 m. Local residents stated that lake whitefish move into areas near the mouth of Slims River for spawning.

Kluane Lake is not crossed by the proposed pipeline, but Halfbreed Creek and Slims River, two tributaries to this waterbody, will be traversed. Lake whitefish spawn near the mouths of both of these watercourses.

5.5.4 Marsh Lake

Marsh Lake was sampled by gillnetting on September 1 and 8, 1977. Nets were set at the mouths of M'Clintock River and Greyling Creek and around the island at the north-west end of Marsh Lake. A total of nineteen lake whitefish were collected. All specimens were mature.

No sampling was carried out on subsequent dates. Whitefish have been reported to spawn around the island and along the north shore of Marsh Lake in late November and early December (Fisheries and Marine Service Lake and Stream Files). These reports do not indicate which species of whitefish spawns in these areas.

Marsh Lake will not be crossed by the proposed pipeline but M'Clintock River, a stream which enters the north end of the lake, may be traversed. Lake whitefish spawning areas may be present near the mouth of this watercourse.

5.5.5 Teslin Lake

Gillnetting in Teslin Lake on September 5, 6 and 7, 1977, resulted in the capture of 47 lake whitefish. This sample included 24 immature and 23 mature specimens. No ripe fish were collected during this survey and no spawning areas were located. Conversations with local residents did not provide any information on lake whitefish spawning areas and times in this region.

Many streams tributary to Teslin Lake will be crossed by the proposed pipeline. It is not known if spawning occurs in Teslin Lake near the mouths of these watercourses.

5.5.6 Nisutlin Bay (Mile 369.0)

Nisutlin Bay was sampled by gillnetting on eight occasions between August 25 and September 4, 1977. There were 74 lake whitefish captured. Two specimens were mature, while all others were immature. It did not appear that the region of Nisutlin Bay near the proposed crossing was utilized for spawning by lake whitefish. In other regions mature lake whitefish were beginning to congregate near spawning areas at this time of year.

5.6 ROUND WHITEFISH

Throughout their range, round whitefish spawn in lakes or rivers in the autumn. Eggs develop during winter months and hatch the following spring (McPhail and Lindsey 1970; Scott and Crossman 1973).

During this investigation round whitefish were collected or observed in ten waterbodies. Very few specimens were collected in Wolf Creek (Pipeline Mile 59.0), Donjek River, Kluane River, Louise Lake, Teslin Lake and Smart River; the round whitefish populations in these waterbodies will not be discussed in this report.

5.6.1 White River (Mile 44.3)

A total of five round whitefish were captured in White River, during thirteen visits to the proposed pipeline crossing site between August 24 and November 5, 1977. On September 25, 1977, two mature adults were collected in this area. A third mature individual was taken on October 3. One immature and one spawned out round whitefish were caught near the crossing site on October 18. The immature fish had eggs in its stomach.

The presence of mature and spent fish suggests that spawning occurred in the area of the proposed crossing. The presence of eggs in the stomach of one fish supports this supposition, although the fish eggs could not be positively identified as round whitefish eggs. It must be noted that very few round whitefish were collected in this region.

The region of the White River near the proposed pipeline crossing may have been utilized as a spawning area by round whitefish. Utilization of this region by this species was minimal.

5.6.2 Koidern River (Miles 48.9 and 63.0)

Koidern River was visited on thirty-three occasions between August 24 and November 6, 1977. The first ripe round whitefish collected in this watercourse was caught on October 3 and the first spawned out fish on October 25.

During this investigation very few round whitefish were collected near the first proposed crossing of Koidern River and no spawning activity was evident in this region. Ripe, partially spent and spent individuals were caught in pools near the second proposed crossing and in areas upstream of this site. These data indicate that spawning occurred in October at the second proposed crossing site and in the upper reaches of Koidern River. Water temperatures during the spawning period ranged from 2.0 to 0.0°C.

The proposed pipeline crosses Koidern River at two locations. The lower crossing (Pipeline Mile 48.9) was not utilized by round whitefish as a spawning area. Round whitefish spawned at the second proposed crossing (Pipeline Mile 63.0) and migrated through this region to spawning sites farther upstream.

5.6.3 Kluane Lake

Round whitefish were collected in Kluane Lake between September 26 and November 8, 1977. The first ripe round whitefish was caught on October 18. All specimens collected prior to this date were classified as being either mature or immature. One spent round whitefish was caught on November 8. Near the end of October surface water temperatures were approximately 1.5°C.

During this investigation round whitefish appeared to be widespread in Kluane Lake. No major concentrations of this species were detected. Mature and ripe individuals were collected near the mouth of Halfbreed Creek and along the south-east shore of the lake near Slims River. The only spent fish was collected near Slims River. Spawning may have occurred in these areas.

Halfbreed Creek and Slims River are traversed by the proposed pipeline. Round whitefish may have spawned in Kluane Lake at the mouths of these watercourses.

5.6.4 Marsh Lake

Marsh Lake was sampled by gillnetting on September 1 and 8, 1977. Three round whitefish were caught in Marsh Lake at the mouth of M'Clintock River. None of these fish was classified as ripe.

Whitefish have been reported to spawn around the island and along the shore on the north end of Marsh Lake (Fisheries and Marine Service Lake and Stream Files). It is not known whether these reports refer to lake, round or broad whitefish.

Marsh Lake is not crossed by the proposed pipeline. Round whitefish spawning areas may be located at the mouth of M'Clintock River, a tributary to Marsh Lake which will be traversed.

5.7 BROAD WHITEFISH

The biology of the broad whitefish is not well known. Spawning has been reported to occur in July and August but mature fish have been caught in the Yukon River as late as October 4 (McPhail and Lindsey 1970). During this investigation, broad whitefish were collected in only two locations, Teslin Lake and Nisutlin Bay.

5.7.1 Teslin Lake

Gillnetting in Teslin Lake resulted in the capture of five broad whitefish. These specimens were collected on September 7 and 8, 1977. All five fish possessed well developed gonads but none was ripe.

It has been reported that broad whitefish move from Teslin Lake into Nisutlin River for spawning (Fisheries and Marine Service Lake and Stream Files). On September 6, one resident stated that these fish were beginning to congregate in pools and backwaters in Nisutlin River. Reports suggest that these fish move back into Teslin Lake after spawning. This spawning run is exploited by domestic fishermen.

5.7.2 Nisutlin Bay

Between August 28 and September 5, 1977, 43 broad whitefish were captured by gillnetting in Nisutlin Bay. Forty of these fish were immature and three possessed well developed gonads. None of the sexually mature fish was classified as ripe.

Nisutlin Bay has not been reported to be utilized for spawning by broad whitefish but this waterbody is a migration route for fish which move to spawning areas in Nisutlin River.

5.8 MOUNTAIN WHITEFISH

Mountain whitefish spawn from September to January, depending on the physical characteristics of the watercourse. Spawning takes place primarily in streams but lake edges are also used by this species. Eggs develop over the winter and hatch in spring (McPhail and Lindsey 1970, Thompson 1974).

In Yukon Territory, mountain whitefish were collected in the Liard River Drainage. Watercourses within the influence of the proposed pipeline were found to contain populations of mountain whitefish fry (Foothills Pipe Lines (Yukon) Ltd. 1977d). Spawning is suspected in these watercourses.

The mountain whitefish was not classified as an economically important species although they may be taken by domestic fishermen in Upper Liard. Anglers apparently take small numbers of this species each year.

5.9 OVERWINTERING AREAS

Potential overwintering areas were identified in many waterbodies within the influence of the proposed pipeline. Locations judged as exhibiting overwintering potential were those which appeared to have groundwater sources, or those which appeared to be deep enough to support fish populations during winter months. A list of those waterbodies which exhibited overwintering potential is presented in Table 3. During this investigation, observations were concentrated in areas near proposed waterbody crossings. Site specific information will be incorporated into the final report.

TABLE 3

LIST OF WATERBODIES EXHIBITING OVERWINTERING POTENTIAL

Waterbody	Location
White River	Pipeline Mile 44.3
Koidern River	Pipeline Miles 48.9 and 63.0
Wolf Creek	Pipeline Mile 59.0
Lake Creek	Pipeline Mile 68.5
Donjek River	Pipeline Mile 81.0
Swede Johnson Creek *	Pipeline Mile 94.1
Duke River	Pipeline Mile 111.0
Kluane River	
Kluane Lake	
Takhini River	Pipeline Mile 240.9
Yukon River	Pipeline Mile 286.0
Marsh Lake	
M'Clintock River	Pipeline Mile 293.8
Teslin River	Pipeline Mile 339.0
Teslin Lake	
Nisutlin Bay	Pipeline Mile 369.0
Morley River	Pipeline Mile 391.5
Smart River	Pipeline Mile 407.0
Swift River	Pipeline Miles 430.7, 432.9 and 439.5

* Overwintering is suspected in a small lake adjoining Swede Johnson Creek.

6.0 Conclusions

The reproductive biology of fall spawning fish species was studied in selected watercourses within the influence of the proposed Alaska Highway pipeline.

Adult chinook salmon were first collected at Dawson on July 15, 1977, marking the beginning of the chinook spawning run in this area (Foothills Pipe Lines (Yukon) Ltd. 1977e). Chinooks began arriving in spawning areas in southern Yukon Territory near the middle of August.

Adult chinook salmon utilized many watercourses as migration routes. The White, Donjek and Kluane Rivers were utilized by those chinooks which spawned near Kluane Lake. Only the lower reaches of the White and Donjek Rivers were used and no chinooks were detected near the proposed pipeline crossings on these watercourses. Kluane River is not traversed by the proposed pipeline but this river receives drainage from streams which are crossed.

Chinook salmon migrated past the proposed pipeline crossing on Takhini River to spawning areas at the outlet of Kusawa Lake. Ibex River, a tributary to Takhini River, was utilized by very few chinooks. No chinooks were seen upstream of the first proposed crossing of the Ibex River (Pipeline Mile 248.1).

In 1977, 277 chinook salmon ascended the fish ladder at the Whitehorse Rapids Dam on the Yukon River. Published reports indicate that a majority of the fish which ascend the ladder migrate up the Yukon River, through Marsh Lake and into M'Clintock River (Brown *et al.* 1976; Walker 1976).

Teslin River was utilized as a migration route by chinook salmon. Chinooks migrated past the proposed crossing site on this river during their migrations to spawning areas in streams tributary to Teslin Lake. Nisutlin Bay was a migration route for chinook salmon which spawned in Nisutlin River and its tributaries. Other adult chinooks also ascended the Morley and Swift Rivers. In Morley River chinooks migrated past the proposed crossing site but in Swift River no chinooks were observed near any of the proposed crossings.

During these migrations chinook salmon ascended some watercourses which were heavily laden with silt. This is especially true of those chinooks which spawned in the Kluane Lake area. Spawning areas, however, were typically situated in streams with relatively silt-free water.

Spawning areas were identified in Kluane River at the outlet of Kluane Lake and in Takhini River at the outlet of Kusawa Lake. Chinooks spawned in Ibex River, a tributary to Takhini River, near the first proposed crossing of this watercourse.

Many of the chinook salmon which ascend the Yukon River past Whitehorse spawn in Michie Creek, a tributary to M'Clintock River (Brown *et al.* 1976, Walker 1976).

Major chinook salmon spawning grounds were identified below the proposed pipeline crossing on Teslin River. The population of chinooks which spawned in this area was heavily exploited by domestic fishermen.

Spawning areas were identified in watercourses tributary to Teslin Lake. Chinook salmon ascended Morley River to spawning sites at the outlet of Morley Lake. The proposed pipeline crosses Morley River in this area. It appeared that very few chinooks utilized Swift River. All were observed below the outlet of Swan Lake, well downstream of any of the proposed crossings of this river.

Chinook salmon spawning activity peaked near the end of August in 1977.

Many of the watercourses utilized by chinook salmon parr during spring and summer months (Foothills Pipe Lines (Yukon) Ltd. 1977 c,d) were not utilized by adults of this species for spawning. These streams include Wolf Creek (Pipeline Mile 277.9), Cowley Creek, Brooks Brook, Lone Tree Creek, Ten Mile Creek, Fox Creek, Hays Creek, Strawberry Creek and Logjam Creek.

Chum salmon were first detected near spawning sites in southern Yukon Territory on September 27, 1977.

Chum salmon utilized the White, Koidern, Donjek and Kluane Rivers, and Kluane Lake during their migrations to spawning sites. Very few chum salmon migrated upstream in the White River to the Koidern River. In the Koidern River, chum salmon migrated past both proposed pipeline crossings of this watercourse, to spawning areas in the upper reaches of this stream. No chums were collected or observed near the proposed crossing of the White River.

Chum salmon also migrated through the lower reaches of the White and Donjek Rivers and the entire lengths of Kluane River and Kluane Lake. No chums were detected near the proposed crossing of Donjek River. Kluane River and Kluane Lake are not crossed by the proposed pipeline but these waterbodies receive drainage from streams which are traversed.

No chum salmon were observed in Teslin River. This watercourse has been reported to be a migration route and spawning area for this species (Sweitzer 1974).

The White and Donjek Rivers were carrying heavy silt loads at the time of the chum salmon migrations. Spawning sites were situated in relatively clear streams although redds were often dug in gravel substrates overlaid by silt.

Spawning areas were identified in Koidern River upstream of the second proposed crossing of this watercourse. Kluane River was utilized by large numbers of chum salmon for spawning. This river is not crossed by the proposed pipeline but many streams tributary to Kluane River are traversed. Many chums were concentrated in areas at the mouths of Quill and Swede Johnson Creeks. No chum salmon spawning areas were identified in Kluane Lake but ripe fish were collected near Burwash Landing and near the mouths of Slims River and Christmas Creek.

No chum salmon were observed in Teslin River near the proposed pipeline crossing site.

Chum salmon spawning activity appeared to peak about October 22, 1977, in southern Yukon Territory.

The reproductive biology of Dolly Varden, lake trout, lake whitefish and round whitefish was studied in selected waterbodies within the influence of the proposed pipeline.

Previous studies have shown that Dolly Varden utilize many watercourses within the influence of the proposed pipeline (Foothills Pipe Lines (Yukon) Ltd. 1977 c,d). Dolly Varden spawning activity was studied in Bear Creek. Spawning was observed to commence near the beginning of September. Substrates suitable for spawning were few but widespread in this creek. No more than three fish were ever visible near any one of these suitable areas. Overall utilization of the study area was low, suggesting that many Dolly Varden moved upstream or downstream to other spawning locations.

Lake trout were distributed throughout Kluane Lake and Teslin Lake. In Kluane Lake spawning appeared to have occurred from mid-September to late October. Local residents reported that lake trout utilize many regions of Kluane Lake for spawning. No spawning areas were identified during this investigation but many lake trout were collected around the island near the mouth of Slims River and off the rock point directly north of this island. Local residents reported that lake trout spawn in this region.

No spawning areas were identified in Teslin Lake. Spawning reportedly occurs in many regions of the lake.

Only one lake trout was caught in Louise Lake during this investigation.

The reproductive biology of lake and round whitefish was studied in stream and lake habitats.

In Koidern River, lake whitefish began congregating in pools in late August. Most fish were located near the second proposed crossing of this watercourse (Pipeline Mile 63.0) and in areas upstream of this point. Spawning occurred in these regions in October when water temperatures were approximately 0.0 to 2.0°C.

Long's Creek flows into Wolf Creek (Pipeline Mile 59.0) near the proposed pipeline crossing. In late August, lake whitefish began congregating in pools below this site but no spawning activity was evident on subsequent visits to this area. A local resident reported that the whitefish move upstream in one of these creeks to spawn near a lake (likely Wolf Lake).

In Kluane Lake the first ripe lake whitefish was collected on October 10. The first spawned out fish was captured on October 30. These results suggest that spawning occurred later in Kluane Lake than in Koidern River. Surface water temperatures in Kluane Lake at the time of lake whitefish spawning were approximately 1.5°C. Lake whitefish were widespread in Kluane Lake, but spawning areas were identified near the mouths of Halfbreed Creek and Slims River.

Lake whitefish were collected in White River, Kluane River, Marsh Lake, Teslin Lake and Nisutlin Bay but no accurate data on spawning times and locations in these waterbodies were obtained.

Round whitefish were collected in many waterbodies during this investigation. Few specimens were collected in White River but the presence of mature and spent fish in the area of the proposed pipeline crossing suggests that spawning may have occurred in that region.

In Koidern River, spawning occurred primarily in October at water temperatures of approximately 0.0 to 2.0°C. Spawning areas were identified near the second proposed crossing of this watercourse (Pipeline Mile 63.0) and in areas upstream of this site.

Round whitefish appeared to be widespread in Kluane Lake but no major concentrations of this species were identified. Spawning may have occurred near the mouths of Halfbreed Creek and Slims River as mature and ripe individuals were collected in these regions. Spawning appeared to have occurred later in Kluane Lake than in Koidern River as the first ripe round whitefish was collected in the lake on October 18. Surface water temperatures were approximately 1.5°C at the time of spawning.

No accurate data on spawning times and locations for round whitefish populations in Wolf Creek (Pipeline Mile 59.0), Donjek River, Kluane River, Louise Lake, Marsh Lake, Teslin Lake and Smart River were obtained during this investigation.

Broad whitefish were collected in Teslin Lake and Nisutlin Bay. None of the fish collected during this investigation was ripe and no spawning areas were identified. A local resident reported that broad whitefish were beginning to congregate near spawning areas in Nisutlin River on September 6.

The reproductive biology of mountain whitefish was not studied during this program.

7.0 Acknowledgements

The assistance and cooperation of the staff of Fisheries and Marine Service, Whitehorse is gratefully acknowledged.

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Common and Scientific Names of Fish Species Noted in this Report

Chinook salmon	*Oncorhynchus tshawytscha*
Chum salmon	*Oncorhynchus keta*
Dolly Varden	*Salvelinus malma*
Lake trout	*Salvelinus namaycush*
Lake whitefish	*Coregonus clupeaformis*
Round whitefish	*Prosopium cylindraceum*
Broad whitefish	*Coregonus nasus*
Mountain whitefish	*Prosopium williamsoni*
Least cisco	*Coregonus sardinella*
Inconnu	*Stenodus leucichthys*
Arctic grayling	*Thymallus arcticus*
Northern pike	*Esox lucius*
Burbot	*Lota lota*
Longnose sucker	*Catostomus catostomus*
Lake chub	*Couesius plumbeus*
Slimy sculpin	*Cottus cognatus*

DATA SHEET - FALL 1977

WATERBODY: White River

LOCATION: Mile 44.3

INVESTIGATION DATE(S): August 24, 29, September 16, 17, 25, 29, October 3, 7, 15, 18, 22, 24, November 5

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 6.0° C

FISH FAUNA: Round whitefish
Lake whitefish
Arctic grayling
Burbot
Longnose sucker

FISHERY UTILIZATION

Migration Route: Chum salmon

Spawning Area: Possibly round whitefish

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: 3,487* seconds 18.5 man hours

Angling: man hours

Seining: 13 seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Local residents report chum salmon spawning upstream of the proposed crossing at the mouth of Miles Creek. This spawning run has not been documented.

* Number of seconds estimated on two occasions.

DATA SHEET - FALL 1977

WATERBODY: Koidern River

LOCATION: Mile 48.9

INVESTIGATION DATE(S): August 24, 29, 30, September 16, 17, 19, 24, 25, 26, 28, 29, 30, October 1, 2, 3, 7, 17, 22, 24, 25, 26, November 5, 6

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 8.5° C

FISH FAUNA:

Chum salmon	Northern pike
Lake whitefish	Burbot
Round whitefish	Slimy sculpin
Arctic grayling	

FISHERY UTILIZATION

Migration Route: Chum salmon

Spawning Area:

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: 1,778 * seconds 12.5 man hours

Angling: + man hours

Seining: seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
8	9.0	0.08
6	22.5	42.5
9	22.5	112.5
9	6.0	23.5

Other: Visual reconnaissance

OBSERVATIONS: Chum salmon migrated through this area to spawning grounds in the upper reaches of this river.

* Number of seconds estimated on two occasions.
\+ Catch of sport fishermen analyzed.

DATA SHEET - FALL 1977

WATERBODY: Long's Creek and Wolf Creek

LOCATION: Mile 59.0

INVESTIGATION DATE(S): August 25, September 15, 16, 17, 24, 28, 30, October 2, 4, 7, 15, 16, 17, 22

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 8.0° C

FISH FAUNA: Lake whitefish
Arctic grayling
Round whitefish
Longnose sucker

FISHERY UTILIZATION

Migration Route: Lake whitefish

Spawning Area:

Other: Probable overwintering area - Wolf Creek

FISHERY SAMPLING EFFORT

Electrofishing: 40 * seconds 1.0 man hours

Angling: 0.25 man hours

Seining: seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
8	22.5	+

Other: Visual reconnaissance
Fry traps

OBSERVATIONS: Lake whitefish congregated in the lower reaches of Wolf Creek before moving to spawning areas.

* Estimated
\+ Net drifted - 2 minutes

DATA SHEET - FALL 1977

WATERBODY: Koidern River

LOCATION: Mile 63.0

INVESTIGATION DATE(S): August 25, 26, 29, September 24, 26, 30, October 4, 7, 15, 16, 17, 18, 22, 24, 25, 26, 27, November 6

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 9.5° C

FISH FAUNA: Lake whitefish
Round whitefish
Arctic grayling
Northern pike

FISHERY UTILIZATION

Migration Route: Chum salmon, lake whitefish and round whitefish

Spawning Area: Lake whitefish and round whitefish

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: 2,292 * seconds 18.0 man hours

Angling: 2.0 man hours

Seining: 3 seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
8	22.5	+
4	22.5	0.5
9	9.0	59.0

Other: Visual reconnaissance
Fry traps

OBSERVATIONS: Chum salmon, lake whitefish and round whitefish migrated through this area to spawning sites in upper Koidern River. Lake and round whitefish spawned at this site.

* Number of seconds estimated on two occasions.

+ Net drifted - 5 minutes

DATA SHEET - FALL 1977

WATERBODY: Koidern River

LOCATION: From confluence of Edith and Lake Creeks to the highway bridge at Km 1853

INVESTIGATION DATE(S): August 24, 25, 26, 27, September 24, 26, 30, October 4, 9, 16, 19, 22, 25, 26, November 5

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 10.0° C

FISH FAUNA:

Chum salmon	Longnose sucker
Lake whitefish	Slimy sculpin
Round whitefish	
Arctic grayling	

FISHERY UTILIZATION

Migration Route:

Spawning Area: Chum salmon, lake whitefish and round whitefish.

Other:

FISHERY SAMPLING EFFORT

Electrofishing: 2,740 seconds 4.5 man hours

Angling: 2.25 man hours

Seining: 1 seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
8	22.5	24.0

Other: Visual reconnaissance

OBSERVATIONS: This region was heavily utilized by fall spawning fish species.

DATA SHEET - FALL 1977

WATERBODY: Edith Creek

LOCATION: Mile 68.1

INVESTIGATION DATE(S): September 18, 24, October 16, 27, November 5

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 9.0° C

FISH FAUNA:

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Utilization of this watercourse by fall spawning species was nil.

DATA SHEET - FALL 1977

WATERBODY: Lake Creek

LOCATION: Mile 68.5

INVESTIGATION DATE(S): September 18, 24, October 16, 27, November 5

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 10.0° C

FISH FAUNA:

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Fall spawning species did not utilize this watercourse.

DATA SHEET - FALL 1977

WATERBODY: Donjek River

LOCATION: Mile 81.0

INVESTIGATION DATE(S): August 24, 30, September 15, 18, 24, 28, 29, October 1, 2, 5, 9, 15, 22

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 5.0° C (September 15 - October 15)

FISH FAUNA: Arctic grayling
Round whitefish
Lake chub
Slimy sculpin

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: 1,967 * seconds 13.5 man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
6	13.5	48.0
17	22.5	16.5

Other: Visual reconnaissance

OBSERVATIONS: Chinook and chum salmon utilized the lower reaches of Donjek River as a migration route. No salmon utilized the region of Donjek River near the proposed pipeline.

* Number of seconds estimated on two occasions.

DATA SHEET - FALL 1977

WATERBODY: Swede Johnson Creek

LOCATION: Mile 94.1

INVESTIGATION DATE(S): August 23, 24, September 15, 18, October 1, 15, 21

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 9.0° C

FISH FAUNA: Arctic grayling

FISHERY UTILIZATION

Migration Route:

Spawning Area: Chum salmon, at mouth

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Major chum salmon spawning areas were identified at the mouth of this watercourse in Kluane River. Probable overwintering in a small adjoining lake.

DATA SHEET - FALL 1977

WATERBODY: Burwash Creek

LOCATION: Mile 106.8

INVESTIGATION DATE(S): October 22

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0° C

FISH FAUNA:

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Utilization by fall spawning species was nil.

DATA SHEET - FALL 1977

WATERBODY: Duke River

LOCATION: Mile 111.0

INVESTIGATION DATE(S): August 24, 26, 30, September 15, 27, October 1, 5, 8, 13, 22

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 1.0° C (September 27 - October 22)

FISH FAUNA: Arctic grayling

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: 5 seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
4	22.5	24.0

Other: Visual reconnaissance

OBSERVATIONS: Duke River was not utilized by fall spawning species during this investigation.

DATA SHEET - FALL 1977

WATERBODY: Kluane River

LOCATION:

INVESTIGATION DATE(S): August 24, 28, September 15, 23, 27, October 1, 5, 8, 13, 14, 15, 17, 18, 19, 21, 22, 28, 29, November 5

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 11.0° C

FISH FAUNA:

Chinook salmon	Lake whitefish
Chum salmon	Northern pike
Arctic grayling	Longnose sucker
Round whitefish	Slimy sculpin

FISHERY UTILIZATION

Migration Route: Chinook salmon and chum salmon

Spawning Area: Chinook salmon and chum salmon

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: 1,117 seconds 5.0 man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Numerous chum salmon spawned in Kluane River. Chinook salmon spawning in Kluane River near the outlet of Kluane Lake was minimal.

DATA SHEET - FALL 1977

WATERBODY: Kluane Lake

LOCATION:

INVESTIGATION DATE(S): August 22, 26, September 23, 26, 27, October 6, 7, 8, 9, 10, 12, 18, 19, 20, 22, 23, 28, 29, 30, November 2, 3, 4, 7

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 7.0° C (September 23 - November 7)

FISH FAUNA:

Chum salmon	Arctic grayling
Lake trout	Longnose sucker
Lake whitefish	Slimy sculpin
Round whitefish	

FISHERY UTILIZATION

Migration Route: Chum salmon

Spawning Area: Chum salmon, lake whitefish, round whitefish and lake trout

Other: Overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: 3 seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
17	45.0	22.5
8	45.0	22.5
4,5,8,10,13	112.5	38.0
4,5,8,10	90.0	182.25
6,11	31.5	22.0
14	22.5	21.5
6,11,14	54.0	21.5
6,8,11,14	76.5	134.0

Other: Visual reconnaissance

OBSERVATIONS: Fall spawning species utilize many areas of Kluane Lake for spawning.

DATA SHEET - FALL 1977

WATERBODY: Halfbreek Creek

LOCATION: Mile 119.1

INVESTIGATION DATE(S): October 18, 31

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0° C

FISH FAUNA:

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: During the sampling period, anchor ice was forming in many regions of this creek. Fishery potential was judged to be nil.

DATA SHEET - FALL 1977

WATERBODY: Bocks Creek

LOCATION: Mile 128.3

INVESTIGATION DATE(S): October 17, 31

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 2.0° C

FISH FAUNA:

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: This watercourse was not utilized by fall spawning species during this investigation.

DATA SHEET - FALL 1977

WATERBODY: Silver Creek

LOCATION: Mile 154.8

INVESTIGATION DATE(S): October 20, 31

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0° C

FISH FAUNA:

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Utilization by fall spawning species was nil.

DATA SHEET - FALL 1977

WATERBODY: Christmas Creek

LOCATION:

INVESTIGATION DATE(S): August 21, 22, 24, October 10, 22, 27, November 3

PHYSICAL CHARACTERISTICS

Water Temperature: 0.0 - 1.0° C (October 10 - November 3)

FISH FAUNA: Arctic grayling
Lake trout
Slimy sculpin

FISHERY UTILIZATION

Migration Route:

Spawning Area: Chum salmon, at mouth

Other:

FISHERY SAMPLING EFFORT

Electrofishing: 360 seconds 2.5 man hours

Angling: 0.75 man hours

Seining: 2 seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: No chum salmon utilized Christmas Creek but two adults were observed in Kluane Lake near the mouth of this watercourse. Lake trout fry were collected in Christmas Bay.

DATA SHEET - FALL 1977

WATERBODY: Boutellier Creek

LOCATION: Mile 158.8

INVESTIGATION DATE(S): August 22

PHYSICAL CHARACTERISTICS

Water Temperature:

FISH FAUNA: Arctic grayling
Slimy sculpin

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: 192 seconds 1.5 man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Boutellier Creek joins Christmas Creek below the proposed pipeline crossing. Beaver dams on Christmas Creek likely restrict upstream movement of fish.

DATA SHEET - FALL 1977

WATERBODY: Bear Creek

LOCATION: Mile 177.2

INVESTIGATION DATE(S): August 21, September 7, 13, 14, 19, 22

PHYSICAL CHARACTERISTICS

Water Temperature: 5.0 - 7.0° C

FISH FAUNA: Dolly Varden
Arctic grayling
Slimy sculpin

FISHERY UTILIZATION

Migration Route: Dolly Varden

Spawning Area: Dolly Varden

Other:

FISHERY SAMPLING EFFORT

Electrofishing: 1,143 seconds 8.0 man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance
Surber sampler

OBSERVATIONS: Many Dolly Varden appeared to have migrated out of the study area. This migration was not documented.

DATA SHEET - FALL 1977

WATERBODY: Takhini River

LOCATION: Mile 240.9

INVESTIGATION DATE(S): August 22, 24, 25

PHYSICAL CHARACTERISTICS

Water Temperature:

FISH FAUNA: Chinook salmon

FISHERY UTILIZATION

Migration Route: Chinook salmon

Spawning Area:

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
17	45.0	21.25

Other: Visual reconnaissance

OBSERVATIONS: Chinook salmon spawn in areas upstream of the proposed crossing, at the outlet of Kusawa Lake.

DATA SHEET - FALL 1977

WATERBODY: Ibex River

LOCATION: Mile 248.1

INVESTIGATION DATE(S): August 23, 24, 25, September 5

PHYSICAL CHARACTERISTICS

Water Temperature:

FISH FAUNA: Chinook salmon
Arctic grayling
Slimy sculpin

FISHERY UTILIZATION

Migration Route:

Spawning Area: Chinook salmon

Other:

FISHERY SAMPLING EFFORT

Electrofishing:		seconds	man hours
Angling:	3.0	man hours	
Seining:	12	seine haul(s)	

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Chinook salmon spawn in this stream.

DATA SHEET - FALL 1977

WATERBODY: Ibex River

LOCATION: Mile 254.6

INVESTIGATION DATE(S): August 21, 24, 25

PHYSICAL CHARACTERISTICS

Water Temperature:

FISH FAUNA: Arctic grayling
Slimy sculpin

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: 168 seconds 1.5 man hours

Angling: 1.5 man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Chinook salmon did not migrate this far upstream in Ibex River.

DATA SHEET - FALL 1977

WATERBODY: Ibex River

LOCATION: Mile 257.2

INVESTIGATION DATE(S): August 21, 24, 25

PHYSICAL CHARACTERISTICS

Water Temperature: 11.0° C (August 21)

FISH FAUNA: Slimy sculpin

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: 271 seconds 2.0 man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: This region of Ibex River was not utilized by chinook salmon for spawning.

DATA SHEET - FALL 1977

WATERBODY: Fish Creek (water control channel)

LOCATION: Mile 264.8

INVESTIGATION DATE(S): August 28, September 7

PHYSICAL CHARACTERISTICS

Water Temperature:

FISH FAUNA: Arctic grayling
Round whitefish
Lake trout

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: 2.0 man hours

Seining: seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
4,5,8,10,13	112.5	17.0

Other: Visual reconnaissance

OBSERVATIONS: All specimens were collected in Louise Lake at the mouth of this water control channel.

DATA SHEET - FALL 1977

WATERBODY: Wolf Creek

LOCATION: Mile 277.9

INVESTIGATION DATE(S): August 21, 23, 24, 26, September 1

PHYSICAL CHARACTERISTICS

Water Temperature: 9.0 - 12.0° C

FISH FAUNA: Chinook salmon
Arctic grayling
Slimy sculpin

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: 467 seconds 2.0 man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: No adult chinook salmon were collected or observed in this watercourse. Chinooks are reported to have spawned in this creek in the past.

DATA SHEET - FALL 1977

WATERBODY: Cowley Creek

LOCATION: Mile 278.7

INVESTIGATION DATE(S): August 21, 24, 26, September 1

PHYSICAL CHARACTERISTICS

Water Temperature: 13.5 - 15.5° C

FISH FAUNA: Slimy sculpin

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: 209 seconds 2.0 man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Cowley Creek was not utilized by chinook salmon during this investigation.

DATA SHEET - FALL 1977

WATERBODY: Yukon River

LOCATION: Mile 286.0

INVESTIGATION DATE(S): August 25

PHYSICAL CHARACTERISTICS

Water Temperature:

FISH FAUNA:

FISHERY UTILIZATION

Migration Route: Chinook salmon

Spawning Area:

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Chinook salmon are known to migrate through this region to spawning areas in Michie Creek. In 1977, 277 chinooks ascended the fish ladder at the Whitehorse Rapids Dam.

DATA SHEET - FALL 1977

WATERSBODY: Marsh Lake

LOCATION:

INVESTIGATION DATE(S): September 1, 8

PHYSICAL CHARACTERISTICS

Water Temperature:

FISH FAUNA: Lake whitefish
Northern pike
Longnose sucker

FISHERY UTILIZATION

Migration Route: Chinook salmon

Spawning Area: Whitefish

Other: Overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
4	31.5	25.0
13	22.5	24.5
13	45.0	24.0
5, 8	90.0	25.5

Other:

OBSERVATIONS: Chinook salmon are known to migrate through Marsh Lake to spawning areas in Michie Creek. Whitefish have been reported to spawn at the north end of Marsh Lake.

DATA SHEET - FALL 1977

WATERBODY: M'Clintock River

LOCATION: Mile 293.8

INVESTIGATION DATE(S): September 8

PHYSICAL CHARACTERISTICS

Water Temperature:

FISH FAUNA: Least cisco
Lake whitefish
Round whitefish
Northern pike
Longnose sucker

FISHERY UTILIZATION

Migration Route: Chinook salmon

Spawning Area:

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
4,5,8,10,13	112.5	25.0

Other:

OBSERVATIONS: Chinook salmon are known to migrate up M'Clintock River to spawning areas in Michie Creek. All fish were collected in Marsh Lake at the mouth of M'Clintock River.

DATA SHEET - FALL 1977

WATERBODY: Teslin River

LOCATION: Mile 339.0

INVESTIGATION DATE(S): August 23, 25, 27, September 4, 7, October 23, 24

PHYSICAL CHARACTERISTICS

Water Temperature: 16.5° C (August 27)

FISH FAUNA: Chinook salmon

FISHERY UTILIZATION

Migration Route: Chinook salmon

Spawning Area: Chinook salmon and chum salmon, downstream

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Major chinook salmon spawning grounds are situated below the proposed crossing. Chum salmon have also been reported to spawn in Teslin River in regions downstream of the proposed crossing.

DATA SHEET - FALL 1977

WATERBODY: Brooks Brook

LOCATION: Mile 343.9

INVESTIGATION DATE(S): August 23, 27, September 1

PHYSICAL CHARACTERISTICS

Water Temperature: 4.0° C (September 1)

FISH FAUNA: Arctic grayling

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance
Surber sampler

OBSERVATIONS: No chinook salmon were observed in Brooks Brook.

DATA SHEET - FALL 1977

WATERBODY: Lone Tree Creek

LOCATION: Mile 356.0

INVESTIGATION DATE(S): August 24, 27, September 2

PHYSICAL CHARACTERISTICS

Water Temperature: 5.0 - 7.0° C

FISH FAUNA:

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Lone Tree Creek was not utilized by chinook salmon in fall, 1977.

DATA SHEET - FALL 1977

WATERBODY: Ten Mile Creek

LOCATION: Mile 359.7

INVESTIGATION DATE(S): August 23, 27, September 1

PHYSICAL CHARACTERISTICS

Water Temperature: 4.5 - 5.0° C

FISH FAUNA: Arctic grayling
Slimy sculpin

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance
Surber sampler

OBSERVATIONS: Ten Mile Creek was not utilized by chinook salmon during fall, 1977.

DATA SHEET - FALL 1977

WATERBODY: Fox Creek

LOCATION: Mile 365.2

INVESTIGATION DATE(S): August 24, 29, September 2

PHYSICAL CHARACTERISTICS

Water Temperature: 5.0 - 5.5° C

FISH FAUNA: Arctic grayling

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: No chinook salmon were collected or observed in Fox Creek.

DATA SHEET - FALL 1977

WATERBODY: Teslin Lake

LOCATION:

INVESTIGATION DATE(S): September 5, 6, 7

PHYSICAL CHARACTERISTICS

Water Temperature:

FISH FAUNA: Lake whitefish
Broad whitefish
Round whitefish
Least cisco
Lake trout
Longnose sucker

FISHERY UTILIZATION

Migration Route: Chinook salmon and broad whitefish

Spawning Area: Lake trout

Other: Overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
4,8,10	67.5	47.5
9,11,14	54.0	71.0
8,10	45.0	24.0

Other: Visual reconnaissance.

OBSERVATIONS: Chinook salmon are known to migrate through Teslin Lake to spawning areas in tributary streams. Broad whitefish migrate to spawning areas in Nisutlin River. Local residents reported that lake trout spawn at the outlet and along the south-west shore.

DATA SHEET - FALL 1977

WATERBODY: Nisutlin Bay

LOCATION: Mile 369.0

INVESTIGATION DATE(S): August 25, 26, 27, 28, 29, 30, September 3, 4

PHYSICAL CHARACTERISTICS

Water Temperature: 14.5° C (August 29)

FISH FAUNA:

Lake whitefish	Northern pike
Broad whitefish	Burbot
Least cisco	Longnose sucker
Inconnu	

FISHERY UTILIZATION

Migration Route: Chinook salmon and broad whitefish

Spawning Area:

Other: Overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting:

Mesh Size (cm)	Length (m)	Effort (hours)
17	22.5	120.5
4,9,11,14	76.5	74.0
9,11,14	54.0	71.0
4,8,10	67.5	48.0

Other: Visual reconnaissance

OBSERVATIONS: Chinook salmon are known to migrate through Nisutlin Bay to spawning grounds in Nisutlin River and its tributaries. Broad whitefish migrate through this region to spawning areas in Nisutlin River.

DATA SHEET - FALL 1977

WATERBODY: Hays Creek

LOCATION: Mile 380.3

INVESTIGATION DATE(S): August 24, 29, September 6

PHYSICAL CHARACTERISTICS

Water Temperature: 5.0 - 7.0° C

FISH FAUNA:

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: No chinook salmon were collected or observed in Hays Creek.

DATA SHEET - FALL 1977

WATERBODY: Strawberry Creek

LOCATION: Mile 383.3

INVESTIGATION DATE(S): August 24, 29, September 6

PHYSICAL CHARACTERISTICS

Water Temperature: 5.5 - 7.0° C

FISH FAUNA:

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Strawberry Creek was not utilized by adult chinook salmon.

DATA SHEET - FALL 1977

WATERBODY: Morley River

LOCATION: Mile 391.5

INVESTIGATION DATE(S): August 22, 23, 25, 28, 29, 30, 31, September 3, 5

PHYSICAL CHARACTERISTICS

Water Temperature: 12.0 - 15.0° C

FISH FAUNA: Chinook salmon
Arctic grayling
Slimy sculpin

FISHERY UTILIZATION

Migration Route: Chinook salmon

Spawning Area: Chinook salmon

Other: Probable overwintering area

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: 1.0 man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance
Dipnetting

OBSERVATIONS: Chinook salmon spawned throughout the Morley River. Large numbers of chinooks spawned at the outlet of Morley Lake.

DATA SHEET - FALL 1977

WATERBODY: Smart River

LOCATION: Mile 407.0

INVESTIGATION DATE(S): August 25, 28, 31, September 5

PHYSICAL CHARACTERISTICS

Water Temperature: 8.0 - 10.0° C

FISH FAUNA: Arctic grayling
Round whitefish

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: 0.75 man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Chinook salmon were observed in Swift River at the mouth of Smart River.

DATA SHEET - FALL 1977

WATERBODY: Swift River

LOCATION: Mouth of Smart River

INVESTIGATION DATE(S): August 23, 25, 28, 31

PHYSICAL CHARACTERISTICS

Water Temperature: 12.0° C (August 31)

FISH FAUNA: Chinook salmon
Slimy sculpin

FISHERY UTILIZATION

Migration Route: Chinook salmon

Spawning Area: Chinook salmon

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance
Dipnetting

OBSERVATIONS: Chinook salmon have been reported to spawn in Swift River between the outlet of Swan Lake and the mouth of Smart River.

DATA SHEET - FALL 1977

WATERBODY: Logjam Creek

LOCATION: Mile 414.4

INVESTIGATION DATE(S): August 23, 28, 31

PHYSICAL CHARACTERISTICS

Water Temperature: 6.0 - 7.5° C

FISH FAUNA: Arctic grayling

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: No chinook salmon were collected or observed in Logjam Creek.

DATA SHEET - FALL 1977

WATERBODY: Swift River

LOCATION: Mouth of Logjam Creek

INVESTIGATION DATE(S): August 23, 28

PHYSICAL CHARACTERISTICS

Water Temperature:

FISH FAUNA: Chinook salmon

FISHERY UTILIZATION

Migration Route: Chinook salmon

Spawning Area: Chinook salmon

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: The mouth of Logjam Creek is situated near the center of known chinook salmon spawning areas in Swift River.

DATA SHEET - FALL 1977

WATERBODY: Swift River

LOCATION: Outlet of Swan Lake

INVESTIGATION DATE(S): August 22, 23, 31

PHYSICAL CHARACTERISTICS

Water Temperature: 12.0° C (August 31)

FISH FAUNA: Arctic grayling

FISHERY UTILIZATION

Migration Route:

Spawning Area: Chinook salmon

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Chinook salmon have been reported to spawn in Swift River between the outlet of Swan Lake and the mouth of Smart River. No chinook salmon have ever been observed upstream of Swan Lake.

DATA SHEET - FALL 1977

WATERBODY: Swift River

LOCATION: Mile 430.7

INVESTIGATION DATE(S): August 23, 26, 30, September 5

PHYSICAL CHARACTERISTICS

Water Temperature: 6.0 - 8.0° C

FISH FAUNA:

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: Chinook salmon did not migrate this far upstream in Swift River.

DATA SHEET - FALL 1977

WATERBODY: Swift River

LOCATION: Mile 432.9

INVESTIGATION DATE(S): August 23, 26, 30

PHYSICAL CHARACTERISTICS

Water Temperature: 7.5° C (August 30)

FISH FAUNA: Arctic grayling

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing:		seconds	man hours
Angling:	1.0	man hours	
Seining:		seine haul(s)	

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: This region of Swift River was not utilized by chinook salmon.

DATA SHEET - FALL 1977

WATERBODY: Swift River

LOCATION: Mile 439.5

INVESTIGATION DATE(S): August 23, 26, 30, September 5

PHYSICAL CHARACTERISTICS

Water Temperature: 6.0 - 6.5° C

FISH FAUNA: Arctic grayling

FISHERY UTILIZATION

Migration Route:

Spawning Area:

Other:

FISHERY SAMPLING EFFORT

Electrofishing: seconds man hours

Angling: man hours

Seining: seine haul(s)

Gillnetting: Mesh Size (cm) Length (m) Effort (hours)

Other: Visual reconnaissance

OBSERVATIONS: No chinook salmon were collected or observed in this region of Swift River.
