Reconnaissance (1:20,000) Fish and Fish Habitat Inventory of Peter-Aleck Creek upstream of Owen Lake

Watershed Code: unknown (drainage pattern differs from watershed atlas)

Prepared for

Houston Forest Products Co.
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_____

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March 31, 2002

PROJECT SUMMARY SHEET

PROJECT REFERENCE INFORMATION

MSR Project #:	HFP-SKR-001-2002
FRBC MYA #	CON 0001398
FRBC Activity #:	721096
FDIS Project #:	948
MSR Region:	Prince Rupert Region (06)
MSR District:	not applicable
FW Management Unit:	06-09
Fisheries Planning Unit:	not applicable
DFO Subdistrict:	Prince George (1)
Forest Region:	Prince Rupert
Forest District:	Morice Forest District
Forest Licensee & Tenure #:	Houston Forest Products, FLA – 16827
First Nations Claim Area:	Wet'suwet'en Nation, Carrier Sekani

WATERSHED INFORMATION

Watershed Group	MORR
Watershed Name	Morice River
Watershed Code	Unknown (portion of Peter-Aleck that drains into Owen Lake)
UTM at Mouth	9.649223.599231
Watershed Area	79.38 km^2 (study areas only)
Total of all stream lengths	118.28 km
Stream Order	4
NTS Maps (1:50,000)	93L/02 (study areas only)
TRIM Maps	093L.006, 093L.005 (study area only)
BEC Zone	SBSmc, SBSdk, ESSFmc
Air Photos	30BCC 96111 No. 88-89, 92-101 (study area only) 30BCC 96156 No. 46-47 (study area only) 30BCC 96138 No. 175-180 (study areas only)

SAMPLING DESIGN

Total # of Reaches	146 (in study area)
Random Sampling Sites	14 (14 proposed)
Discretionary Sample Sites	13 (13 proposed)
Added Value Sites	1 (1 discretionary)
Total Sample Sites	28 (27 proposed)
Field Sampling Dates	August 10^{th} – 22^{nd}, 2001
Fish Species in Watershed	RB, DV

CONTRACTOR INFORMATION

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DISCLAIMER

This product has been accepted as being in accordance with the approved standards within the limits of the Ministry quality assurance procedures. Users are cautioned that interpreted information on this product developed for the purposes of the Forest Practices Code Act and Regulations, for example stream classifications, is subject to review by a statutory decision maker for the purposes of determining whether or not to approve an operational plan.

ACKNOWLEDGEMENTS

Funding for this project was provided by Forest Renewal B.C. and Houston Forest Products Co. (HFP), Houston, B.C. The contract was administered and monitored by Karen Balkwill for HFP. Melissa Todd and Karen Balkwill (HFP) were invaluable in their support throughout this project. Helicopter services were provided by Highland Helicopters, and the help and effort of Pat Rooney, Ryan Buchanan, and Tanya Booth are greatly appreciated. Editorial comments on drafts of this report were provided by Karen Balkwill and Melissa Todd (HFP), Ron Saimoto (SKR Consultants Ltd.), Chris Schell (QA/QC Monitor), and Matthew Jessop (Ministry of Sustainable Resources). Matthew Jessop (Ministry of Sustainable Resources) reviewed the non-fish bearing table for this project.

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1.0 INTRODUCTION

The upper portion of the Peter-Aleck Creek watershed, upstream of Owen Lake, was inventoried in August 2001 to assess fish habitat characteristics and to investigate the diversity, population characteristics, and distribution of fish in the study area. The lower portion of Peter-Aleck Creek (WSC 180-374000-95200-99500-2270) drains into the Nadina River. The creek has been mis-mapped upstream of Park Lake, since the upper portion of Peter-Aleck Creek does not drain into the Nadina River system (Nechako River system), but drains to the north into the southern end of Owen Lake (Morice River Drainage, Bulkley River system). The portion of the Peter-Aleck Creek that connects to the Morice River system via Owen Lake was inventoried in 2001. SKR Consultants Ltd. was retained by Houston Forest Products Co. (Houston, B.C.) to conduct these surveys. The project was jointly funded by Forest Renewal B.C. (FRBC) and Houston Forest Products Co. (HFP). This report summarizes the results of the reconnaissance level stream inventory project that was conducted in the Peter-Aleck watershed.

1.1 OBJECTIVES

The main objectives of the 1:20,000 fish and fish habitat reconnaissance level stream inventory project in the Peter-Aleck watershed were:

- to review and summarize historical fisheries information for the study area,
- to describe fish distribution and diversity by conducting a 1:20,000 fish inventory,
- to document barriers to fish passage,
- to document fish habitat characteristics,
- to conduct secondary lake inventories at lakes where fish presence is unknown,
- to identify further sampling requirements, and
- to classify reaches sampled according to the B.C. Forest Practices Code Fish – Stream Identification guidebook (FPC 1998).

1.2 LOCATION

Peter-Aleck Creek is located in the Morice Forest District within the Prince Rupert Region (Ministry of Forests, Ministry of Sustainable Resources). The upper portion of Peter-Aleck Creek drains into the Morice River via Owen Lake and Owen Creek, and is not connected to the lower reaches of Peter-Aleck Creek (WSC 180-374000-95200-99500-2270), which drain into the Nadina River (Nechako River watershed). The portion of Peter-Aleck Creek that drains into the southern tip of Owen Lake was inventoried in August 2001.

Figure 1. Overview map of the Peter-Aleck Creek watershed located in central British Columbia.

1.2.1 Access

The study area was accessed by vehicle, boat and helicopter. To access the area by vehicle, proceed west from the Houston town center along Highway 16 for approximately 5 km. Turn left onto the Morice River Forest Service Road (FSR). At 27 km the Morice River FSR veers to the right, and the Morice – Owen FSR continues straight. Take the Morice – Owen FSR past Owen Lake and the Owen Lake Resort. Turn left at 48 km onto the Morice – Tahtsa Road, and continue for 5.1 km. Turn right onto the road that is located along the north shore of Duck Lake. This road and associated spur roads can be used to access the study area.

1.3 HISTORICAL INFORMATION

The portion of Peter-Aleck Creek sampled in August 2001 drains into Owen Lake, rather than connecting to lower reaches of Peter-Aleck Creek. However, due to the mis-mapped drainage pattern, Peter-Aleck Creek was not included in previous inventories conducted in the Owen Creek watershed (Bustard 1999). Fish documented present in the Owen watershed include rainbow trout and steelhead (*Oncorhynchus mykiss*), coho (*O. kisutch*), cutthroat trout (*O. clarki*), Dolly Varden (*Salvelinus malma*), mountain whitefish (*Prosopium williamsoni*), burbot (*Lota lota*), pygmy whitefish (*Prosopium coulteri*), redside shiner (*Richardsonius balteatus*), largescale sucker (*Catostomus macrocheilus*), longnose sucker (*Catostomus catostomus*), northern pike minnow (*Ptychocheilus oregonensis*), longnose dace (*Rhinichthys cataractae*) and peamouth chub (*Mylocheilus caurinus*) (FISS, Bustard 1999, SKR 1998, 1999, 2001a). Operational inventory in Peter-Aleck Creek has resulted in the capture of Dolly Varden and rainbow trout in the mainstem of Peter-Aleck Creek, and some of its tributaries (SKR 1998, 1999).

2.0 RESOURCE USE

The Peter-Aleck Creek watershed consists of public and private land, and as such is utilized by several resource sectors.

1. First Nations issues and interests in the study area:
   - The Wet'suwet'en Nation has claimed a portion of the Nadina watershed as part of their traditional territories. The Wet'suwet'en Nation is in Stage 4 of the treaty process (B.C. Treaty Commission 2000).
2. Development and land use: forestry, mining, recreation:
   - The study area falls into forest license FLA-16827 (HFP) and harvesting and road building is in varying stages of planning and or development. Harvesting and road development in the area is proposed to 2005 (HFP 2000).
   - Owen Hill, an old fire lookout which provides extensive view of the Owen area and Peter-Aleck Creek system, is located to the north of the study area. The Nadina Mountain Trail runs approximately 2.5 to 3 km north of the proposed extension of the Peter Main Access road (MoF 1997).
   - A mineral tenure exists within the Peter-Aleck Creek watershed (adjacent to the east side of CP 364-2), and the Peter Main access road is planned to pass through this tenure (Ministry of Employment and Investment, 2000)
   - The guide outfitter territories in the study area are 609G004 and 609G006 and the trapline territories are 604T046. The Poplar Lake Range unit also exist within the study area (HFP 2000).
3. Impacts and uses by wildlife:
   - A comprehensive inventory of wildlife species does not exist for the Morice Forest District. However, several rare and endangered wildlife species are known or suspected to utilize habitat in the upper Peter Aleck Creek and Owen watersheds, including Grizzly bear (*Ursus arctos*), wolverine (*Gulu gulu luscus*), and fisher (*Martes pennanti*) (Horn and Tamblyn 2000). Other wildlife species of interest include moose and deer.
4. Other developments, concerns or points of interest:
   - No Protected Areas Strategy (PAS) study sites are known to exist within the portion of the Peter – Aleck Creek watershed that drains into Owen Lake.
   - No water licences exist in the Peter-Aleck Creek watershed, and no community watersheds are located in the study area (Ministry of Sustainable Resources 2001).
5. Existing water quality data:
   - No existing water quality data was available at the time of survey.
6. Previous presence of fish in systems of interest:
   - Fish presence previously documented in the study area is summarized in Table 1. The section of Peter-Aleck Creek included in Table 1 is the section draining into Owen Lake, contrary to the drainage pattern indicated for this section of stream on the 1:50,000 NTS map. This section therefore forms a part of the Owen Creek watershed.

Table 1. Summary of fish species in the Owen Creek Watershed.

Fish Species	**Location**	**Reference**
Coho (*O. kisutch*)	Owen watershed	FISS, Bustard 1999
Steelhead (*O. mykiss*)	Owen watershed	FISS, Bustard 1999
Rainbow trout (*O. mykiss)*	Owen watershed, Peter-Aleck Creek	FISS, Bustard 1999 SKR 1998, 1999
Dolly Varden (*S. malma*)	Owen watershed Peter-Aleck Creek	FISS, Bustard 1999 SKR 1998, 1999
Cutthroat trout (*O. clarki*)	Owen watershed	FISS
Mountain whitefish (*Prosopium williamsoni)*	Owen watershed	FISS, Bustard 1999
Pygmy whitefish (*Prosopium coulteri*)	Owen watershed	FISS
Burbot (*Lota lota*)	Owen watershed	FISS
longnose suckers (*Catostomus catostomus)*	Owen watershed	FISS
Largescale suckers (*C. macrocheilus*)	Owen watershed	FISS
Peamouth chub (*Couesius plumbeus*)	Owen watershed	FISS
Redside shiners (*Richardsonius balteatus*)	Owen watershed	FISS, Bustard 1999
Northern pike minnow (*Ptychocheilus oregonensis*)	Owen watershed	FISS
Longnose dace (*Rhinichthys cataractae*)	Owen watershed	FISS, Bustard 1999

3.0 METHODS

This project closely followed all applicable RIC standards (2001) and the Forest Practice Code fish-stream identification guidebook (1998). Details on methodologies and value added attributes of sampling site selection, field assessments, and digital mapping are provided in the following sub-sections.

3.1 SAMPLE SITE SELECTION

Sample sites were selected by conducting reach break analysis and random sampling queries using the Fish Data Information System (FDIS) ACCESS 97 data tool for the Peter-Aleck Creek watershed. All streams on the 1:20,000 TRIM map scale were identified numerically by assigning an Interim Location Point (ILP) or watershed code, following 1:20,000 fish and fish habitat inventory standards (RIC 2001). Streams were divided into reaches based on map and air photo interpretation. Necessary reach information was entered in the FDIS database, following Resource Inventory Committee standards (RIC 2001). Version 7.6 of the FDIS ACCESS 97 data tool was used to randomly select sampling sites to determine the general distribution and total number of sites required in the study area. Some sites were deleted or moved based on previous fish sampling in the watershed and site accessibility. Random and biased sampling sites were mapped on 1:20,000 scale, along with existing fisheries information for presentation to the contract monitor and the ministry representative. The sampling plan was summarized in a project plan (SKR 2001b) for ministry and contract monitor approval.

3.2 STREAM ASSESSMENT

All stream assessments were conducted in August and September 2001. Stream sites were accessed by two-wheel drive vehicle, four-wheel drive vehicle, on foot and helicopter. Stream sections of interest were assessed to determine fish distribution and habitat values. Fish Data Information System (FDIS) site cards and fish collection cards were completed at sample sites, following Resource Inventory Committee Standards (RIC 2001), and data were entered into the FDIS database using the FDIS data entry tool.

All fish that were captured during this study were identified to species in the field or small sub-samples were preserved for confirmation using a dissecting microscope. Identification keys in McPhail and Carveth (1994) and Scott and Crossman (1973) were consulted for species identification. Fork lengths were recorded for fish captured, and fish were released. Voucher specimens were preserved in 10% formalin for a minimum of fourteen days, and then transferred to isopropyl alcohol. Voucher specimens were submitted to the Ministry of Sustainable Resources (MSR) for verification. Scale samples were collected from a sub-sample of salmonids for age determination. Scales were read by Doug MacKay and Ron Saimoto (SKR Consultants Ltd.).

A list of sampling equipment used during this 1:20,000 reconnaissance level fish and fish habitat inventory project is presented in Table 2.

Table 2. List of sampling equipment for stream reaches used during the 1:20,000 reconnaissance fish and fish habitat inventory project in the Peter-Aleck Creek watershed, August 2001.

Parameter	Sampling Intensity	Method
date and time	each site	wrist watch
water temperature	each site	alcohol thermometer
PH	each site	Oaktron pHTestr2
Conductivity	each site	Hanna HI 9033, Oaktron TDSTestr 3
water clarity	each site	Visual
fish presence	as required to determine fish presence	Smith Root Model 15C, Smith Root Model 12B, GEE minnow traps,
Photography	each site	Canon Sureshot A1, Minolta Weathermatic Dual 35
GPS	where available	Garmen GPS 45
Gradient	each site	Abney Level or Suunto clinometer

3.3 MAPPING

Mapping during phases I, II and III of the project were completed by SKR Consultants Ltd. using the Fish Inventory Mapping System (Geosense Consulting Ltd. 2000). Data presented on the maps included sub-basin boundaries, sample site locations, significant features, and historical information within the study area. In addition, SKR identified reaches with known fish presence, suspected fish presence, suspected fish absence, and known fish absence for presentation of fish distribution on the interpretive maps. The criteria used by SKR for determining fish presence and absence are presented in Table 3.

Table 3. Criteria used to evaluate fish distribution for colour coded presentation on the Fisheries Project/Interpretive Hardcopy Maps (Appendix 5) of this study area.

Fish Present _____	• Stream reaches where fish have been captured or can be classified as fish bearing based on fish captured upstream. NOTE: fish distribution may not always extend to the upper limit of all reaches symbolized as fish bearing
Fish Suspected Present ----------	• Stream reaches with gradients less than 21% and with any potential for fish presence, excluding first order streams less than 1 km in length on 1:20000 TRIM map
Fish Suspected Absent ----------	• First order streams less than 1 km in total length on 1:20000 TRIM map • Streams visited with limited potential for fish presence, but no definable barriers to fish passage following RIC standards, thus still requiring resampling
Fish Absent _____	• Reaches with no fish captured in two seasons upstream of natural obstructions to fish migration • Reaches upstream of identified natural barriers to fish migration following intensive sampling in one season • 1st and small 2nd order streams flowing into non fish bearing reaches • Reaches with gradients exceeding 20% (Note: the location of lower reach break is not defined until field sampling is conducted)

4.0 RESULTS AND DISCUSSION

Twenty-eight stream reaches (sample sites) of the 146 stream reaches identified in portion of Peter-Aleck Creek that drains into Owen Lake were sampled in August 2001. This includes 14 reaches randomly selected by FDIS and 14 discretionary reaches (including 1 value added reach) added to complement fish distribution information obtained in previous studies (FISS, SKR 1998, 1999). The following sections discuss findings from this field inventory project in context with historical information available for the Peter-Aleck Creek watershed, and as outlined in the "Buba Creek Example Report" (MSR 2001).

4.1 LOGISTICS

Access to the majority of reaches sampled within the Peter-Aleck sub-basin helicopter was by (42.9%) and foot (35.7% were more than 200 m distance from a road). Road access was available for only six sites (21.4%), two of which were four wheel truck access only. Helicopter landing sites were abundant in valley flat areas and wetlands along the mainstem, but some sections of the drainage were difficult to access even by helicopter due to steep gradients and lack of available landing sites. A bear encounter during stream inventory in the Nadina watershed (SKR 2002) resulted in the loss of all but three of the scale samples collected for Dolly Varden captured in the Peter-Aleck watershed.

Conductivity encountered in one of the reaches sampled (3.6%) was below 30 μS/cm, and electrofishing efficiency may have been reduced at this site as a consequence. However, five Dolly Varden were captured at this site, indicating that sampling efficiency was adequate despite the low conductivity. Overall, water levels and weather conditions were conducive to sampling by electrofishing, although two of the reaches surveyed (7.1%) were dry at the time of sampling.

4.2 SUMMARY OF BIOPHYSICAL INFORMATION

The portion of Peter-Aleck Creek sampled is a 4^{th} order inlet stream to the south tip of Owen Lake, which drains an area of approximately 79.38 km^2 over a distance of 25 km. The portion of the Peter-Aleck Creek watershed that drains into Owen Lake is characterized by very little glacial influence, a predominance of low gradient reaches, and a low proportion of lakes. The headwaters of this system are found at an elevation of 1500 meters, and the confluence of Peter-Aleck and Owen Lake is found at an elevation of 830 meters. The topography consists primarily of low gradient valley flat areas along the mainstem Peter-Aleck Creek, with steeper terrain along the south facing slopes of Nadina Mountain in the northern portion of the watershed, and the north facing slopes of Poplar mountain in the southwest portion of the watershed. The Peter-Aleck sub-basin is of interest since it is a potential cross over point for fish populations from the Skeena and Nechako systems, separated from each other in a large wetland to the south of Owen Lake. The portion of Peter-Aleck Creek that drains into Owen Lake watershed falls within the Humid Continental Highlands Ecodivision of the Humid Temperate Ecodomain. Within the Central Interior Ecoprovince, the entire area is within the Fraser Plateau Ecoregion (Meidinger and Pojar 1991, MoF 2001). The lower and mid-elevation reaches are found within the Sub-Boreal Spruce biogeoclimatic zone, while the upper reaches extend into the Engelman Spruce-Sub Alpine fir biogeclimatic zone. Very small portions of the upper reaches of tributaries at the

higher elevations of the south facing slopes of Nadina Mountain are characterized by Alpine Tundra Biogeoclimatic Zone. Table 4 provides a summary of watershed information for the Peter-Aleck Creek watershed.

Table 4. Summary of watershed information for in the Peter-Aleck Creek watershed.

Name	Watershed Code	Watershed Area (km^2)	Stream Length (km)	Stream Order[1]	NTS map	BEC Zone	Wetland areas (km^2)
Peter-Aleck (inlet to Owen Lake) UTM: 9.649223.599231	**Unknown**	**79.38**	**118.28**	**4**	**93L/02**	**SBSmc ESSFmc AT**	**1.63**

Water quality measurements were taken at 18 of the 28 sample sites. Temperature ranged from 5 ^{o}C to 13 ^{o}C (mean = 7.8, SE = 0.62). For sites where water quality measurements could be taken, pH averaged 7.62 (SE = 0.07), and the range of pHs was from 6.6 to 7.9. The lowest pH value of 6.6 was recorded at site 6 (ILP 70013, reach 4), located between two wetlands, which may account for the low pH value when compared to pH readings recorded at other sites, all of which had slightly basic pH values (7.4 to 7.9). Sites at higher elevation tended to have higher pH values, and this is speculated to be a reflection of the underlying geology. Conductivity was fairly consistent with values ranging between 20-160 μS/cm (mean = 99.7 μS/cm, SE = 10.40), with only one of the locations (site 8, ILP 70023 reach 2) having a value less than 30μS/cm. Although conductivity was variable throughout the drainage, sites along the northeast facing slope of Poplar Mountain appeared to have slightly higher conductivities than those along the south facing slope of Nadina Mountain, which again is speculated to be due to underlying geology. Water was clear at all locations, reflecting a lack of glacial influence, and the pristine nature of the watershed.

4.3 HABITAT AND FISH DISTRIBUTION

Fish were confirmed to be present in approximately 40.53 kilometres of stream in the study area, which has approximately 118.28 kilometres of first, second, third and fourth order streams shown on the 1:20,000 TRIM maps. Of the seven first order reaches sampled, three (42.9%) were NCD and two (28.6%) were dry. Dolly Varden were captured in the two wetted first order reaches (ILP 70001 reach 22 site 2, ILP 70059 reach 1 site 23). Both of these reaches had average channel widths greater than 1 m, and sample sites were in close proximity to higher order reaches downstream. Habitat quality in most of the first order reaches sampled was poor or absent (Tables 5 to 9, Figure 2). Habitat quality tended to improve in higher order reaches, and all of the third and fourth order reaches sampled were identified to be fish bearing.

No topographical barriers (e.g. waterfalls, cascades) were identified in the mainstem of Peter-Aleck Creek, where 23.76 of the 24.49 km of the stream were examined, and Dolly Varden were captured to within 734 meters of the origin of the mainstem (in a wetland complex). Steep gradient restricted fish access to several of the first and second order reaches, particularly those located along the south facing slopes of Nadina Mountain, and the northeast facing slopes of Poplar Mountain in the west half of the study area. The low topographic relief along the mainstem, and in the east half of the study area results in a lack of vertical barriers in this section

of the drainage. Within the valley flat of the Peter-Aleck mainstem, and the gentle gradient section in the east half of the drainage, seepage flow restricts access in some of the first and second order tributaries to Peter-Aleck Creek. Within the reaches sampled, the best fish habitat was found in reach 2 of ILP 70021 (site 6), reach 2 of ILP 70023 (site 8), and reach 2 of ILP 70026 (site 9), all of which are second order streams, and all of which offer good or excellent spawning, rearing and overwintering habitat. In addition, mainstem reaches of Peter-Aleck Creek sampled in previous studies (SKR 1998, 1999, Bustard 1999) offer good to excellent habitat for both Dolly Varden and rainbow trout.

Overall, the Peter-Aleck watershed upstream of Owen Lake appears to contain a moderate to high amount of suitable fish habitat. In total, 2.19 km of first order reaches, 10.48 km of second order reaches, 5.76 km of third order reaches, and 22.09 km of fourth order reaches were found to be fish bearing (Figure 2, Tables 5 to 8). This accounts for 34.3 % of all streams in the study area. In addition, 4.81 km of first order reaches and 5.34 km of second order reaches are suspected to be fish bearing (Figure 2, Tables 5 to 8). Fish are confirmed or suspected absent from 41.69 km of first order reaches, and 25.93 km of second order reaches, which accounts for 57.2% of all stream reaches in the study area (Figure 2, Tables 5 to 8).

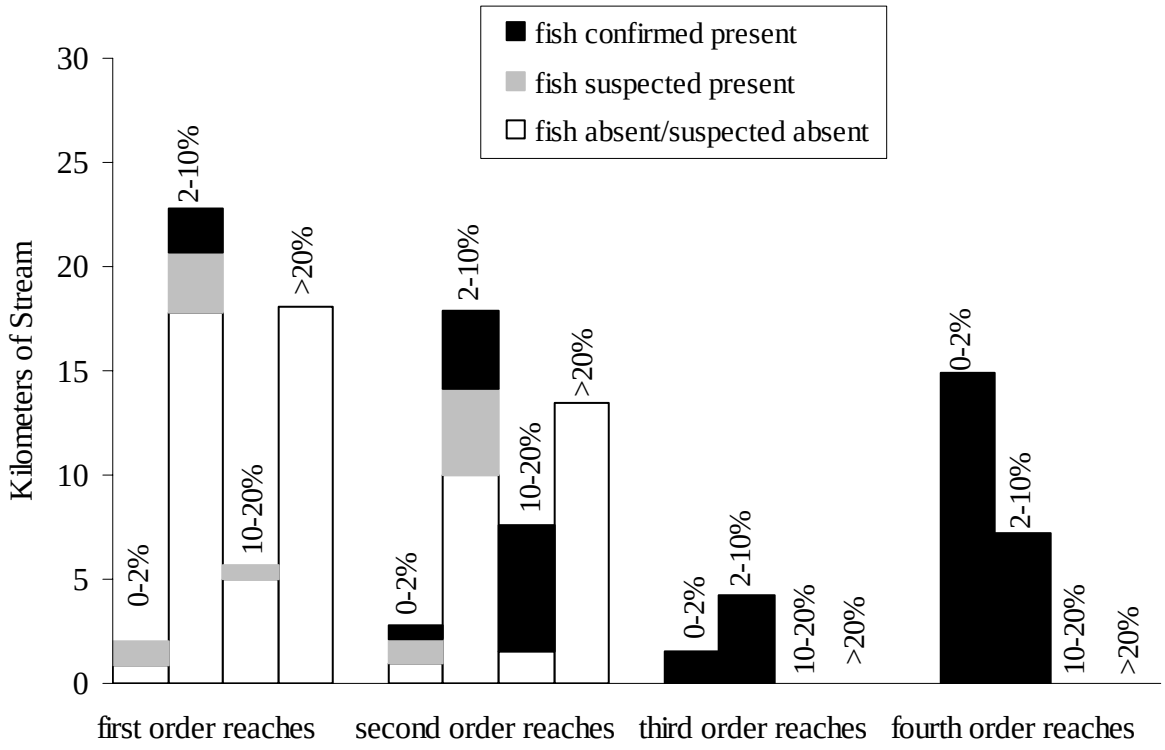

Figure 2. Distribution of fish presence and absence in different order and gradient classes of stream reaches in the Peter-Aleck watershed as determined from 1:20,000 TRIM maps *(for details* see Tables 5-8). Data labels indicate gradient classes within each stream order.

Table 5. Fish presence and absence in first order reaches in the Peter-Aleck watershed upstream of Owen Lake.

% Gradient Range	1st order reaches (km)			
	Fish Confirmed Present	Fish Suspected Present	Fish Absent/ Suspected Absent	**Totals**
0-2	0	1.22	0.83	**2.04 (4.2%)**
2-10	2.19	2.87	17.76	**22.83 (46.7%)**
10-20	0	0.72	4.98	**5.69 (11.7%)**
>20	0	0.00	18.12	**18.12 (37.4%)**
Totals	**2.19 (4.5%)**	**4.81 (9.9%)**	**41.69 (85.6%)**	**48.69**

Table 6. Fish presence and absence in second order reaches in the Peter-Aleck watershed upstream of Owen Lake.

% Gradient Range	2nd order reaches (km)			
	Fish Confirmed Present	Fish Suspected Present	Fish Absent/ Suspected Absent	**Totals**
0-2	0.75	4.81	0.95	**6.51 (14.0%)**
2-10	3.69	1.13	9.96	**14.78 (31.7%)**
10-20	6.04	4.21	1.56	**11.81 (25.4%)**
>20	0.00	0.00	13.46	**13.46 (28.9%)**
Totals	**10.48 (25.1%)**	**10.15 (12.8%)**	**25.93 (62.1%)**	**46.56**

Table 7. Fish presence and absence in third order reaches in the Peter-Aleck watershed upstream of Owen Lake.

% Gradient Range	3rd order reaches (km)			
	Fish Confirmed Present	Fish Suspected Present	Fish Absent/ Suspected Absent	**Totals**
0-2	1.49	0	0	**1.49 (25.9%)**
2-10	4.27	0	0	**4.27 (74.1%)**
10-20	0	0	0	**0 (0%)**
>20	0	0	0	**0 (0%)**
Totals	**5.76 (100%)**	**0 (0%)**	**0 (0%)**	**5.76**

Table 8. Fish presence and absence in fourth order reaches in the Peter-Aleck watershed upstream of Owen Lake.

% Gradient Range	4th order reaches (km)			
	Fish Confirmed Present	Fish Suspected Present	Fish Absent/ Suspected Absent	**Totals**
0-2	14.87	0	0	**14.87 (67.3%)**
2-10	7.22	0	0	**7.22 (32.7%)**
10-20	0	0	0	**0 (0%)**
>20	0	0	0	**0 (0%)**
Totals	**22.09 (100%)**	**0 (0%)**	**0 (0%)**	**22.09**

Table 9. Summary of historic and new barriers and obstructions to fish migration found in Peter-Aleck Creek upstream of Owen Lake (sorted by ILP and reach number).

ILP	TRIM map #	Reach	Barrier			
			Type	Height (m)	Verified in field	Description
70004	093L.007	1	GR		Y	30 m long section of 30% gradient with SP morphology at mouth of stream (SKR 1999)
70026	093L.006	2	FD		Y	Ford where culvert has been removed
70054	093L.006	2	F	1.1	Y	In high gradient section with smaller falls.
70056	093L.006	1	C	26	Y	cascade 85 m upstream of confluence with mainstem.

[1] GR = gradient barrier, F = falls, C = cascade, FD = ford

4.4 FISH AGE, SIZE AND LIFE HISTORY

Dolly Varden was the only species captured in the sites sampled in the Peter-Aleck watershed in August 2001. Although rainbow trout were captured during previous inventory projects (Bustard 1999, SKR 1998, 1999), no rainbow trout were captured at sites sampled in 2001. The following sub-sections summarize the acquired fish data and provide interpretations and discussions of fish size and age distributions, and species life histories.

4.4.1 Dolly Varden

Dolly Varden were wide spread throughout the Peter-Aleck watershed, and the species was captured at 10 of the 18 sites sampled for fish in August 2001. All of the Dolly Varden captured (44) were measured, and scale samples were collected for a sub-sample. Unfortunately, all but three scale samples were lost in transit, during a bear encounter. All three of the age samples that were analysed were suitable for aging. Length frequency histogram and age sample analysis was conducted to estimate the size groups of different age classes of Dolly Varden captured in the Peter-Aleck drainage (Figure 3). Dolly Varden captured in the Peter-Aleck sub-basin are estimated to represent five distinct age groups, ranging from 0+ to 4+. Age at maturity for Dolly Varden reported by Scott and Crossman (1973), and for Dolly Varden in the Nadina watershed (SKR 2001c) is generally between ages 3 and 4, with males frequently maturing one year earlier than females, which corresponds to the age at sexual maturity found in the scales collected from the Peter-Aleck watershed.

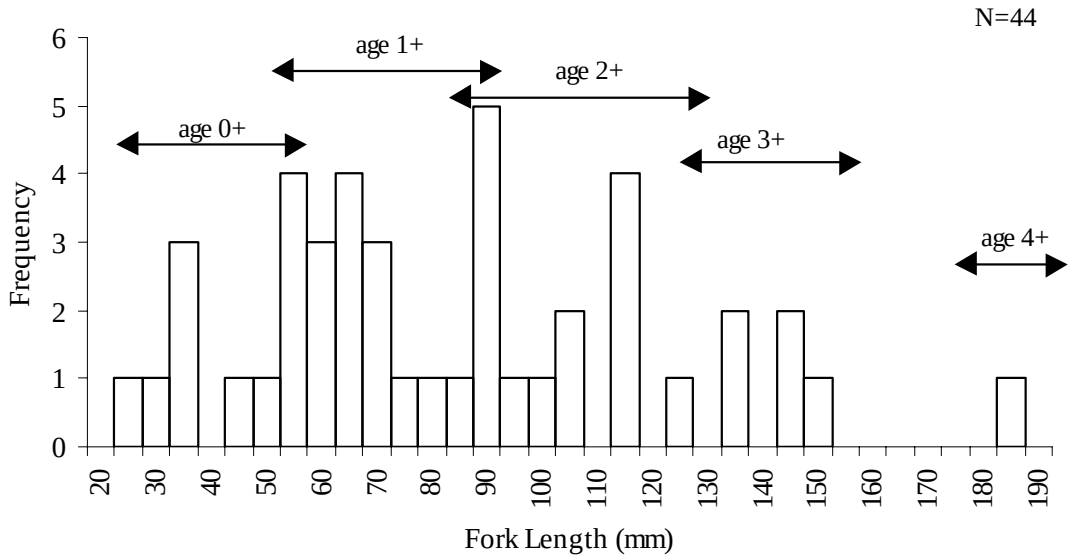

Figure 3. Length frequency histogram of Dolly Varden captured in streams sampled in the Peter-Aleck Creek watershed upstream of Owen Lake. Arrows refer to estimated age categories.

Dolly Varden were captured throughout many of the stream reaches in Peter-Aleck watershed sampled. These populations may exhibit an adfluvial or fluvial life history, with Dolly Varden captured in proximity to Owen Lake suspected to have an adfluvial life history. Dolly Varden captured in some of the higher elevation reaches in the watershed are suspected to have a fluvial life history, due to the low abundance of lakes in the system (6 lakes ranging between 0.4 and 2.8 ha, and covering a total of 8.8 ha).

4.5 SIGNIFICANT FEATURES AND FISHERIES OBSERVATIONS

Overall, the Peter-Aleck watershed offers accessible and suitable habitat for resident char and trout populations throughout most of the mainstem reaches, and lower reaches of tributaries, located within the Peter-Aleck valley flat area. While rainbow trout have only been captured in the mainstem and larger tributaries draining into the lower twelve reaches of Peter-Aleck Creek (Bustard 1999, SKR 1998, 1999, and sample site 9), Dolly Varden are found throughout lower and mid elevation reaches, and their distribution extends into the headwaters of the system. The Peter-Aleck watershed is of interest since it is a potential cross over location for fish between the Nadina River (Nechako) and Owen Creek (Skeena) drainages. The mainstem of Peter-Aleck Creek is mis-mapped to drain into the Nadina River, through a wetland complex which covers most of the area between Owen Lake (Skeena) and Park Lake (Nechako). Movement of the channel within the wetland, and/or periodic flooding make this area a likely location for past or future cross overs of species between the two drainages. The following sections describe interesting features related to fish, fish habitat, and habitat protection concerns in the Peter-Aleck watershed based on historical information and the findings from this study.

4.5.1 Fish and Fish Habitat

The higher order and moderate-low gradient reaches of mainstem and larger (third order) tributaries within the study area appear to offer the most suitable and abundant fish spawning, rearing and overwintering habitat. Overwintering and rearing habitat is also provided by a few of the moderate and small sized wetlands, and the few small sized lakes in the systems. In addition to Dolly Varden captured and observed during the inventory conducted in August 2001, rainbow trout have been documented in the lower reaches of the mainstem, and larger order tributaries that drain into the lower reaches of the mainstem (e.g. ILP 70009, a third order tributary to reach 5).

4.5.2 Habitat Protection Concerns

4.5.2.1 Fisheries Sensitive Zones

One fisheries sensitive zone was identified in reach 1 of ILP 70002 during a previous inventory (SKR 1998). Multiple side channels around debris in the lower portion of this reach were noted during sampling on October 20th, 1997.

4.5.2.2 Fish above 20% gradient

No fish were captured in reaches with gradients greater than 20%.

4.5.2.3 Rare and Endangered Species

Dolly Varden, a blue listed species (B.C. Environment 2001) were present throughout the Peter-Aleck watershed.

4.5.2.4 High Value Sport Fishing

While sportfishing opportunities exist at Owen Lake, sportfishing opportunities in the upper Peter Aleck Creek drainage are restricted to rainbow trout and Dolly Varden. No notably high value sport fishing opportunities were noted in the upper Peter Aleck watershed.

4.5.2.5 Restoration and Rehabilitation Opportunities

Two culverts in reach 2 of ILP 70026 (site 9) have been washed out from the road crossing, and a ford is currently present at this stream, in which Dolly Varden of three life stages (fry, juvenile and adult) were captured. One of the culverts remains partly in the stream channel downstream of the road crossing, and the second culvert remains under the road, but appears partly crushed. The road should be deactivated, or the crossing should be replaced with a structure that will minimize impacts on fish and fish habitat in this reach. The reach is located in a harvested area, with no riparian retention. The riparian vegetation has re-established since harvesting, and provides some shading for the stream.

4.6 FISH BEARING STATUS

Fish distribution in the study area is limited by a combination of gradient barriers to fish migration, and intermittent channels. Fish bearing reaches are summarized in Table 10, while proposed non-fish bearing reaches are summarized in Table 11. Reaches upstream of barriers to fish migration where no fish were captured, or where no perennial fish habitat was identified, are classified as non-fish bearing based on one season of sampling. Some reaches where no fish were captured, but no definite barrier to fish migration were observed, were noted to require further sampling to conclusively establish fish presence or absence (Table 12).

4.6.1 Fish Bearing Reaches

Fish bearing status was assigned to all reaches in which species listed in the Forest Practices Code Fish Stream Identification guidebook were captured (FPC 1998). In addition, reaches in which no fish were captured, but where fish presence has been documented upstream, and where no barriers to fish migration have been identified were defaulted as fish bearing. Table 11 summarizes reaches that were documented to be fish bearing during this study. Of the 28 reaches sampled in August 2001, fish were captured in 10 stream reaches (Table 10). Other potential fish bearing reaches are indicated on the Fisheries Project/Interpretive Map (Appendix 5).

4.6.2 Non - Fish Bearing Reaches

Non-fish bearing status was assigned to 11 reaches sampled upstream of barriers to fish migration in which no fish were captured in one season of sampling or which did not offer perennial fish habitat (Table 11). This indicates a lack of resident fish upstream of these barriers.

4.6.3 Follow – Up Sampling Required

Fish presence or absence was not conclusively determined for seven reaches sampled in the Peter-Aleck watershed during the reconnaissance fish and fish habitat inventory project conducted in August 2001 (Table 12). In one of these reaches (ILP 70051 reach 2) Dolly Varden were captured downstream of a 1.1 m falls, but no sampling was conducted upstream of the falls, which were noted from the helicopter. This reach is included in both, Tables 10 and 12. Reaches which could not be conclusively classified require re-sampling to indicate if seasonal fish use is present and to confirm fish absence as described under Forest Practices Code standards (FPC 1998).

Table 10. Summary of data from 10 fish bearing reaches (sorted by site number) in the Peter-Aleck Creek watershed sampled in August 2001 (*for details see* Appendix 1).

Site #	Alias Stream name	ILP/ Watershed Code	TRIM map	Reach	Species	Channel		Proposed Riparian Class	Comments
						Width (m)	Site gradient (%)		
1	Peter-Aleck	70001	093L.006	18	DV	1.77	2.5	**S3**	Five juvenile Dolly Varden were captured in this reach on August 22nd, 2001
2	Peter-Aleck	70001	093L.006	22	DV	1.28	3.5	**S4**	One juvenile Dolly Varden was captured in this reach on August 22nd, 2001; Dolly Varden density appeared to be low in this reach
3	Unnamed	70013	093L.006	1	DV	2.43	3	**S3**	Three adult Dolly Varden were captured in residual pool in this intermittent reach, which was primarily dry at the time of sampling (August 15th, 2001)
6	Unnamed	70021	093L.006	2	DV	2.08	7	**S3**	10 juvenile and three adult Dolly Varden were captured in this reach on August 15th, 2001; Dolly Varden appeared to be present at high densities, and likely utilize this reach for spawning as good spawning habitat was noted present
8	Unnamed	70023	093L.006	2	DV	1.82	5	**S3**	Five juvenile Dolly Varden were captured in this reach on August 15th, 2001; excellent spawning habitat was noted in the reach
9	Unnamed	70026	093L.006	2	DV	2.03	12	**S3**	Two adult, two juvenile and two Dolly Varden fry were captured in this reach on August 15th, 2001; this reach provides excellent spawning habitat, and the presence of both fry and adult Dolly Varden suggest that the reach is used for spawning
20	Unnamed	70051	093L.006	1	DV	2.67	1.5	**W1**	One juvenile Dolly Varden and two Dolly Varden fry were captured in this reach on August 22nd, 2001; this reach does not provide suitable spawning substrate
21	Unnamed	70051	093L.006	2	DV	2.5	10	**S3**	Two juvenile Dolly Varden were captured downstream of a 1.1 m high falls at the upper extent of the reach
23	Unnamed	70059	093L.006	1	DV	1.55	1.5	**S3**	Four juvenile Dolly Varden were captured on August 22nd, 2001

Table 10. Summary of data from 10 fish bearing reaches (sorted by site number) in the Peter-Aleck Creek watershed sampled in August 2001 (*for details see* Appendix 1).

Site #	Alias Stream name	ILP/ Watershed Code	TRIM map	Reach	Species	Channel			
						Width (m)	Site gradient (%)	Proposed Riparian Class	Comments
25	Unnamed	70060	093L.006	1	DV	1.52	2.5	**S3**	This reach flows into Peter-Aleck Creek 120 m north of the mapped location (see site 24, Table 12); two juvenile Dolly Varden were captured in this reach

Table 11. Summary of data from 11 non-fish bearing reaches (sorted by site number) in the Peter-Aleck watershed sampled in August 2001 (*for details see* Appendix 1).

Site #	Alias Stream Name	ILP/ Watershed Code	Reach	TRIM map	Electrofishing specifications								Secondary Method	Date (2001)	Proposed Riparian Class	Comments
					Gradient (%)	Channel Width (m)	Dist. (m)	Time (s)	Cond. (µS)	Temp.	Stage	Turbidity				
4	Unnamed	70013	6	93L.007	1.5	---	---	---	---	---	---	---	---	08/15	**NCD**	No defined channel could be found in a 30-40 m wide band of willow, Labrador tea, black spruce and sedges; some moist puddles were present, but no channel was noted, and all flow was via seepage; no evidence of flooding of this reach from the wetland located downstream was noted, and this reach was identified as a barrier to fish passage
5	Unnamed	70018	2	93L.006	2	---	---	---	---	---	---	---	---	08/15	**NCD**	No continuous channel was noted in the lower 320 m of this reach; the location of the drainage was difficult to determine due to the lack of a clear, continuous riparian band; some discontinuous sections of channel (5-8 m long) were noted to be dry, and likely only carry water during short periods in the spring, the majority of the reach consisted of seepage sections
11	Unnamed	70032	1	93L.006	3	---	---	---	---	---	---	---	---	08/15	**NCD**	This drainage consists of a low gradient area, marked by the presence of a band of sedges through a dry pine forest; no defined channel or evidence of surface flow was noted in a the lower 300 m of the reach
13	Unnamed	70035	1	93L.006	15	---	---	---	---	---	---	---	---	08/15	**NCD**	No defined channel was identified in this reach, which consisted of a 1-5 m wide riparian band with some isolated, moist puddles and no intervening flow

Table 11. Summary of data from 11 non-fish bearing reaches (sorted by site number) in the Peter-Aleck Creek watershed sampled in August 2001 (*for details see* Appendix 1).

Site #	Alias Stream Name	ILP/ Watershed Code	Reach	TRIM map	Electrofishing specifications								Secondary Method	Date (2001)	Proposed Riparian Class	Comments
					Gradient (%)	Channel Width (m)	Dist. (m)	Time (s)	Cond. (µS)	Temp.	Stage	Turbidity				
14	Unnamed	70040	1	93L.006	2	---	---	---	---	---	---	---	---	08/10	**NCD**	No visible channel was noted in this reach, which consisted of a 10-30 m wide moist riparian band
17	Unnamed	70045	1	93L.006	7	---	---	---	---	---	---	---	---	08/09	**S6**	This area consists of some sections of scoured channel with a gravel/cobble substrate (up to 9 m long), interspersed with seepage sections (up to 11 m long); no evidence of surface flow in the seepage section was noted; the extensive seepage sections are barriers to fish passage, and no perennial fish habitat was identified in the reach, due to the lack of deep pools
18	Unnamed	70046	2	93L.006	0.5	1.50	100	640	80	8	L	C	---	08/22	**S6**	No fish were captured in this reach, and no perennial fish habitat was noted in this reach due to the lack of deep pools; the "lake" shown on the TRIM map upstream is actually a 1 meter deep wetland, which also does not provide suitable overwintering habitat; the steep gradient in the lower portion of reach 2, which exceeds 25%, is a barrier to fish passage
19	Unnamed	70048	2	93L.006	2.5	---	---	---	---	---	---	---	---	08/22	**NCD**	A poorly defined channel was found in the lower 30 m of this reach, which is a continuation of a large channel morphology of the wetland in reach 1; the channel extends into reach 2 due to the fact that an uprooted tree has created a depression for seepage water to collect in; upstream of the lower 30 m in this reach no evidence of a channel was found

Table 11. Summary of data from 11 non-fish bearing reaches (sorted by site number) in the Peter-Aleck Creek watershed sampled in August 2001 (*for details see* Appendix 1).

Site #	Alias Stream Name	ILP/ Watershed Code	Reach	TRIM map	Electrofishing specifications								Secondary Method	Date (2001)	Proposed Riparian Class	Comments
					Gradient (%)	Channel Width (m)	Dist. (m)	Time (s)	Cond. (µS)	Temp.	Stage	Turbidity				
22	Unnamed	70056	1	93L.006	5.5	2.22	100	595	40	6	M	C	---	08/22	**S3/S6**	No fish were captured in this reach, upstream of a 130 m long 20% gradient cascade located 85 m upstream of ILP 70048; fish may use the lower 85 m of the reach, downstream of the cascade, and this section should be managed as fish bearing
24	Unnamed	70060	1	93L.006	4.5	---	---	---	---	---	---	---	---	08/22	**NCD**	This reach lacks a continuous channel, and consisted primarily of seepage; up to 10 m long sections of channel were identified in the section surveyed; the actual channel is located 120 m to the north of the mapped location of this reach (*see* site 25, Table 10)
27	Unnamed	70061	2	93L.006	39.3	---	---	---	---	---	---	---	---	08/22	**NCD**	A few puddles were noted at the upper extent of this steep gradient reach, but the remainder of the reach consisted of seepage flow only; a few, up to 2 m long sections of 0.2 m wide channel were noted in the upper portion of the reach, where the gradient is 20%, but only seepage was noted downstream, in gradients of up to 60%

Table 12. Follow - up sampling requirements for eight reaches (sorted by Site number) in the Peter-Aleck Creek watershed that were sampled in August 2001 (*for details see* Appendix 1).

Site #	ILP/Stream name	Reach	TRIM map	Channel Width (m)	Timing	Methods	Proposed Riparian Class	Comments
7	70021	3	093L.006	2.25	Spring	EF	**S3**	No fish were captured in 721 seconds of electrofishing (120 lineal meters) despite good water temperature, conductivity and visibility; electrofishing was conducted in shallow large channel morphology in the lower portion of reach 3; good rearing and moderate overwintering habitat were noted present, but no spawning habitat was identified (no gravels); relatively steep gradients in reach 2 (map interpretation) may obstruct fish passage
10	70029	1	093L.006	1.28	Spring high flows	EF	**S4**	No fish were captured in the 462 seconds of electrofishing in this reach; the lower 20 m of the reach were wetted and exhibited large channel morphology; the upper portion of the reach was dry; poor rearing and spawning habitat, and no overwintering habitat (no deep pools) were noted in this reach; re-sampling is recommended to assess seasonal fish use of this reach; seasonal or sporadic fish presence is suspected
12	70033	1	093L.006	0.45	Spring high flows	EF	**S4**	This reach was dry at the time of survey (15/08/01); the lower 100 m is located in a wetland, and exhibits a defined channel; upstream the channel is poorly defined; poor rearing habitat, no spawning habitat (no gravels) and no overwintering habitat (insufficient depth) were noted in this reach; fish use is unlikely due to the intermittent nature of the reach and the lack of suitable habitat
15	70041	1	093L.006	0.55	Spring	EF	**S4**	No fish were captured in 442 seconds of electrofishing over 100 lineal meters, although one juvenile rainbow trout was captured in the lower 5 meters, which is basically off channel habitat from Peter-Aleck Creek; a 20 m section of what appears to be seepage flow (but could be piped sub terrain flow) was identified as a potential barrier to fish passage near the mouth of the stream and this section should be assessed during high flows for passage; no fish were captured upstream of several sections of seepage/sub terrain flow

Table 12. Follow - up sampling requirements for classification of eight reaches (sorted by site number) in the Peter-Aleck watershed that were sampled from August 2001 (*for details see* Appendix 1).

Site #	ILP/Stream name	Reach	TRIM map	Channel Width (m)	Timing	Methods	Proposed Riparian Class	Comments
16	70043	1	093L.006	0.52	Spring	EF	**S4**	No fish were captured in 522 seconds of electrofishing over 100 lineal meters; sampling efficiency was reduced by overhanging vegetation, but water temperature and conductivity was conducive to sampling; the lower 80 m provide some fish habitat, but fish presence upstream is unlikely
21	70051	2	093L.006	2.50	Fall	EF	**S3**	Dolly Varden were captured in the lower portion of the reach (see Table 11); a 1.1 m falls was noted in the upper portion of this reach, and this falls is a barrier to fish passage; fish presence upstream is not suspected, but sampling is required to document the lack of resident Dolly Varden
26	70060	2	093L.006	2.23	Spring	EF	**S3**	No fish were captured in 480 seconds of electrofishing over 100 lineal meters despite good sampling conditions; poor rearing habitat, poor overwintering habitat and poor spawning habitat were noted in the lower section of the reach (12% gradient), but fish habitat quality and potential for fish presence decreases upstream with increasing gradients in excess of 20%.
28	70063	1	093L.006	0.98	Spring	EF	**S4**	No fish were captured in 320 seconds of electrofishing over 100 lineal meters despite good sampling conditions; the lower 100 m of the reach provide some suitable fish habitat, but upstream of this the habitat quality is poor and access is limited

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Appendix 1. Sample Site Information including FDIS Site Cards, Fish Forms, and Site Photographs (sorted by site number).

SITE CARD INDEX

ILP	TRIM Map #	Reach #	Site #	Page #
70001	093L.006	18.0	1	S-1
70001	093L.006	22.0	2	S-2
70013	093L.006	4.0	3	S-3
70013	093L.006	6.0	4	S-4
70018	093L.006	2.0	5	S-5
70021	093L.006	2.0	6	S-6
70021	093L.006	3.0	7	S-7
70023	093L.006	2.0	8	S-8
70026	093L.006	2.0	9	S-9
70029	093L.006	1.0	10	S-10
70032	093L.006	1.0	11	S-11
70033	093L.006	1.0	12	S-12
70035	093L.006	1.0	13	S-13
70040	093L.006	1.0	14	S-14
70041	093L.006	1.0	15	S-15
70043	093L.006	1.0	16	S-16
70045	093L.006	1.0	17	S-17
70046	093L.006	2.0	18	S-18
70048	093L.006	2.0	19	S-19
70051	093L.006	1.0	20	S-20
70051	093L.006	2.0	21	S-21
70056	093L.006	1.0	22	S-22
70059	093L.006	1.0	23	S-23
70060	093L.006	1.0	24	S-24
70060	093L.006	1.0	25	S-25
70060	093L.006	2.0	26	S-26
70061	093L.006	2.0	27	S-27
70063	093L.006	1.0	28	S-28

Appendix 2. Photodocumentation Forms 1 and 2. Negatives and digital images of photos (2 copies) were submitted to Ministry of Sustainable Resources.

Photodocumentation Form 1 – Equipment Details

Survey Start Date: August 9th, 2001 Survey End Date: August 22nd, 2001
Agency: C141
Crew: RS/ML/DM/NF

Camera #1:
Make and Model: Canon Sureshot A1
Lense: 35 mm
Format: 135 mm, Kodak CD Rom, TIFF files

Roll and or Batches Detail:

Roll #	CD #	Camera	Output Medium	Film Type	ISO
P1	2 (Peter-Aleck)	1	Negative/CD Rom	Colour print	200
P2	2 (Peter-Aleck)	1	Negative/CD Rom	Colour print	200
P3	2 (Peter-Aleck)	1	Negative/CD Rom	Colour print	200
P4	2 (Peter-Aleck)	1	Negative/CD Rom	Colour print	200

Appendix 3. List of Voucher Specimens submitted to Ministry of Sustainable Resources.

Landscape Unit	ILP	TRIM map	Reach	Site	Date Collected	Voucher	Species ID	Fork Length (mm)	Verified ID
Nadina	21855		1	20	25-Jul-01	LSU1	LSU	147	
Nadina	21855		1	20	25-Jul-01	LSU2	LSU	174	
Nadina	21855		1	20	25-Jul-01	LSU3	LSU	108	
Nadina	21855		1	20	25-Jul-01	RB2	RB	86	
Nadina	21855		1	20	25-Jul-01	RB3	RB	33	
Nadina	21855		1	20	25-Jul-01	RB4	RB	44	
Nadina	21855		1	20	25-Jul-01	RB5	RB	117	
Nadina	21855		1	20	25-Jul-01	CAS3	CAS	108	
Nadina	21855		1	20	25-Jul-01	CAS4	CAS	100	
Nadina	21855		1	20	25-Jul-01	CAS5	CAS	62	
Nadina	21567		1	58	25-Jul-01	DV3	DV	95	
Nadina	21567		1	58	25-Jul-01	DV4	DV	87	
Nadina	21567		1	58	25-Jul-01	DV5	DV	60	
Nadina	21763		1	41	25-Jul-01	RSC1	RSC	73	
Nadina	21763		1	41	25-Jul-01	RSC2	RSC	64	
Nadina	21763		1	41	25-Jul-01	RSC3	RSC	45	
Nadina	21763		1	41	25-Jul-01	RSC4	RSC	65	
Nadina	21763		1	41	25-Jul-01	RSC5	RSC	74	
Nadina	21915		1	16	16-Jul-01	LNC1	LNC	50	
Nadina	21915		1	16	16-Jul-01	LNC2	LNC	45	
Fulton	40208		1	1	18-Jul-01	DV1	DV	111	
Fulton	40208		1	1	18-Jul-01	DV2	DV	58	
Fulton	40208		1	1	18-Jul-01	CT4	CT	109	
Fulton	40208		1	1	18-Jul-01	RB1	RB	128	
Fulton	40356		1	23	18-Jul-01	CO1	CO	69	
Fulton	40356		1	23	18-Jul-01	CO2	CO	62	
Fulton	40356		1	23	18-Jul-01	CO3	CO	74	
Fulton	40356		1	23	18-Jul-01	CO4	CO	55	
Fulton	40356		1	23	18-Jul-01	CO5	CO	75	
Fulton	40356		1	23	18-Jul-01	CT1	CT	114	
Fulton	40356		1	23	18-Jul-01	CT2	CT	104	
Fulton	40356		1	23	18-Jul-01	CT3	CT	97	
Fulton	40356		1	23	18-Jul-01	CAS1	CAS	70	
Fulton	40356		1	23	18-Jul-01	CAS2	CAS	72	
Tahtsa	61775		7	14	02-Aug-01	BB1	BB	193	
Tahtsa	61773		1	11	31-Jul-01	MW1	MW	153	
Tahtsa	61778		3	18	31-Jul-01	LKC1	LKC	116	

Appendix 4. QA/QC Communications

Appendix 5. 1:20,000 Fisheries Project/Interpretive Maps for Peter-Aleck Creek watershed.

Fisheries Project/Interpretive Maps:
093L.006
093L.007