Fish and Fish Habitat Inventory
for
Operational Areas
Inlet Streams to Owen Lake
(460-600600-23900-01)

in the Owen IRM Unit:
CP 364-1&2, CP 366-1&2,
and
Peter Main access road

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DISCLAIMER

The Province has not accepted the contents of this product for the purposes of the Forest Practices Code, and reserves the right to dispute the validity of summarized results. The province does not necessarily agree with the classification assigned to any individual stream reach, for use in logging plans, silviculture prescriptions or any other application.

PROJECT SUMMARY SHEET

Project Reference Information

MELP Contract Number	CSK 3070
FDIS Project Number	06-MORR-0000-0012-1998
MELP Region	Skeena Region (06)
FW Management Unit	06-09
DFO Subdistrict	Prince Rupert (8)
Forest Region	Prince Rupert
Forest District	Morice
Forest Licensee	Houston Forest Products
First Nations Claim Area	Wet'suwet'en, Carrier Sekani

Watershed Information

Watershed Group	Owen Creek
Watershed Name	Owen Creek
Watershed Code	460-600600-23900
UTM at Mouth	9.5998095.646484
Watershed Area	68 km^2
Stream Order	2
NTS Maps (1:250,000)	93L
TRIM Maps	93L.006; 93L.007
BEC Zone	SBS mc^2

Sampling Design

Number of Reaches Sampled	15
Total Sample Sites	15
Field Sampling Dates	October 1997
Fish Species in Watershed	RB/ST, CO, MW, RSC, LSU, CSU, NSC, CT, DV, PW, BB, PCC

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ACKNOWLEDGMENTS

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1.0 INTRODUCTION

The study area is located in the Bulkley River drainage (watershed code 460) of the Skeena River watershed in north-central British Columbia (Figure 1). Selected streams in the area were inventoried for stream classification under the Forest Practices Code (FPC) and evaluation of requirements for appropriate management of stream/wetland riparian zones related to cutting permits 364-1&2, 366-1&2, and the Peter Main access road.

The main objectives of this project were:

- to complete a detailed literature review of historical fisheries information for related areas,
- to conduct field visits and appropriate fish sampling at representative sites to determine fish species distribution and relative abundance in the related watershed(s),
- to recommend FPC stream classification for all stream reaches in contact with planned forest harvest,
- to describe management concerns for stream/wetland and lake riparian zones in the relevant areas planned for forest harvest,
- to provide recommendations for more conservative protection of stream riparian zones that are not adequately protected by the minimum standards of the FPC, and
- to provide recommendations for appropriate structures, designs, and installation of planned road/stream crossings with regard to concerns for fish, fish migration, and fish habitat.

2.0 STUDY AREA

2.1 Location

The Owen Integrated Resource Management (IRM) Unit is located within the Morice Forest District (Prince Rupert Forest Region) roughly 30 kilometers south of the community of Houston.

This project focused on the creeks in and adjacent to CP 364-1&2 and CP 366-1&2 and those crossed by the Peter Main access road that will be used to access these proposed harvest areas. The proposed harvest blocks are located in the Moist-Cold and Dry Cool Subzones of the Sub-Boreal Spruce Biogeoclimatic Zone (SBS mc^2) (MoF 1988).

Figure 1. 1:250 000 NTS Map (93L) showing the general area of fish inventory and stream classification for CP 364-1&2, CP 366-1&2 and the Peter Main access road.

2.2 Access

The Owen IRM Unit is reached by the Morice River Forest Service Road which originates at the turn-off to Houston Forest Products Ltd., five kilometers west of the Houston town center along Highway 16. The Morice Tahtsa Road, located at kilometre 48 of the Morice River FSR, provides access from the south end of the Owen IRMU. Stream survey sites were accessed by 4 wheel drive vehicle, helicopter, and boat.

2.3 Resource Use

The Owen IRM Unit is public land and as such is utilized by several sectors. Forestry, however, is the main activity in the area. Houston Forest Products is the main licencee for the unit, although two independently operated woodlots exist near the south end of Owen Lake (Ross, pers. comm.). Logging and/or road building is proposed in 1998, 1999, and 2000 near the stream survey sites examined in this report. There are some recreational values in the management unit including hunting and fishing. The Owen Lake Forest Service recreation site is located at the north end of Owen Lake, and Owen Lake Resort is located on the east side of the lake. The Nadina Mountain Trail runs approximately 2.5 to 3 kilometres north of the proposed extension to the Peter Main access road. Two guide-territories (609G006 and 609G004), two trap line territories (609T010 and 604T046), and one range territory (Poplar Lake) exist in the study area. No Protected Areas Strategy (PAS) study sites are known to exist within the Owen IRM Unit.

Two Native groups including the Wet'suwet'en and Carrier Sekani have claimed the Owen Lake area as part of their traditional territories (Ministry of Forests, 1995).

A mineral tenure exists adjacent to CP 364-2 on the east side but the boundaries of the two land uses do not appear to overlap. The Peter Main access road is planned to pass through this tenure (Ministry of Employment and Investment 1998).

A search of BC Environment Water Management Branch's web page revealed that no water licenses exist in or near the study area, nor are any community watersheds located in the study area (Meredith pers. comm.).

3.0 METHODS

3.1 Literature Review

All pertinent literature on the streams inventoried in this project was collected and summarized. Existing data pertaining to stream classification in the Fisheries Information Summary System (FISS), and in the rivers and lakes files at the BC Environment Skeena Region office were summarized and mapped. Known fish distribution in the study area watersheds were mapped. In addition, existing watershed codes were assigned to streams. An interim locational point (ILP) was assigned to each stream for which no watershed code existed. The UTM co-ordinate at the mouth of each stream was determined from the BC Environment watershed code dictionary or digitally from 1:20,000 maps. Stream order was determined from 1:20,000 TRIM maps.

3.2 Reach Break Identification

Reach breaks were tentatively identified and mapped by examining 1:20,000 TRIM map sheets and air photographs (approx. 1:15,000 scale). The identification of reach breaks followed RIC standards (RIC 1997). When feasible, reach breaks were confirmed in the field. Reaches were numbered sequentially moving upstream, in ascending order.

3.3 Stream Assessment

Stream sites were accessed by 4 wheel drive vehicle, helicopter, and boat. Sections of the streams of interest were evaluated on site to determine fish presence and habitat values in or adjacent to planned harvest areas, at proposed road crossings, and in downstream reaches. At representative sites, the following stream characteristics were measured: channel width, wetted width, residual pool depth, gradient (Suunto clinometer or Abney level), temperature (ambient and water), pH (pHep 3 and Oaktron pHTestr2), substrate composition (including D_{95}), bank material, and cover. Conductivity was recorded with a hand held Hanna HI9033 conductivity meter for all sites in which electroshocking was conducted. Reach breaks were verified in the field when possible. All data were collected on 1997 Field Data Information System (FDIS) site cards and fish collection cards following RIC standards (RIC 1997), and data were entered into the FDIS database.

Fish presence was ascertained by electroshocking with a Smith-Root Model 15C backpack electroshocker. At each site, when possible, an area of approximately 100 m^2 was sampled by electroshocking. Captured fish were identified to species, measured (fork length), and released. In addition, sensitive sites, potential or known barriers to fish migration, and critical fish habitat were identified and mapped, when possible. Photographs were taken of sample locations, barriers to fish migration, and other features of interest. Photographs were compiled into a photodocumentation document.

3.4 Map Production

All sample sites, fish distribution, reach breaks and alternative stream drainage patterns to those shown on the TRIM maps were hand drawn onto existing 1:20,000 TRIM maps for future digital mapping by Western Geographic Ltd. The following is indicated on all maps: watershed codes or ILPs, reach breaks, reach numbers, sample sites, numeric identifiers (NIDs), stream classifications, and fish distribution. Codes for fish species follow those outlined in FISS, and are indicated on applicable maps.

4.0 RESULTS AND DISCUSSION

The results section describes the streams surveyed to the reach level. General information for relevant mainstems and tributaries are summarized, followed by a more detailed description for each reach inventoried. Reach descriptions include recommended stream, wetland and/or lake classifications (identified following the FPC standards), comments describing fish habitat types and fish captured at the sites sampled, and recommendations for proposed stream/road crossings and riparian management. Recommendations for riparian management generally fall into one of three types:

1. No additional recommendations are made in cases when FPC standards for riparian management are expected to provide adequate protection to fish and fish habitat.

2. Recommendations for riparian management are provided in cases where FPC standards appear to provide insufficient protection of fish habitat based on:
    - reach characteristics, including stream gradient, stream substrate, bank material, and surrounding topography (e.g. wetland, sideslope, valley:channel ratio),
    - fisheries resources in immediate and downstream reaches and/or mainstems,
    - influences of riparian vegetation on fish habitat (e.g. nutrients, LOD, stream temperature, bank stability),
    - potential flood conditions, and
    - forest type and values within riparian reserve and management zones.

3. Recommendations with explanations for S6 classification of streams with S4 default classification under FPC standards. This is exemplified at reaches where:
    - a definite barrier to fish migration exists with no available habitat for resident fish populations upstream (e.g. no potential spawning habitat above barrier or channel width of less than 1.5 m in the Central Interior Region), or
    - a single season's sampling in good fish habitats, and good sampling conditions confirms fish absence above definite barriers to fish migration, or
    - a single season's sampling in available habitat confirms fish absence above a potential barrier in a reach that contains limited fish habitat, or
    - no potential fish habitat was identified in the reach, and no valuable fish habitat is present upstream (e.g. no well defined channel).

Note: various levels of forest retention in riparian management zones are commonly recommended for these S6 streams to protect downstream fisheries values.

Completed stream survey cards and sample site photographs are located in Appendix 1. Two stream classification maps with study sites and NIDs are included in Appendix 2.

Note: Only fisheries values are taken into consideration when recommending special riparian reserve management zones. Other ecological contexts or wildlife values were not considered in this study, and are thus not reflected on in the results, discussions, or recommendations.

4.1 Owen Watershed

Watershed code: 460-600600-23900
Dates surveyed: October 4, 17 and 20, 1997

According to the 1:20,000 TRIM maps (93L006 and 93L007), all streams flowing through or near CP 364-1&2 are first order tributaries to Owen Lake. All streams flowing through or near CP 366-1&2 belong to the Peter Aleck Creek drainage area (180-374000-95200-22700). The streams that are crossed by the Peter Main access road are either first order tributaries to Owen Lake or belong to the Peter Aleck Creek drainage system. Ground truthing has revealed that the headwaters of Peter Aleck Creek, approximately three kilometres upstream of Park Lake (180-374000-95200-22700-01), actually flow into the south end of Owen Lake, not the Nadina River as previously illustrated on TRIM and NTS maps. Therefore, the upper watershed of "Peter Aleck" Creek (ILP 00501) is part of the Skeena River drainage system, not the Fraser River drainage system

Fish documented in the Owen watershed include rainbow and steelhead trout (*Oncorhynchus mykiss*), coho (*Oncorhynchus kisutch),* mountain whitefish (*Prosopium williamsoni*), redside shiner (*Richardsonius balteatus*), largescale sucker (*Catostomus macrocheilus),* longnose sucker (*Catostomus catostomus),* northern squawfish (*Ptychocheilus oregonensis*), cutthroat trout (*Oncorhynchus clarki*), Dolly Varden (*Salvelinus malma*), pygmy whitefish (*Prosopium coulteri*), burbot (*Lota lota*), and peamouth chub (*Mylocheilus caurinus*) (FISS).

All the fish species noted to be present in the Owen watershed are also present in Owen Lake with the exception of steelhead trout and coho (FISS). Based on the information gathered for this project, it is speculated that populations of fish captured in the inlet streams to Owen Lake are likely lacustrine-adfluvial, as indicated by the proximity of sample sites to Owen Lake. Rainbow trout present in the upper section of Peter Aleck Creek, which appears to drain into Owen Lake via a large wetland, may be either lacustrine-adfluvial or stream resident.

4.1.1 Unnamed Creek (460-600600-23900-84800)

Watershed Code:	460-600600-23900-84800
ILP # / Map #:	NA / 93L007
UTM (at confluence):	9.5994007.647405
Estimated number of reaches:	4
Number of reaches examined:	3

This first order stream flows east and drains into the southwestern shore of Owen Lake, directly opposite Wrinch Creek (460-600600-23900-85300). The upper 300 metres of reach 2 and all of reach 3 flow along the northern boundary of CP 364-2.

Reach 1

NID # / NID Map #:	00557 / 93L007	Site #:	1
Length of Reach:	500 m	Stream Order:	1
Length Surveyed:	400 m	Channel Width:	1.6 m
		Gradient:	6.0 - 9.0 %
Date of Sampling:	October 17, 1997		
Fish Presence:	none caught in one season		

Reach Classification:	S3 default
Recommended Reach Classification:	**S3**

This reach was sampled over a distance of 400 metres, beginning 100 metres upstream of Owen Lake. Good fish rearing and overwintering habitat were observed in addition to good cover. Spawning habitat was assessed to be fair. Electroshocking was conducted over 140 m^2 of habitat for 730 seconds, but no fish were captured or observed.

S3 classification is recommended for this reach due to the presence of numerous FPC listed species downstream in Owen Lake and no barriers in the reach.

Reach 2 (CP 364-2)

NID # / NID Map #:	- / 93L007	Site #:	no site card
Length of Reach:	700 m	Stream Order:	1
Length Surveyed:	700 m	Channel Width:	~1.6 m
		Gradient:	unknown
Date of Sampling:	October 17, 1997		
Fish Presence:	unknown		

Reach Classification:	S3 default
Recommended Reach Classification:	**S3 default**

No sample site was established in this reach, although the entire reach was observed en route to reach 3. A 5 metre high, 30 metre long cascade (NID 00561) was discovered

approximately 650 metres upstream from Owen Lake. The gradient at this location was 17% and it was noted that this cascade may potentially be a velocity barrier to fish migration.

S3 default classification is recommended although resampling downstream of the cascade in the spring may allow this classification to be changed to S6 upstream of the cascade. Should fish be captured during resampling downstream of the cascade, sampling should also be conducted upstream of the cascade to confirm fish absence.

Reach 3 (CP 364-2)

NID # / NID Map #:	00558 / 93L007	Site #:	2
Length of Reach:	700 m	Stream Order:	1
Length Surveyed:	300 m	Channel Width:	1.3 m
		Gradient:	16 - 17 %
Date of Sampling:	October 17, 1997		
Fish Presence:	unknown		

Reach Classification:	S4 default
Recommended Reach Classification:	**S4 default**

This site was located approximately 1420 metres upstream of Owen Lake. Although good fish cover was observed, rearing and overwintering habitat was moderate. Spawning habitat was only fair due to a lack of suitably sized gravel substrate. Since no fish were captured in reach 1, no electroshocking was conducted at this site. The cascade (NID 00561) located in reach 2 is a potential barrier to fish migration.

S4 default classification is recommended until resampling is conducted downstream of the cascade during a period of high flow (May or June), at which time the classification for this reach may change to S6. If fish are captured downstream of the cascade during resampling, sampling should also be conducted upstream of the cascade to confirm fish absence. Full (100%) retention in the riparian management zone (RMZ) is recommended unless no fish are captured during resampling. In this event the recommended retention in the RMZ may be downgraded.

4.1.2 Unnamed Creek (ILP 00503)

Watershed Code:	(not available)
ILP # / Map #:	00503 / 93L007
UTM (at confluence):	9.648038.5993059
Estimated number of reaches:	3
Number of reaches examined:	3

This first order stream flows east into the south shore of Owen Lake. The proposed extension of the Peter Main access road crosses this stream once in the first reach and once in the second reach. The second reach drains along the north boundary of CP 364-1.

Reach 1 (proposed extension of Peter Main access road)

NID # / NID Map #:	00554 / 93L007	Site #:	1
Length of Reach:	2500 m	Stream Order:	1
Length Surveyed:	200 m	Channel Width:	0.8 m
		Gradient:	8.5 - 11 %
Date of Sampling:	October 17, 1997		
Fish Presence:	none caught in one season		

Reach Classification:	S4 default
Recommended Reach Classification:	**S4 default**

This site begins 100 metres upstream of Owen Lake. Fair fish rearing and spawning habitat were noted, but poor overwintering habitat was observed. The cover at this site was deemed to be moderate. No fish were captured after electroshocking for 650 seconds over a 100 m^2 area. While the channel was found to flow underground for up to 10 metre long sections, the field crew judged that they were unlikely to be definite barriers to fish migration due to well eroded underground channels.

NID # / NID Map #:	00555 / 93L007	Site #:	2
Length of Reach:	2500 m	Stream Order:	1
Length Surveyed:	200 m	Channel Width:	0.9 m
		Gradient:	11 - 13 %
Date of Sampling:	October 17, 1997		
Fish Presence:	none caught in one season		

Reach Classification:	S4 default
Recommended Reach Classification:	**S4 default (see comments)**

This site is located 450 metres upstream of Owen Lake at the proposed road crossing of the Peter Main access road to CP 364-2. Poor spawning habitat was available at this site due to limited gravel substrate. Some potential fish rearing habitat and overwintering habitat was observed. It is likely that fish use is limited in this section of the reach due to many small (less than one metre high) step-pools and cascade-pools, and a relatively steep gradient immediately downstream of the proposed road crossing. Electroshocking over 96 m^2 of habitat for 690 seconds yielded no fish.

S4 default classification is recommended for this reach due to the presence of FPC listed fish species downstream in Owen Lake. Resampling may result in a change in stream classification to S6, and is recommended if future harvest is planned along this reach. A culvert will be appropriate at the proposed road crossing due to limited fish habitat and unlikely fish passage upstream.

Reach 2 (CP 364-1, proposed extension of Peter Main access road)

NID # / NID Map #:	00552 / 93L007	Site #:	3
Length of Reach:	1600 m	Stream Order:	1
Length Surveyed:	400 m	Channel Width:	0.9 m
		Gradient:	3 -3.5 %
Date of Sampling:	October 4, 1997		
Fish Presence:	none caught in one season		

Reach Classification:	S4 default
Recommended Reach Classification:	**S6**

Located approximately 3.5 kilometres upstream from Owen Lake, the spawning and overwintering habitat at this site were found to be poor, while the cover and rearing habitat were moderate. After 680 seconds of electroshocking over 120 m^2 no fish were captured.

S6 classification is recommended due to likely barriers to fish migration in reach 1 (sections of underground flow) and no fish captured in one season. Partial retention of the RMZ is recommended until resampling is conducted in reach 1. A culvert is recommended for the proposed road crossing to ensure adequate drainage.

Reach 3 (CP 364-1)

NID # / NID Map #:	00551 / 93L007	Site #:	4
Length of Reach:	1900 m	Stream Order:	1
Length Surveyed:	300 m	Channel Width:	not defined
		Gradient:	0.5 %
Date of Sampling:	October 4, 1997		
Fish Presence:	no stream identified		

Reach Classification:	no stream identified
Recommended Reach Classification:	**no stream identified**

This site was located at the northwest corner of CP 364-1, approximately 4.1 kilometres upstream of Owen Lake, in a wetland. No electroshocking was conducted since no defined channel could be found.

This section of stream on the TRIM map does not require stream classification.

4.1.3 Unnamed Creek (ILP 00502)

Watershed Code:	(not available)
ILP # / Map #:	00502 / 93L007
UTM (at confluence):	9.648106.5993090
Estimated number of reaches:	2
Number of reaches examined:	2

This first order stream drains into the southern shore of Owen Lake approximately 80 metres east of Unnamed Creek (ILP 00503). This stream is crossed in reach 2 by the Peter Main access road.

Reach 1

NID # / NID Map #:	00556 / 93L007	Site #:	1
Length of Reach:	1700 m	Stream Order:	1
Length Surveyed:	100 m	Channel Width:	15.5 m
		Gradient:	0.5%
Date of Sampling:	October 17, 1997		
Fish Presence:	none caught in one season		

Reach Classification:	S3
Recommended Reach Classification:	**S3 / W1 (see comments)**

This reach was surveyed 50 metres upstream from Owen Lake. Numerous beaver dams were present starting at the confluence with Owen Lake, and have created a wetland area with several ponds which exaggerate the normal channel width of the stream. These beaver dams are not permanent barriers to fish migration. Good fish rearing and overwintering habitat were observed at this location. Spawning habitat was poor due to the absence of gravel substrate. While no fish where captured or observed after 780 seconds of electroshocking over approximately 120 m^2, turbidity, water depth, and unstable footing likely reduced sampling efficiency.

The channel widths for this site are reflective of its wetland nature. For this reason the measurements taken in the narrower, less flooded portion of the site (ie. 3 and 5 metres) were used to determine the recommended stream classification of S3.

Reach 2 (Peter Main access road)

NID # / NID Map #:	00504 / 93L007	Site #:	2
Length of Reach:	800 m	Stream Order:	1
Length Surveyed:	110 m	Channel Width:	not well defined
		Gradient:	20 %
Date of Sampling:	October 4, 1997		
Fish Presence:	dry channel		

Reach Classification:	S6
Recommended Reach Classification:	**S6**

This site was located approximately 1.1 kilometres upstream of Owen Lake. While the gradient at the road crossing was 5%, it increased to 20% just downstream of the road. No electroshocking was conducted due to the channel being dry at the time of the survey and the gradient barrier to fish migration.

4.1.4 "Peter Aleck" Creek (ILP 00501)

Old Watershed Code:	180-374000-95200-99500-2270
New Watershed Code:	(not available)
ILP # / Map #	00501 / 93L007
UTM (at confluence):	9.649225.5992929
Estimated number of reaches:	6
Number of reaches examined:	2

This fourth order stream has previously been illustrated on both TRIM and NTS maps to flow into the Nadina River (180-374000-95200-99500). Ground truthing revealed that the headwaters of Peter Aleck Creek, approximately three kilometres upstream of Park Lake (180-374000-95200-22700-01), actually drain into the southern shore of Owen Lake. "Peter Aleck" Creek (ILP 00501) is crossed by the Peter Main access road in reach 2, and the upper kilometre of reach 4 flows along the southern boundary of CP 366-2.

Reach 2 (Peter Main access road)

NID # / NID Map #:	00505 / 93L007	Site #:	1
Length of Reach:	6600 m	Stream Order:	4
Length Surveyed:	220 m	Channel Width:	6.1 m
		Gradient:	2 %
Date of Sampling:	October 4, 1997		
Fish Presence:	Dolly Varden char, rainbow trout		

Reach Classification:	S2
Recommended Reach Classification:	**S2**

This site was located approximately 3.3 kilometres upstream of Owen Lake at the Peter Main access road crossing. Good fish rearing and overwintering habitat exists, with some moderate spawning habitat available. No electroshocking was conducted due to the capture of FPC listed species upstream in reach 4. A bridge currently exists at this road crossing.

Reach 4 (CP 366-2)

NID # / NID Map #:	00553 / 93L006	Site #:	2
Length of Reach:	2800 m	Stream Order:	4
Length Surveyed:	400 m	Channel Width:	4.9 m
		Gradient:	1 %
Date of Sampling:	October 4, 1997		
Fish Presence:	Dolly Varden char, rainbow trout		

Reach Classification:	S3
Recommended Reach Classification:	**S3**

This site was located approximately 12.6 kilometres upstream of Owen Lake along the south boundary of CP 366-2. Electroshocking for 660 seconds over 105 m^2 of habitat yielded three juvenile Dolly Varden char (fork length = 58-128 mm) and two juvenile rainbow trout (fork length = 41-104 mm). Moderate spawning habitat was available, with good fish cover, rearing habitat, and overwintering habitat.

4.1.4.1 Unnamed Creek (ILP 00505)

Watershed Code:	(not available)
ILP # / Map #:	00505 / 93L007
UTM (at confluence):	to be provided by Western GIS Inc.
Estimated number of reaches:	undetermined
Number of reaches examined:	1

ILP 00505 is a second order stream that drains into "Peter Aleck" Creek (ILP 00501) from the northwest, approximately 4.6 kilometres upstream from Owen Lake.

Reach 1

NID # / NID Map #:	00560 / 93L007	Site #:	1
Length of Reach:		Stream Order:	2
Length Surveyed:	200 m	Channel Width:	1.6 m
		Gradient:	4.5 %
Date of Sampling:	October 20, 1997		
Fish Presence:	none caught in one season		

Reach Classification:	S3
Recommended Reach Classification:	**S3**

This site was located 200 metres upstream of "Peter Aleck" Creek (ILP 00501). Electroshocking over 112 m^2 of habitat for 710 seconds resulted in no fish captured or observed. The fish cover, spawning habitat, and overwintering habitat was moderate, while the rearing habitat was found to be good. At the confluence with "Peter Aleck" Creek (ILP 00501) the stream flowed underground for approximately 20 meters and may be a potential

barrier since there was no evidence of recent surface flow, and no underground channel could be identified.

S3 classification is recommended due to the presence of FPC listed species downstream in "Peter Aleck" Creek (ILP 00501). Resampling in the spring is recommended and may result in a change in stream classification to S6.

4.1.4.2 Unnamed Creek (ILP 00506)

Watershed Code:	(not available)
ILP # / Map #:	00506 / 93L007
UTM (at confluence):	9.645911.5990871
Estimated number of reaches:	undetermined
Number of reaches examined:	1

Unnamed Creek (ILP 00506) is a first order tributary that flows into "Peter Aleck" Creek (ILP 00501) approximately 6.9 kilometres upstream of Owen Lake. The creek drains from the northwest, and no harvest or road crossing has been proposed near it.

Reach 1

NID # / NID Map #:	00559 / 93L007	Site #:	1
Length of Reach:		Stream Order:	1
Length Surveyed:	200 m	Channel Width:	1.0 m
		Gradient:	4 %
Date of Sampling:	October 20, 1997		
Fish Presence:	none caught in one season; barrier at confluence		

Reach Classification:	S4 default
Recommended Reach Classification:	**S6**

Sampling began 200 metres upstream of the confluence with "Peter Aleck" Creek (ILP 00501). Only fair fish rearing habitat was found, with poor spawning habitat, overwintering habitat, and cover available. Electroshocking was conducted for 670 seconds over 80 m^2 of habitat but no fish were captured or observed. This is likely due to 30 metre long series of step-pools with a 31% gradient that exists at the confluence with "Peter Aleck" Creek (ILP 00501).

S6 classification is recommended for this stream due to no fish captured after one season of sampling, and the gradient barrier at the confluence with "Peter Aleck" Creek (ILP 00501). Full (100%) retention of the RMZ is recommended if future harvest plans are in contact with this stream to prevent/minimize potential downstream impacts on fish and fish habitat in "Peter Aleck" Creek (ILP 00501).

4.1.4.3 Unnamed Creek (ILP 00507)

Watershed Code:	(not available)
ILP # / Map #:	00507 / 93L006
UTM (at confluence):	9.642949.5991455
Estimated number of reaches:	undetermined
Number of reaches examined:	1 (from air)

This second order stream drains into "Peter Aleck" Creek (ILP 00501) from the northeast, approximately 11 kilometres upstream of Owen Lake. The stream flows through CP 366-1. Since no access was yet available by vehicle and no nearby landing sites were available for a helicopter, only cursory observations from the helicopter could be made.

Reach 1 (CP 366-1)

NID # / NID Map #:	- / 93L006	Site #:	no site card
Length of Reach:		Stream Order:	2
Length Surveyed:		Channel Width:	≥1.5 m
		Gradient:	undetermined
Date of Sampling:	October 4, 1997		
Fish Presence:	undetermined		

Reach Classification:	S3 default
Recommended Reach Classification:	**S3 default**

Due to the lack of available access to this stream, preliminary observations where made from the helicopter. The channel was determined to be at least 1.5 metres wide.

S3 default is recommended since FPC listed species are present downstream in "Peter Aleck" Creek (ILP 00501), and no barriers to fish migration were identified. It is recommended that sampling be conducted on this stream when road access comes within at least two kilometres.

4.1.4.4 Unnamed Creek (ILP 00508)

Watershed Code:	(not available)
ILP # / Map #:	00508 / 93L006
UTM (at confluence):	9.642654.5991608
Estimated number of reaches:	undetermined
Number of reaches examined:	1 (from air)

Unnamed Creek (ILP 00508) is a first order stream draining into "Peter Aleck" Creek (ILP 00501) from the north. Its confluence with Peter Aleck Creek is approximately 11.4 kilometres upstream of Owen Lake. Part of the western boundary of CP 366-1 touches this stream and the proposed extension to the Peter Main access road crosses it approximately 550 metres upstream of the mainstem. Since no access was yet available by vehicle and no

nearby landing sites were available for a helicopter, only cursory observations from the helicopter were made.

Reach 1 (CP 366-1, proposed extension of Peter Main access road)

NID # / NID Map #:	- / 93L006	Site #:	no site card
Length of Reach:		Stream Order:	1
Length Surveyed:		Channel Width:	<1.5 m
		Gradient:	undetermined
Date of Sampling:	October 4, 1997		
Fish Presence:	undetermined		

Reach Classification:	S4 default
Recommended Reach Classification:	**S4 default**

Due to the lack of available access to this stream, preliminary observations where made from the helicopter. The channel was determined to be less than 1.5 metres wide.

S4 default classification is recommended since FPC listed species are present downstream in "Peter Aleck" Creek (ILP 00501) and no barriers to fish migration were observed. It is recommended that sampling be conducted on this stream when road access comes within at least two kilometres. One-hundred percent retention of the RMZ is recommended until suitable sampling can be conducted. The road crossing should ensure adequate drainage and fish passage since fish presence is unknown.

4.1.4.5 Unnamed Creek (ILP 00509)

Watershed Code:	(not available)
ILP # / Map #:	00509 / 93L006
UTM (at confluence):	9.642500.5991581
Estimated number of reaches:	undetermined
Number of reaches examined:	1 (from air)

This stream is a second order tributary to "Peter Aleck" Creek (ILP 00501). It enters the mainstem from the north, approximately 11.6 kilometres upstream of Owen Lake. The proposed extension of the Peter Main access road crosses this stream approximately 800 metres upstream of the confluence with Peter Aleck Creek. Since no access was yet available by vehicle and no nearby landing sites were available for a helicopter, only cursory observations from the helicopter could be made.

Reach 1 (proposed extension of Peter Main access road)

NID # / NID Map #:	- / 93L006	Site #:	no site card
Length of Reach:		Stream Order:	2
Length Surveyed:		Channel Width:	≥1.5 m
		Gradient:	undetermined
Date of Sampling:	October 4, 1997		
Fish Presence:	undetermined		

Reach Classification:	S3 default
Recommended Reach Classification:	**S3 default**

Due to the lack of available access to this stream, preliminary observations where made from the helicopter. The channel was determined to be at least 1.5 metres wide.

S3 default classification is recommended due to FPC listed species present downstream in "Peter Aleck" Creek (ILP 00501), and no known barriers to fish migration. It is recommended that sampling be conducted on this stream when road access comes within at least two kilometres.

4.1.4.6 Unnamed Creek (ILP 00510)

Watershed Code:	(not available)
ILP # / Map #:	00510 / 93L006
UTM (at confluence):	9.642467.5991575
Estimated number of reaches:	undetermined
Number of reaches examined:	3

The confluence of this second order tributary to "Peter Aleck" Creek (ILP 00501) is approximately 11.7 kilometres upstream of Owen Lake. It enters the mainstem from the northwest. The first and second reaches drain northwest along the northern boundary of CP 366-2, and the proposed extension of the Peter Main access road crosses this stream in the third reach.

Reach 1 (CP 366-2)

NID # / NID Map #:	00501 / 93L006	Site #:	1
Length of Reach:	1100 m	Stream Order:	2
Length Surveyed:	350 m	Channel Width:	1.6 m
		Gradient:	5 %
Date of Sampling:	October 4, 1997		
Fish Presence:	none captured in one season		

Reach Classification:	S3
Recommended Reach Classification:	**S3 (see comments)**

This stream was surveyed approximately 780 meters upstream of the confluence with "Peter Aleck" Creek (ILP 00501). Good fish cover was present in this reach, and rearing habitat was moderate. Spawning habitat and overwintering habitat were poor. Electroshocking over 100 m^2 of habitat for 451 seconds resulted in no fish captured or observed.

S3 classification is recommended for this reach since FPC listed species were captured downstream in "Peter Aleck" Creek (ILP 00501), and no barriers to fish migration were identified in the reach. Resampling in the spring is recommended, and may result in a change in stream classification to S6.

Reach 2 (CP 366-2)

NID # / NID Map #:	00502 / 93L006	Site #:	2
Length of Reach:	200 m	Stream Order:	2
Length Surveyed:	150 m	Channel Width:	not well defined
		Gradient:	2 %
Date of Sampling:	October 4, 1997		
Fish Presence:	no habitat; channel not well defined		

Reach Classification:	S6
Recommended Reach Classification:	**S6 / W3 (see comments)**

This site was located in a wetland area, approximately 1150 metres upstream of the confluence with "Peter Aleck" Creek (ILP 00501). No electroshocking was conducted due to no available habitat and no well defined channel.

To prevent potential downstream impacts on fish and fish habitat, 100% retention in the RMZ is recommended until resampling in the first reach confirms fish absence.

Reach 3 (proposed extension of Peter Main access road)

NID # / NID Map #:	00503 / 93L006	Site #:	3
Length of Reach:		Stream Order:	2
Length Surveyed:	200 m	Channel Width:	1.8 m
		Gradient:	12 -14 %
Date of Sampling:	October 4, 1997		
Fish Presence:	wetland barrier in reach 2		

Reach Classification:	S6
Recommended Reach Classification:	**S6**

This site is located approximately 1700 metres upstream of the confluence with "Peter Aleck" Creek (ILP 00501). Moderate fish cover and rearing habitat was observed in this reach. The overwintering habitat is fair and the spawning habitat is poor. No electroshocking was conducted due to the wetland in reach 2 which is a barrier to fish migration.

A culvert is recommended for the proposed extension of the Peter Main access road to ensure adequate drainage. Due to the limited potential for downstream impacts on fish habitat, only partial retention of riparian vegetation is recommended until resampling in the first reach confirms fish absence from this stream.

5.0 SUMMARY OF RECOMMENDATIONS FOR STREAM RESAMPLING

5.1 CP 364-2

5.1.1 Unnamed Creek (460-600600-23900-84800)

Refer to Report Section:	4.1.1	Reach / Site:	1 / 1
NID #:	00557	NID map #:	93L007

Good fish rearing habitat, overwintering habitat and cover were observed. Spawning habitat was assessed to be fair. Electroshocking was conducted over 140 m^2 of habitat for 730 seconds but no fish were captured or observed.

S3 classification is recommended for this reach due to the presence of numerous FPC listed species downstream in Owen Lake. Resampling in the spring is recommended, and may change the classification upstream of the cascade (NID 00561) to S6.

5.2 CP 366-1, Peter Main access road

5.2.1 Unnamed Creek (ILP 00503)

Refer to Report Section:	4.1.2	Reach / Sites:	1 / 1 & 2
NIDS #:	00554 & 00555	NID map #:	93L007

Fair fish rearing and spawning habitat, poor overwintering habitat, and moderate cover were observed at the most downstream site. The site at the road crossing was found to have poor spawning habitat, while the cover, rearing habitat, and overwintering habitat were fair. It is likely that fish use is limited in the section of the reach near the proposed road crossing due to many small (less than one metre high) step-pools and cascade-pools, and a relatively steep gradient. Electroshocking did not result in the capture of fish at either site.

S4 default classification is recommended for this reach due to the presence of FPC listed fish species downstream in Owen Lake. Resampling in the spring is recommended in the first reach to potentially change the stream classification to S6 and reduce the necessity for retention in reach 2.

5.2.2 Unnamed Creek (ILP 00507)

Refer to Report Section:	4.1.4.3	Reach / Site:	1 / -
NID #:		NID map #:	93L006

Due to the lack of available access to this stream, preliminary observations where made from the helicopter. The channel was determined to be at least 1.5 metres wide.

S3 default is recommended since FPC listed species are present downstream in "Peter Aleck" Creek (ILP 00501), and no known barriers to fish migration were identified. It is recommended that sampling be conducted on this stream when road access comes within at least two kilometres.

5.2.3 Unnamed Creek (ILP 00508)

Refer to Report Section:	4.1.4.4	Reach / Site:	1 / -
NID #:		NID map #:	93L006

Due to the lack of available access to this stream, preliminary observations where made from the helicopter. The channel was determined to be less than 1.5 metres wide.

S4 default classification is recommended since FPC listed species are present downstream in "Peter Aleck" Creek (ILP 00501) and no barriers to fish migration were observed. It is recommended that sampling be conducted on this stream when road access comes within at least two kilometres. 100% retention of the RMZ is recommended until suitable sampling can be conducted. The road crossing should ensure adequate drainage and fish passage since fish presence is unknown.

5.2.4 Unnamed Creek (ILP 00509)

Refer to Report Section:	4.1.4.5	Reach / Site:	1 / -
NID #:		NID map #:	93L006

Due to the lack of available access to this stream, preliminary observations where made from the helicopter. The channel was determined to be at least 1.5 metres wide.

S3 default classification is recommended due to FPC listed species present downstream in "Peter Aleck" Creek (ILP 00501), and no known barriers to fish migration. It is recommended that sampling be conducted on this stream when road access comes within at least two kilometres.

5.3 CP 366-2

5.3.1 Unnamed Creek (ILP 00510)

Refer to Report Section:	4.1.4.6	Reach / Site:	1 / 1
NID #:	00501	NID map #:	93L006

Good fish cover was present in this reach, and rearing habitat was moderate. Spawning habitat and overwintering habitat were poor. Electroshocking over 100 m^2 of habitat for 451 seconds resulted in no fish captured or observed.

S3 classification is recommended for this reach since FPC listed species were captured downstream in "Peter Aleck" Creek (ILP 00501), and no barriers to fish migration were identified in the reach. Resampling in the spring is recommended, and may result in a change in stream classification to S6.

Note: Additional resampling recommendations for other sites not near planned harvest areas or road crossings indicated by Houston Forest Products Ltd. are discussed throughout the text.

6.0 REFERENCES

BC Environment. 1996. A guide to the hierarchical watershed coding for British Columbia.

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APPENDIX 1 - Site Cards, Fish Data Collection Forms, and Site Photographs

Site Cards, Fish Data Collection Forms, and photographs for all streams inventoried in 1997 relevant to CP 364-1&2, CP 366-1&2, and the Peter Main access road.

Note: All Site Cards are entered into a Field Data Information System (FDIS) database.

All Fish Data Collection Forms are entered into a Fish Card Collection System database.

Photodocumentation includes:

- All photographs on photo CDs
- Hardcopy of all photographs ($3\ ^{1}/_{2}$" x 5")
- Hardcopy of photodocumentation
- Digital copy of MS Excel spreadsheet with photodocumentation information

Unnamed Creek (460-600600-23900-84800) - Reach 1

Plate 1. Reach 1 - sample site 1. Upstream view (above) and downstream view (below).

Unnamed Creek (460-600600-23900-84800) - Reach 3

Plate 2. Reach 3 - sample site 2. Upstream view (above) and downstream view (below).

Unnamed Creek (460-600600-23900-84800)

Plate 3. View of 5 metre high, 30 metre long cascade in reach 2 (above) and bank failure at the proposed extension of the Peter Main access road in reach 3 (below).

Unnamed Creek (ILP 00503) - Reach 1

Plate 4. Reach 1 - sample site 1. Upstream view (above), downstream view (above - right), and a 70 cm step-pool (below - right).

Unnamed Creek (ILP 00503) - Reach 1

Plate 5. Reach 1 - sample site 2. Upstream view (above) and downstream view (below).

Unnamed Creek (ILP 00503) - Reach 2

Plate 6. Reach 2 - sample site 3. Upstream view (above) and downstream view (below).

Unnamed Creek (ILP 00503) - Reach 3

Plate 7. Reach 3 - sample site 4. Upstream view (above) and downstream view (below).

Plate 8. Reach 1 - sample site 1. Upstream view with 1.2 metre high beaver dam (above) and downstream view (below).

Unnamed Creek (ILP 00502) - Reach 2

Plate 9. Reach 2 - sample site 2. Upstream view (above) and downstream view (below).

Unnamed Creek (ILP 00501) - Reach 2

Plate 10. Reach 2 - sample site 1. Upstream view (above) and downstream view (below).

Unnamed Creek (ILP 00501) - Reach 4

Plate 11. Reach 4 - sample site 2. Upstream view (above) and downstream view (below).

Unnamed Creek (ILP 00501) - Reach 4

Plate 12. Reach 4 - sample site 2. 104 mm rainbow trout (above) and 128 mm Dolly Varden (below).

Unnamed Creek (ILP 00505) - Reach 1

Plate 13. Reach 1 - sample site 1. Upstream view (above), downstream view (above - right), and apparent confluence with Peter Aleck Creek (below - right).

Unnamed Creek (ILP 00506) - Reach 1

Plate 14. Reach 1 - sample site 1. Upstream view (above) and downstream view (below).

Unnamed Creek (ILP 00510) - Reach 1

Plate 15. Reach 1 - sample site 1. Upstream view (above) and downstream view (below).

Unnamed Creek (ILP 00510) - Reach 2

Plate 16. Reach 2 - sample site 2. Upstream view (above) and downstream view (below).

Unnamed Creek (ILP 00510) - Reach 3

Plate 17. Reach 3 - sample site 3. Upstream view (above) and downstream view (below).

APPENDIX 2 - 1:20 000 TRIM Maps

2 maps illustrating reach breaks, sampling sites with NIDs, ILPs and stream classification for applicable watersheds including excerpts from:

93 L 006
93 L 007