

**Reconnaissance (1:20 000) Fish and Fish Habitat  
Inventory  
of the  
Kleanza Creek Watershed  
WSC: 400-231800-00000-0000**

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## PROJECT REFERENCE INFORMATION

|                                     |                        |
|-------------------------------------|------------------------|
| <b>MELP Project Number</b>          | 06-KLUM-000001094-1999 |
| <b>FRBC Project Number</b>          | N/A                    |
| <b>FDIS Project Number</b>          | 06-KLUM-000001047-1999 |
| <b>FRBC Region</b>                  | Skeena Region          |
| <b>MELP Region</b>                  | 06                     |
| <b>FW Management Unit</b>           | 06-9                   |
| <b>Fisheries Planning Unit</b>      | N/A                    |
| <b>DFO Sub-District</b>             | Prince Rupert (06)     |
| <b>Forest Region</b>                | Prince Rupert          |
| <b>Forest District</b>              | Kalum district         |
| <b>Forest Licensee and Tenure #</b> | A16835                 |
| <b>First Nations Claim Area</b>     | Tsimshian              |

## WATERSHED INFORMATION

|                                    |                                                               |
|------------------------------------|---------------------------------------------------------------|
| <b>Watershed Group</b>             | KLUM (Kalum River)                                            |
| <b>Watershed Name</b>              | Kleanza                                                       |
| <b>Watershed Code</b>              | 400-231800-00000-00000-00000                                  |
| <b>UTM at Mouth</b>                | 9.538120.602920                                               |
| <b>Watershed Area</b>              | 303.3 km <sup>2</sup>                                         |
| <b>Total of All Stream Lengths</b> | 654.7 km                                                      |
| <b>Stream Order</b>                | 5th order                                                     |
| <b>NTS Maps</b>                    | 103I/9                                                        |
| <b>TRIM Maps</b>                   | 103I.059, 103I.060, 103I.069,<br>103I.070, 103I.068, 103I.058 |
| <b>BEC Zone</b>                    | CWH, MH, AT                                                   |
| <b>Air Photos</b>                  | BC88021 No. 15-33,<br>BC88022 No. 206-220, 50-54              |

## SAMPLING DESIGN SUMMARY

|                                   |                                                                      |
|-----------------------------------|----------------------------------------------------------------------|
| <b>Total Number of Reaches</b>    | 871                                                                  |
| <b>Random Sampling Sites</b>      | 51                                                                   |
| <b>Discretionary Sample Sites</b> | 24                                                                   |
| <b>Total Sample Sites</b>         | 75                                                                   |
| <b>Field Sampling Dates</b>       | July 17 - September 8, 1999                                          |
| <b>Fish Species in Watershed</b>  | BT, DV, CT, RB, ST, KO, MW, CO, CH,<br>PK, CM, SK, LNC, BB, PCC, CAS |

## 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.

## **ACKNOWLEDGMENTS**

Funding for this project was provided by Forest Renewal B.C., and administered by Skeena Cellulose Inc., Terrace, B.C.. The contract was monitored jointly by Kim Haworth (Skeena Cellulose Inc.) and Brad Pollard (Acer Resource Consulting Ltd.). Skeena Cellulose Inc. provided maps and air photos. Editorial comments on drafts of this report were provided by, Todd Zimmerling (Applied Ecosystem Management Ltd.), Sam Buchanan and Brad Pollard (QA/QC Monitors).

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## LIST OF ATTACHMENTS AVAILABLE AT MoELP OFFICE

- Attachment 1. Original site cards.
- Attachment 2: Photograph CDs.
- Attachment 3. Photodocumentation - photograph negatives and Form 1.
- Attachment 4. Digital Data: Report, FDISdat.mdb, GIS map files.
- Attachment 5. FISS update forms.
- Attachment 6. Interpretive and Project maps.

## **1.0 INTRODUCTION**

This inventory project encompassed the Kleanza Creek watershed and Tributaries to the Skeena River that were in close proximity to the mouth of Kleanza Creek. The streams were inventoried from July to September, 1999, to determine habitat characteristics of streams within the watersheds, as well as the diversity, abundance and distribution of fish populations. Applied Ecosystem Management Ltd. was retained by Skeena Cellulose Inc. (Terrace Woodlands) to conduct the inventory. As part of this project a full background review of all existing fisheries information was conducted. In addition, using Resource Inventory Committee (RIC) protocol and the Field Data Information System (FDIS) database, 75 sites were selected for field surveys. This report summarizes the results of the reconnaissance level stream inventory for the Kleanza watershed.

### **1.1 PROJECT SCOPE/OBJECTIVES**

The objectives of this project were:

- 1) Review and summarize historical fisheries information for the Kleanza watershed.
- 2) Undertake a 1:20 000 reconnaissance level stream inventory to describe fish diversity, abundance and distribution.
- 3) Document fish habitat characteristics.
- 4) Document barriers to fish passage.
- 5) Identify any further sampling requirements in the watershed.

This project did not encompass 1:5000 inventories, nor did it include any lake surveys, as no lakes requiring future surveys were identified.

### **1.2 LOCATION**

The Kleanza watershed is located northeast of Terrace, B.C. (see Figure 1), and flows into the Skeena River. The Skeena River forms the western boundary of the study area, while mountain ranges to the north, south and east serve as the other boundaries to the study area.

#### **1.2.1 Access**

Road access to the Kleanza watershed is available along the Kleanza mainline Forest Service Road (FSR), which is located approximately 17 km east of Terrace, along Highway 16. The FSR is accessible using 2-wheel drive over most of the watershed, although some side roads have been deactivated and require 4-wheel drive.

Helicopter access to all three watersheds is available from a number of companies operating from the Terrace-Kitimat Regional Airport. Flight time from the airport to the study area is approximately 6 minutes.

**Figure 1. Overview location map of Kleanza Creek watershed study area.**

## 2.0 RESOURCE INFORMATION

The study area has been subject to logging activities since the early 1960's (Smith, B., pers. comm.). The area became part of F.L.A. 16835 in the mid 1970's and is currently managed by Skeena Cellulose Inc.. The long-term forestry activities in the area have resulted in the majority of CWHws1 (valley bottom) old-growth being logged.

This area provides a variety of fishing, hunting and hiking opportunities for recreation. Bornite mountain is accessed from the Kleanza mainline. The trail up Bornite mountain allows individuals to access the extensive alpine plateaus in the area (Newman, K., pers. comm.). Kleanza Lake provides good fishing opportunities for cutthroat trout (*Oncorhynchus clarki*), and although there is currently no recreation site on the lake a proposal has been put forth to have a site developed (Newman, K., pers. comm.). The entire watershed is also hunted extensively for bear, moose (*Alces alces*) and mountain goat (*Oreamnos americanus*) (Newman, K., pers. comm.).

Kleanza Creek Provincial Park is located adjacent to Kleanza Creek and Highway 16 (along the north side of reach 1 and lower section of reach 2). This park has overnight camping and picnic facilities. As well, there are hiking trails on the north side of Kleanza Creek starting from the main parking area.

Although there are no specific large areas of rare or high value habitat known for any species of wildlife in this study area, the area does provide habitat for a large number of mammal, bird, and amphibian species. In addition, pink (*O. gorbuscha*), chinook (*O. tshawytscha*) and chum (*O. keta*) salmon are all known to spawn in the upper section of reach 1 and coho (*O. kisutch*) spawning occurs in reach 2 (FISS). Large numbers of fish can be seen from the Kleanza Provincial Park congregating at the bottom of the falls located in reach 2. This area is important, as a large number of fish hold in the pools below the waterfall and cascade.

Resident populations of Dolly Varden char (*Salvelinus malma*), cutthroat trout, rainbow trout (*O. mykiss*), mountain whitefish (*Prosopium williamsoni*) and kokanee (*O. nerka*) have been previously identified in the Kleanza watershed (FISS) and sampling for this project also identified bull trout (*Salvelinus confluentus*). FISS also identifies sockeye salmon (*Oncorhynchus nerka*), longnose dace (*Rhinichthys cataractae*), peamouth chubb (*Mylocheilus caurinus*), burbot (*Lota lota*), and prickly sculpin (*Cottus asper*) in the lower section of reach 1.

The study area is part of the Tsimshian traditional territory and has been used in the past by the Kitselas band. The current Tsimshian land claim encompasses the entire study area.

To summarize resource information:

- i) Entire area is located within F.L.A. 16835, managed by Skeena Cellulose Inc.
- ii) Extensive use of the area by a variety of wildlife species.
- iii) Coho, chinook, chum and pink salmon are known in the watershed, along with Dolly Varden, bull trout, cutthroat trout, rainbow trout, mountain whitefish and kokanee.
- iv) Access to most of the study area is good, along 2 and 4-wheel drive FSR.
- v) Recreational activities are extensive with fishing, hiking, hunting and camping opportunities.
- vi) Entire study area is within the Tsimshian traditional territory.

## 3.0 METHODS

### 3.1 SAMPLE SITE SELECTION

Sample sites were selected randomly through the Field Data Information System (FDIS) by conducting reach break analysis for the entire study area. During Phases I-III of this Reconnaissance (1:20 000) Fish and Fish Habitat Inventory (completed by Applied Ecosystem Management, Ltd., 1999) all streams on 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 1998; RIC Errata 1999). Streams were divided into reaches based on map and air photo interpretation. Basin types were assigned to each reach, and all reach information was entered in the FDIS database, following Resource Inventory Committee standards (RIC 1998; RIC Errata 1999).

The FDIS program was used to determine randomly selected reaches for field sampling. These reaches were mapped on 1:20 000 and 1:50,000 map scale and some sites were deleted or moved based on previous fish sampling, site accessibility. Random and biased (selected by researchers) sampling sites were mapped on 1:20 000 scale, along with existing fisheries information for presentation to the contract monitor.

### 3.2 STREAM ASSESSMENT

From July 17 to September 8, 1999 field sampling was undertaken. At each selected sample site FDIS site cards and fish collection cards were completed as per Resource Inventory Committee Standards (RIC 1998; RIC Errata 1999). Fish were sampled using electroshocking or Gee-traps, as per the Fish Collection and Methods Standards (1997; Errata 1999). Table 1 summarizes the sampling equipment used during the field portion of this project.

All fish captured were identified to species. Bull trout and Dolly Varden char were distinguished based on the linear discriminant function (equation 1) developed by Haas and McPhail (1991).

Equation 1. 
$$\text{LDF} = 0.63 \times \text{BR} + 0.18 \times \text{AFR} + 37.31 \times (\text{UJL}/\text{SL}) - 21.8$$

where: LDF = linear discriminant function (>0 are bull trout, <0 are Dolly Varden)  
BR = total branchiostegal ray number  
AFR = total anal fin ray number  
UJL = total upper jaw length  
SL = standard length

Fork lengths were recorded for all fish captured to allow for an estimation of age based on fork length.

No voucher specimens or DNA samples were collected from this study area.

**Table 1. Summary of sampling equipment and sampling intensity.**

| <b>Parameter</b>  | <b>Intensity</b>                       | <b>Equipment</b>                                                   |
|-------------------|----------------------------------------|--------------------------------------------------------------------|
| water temperature | each site                              | alcohol thermometer                                                |
| pH                | each site                              | Oakton pHTestr 2r                                                  |
| conductivity      | each site                              | Oakton TDSTestr 3                                                  |
| water clarity     | each site                              | Visual                                                             |
| fish presence     | as required to determine fish presence | Smith-Root Model 12B - POW electroshocker or Gee-type minnow-traps |
| photography       | each site                              | Minolta Weathermatic Dual 35                                       |
| gradient          | each site                              | CST Abney Level or Suunto clinometer                               |
| site length       | each site                              | visual/Fieldranger 6500 hipchain                                   |

## 4.0 RESULTS AND DISCUSSION

### 4.1 LOGISTICS

Rugged terrain and small size of some streams in the study area created difficulty in accessing some sites; however, the majority of sites were accessible by 2 or 4-wheel drive. Where steep terrain prevented road and foot access, a helicopter was used. In addition, a helicopter overview flight was used on all streams to identify barriers to fish migration.

### 4.2 HABITAT AND FISH DISTRIBUTION

The study area has been split into two distinct sub-basins (Table 2): Kleanza Creek sub-basin (400-231800-00000-00000) and Tributaries to the Skeena River sub-basin. Data collected is presented for each sub-basin.

**Table 2. Summary of Sub-basins in the Kleanza Creek Watershed study area.**

| Sub-basin name              | Watershed Code         | UTM at mouth    | Sub-basin Area (km <sup>2</sup> ) | Stream length (km) | Stream Order | NTS Map | BEC Zone  |
|-----------------------------|------------------------|-----------------|-----------------------------------|--------------------|--------------|---------|-----------|
| Kleanza Creek               | 400-248400-00000-00000 | 9.538120.602920 | 271.5                             | 575.5              | 5            | 103-I/9 | CWH/MH/AT |
| Tributaries to Skeena River | various                | -               | 31.8                              | 79.2               | 3            | 103-I/9 | CWH/MH    |

#### 4.2.1 Kleanza Creek Sub-basin (400-231800-00000-)

In general, there is good fish habitat found throughout the study area (Table 3); however, barriers to fish passage in the lower section of reach 2 of the Kleanza Creek prevent most anadromous fish from accessing the upper reaches (Table 4). The exception appears to be coho, which, according to FISS records, spawn above these barriers. The existence of coho within the drainage above reach 1 was not confirmed in sampling for this project.

FISS information indicates spawning of chinook, pink and chum salmon in reach 1 of Kleanza Creek. As well, FISS indicates the presence of steelhead, cutthroat trout, and mountain whitefish in Kleanza Creek and Dolly Varden, kokanee and rainbow trout in Kleanza Lake. Sampling for this project confirmed the presence of rainbow trout and bull trout within the Kleanza Creek sub-basin; however, no cutthroat trout, Dolly Varden or mountain whitefish were captured.

Despite the apparent availability of good fish habitat, fish were captured in relatively few locations within the Kleanza sub-basin (Table 3). Where fish were present, densities were usually very low, requiring extensive electroshocking time to capture even a single

fish. This phenomenon was not limited to smaller tributaries, as the Kleanza mainstem also had low densities of fish. The exception to the overall low densities was reach 9 of Kleanza mainstem where numerous rainbow fry were observed.

The most common species captured within the sub-basin was rainbow trout. This was the only species captured within the Kleanza Creek mainstem. Bull trout were captured in two locations (NID 2027 and NID 2042; Photograph 1) with significant distance between the sites. This finding made the lack of bull trout in the mainstem of Kleanza Creek that much more puzzling, and sampling for this project was not able to explain the apparent isolation of these two bull trout populations.

Owing to the steep nature of the watershed, the majority of tributaries to Kleanza Creek had fish passage barriers in reach 1 or lower reach 2 (Table 4). These barriers confined most fish presence to a relatively narrow area close to the valley bottom.



**Photograph 1. Bull trout (135 mm) captured at NID 2027.**

**Table 3. Summary of sample sites in the Kleanza Creek watershed study area (July 17 - September 8 1999).**

| Watershed Code or ILP/NID    | Description         | Reach | Channel      |           | Substrate <sup>1</sup> |     | Morph <sup>2</sup> | Rearing | Habitat <sup>3</sup> |            | Fish Species <sup>4</sup> |
|------------------------------|---------------------|-------|--------------|-----------|------------------------|-----|--------------------|---------|----------------------|------------|---------------------------|
|                              |                     |       | Gradient (%) | Width (m) | Dom                    | Sub |                    |         | Spawning             | Overwinter |                           |
| Kleanza Creek sub-basin      |                     |       |              |           |                        |     |                    |         |                      |            |                           |
| 400-231800-25500-/1000       | Unnamed Creek       | 2     | 12.3         | 4.93      | C                      | G   | CP                 | G       | P                    | M          | NFC                       |
| ILP 59041/1002               | Unnamed Creek       | 2     | 20.7         | 2.51      | C                      | G   | CPCW               | G       | M                    | P          | NFC                       |
| 400-231800-/2000             | Kleanza Creek       | 2     | 5            | 17.65     | C                      | B   | CPB                | G       | G                    | G          | RB                        |
| 400-231800-/2001             | Kleanza Creek       | 3     | 3.5          | 25.5      | G                      | C   | RP                 | G       | G                    | G          | RB                        |
| 400-231800-/2002             | Kleanza Creek       | 5     | 2            | 15.1      | C                      | B   | RPCW               | G       | M                    | G          | RB                        |
| 400-231800-/2003             | Kleanza Creek       | 8     | 5            | 19.5      | G                      | C   | RPCW               | E       | G                    | G          | NFC                       |
| 400-231800-/2004             | Kleanza Creek       | 9     | 1.5          | 5.62      | G                      | C   | RPGW               | G       | E                    | P          | RB                        |
| 400-231800-24100-/2005       | Kendal Creek        | 1     | 6.5          | 6.82      | G                      | B   | SPBW               | G       | M                    | B          | RB                        |
| 400-231800-24100-29600-/2006 | Unnamed Creek       | 2     | 11.5         | 1.7       | C                      | G   | RP                 | M       | P                    | P          | NFC                       |
| ILP 59047/2007               | Unnamed             | 2     | 15           | .38       | F                      | G   | SP                 | P       | P                    | P          | NFC                       |
| 400-231800-28200-/2010       | Bosco Creek         | 2     | 9            | 8.53      | B                      | G   | CPB                | G       | M                    | M          | NFC                       |
| 400-231800-28200-/2011       | Bosco Creek         | 3     | 2.5          | 4.42      | G                      | C   | RPGW               | E       | G                    | M          | NFC                       |
| ILP 59062/2012               | Unnamed Creek       | 1     | 2            | 0.72      | F                      | G   | RP                 | P       | P                    | P          | NFC                       |
| ILP 59071/2013               | Trib to Bosco Creek | 1     | 4.5          | 0.56      | G                      | C   | NS                 | M       | M                    | P          | NFC                       |
| ILP 59058/2014               | Unnamed Creek       | 3     | 6            | 1.3       | B                      | F   | RP                 | P       | N                    | M          | NFC                       |
| 400-231800-37600-/2015       | Mike Creek          | 1     | 34.3         | 7.48      | B                      | C   | CPB                | G       | P                    | P          | RB                        |
| ILP 59104/2016               | Unnamed Creek       | 1     | 1.5          | 1.18      | F                      | G   | NS                 | G       | M                    | P          | NFC                       |
| 400-231800-44600-/2017       | Keap Creek          | 1     | 6            | 9.17      | C                      | B   | CPB                | G       | G                    | G          | RB                        |
| 400-231800-44600-/2018       | Keap Creek          | 2     | 6.5          | 9.7       | C                      | G   | CPB                | E       | M                    | -          | NFC                       |
| 400-231800-44600-/2019       | Keap Creek          | 3     | 9            | 9.65      | C                      | B   | CPB                | P       | N                    | M          | NFC                       |
| 400-231800-44600-65500-/2020 | Unnamed Creek       | 1     | 11.5         | 7.47      | B                      | C   | CPB                | M       | P                    | M          | NFC                       |
| ILP 59122/2021               | Unnamed Creek       | 1     | 8.5          | 1.28      | F                      | G   | RP                 | M       | P                    | N          | NFC                       |
| ILP 59147/2022               | Trib to Keap Creek  | 1     | 17.5         | 4.87      | C                      | G   | SP                 | G       | G                    | G          | NFC                       |
| 400-231800-44600-37900-/2023 | Unnamed Creek       | 2     | 24           | 0.92      | C                      | B   | SP                 | G       | G                    | M          | NFC                       |
| ILP 59169/2024               | Unnamed Creek       | 1     | 31.5         | 2.4       | R                      | B   | CPB                | P       | P                    | P          | NFC                       |
| ILP 60011/2025               | Unnamed Creek       | 1     |              | NVC       |                        |     |                    |         |                      |            |                           |
| ILP 60012/2026               | Unnamed Creek       | 1     | 34           | 1.13      | C                      | G   | SP                 | G       | M                    | P          | NFC                       |
| 400-231800-61200-/2027       | Kipulta Creek       | 1     | 5.5          | 11.87     | C                      | F   | CPB                | G       | M                    | M          | BT                        |

Table 3. (continued).

| Watershed Code or ILP/NID    | Description           | Reach | Channel      |           | Substrate <sup>1</sup> |     | Morph <sup>2</sup> | Rearing | Habitat <sup>3</sup> |            | Fish Species <sup>4</sup> |
|------------------------------|-----------------------|-------|--------------|-----------|------------------------|-----|--------------------|---------|----------------------|------------|---------------------------|
|                              |                       |       | Gradient (%) | Width (m) | Dom                    | Sub |                    |         | Spawning             | Overwinter |                           |
| 400-231800-61200-48600-/2028 | Unnamed Creek         | 1     | 15           | 0.63      | F                      | C   | RP                 | P       | N                    | N          | NFC                       |
| ILP 60063/2029               | Trib to Kipulta Creek | 1     | 19           | 1.47      | C                      | G   | SP                 | M       | M                    | P          | NFC                       |
| 400-231800-70000-/2030       | Unnamed Creek         | 2     | 11.5         | 4.84      | G                      | C   | RP                 | M       | P                    | P          | NFC                       |
| ILP 60081/2031               | Unnamed Creek         | 1     | 37.5         | 0.70      | G                      | C   | RPGW               | N       | N                    | N          | NFC                       |
| 400-231800-76900-/2032       | Unnamed Creek         | 1     | 28           | 0.90      | R                      | C   | CPB                | M       | M                    | M          | NFC                       |
| 400-231800-83000-/2033       | Unnamed Creek         | 1     | 14.5         | 9.49      | C                      | B   | SP                 | M       | M                    | M          | SP                        |
| ILP 60084/2034               | Unnamed Creek         | 1     |              | NVC       |                        |     |                    |         |                      |            |                           |
| 400-231800-86000-/2035       | Call Creek            | 1     | 6            | 20.85     | B                      | C   | CPB                | M       | P                    | M          | NFC                       |
| 400-231800-86000-/2036       | Call Creek            | 2     | 11.5         | 7.90      | B                      | C   | CPB                | G       | P                    | G          | NFC                       |
| ILP 60116/2037               | Unnamed Creek         | 1     | 11.5         | 0.45      | C                      | B   | CPB                | M       | P                    | P          | NFC                       |
| ILP 60091/2038               | Unnamed Creek         | 1     | 19.5         | 2.2       | C                      | B   | CPB                | G       | M                    | M          | NFC                       |
| 400-231800-87700-/2039       | South Kleanza Creek   | 2     | 7            | 10.65     | C                      | B   | CPB                | G       | M                    | M          | NFC                       |
| ILP 60145/2040               | Unnamed Creek         | 1     | 14           | 1.6       | G                      | B   | RP                 | P       | N                    | N          | NFC                       |
| ILP 60163/2041               | Unnamed Creek         | 2     | 7            | 0.97      | G                      | C   | RP                 | M       | M                    | P          | NFC                       |
| ILP 60171/2042               | Unnamed Creek         | 1     | 2            | 3.43      | G                      | F   | RP                 | G       | G                    | G          | BT                        |
| ILP 60173/2043               | Unnamed Creek         | 1     | 8.5          | 1.35      | G                      | F   | RP                 | M       | P                    | N          | NFC                       |
| 400-231800-80300-/2044       | North Kleanza Creek   | 1     | 11           | 4.35      | C                      | R   | CPB                | G       | P                    | M          | NFC                       |
| 400-231800-80300-/2045       | North Kleanza Creek   | 2     | 9.7          | 10.1      | B                      | C   | SPBW               | M       | P                    | M          | NFC                       |
| 400-231800-80300-/2046       | North Kleanza Creek   | 3     | 17           | 8.1       | B                      | C   | CPB                | G       | N                    | E          | NFC                       |
| ILP 60180/2047               | Unnamed Creek         | 1     | 21           | 5.2       | G                      | C   | RP                 | G       | M                    | M          | NFC                       |
| 400-231800-80300-50400-/2048 | Unnamed Creek         | 2     | 2            | 1.34      | C                      | F   | RP                 | M       | P                    | P          | NFC                       |
| ILP 60204/2049               | Unnamed Creek         | 1     | 35           | 2.1       | C                      | G   | SPBW               | P       | P                    | P          | NFC                       |
| ILP 60205/2050               | Unnamed Creek         | 1     | 20           | 0.53      | F                      | C   | SP                 | N       | N                    | N          | NFC                       |
| 400-231800-70900-36800-/2051 | Unnamed Creek         | 2     | 17.5         | 1.65      | G                      | C   | SP                 | M       | N                    | M          | NFC                       |
| 400-231800-68400-/2052       | Unnamed Creek         | 4     | 6.5          | 0.74      | C                      | G   | RP                 | P       | N                    | M          | NFC                       |
| 400-231800-63800-/2053       | Unnamed Creek         | 2     | 5            | 1.53      | G                      | F   | RP                 | P       | P                    | N          | NFC                       |
| ILP 60245/2054               | Unnamed Creek         | 2     | 13.5         | 0.63      | F                      | C   | NS                 | P       | N                    | P          | NFC                       |
| ILP 60243/2055               | Unnamed Creek         | 1     | 23.8         | 2.40      | C                      | G   | CP                 | G       | G                    | M          | NFC                       |
| 400-231800-48300-/2056       | Unnamed Creek         | 1     | 19.3         | 6.4       | G                      | C   | SP                 | G       | M                    | M          | NFC                       |

Table 3. (continued).

| Watershed Code or ILP/NID                 | Description         | Reach | Channel      |           | Substrate <sup>1</sup> |     | Morph <sup>2</sup> | Rearing | Habitat <sup>3</sup> |            | Fish Species <sup>4</sup> |
|-------------------------------------------|---------------------|-------|--------------|-----------|------------------------|-----|--------------------|---------|----------------------|------------|---------------------------|
|                                           |                     |       | Gradient (%) | Width (m) | Dom                    | Sub |                    |         | Spawning             | Overwinter |                           |
| 400-231800-39700-/2057                    | Unnamed Creek       | 1     | 15           | 2.0       | G                      | C   | CP                 | G       | M                    | P          | RB                        |
| ILP 59088/2058                            | Unnamed Creek       | 1     | 11.5         | 0.58      | F                      | G   | CP                 | P       | P                    | N          | DC                        |
| ILP 59021/2059                            | Unnamed Creek       | 2     |              | NVC       |                        |     |                    |         |                      |            |                           |
| ILP 59016/2060                            | Unnamed Creek       | 1     | 33.3         | 2.49      | C                      | B   | SP                 | P       | P                    | P          | NFC                       |
| 400-231800-87700-/2074                    | South Kleanza Creek | 1     | 3            | 24        | G                      | C   | RP                 | G       | G                    | M          | NFC                       |
| Tributaries to the Skeena River sub-basin |                     |       |              |           |                        |     |                    |         |                      |            |                           |
| ILP 69001/2061                            | Unnamed Creek       | 1     |              | NVC       |                        |     |                    |         |                      |            |                           |
| ILP 69003/2062                            | Unnamed Creek       | 1     |              | NVC       |                        |     |                    |         |                      |            |                           |
| 400-242300-/2063                          | Unnamed Creek       | 1     | 0.5          | 9.56      | F                      | C   | LC                 | M       | N                    | G          | NFC                       |
| ILP 69004/2064                            | Unnamed Creek       | 1     | 15           | 1.22      | C                      | B   | CPB                | M       | P                    | P          | NFC                       |
| ILP 68002/2065                            | Unnamed Creek       | 3     |              | NVC       |                        |     |                    |         |                      |            |                           |
| ILP 68002/2066                            | Unnamed Creek       | 1     | 2            | 6.5       | F                      | NS  | LC                 | P       | N                    | N          | CO                        |
| ILP 68001/2067                            | Unnamed Creek       | 1     | 0            | 11.9      | F                      | G   | LC                 | G       | G                    | G          | CO, CH, PK, MW            |
| 400-232100-/2068                          | Singlehurst Creek   | 1     | 3.5          | 5.12      | G                      | F   | RPGW               | E       | E                    | E          | CO, CT, CH, RB, DV        |
| ILP 69015/2069                            | Unnamed Creek       | 1     | 6.5          | 1.28      | F                      | G   | RP                 | G       | P                    | P          | CT, DV                    |
| 400-230200-/2070                          | Noble Five Creek    | 1     | 0.75         | 3         | G                      | C   | RPGW               | G       | E                    | P          | CO                        |
| 400-22500-/2071                           | Fall Creek          | 1     | 5            | 8.15      | B                      | C   | CPB                | G       | G                    | G          | RB, DV                    |
| ILP 59185/2072                            | Unnamed Creek       | 1     |              | NVC       |                        |     |                    |         |                      |            |                           |
| 400-22500-/2073                           | Fall Creek          | 5     | 11.5         | 1.0       | C                      | G   | RP                 | P       | P                    | N          | NFC                       |

<sup>1</sup>substrate classed as: R = bedrock; B = boulder; C = cobble; G = gravel; F = fines.<sup>2</sup>channel morphology classed as: SPBW = step pool boulder, woody debris functional; RP = riffle pool; CPB = cascade pool, boulder; CPBW = cascade pool, boulder woody debris functioning; SPC = step pool cobble; SPB = step pool boulder; SP = step pool; CP = cascade pool; LC = large channel; NS = non-specified.<sup>3</sup>habitat classed as: E = excellent; G = good; M = moderate; P = poor; N = none.

<sup>4</sup>fish species: RB = rainbow trout; CT = cutthroat trout; DV = Dolly Varden char; BT = bull trout, MW = mountain whitefish, CO = coho, PK = pink, CH = chinook, SP = unidentified species, DC = dry channel; NFC = no fish captured.

#### **4.2.2 Tributaries to the Skeena River sub-basin**

In the Tributaries to the Skeena River sub-basin most reaches that were sampled and had flow were found to have fish (6 of 8 reaches). All but one of the reaches found to have fish flowed directly into the Skeena River and provided good rearing habitat for a variety of juvenile fish species. Unlike the Kleanza Creek sub-basin, streams within the Tributaries to the Skeena River sub-basin had few fish passage barriers in the lower reaches, and fish densities were relatively high in comparison with Kleanza Creek (see Appendix 1 for fish caught and electrofishing times).

Sampling for this project found Dolly Varden char, rainbow trout, cutthroat trout (Photograph 2), mountain whitefish, coho, chinook and pink salmon present in the sub-basin. In all but one of the reaches in which fish were found, rearing habitat was rated as good or excellent (Table 4) and the majority of fish captured were juveniles, rearing within the reach.



**Photograph 2. Cutthroat trout (146 mm) captured at NID 2068.**

**Table 4. Summary of historic and new barriers to fish migration found in the Kleanza Creek watershed study area (July 17 - September 8, 1999).**

| Stream name         | Watershed Code          | TRIM map # | Reach | Barrier Type | Ht. of barrier (m) | Verified in Field | Description of Barrier                                                                                                               |
|---------------------|-------------------------|------------|-------|--------------|--------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Fall Creek          | 400-225000-00000        | 103I.058   | 1     | Falls        | 20                 | n                 | NID 1701; FISS information. No fish captured in Reach 5.                                                                             |
| Kleanza Creek       | 400-231800-00000-       | 103I.058   | 1     | Falls        | 2                  | n                 | NID 1704; FISS information. RB captured upstream.                                                                                    |
| Kleanza Creek       | 400-231800-00000-       | 103I.058   | 2     | Falls        | 2                  | n                 | NID 1705; FISS information. RB captured upstream.                                                                                    |
| Kleanza Creek       | 400-231800-00000-       | 103I.058   | 2     | Falls        | 2                  | n                 | NID 1706; FISS information. RB captured upstream.                                                                                    |
| North Kleanza Creek | 400-231800-80300-       | 103I.060   | 1     | Falls        | 5                  | y                 | NID 1714; FISS information. No fish captured upstream.                                                                               |
| Call Creek          | 400-231800-86000-00000- | 103I.060   | 1     | Falls        | none given         | n                 | NID 1715; FISS information. No barriers to fish passage observed on Reach 1 of Call Creek during this field reconnaissance.          |
| South Kleanza Creek | 400-231800-87700-00000- | 103I.060   | 2     | Falls        | 8                  | n                 | NID 1717; FISS information. No barriers to fish passage observed in Reach 2 of South Kleanza Creek during this field reconnaissance. |
| Unnamed             | ILP 59041               | 103I.059   | 2     | Cascades     | 10                 | y                 | NID 1003; series of 50 m cascades. No fish captured upstream.                                                                        |
| Unnamed             | ILP 59047               | 103I.059   | 1     | Falls        | 10                 | y                 | NID 1004; 10 m falls. No fish captured upstream.                                                                                     |
| Unnamed             | ILP 59058               | 103I.059   | 3     | Falls        | 1.5                | y                 | NID 9947; impediment to fish passage. No fish captured upstream.                                                                     |
| Unnamed             | ILP 59061               | 103I.059   | 1     | Falls        | 200                | y                 | NID 9983; no sampling upstream.                                                                                                      |
| Unnamed             | ILP 59104               | 103I.059   | 1     | Cascade      | 10                 | y                 | NID 9953; no fish captured upstream.                                                                                                 |
| Unnamed             | ILP 59122               | 103I.059   | 1     | Falls        | 7                  | y                 | NID 995; no sampling upstream.                                                                                                       |
| Unnamed             | ILP 59163               | 103I.059   | 1     | Falls        | 7                  | y                 | NID 9957; no sampling upstream.                                                                                                      |
| Unnamed             | ILP 60116               | 103I.060   | 1     | Falls        | 7                  | y                 | NID 9994; impassable barrier – no fish captured above.                                                                               |
| Unnamed             | ILP 60163               | 103I.060   | 1     | Falls        | 25                 | y                 | NID 9971; no fish captured upstream.                                                                                                 |
| Unnamed             | ILP 60180               | 103I.060   | 1     | Falls        | 4                  | y                 | NID 9941; no fish captured upstream.                                                                                                 |

**Table 4. (continued).**

| Stream name  | Watershed Code          | TRIM map # | Reach | Barrier Type | Ht. of barrier (m) | Verified in Field | Description of Barrier                                                                      |
|--------------|-------------------------|------------|-------|--------------|--------------------|-------------------|---------------------------------------------------------------------------------------------|
| Unnamed      | ILP 60243               | 103I.060   | 1     | Falls        | 2.8                | y                 | NID 830; suspended culvert – no fish captured upstream.                                     |
| Unnamed      | ILP 60243               | 103I.060   | 1     | Falls        | 1                  | y                 | NID 840; no sampling upstream.                                                              |
| Fall Creek   | 400-225000-             | 103I.059   | 4     | Falls        | 50                 | y                 | NID 9979; no fish captured upstream.                                                        |
| Kendal Creek | 400-231800-24100-       | 103I.059   | 1     | Falls        | 7                  | y                 | NID 9991; no fish captured on upstream tributary.                                           |
| Kendal Creek | 400-231800-24100-       | 103I.059   | 1     | Falls        | 3                  | y                 | NID 9945; no fish captured on upstream tributary.                                           |
| Unnamed      | 400-231800-24100-29600  | 103I.059   | 2     | Falls        | 7                  | y                 | NID 9942; no fish captured upstream.                                                        |
| Unnamed      | 400-231800-24100-29600- | 103I.059   | 3     | Falls        | 10                 | y                 | NID 9946; numerous falls up to 10 m -- no sampling upstream.                                |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 1     | Falls        | 6                  | y                 | NID 9981; no fish captured upstream.                                                        |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 2     | Falls        | 10                 | y                 | NID 9977; no fish captured upstream.                                                        |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 2     | Falls        | 5                  | y                 | NID 9976; no fish captured upstream.                                                        |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 2     | Falls        | 5                  | y                 | NID 9958; no fish captured upstream.                                                        |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 2     | Falls        | 5                  | y                 | NID 9975; no fish captured upstream.                                                        |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 2     | Falls        | 3                  | y                 | NID 9960; no fish captured upstream.                                                        |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 2     | Falls        | 2                  | y                 | NID 9959; no fish captured upstream.                                                        |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 1     | Falls        | 5                  | y                 | NID 9974; no fish captured upstream.                                                        |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 1     | Falls        | 7                  | y                 | NID 9980; no fish captured upstream.                                                        |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 2     | Falls        | 20                 | y                 | NID 9944; no fish captured upstream.                                                        |
| Bosco Creek  | 400-231800-28200-       | 103I.059   | 2     | Falls        | 7                  | y                 | NID 9943; no fish captured upstream.                                                        |
| Mike Creek   | 400-231800-37600-       | 103I.059   | 1     | Falls        | 2                  | y                 | NID 9950; no fish captured in upstream tributary.                                           |
| Mike Creek   | 400-231800-37600-       | 103I.059   | 1     | Falls        | 3                  | y                 | NID 9949; no fish captured in upstream tributary.                                           |
| Mike Creek   | 400-231800-37600-       | 103I.059   | 1     | Falls        | 5                  | y                 | NID 9948; no fish captured in upstream tributary.                                           |
| Mike Creek   | 400-231800-37600-       | 103I.059   | 1     | Falls        | 7                  | y                 | NID 9990; bedrock falls is a permanent barrier. No fish captured directly above this falls. |
| Unnamed      | 400-231800-39700-       | 103I.059   | 1     | Falls        | 1.7                | y                 | NID 810; no fish captured above falls.                                                      |

Table 4. (continued).

| Stream name   | Watershed Code          | TRIM map # | Reach | Barrier Type | Ht. of barrier (m) | Verified in Field | Description of Barrier                                                                        |
|---------------|-------------------------|------------|-------|--------------|--------------------|-------------------|-----------------------------------------------------------------------------------------------|
| Unnamed       | 400-231800-39700-       | 103I.059   | 1     | Cascade      | 1.6                | y                 | NID 820; no fish captured above cascade (partial barrier).                                    |
| Keap Creek    | 400-231800-44600-       | 103I.059   | 2     | Cascade      | 5                  | y                 | NID 9939; no fish captured upstream.                                                          |
| Keap Creek    | 400-231800-44600-       | 103I.059   | 2     | Falls        | 3                  | y                 | NID 9938; no fish captured upstream.                                                          |
| Keap Creek    | 400-231800-44600-       | 103I.059   | 2     | Cascade      | 5                  | y                 | NID 9937; no fish captured upstream.                                                          |
| Unnamed       | 400-231800-44600-37900- | 103I.059   | 1     | Cascade      | 20                 | y                 | NID 9952; no fish captured upstream.                                                          |
| Unnamed       | ILP 59147               | 103I.059   | 1     | Falls        | 10                 | y                 | NID 9951; not sampled above falls - no fish found in this system above Reach 1 of Keap Creek. |
| Unnamed       | 400-231800-44600-65500- | 103I.059   | 1     | Falls        | 6                  | y                 | NID 9992; not sampled above falls - no fish captured above Reach 1 of Keap Creek system.      |
| Unnamed       | 400-231800-48300-       | 103I.059   | 1     | Falls        | 2                  | y                 | NID 9982; not sampled above falls.                                                            |
| Unnamed       | 400-231800-48300-       | 103I.059   | 1     | Falls        | 6                  | y                 | NID 9978; not sampled above falls.                                                            |
| Unnamed       | 400-231800-48300-       | 103I.059   | 1     | Falls        | 1.5                | y                 | NID 9940; no fish captured above falls.                                                       |
| Kipulta Creek | 400-231800-61200-       | 103I.060   | 1     | Falls        | 5                  | y                 | NID 9988; no fish captured in 2 upstream tributaries.                                         |
| Kipulta Creek | 400-231800-61200-       | 103I.060   | 1     | Falls        | 5                  | y                 | NID 9993; no fish captured in upstream tributary.                                             |
| Unnamed Creek | 400-231800-63800-       | 103I.060   | 1     | Falls        | 7                  | y                 | NID 9972; no fish captured upstream.                                                          |
| Unnamed Creek | 400-231800-63800-       | 103I.060   | 1     | Falls        | 3                  | y                 | NID 9956; no fish captured upstream.                                                          |
| Unnamed Creek | 400-231800-68400-       | 103I.060   | 3     | Cascade      | 50                 | y                 | NID 9973; no fish captured upstream.                                                          |
| Unnamed Creek | 400-231800-70000-       | 103I.060   | 1     | Cascade      | 140                | y                 | NID 9964; no fish captured upstream of 420 m long 33% gradient barrier.                       |
| Unnamed Creek | 400-231800-70900-36800- | 103I.060   | 1     | Falls        | 10                 | y                 | NID 9963; no fish captured upstream.                                                          |

|               |                   |          |   |         |     |   |                                                    |
|---------------|-------------------|----------|---|---------|-----|---|----------------------------------------------------|
| Unnamed Creek | 400-231800-76900- | 103I.060 | 1 | Cascade | 3.5 | y | NID 997; barrier to fish - none captured upstream. |
|---------------|-------------------|----------|---|---------|-----|---|----------------------------------------------------|

**Table 4. (continued).**

| Stream name         | Watershed Code          | TRIM map # | Reach | Barrier Type | Ht. of barrier (m) | Verified in Field | Description of Barrier                                                                                             |
|---------------------|-------------------------|------------|-------|--------------|--------------------|-------------------|--------------------------------------------------------------------------------------------------------------------|
| Unnamed Creek       | 400-231800-79300-       | 103I.060   | 2     | Cascade      | 15                 | y                 | NID 9961; not sampled above cascade.                                                                               |
| North Kleanza Creek | 400-231800-80300-       | 103I.060   | 1     | Falls        | 2                  | y                 | NID 9955; no fish captured upstream.                                                                               |
| North Kleanza Creek | 400-231800-80300-       | 103I.060   | 1     | Falls        | 3                  | y                 | NID 9986; no fish captured upstream.                                                                               |
| North Kleanza Creek | 400-231800-80300-       | 103I.060   | 1     | Falls        | 7                  | y                 | NID 9985; no fish captured upstream.                                                                               |
| North Kleanza Creek | 400-231800-80300-       | 103I.060   | 1     | Falls        | 4                  | y                 | NID 9984; no fish captured upstream.                                                                               |
| North Kleanza Creek | 400-231800-80300-       | 103I.060   | 1     | Cascade      | 4                  | y                 | NID 9995; no fish captured upstream.                                                                               |
| Unnamed             | 400-231800-80300-26800- | 103I.060   | 2     | Falls        | 3                  | y                 | NID 9968; not sampled above - no fish captured in the North Kleanza system.                                        |
| Unnamed             | 400-231800-80300-26800- | 103I.060   | 2     | Falls        | 3                  | y                 | NID 9954; not sampled above - no fish captured in the North Kleanza system.                                        |
| Unnamed Creek       | 400-231800-83000-       | 103I.060   | 1     | Falls        | 2                  | y                 | NID 9989; no fish captured above barrier - one unidentified fish observed below obstruction.                       |
| Call Creek          | 400-231800-86000-       | 103I.060   | 2     | Cascade      | 20                 | y                 | NID 9962; 3 and 4 m falls compose this cascade. Not sampled above barrier - no fish captured in Call Creek system. |
| South Kleanza Creek | 400-231800-87700-       | 103I.060   | 3     | Falls        | 4                  | y                 | NID 9966; not sampled above barrier - no fish captured in South Kleanza system.                                    |
| Peerless Creek      | 400-231800-87700-48700- | 103I.060   | 1     | Falls        | 5                  | y                 | NID 9969; no fish captured in upstream tributary.                                                                  |

|                |                         |          |   |       |   |   |                                                   |
|----------------|-------------------------|----------|---|-------|---|---|---------------------------------------------------|
| Peerless Creek | 400-231800-87700-48700- | 103I.060 | 1 | Falls | 5 | y | NID 9965; no fish captured in upstream tributary. |
|----------------|-------------------------|----------|---|-------|---|---|---------------------------------------------------|

**Table 4 (continued)**

| Stream name   | Watershed Code    | TRIM map # | Reach | Barrier Type | Ht. of barrier (m) | Verified in Field | Description of Barrier                            |
|---------------|-------------------|------------|-------|--------------|--------------------|-------------------|---------------------------------------------------|
| Unnamed Creek | 400-231800-94100- | 103I.060   | 2     | Falls        | 5                  | y                 | NID 9970; no fish captured in upstream tributary. |

### 4.3 FISH AGE, SIZE AND LIFE HISTORY

Table 5 provides information on the age and length of fish captured in the Kleanza Creek and Tributaries to the Skeena River sub-basins which was extrapolated from age/length distribution data from other areas (Scott and Crossman, 1973). Rainbow trout were the most widely distributed fish species within the study area, being captured throughout the Kleanza Creek sub-basin and in several streams in the Tributaries to the Skeena River sub-basin (Table 3 and Table 5).

The majority of rainbow trout captured in the Kleanza sub-basin were in the 1+ age class, whereas in the Tributaries to the Skeena River sub-basin there were relatively equal numbers of 1+ and 2+ individuals captured. The larger individuals (relative to those captured in the Kleanza sub-basin) within the streams of the Tributaries to the Skeena River sub-basin may be inflicting a higher rate of predation on the smaller 0+ age category, which may explain the lack of individuals within this age class.

A comparison of population fork length distribution between the rainbow trout in the two sub-basins (Figures 2 and 3) reveals the same differences as observed in the age distribution. The population in the Tributaries to the Skeena River sub-basin has a distinct lack of small size class individuals as compared to the population from the Kleanza Creek sub-basin. There are a number of possible explanations, including differences in predation pressure or differences in egg survival from year-to-year. The different fork length distributions may also be related to differences in life history strategies. The Kleanza Creek sub-basin most likely contains rainbow trout that exhibit, fluvial-adfluvial and lacustrine-adfluvial life history strategies, whereas, the rainbow trout within the Tributaries to the Skeena River sub-basin are most likely using a fluvial-adfluvial life history strategy.

Bull trout were captured only in the Kleanza Creek sub-basin; however, the low sample size (3 individuals) makes it impossible to make any comments on age or size distribution. It is interesting to note that the bull trout were captured in two separate locations. One location (NID 2027) was in Kipulta Creek (a large tributary to Kleanza Creek) and the other location was well upstream, in a 1st order tributary to Kleanza Lake (NID 2042). At both locations fish were captured which may have been large enough to be spawners (135 mm and 125 mm respectively). This result indicates that bull trout in the system may be using both lacustrine-adfluvial and fluvial-adfluvial life history strategies. The lack of any other individuals being captured between these two locations also indicates the possibility of relatively isolated populations; however, it should be cautioned that densities were very low and bull trout may have been missed at other locations.

Small numbers of chinook salmon, pink salmon, Dolly Varden char, mountain whitefish and cutthroat trout were also captured within the Tributaries to the Skeena River sub-basin (Table 5), though not in sufficient number to present length-frequency histograms. With the exception of the cutthroat trout, all species appeared to be using the streams

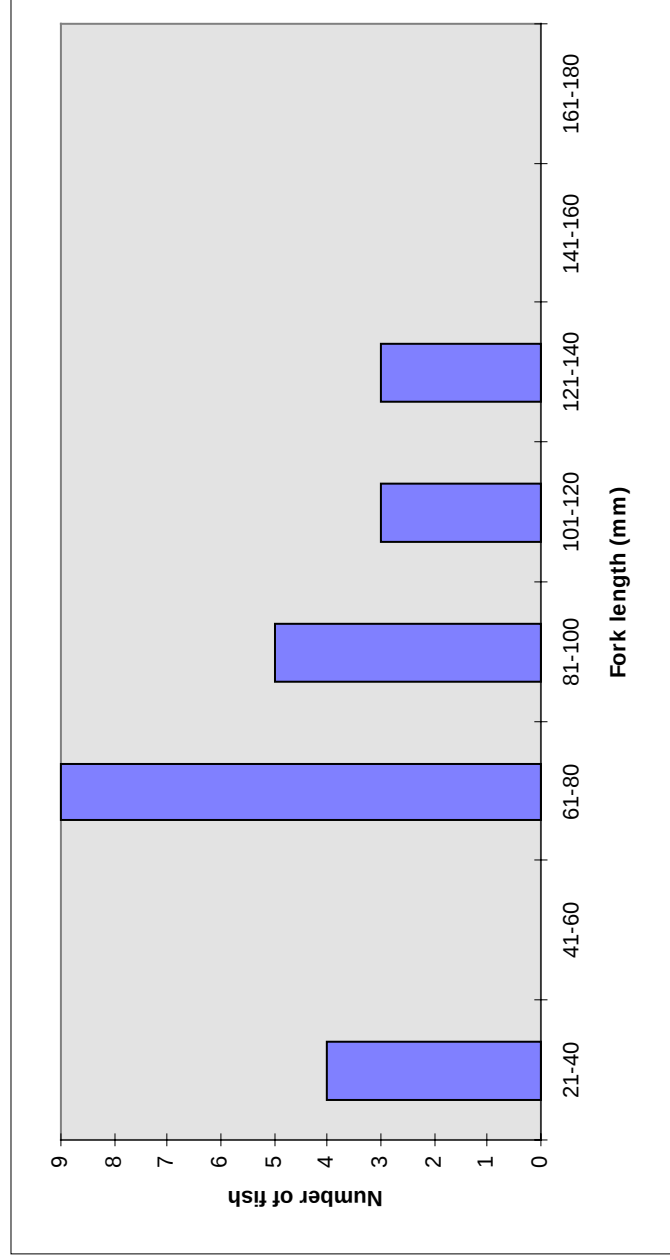
within this sub-basin for rearing. In the case of the cutthroat trout the 1+ and 2+ individuals may be part of a resident population which spawn and rear within these smaller streams.

Figure 4 provides a length-frequency histogram for coho salmon captured within the Tributaries to the Skeena River sub-basin. The fork length distribution shows a large range of sizes which may be attributed to differences in food supply in the different streams and/or differences in time of emergence. Overall, the histogram in Figure 4 shows a typical bell shaped size distribution curve, with the majority of fish in the 21 mm to 60 mm size class and smaller numbers in the larger and smaller size classes. The small number of individuals in the 81 mm to 100 mm size class are most likely 1+ individuals, most of which have already left the system at the time of sampling.

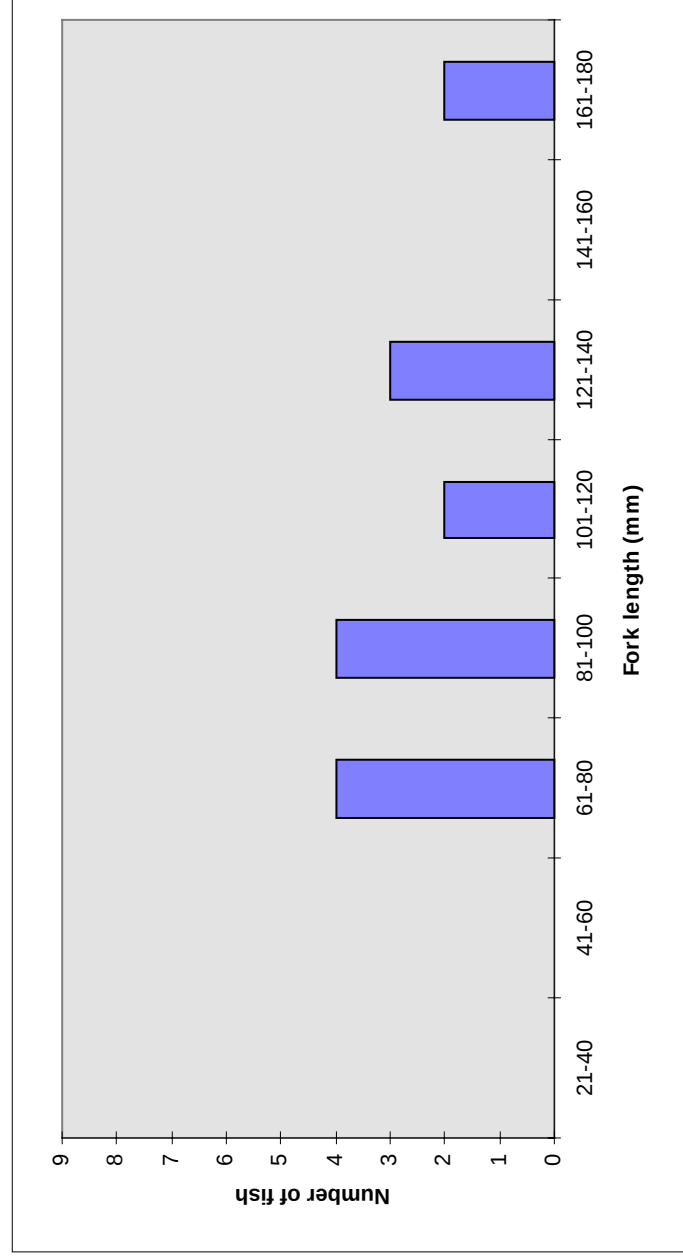
**Table 5. Age and length of fish captured in the Kleanza Creek watershed study area (July 17 - September 8, 1999).**

| Sub-basin                   | Watershed Code/ NID of Sample Site | Species | Age | Number of Fish | Mean Length (mm) | Range of length (mm) |
|-----------------------------|------------------------------------|---------|-----|----------------|------------------|----------------------|
| Kleanza Creek               | 400-231800-/2000                   | RB      | 0+  | 4              | 34.3             | 29 - 38              |
|                             | 400-231800-/2001                   |         | 1+  | 14             | 79.1             | 62 - 98              |
|                             | 400-231800-/2002                   |         | 2+  | 6              | 119              | 104 - 131            |
|                             | 400-231800-/2004                   | BT      |     |                |                  |                      |
|                             | 400-231800-24100-/2005             |         | 1+  | 1              | 89               | -                    |
|                             | 400-231800-37600-/2015             |         | 2+  | 2              | 130              | 125 - 135            |
|                             | 400-231800-44600-/2017             |         |     |                |                  |                      |
|                             | 400-231800-61200-/2027             |         |     |                |                  |                      |
|                             | 400-231800-83000-/2033             |         |     |                |                  |                      |
|                             | ILP 60171; 103I.060/2042           |         |     |                |                  |                      |
|                             | 400-231800-39700-/2057             |         |     |                |                  |                      |
| Tributaries to Skeena River | ILP 68002; 103I.068/2066           | CH      | 0+  | 7              | 82.1             | 49 - 95              |
|                             | ILP 68001; 103I.068/2067           |         | 1+  | 1              | 118              | -                    |
|                             | 400-232100-/2068                   | CO      | 0+  | 30             | 43.4             | 35 - 68              |
|                             | ILP 69015; 103I.069/2069           |         | 1+  | 2              | 80.5             | 79 - 82              |
|                             | 400-23200-/2070                    | DV      | 0+  | 6              | 66.3             | 47 - 75              |
|                             | 400-225000-/2071                   |         | 1+  | 1              | 115              | -                    |
|                             |                                    | MW      | 0+  | 2              | 44.5             | 44 - 45              |
|                             |                                    | PK      | 0+  | 2              | 42.5             | 42 - 43              |
|                             |                                    | RB      | 1+  | 8              | 77.6             | 61 - 93              |
|                             |                                    |         | 2+  | 5              | 124.2            | 115 - 132            |
|                             |                                    |         | 3+  | 2              | 170              | 170                  |
|                             |                                    | CT      | 1+  | 3              | 109.3            | 102 - 116            |
|                             |                                    |         | 2+  | 1              | 146              | -                    |

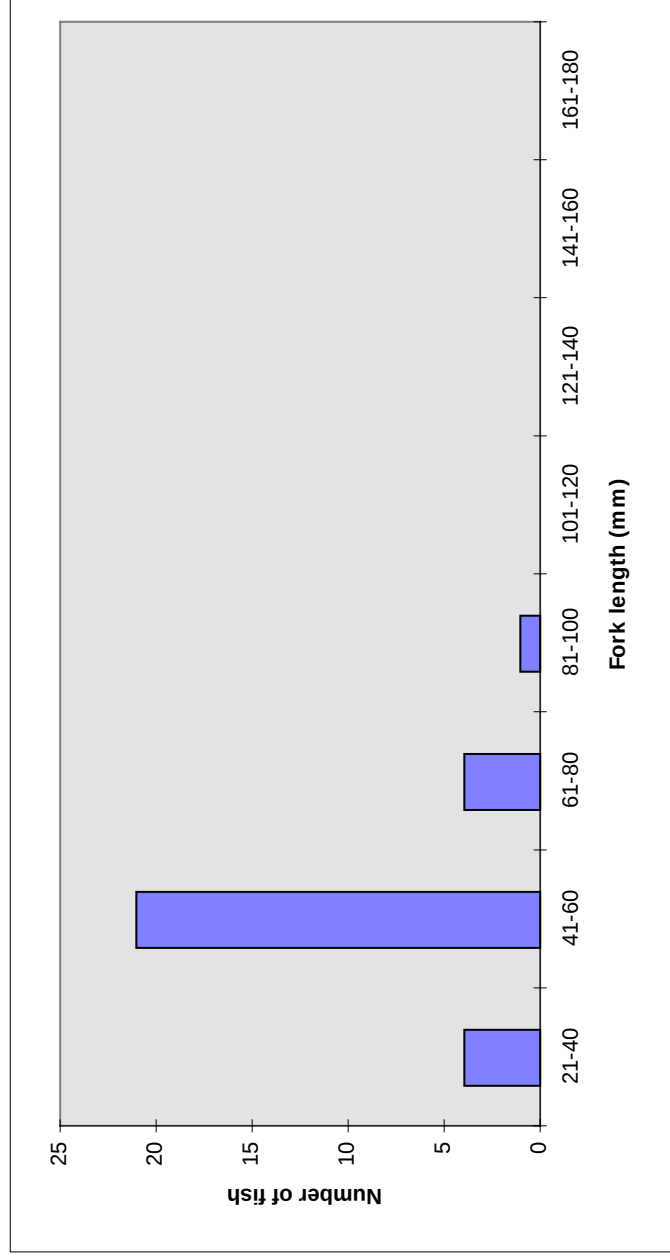
DV - Dolly Varden char, CT - Cutthroat trout, RB - Rainbow trout, CH - Chinook salmon, CO - Coho salmon, PK - Pink salmon, MW - mountain whitefish



**Figure 2. Length-frequency histogram of sampled rainbow trout in the Kleanza Creek sub-basin (July 17 - September 8, 1999).**



**Figure 3. Length-frequency histogram of sampled rainbow trout in the Tributaries to the Skeena River sub-basin (July 17 - September 8, 1999).**



**Figure 4. Length-frequency histogram of sampled coho salmon in the Tributaries to the Skeena River sub-basin (July 17 - September 8, 1999).**

## **4.4 SIGNIFICANT FEATURES AND FISHERIES OBSERVATIONS**

### **4.4.1 Fish and Fish Habitat**

No critical habitat has been identified in this project; however, pink, chinook and chum salmon are all known to spawn in reach 1 of Kleanza Creek adjacent to Kleanza Creek Provincial Park. At spawning time a large number of fish congregate in the large pools at the base of the waterfalls adjacent to the provincial park. During this time the fish are susceptible to disturbance by the general public.

### **4.4.2 Habitat Protection Concerns**

Reach 9 of Kleanza Creek was identified as having excellent spawning gravel and numerous rainbow fry (too small to be minnow trapped) were observed in the reach during sampling. This reach is directly downstream of Kleanza Creek and may provide spawning habitat to a significant proportion of the fish inhabiting the lake. As a result, special consideration should be given to the protection of this reach should future development occur in close proximity. Additionally, future assessment work should be done in the reach to determine if special fishing regulations should be in place to protect spawning fish in this reach during certain times of the year.

In addition to reach 9 of Kleanza Creek, two locations have been found to contain bull trout (a blue listed species). These two sites are located in Kipulta Creek reach 1 (NID 2027) and a 1st order tributary to Kleanza Lake (NID 2042). These areas may require special attention when planning future development.

#### *4.4.2.1 Fisheries Sensitive Areas*

No fisheries sensitive areas have been identified in this watershed.

#### *4.4.2.2 Fish above 20% Gradients*

Of the original 11 reaches selected for sampling with a gradient over 20%, only a single site (reach 1 of 400-231800-37600; NID 2015; Mike Creek) located in a tributary to Kleanza Creek was found to have fish present (Table 3). This site had an average gradient of 34% (with some stretches of lower gradient) with a cascade-pool-boulder morphology (Photograph 3). Unlike other high gradient streams where Dolly Varden or bull trout are present, this stream contained rainbow trout.

In general, it appears that in reaches with gradients over 20% the probability of fish being present is low; however, the possibility still exists depending on the morphology of the reach. Both cascade-pool and step-pool morphologies, in combination with adequate waterflow, appear conducive to fish passage.



**Photograph 3. Reach 1 of 400-231800-37600 (NID 2015). Rainbow trout present, with 34% gradient.**

#### *4.4.2.3 Restoration and Rehabilitation Opportunities*

Two reaches have been identified for potential restoration activities (Table 6). In both cases suspended culverts running under Highway 16 and into the Skeena River present barriers to fish passage when the Skeena River flow is low. As these culverts are running under a major highway, fixing the problem may be cost prohibitive.

**Table 6. Potential restoration sites in the Kleanza Creek watershed study area.**

| <b>Watershed code/NID</b> | <b>Reach</b> | <b>Problem</b>                      |
|---------------------------|--------------|-------------------------------------|
| 400-242300-/2063          | reach 1      | Culvert under highway is suspended. |
| 400-230200/2070           | reach 1      | Culvert under highway is suspended. |

## **4.5 FISH BEARING STATUS**

Sampled reaches have been placed into three categories based on the results of this project. The first category is “fish bearing,” meaning that fish were captured or sighted within the reach during the sampling period. The second category is “non-fish bearing.” This category contains reaches within which fish were not captured during sampling and there is a barrier to upstream fish passage that would explain the absence of fish in the reach. These reaches require no further sampling to confirm fish absence. The third category is “follow-up sampling” and consists of reaches where sampling was not done owing to a dry channel or low water flows, or reaches within which fish were not captured during sampling, but there is no definitive barrier downstream to explain fish absence. These sites must be re-sampled using different sampling techniques or at a different time of year, before a definitive “non-fish bearing” classification can be given.

### **4.5.1 Fish Bearing Reaches**

Fish presence was confirmed at 18% (12/64) of sites sampled within the Kleanza Creek sub-basin (Table 7). Rainbow trout were distributed throughout most of the mainstem of Kleanza Creek; however, the majority of the tributaries to Kleanza Creek had no fish at time of sampling. In addition, a large number of barriers to fish passage were identified on the tributaries (Table 4) making many of the upper reaches of tributaries non-fish bearing (Table 8). Despite the numerous barriers fish were captured up to 720 m in elevation on the Kleanza mainstem and up to 740 m in one of the tributaries to Kleanza Creek.

In the Tributaries to the Skeena River sub-basin the majority of streams that had sufficient water flow at time of sampling were found to have fish. A total of 55% (6/11) of sites were fish bearing (Table 7). In contrast to the Kleanza sub-basin, there were few fish barriers found in the lower reaches of streams in the Tributaries to the Skeena River sub-basin (Table 4). The majority of sites within this sub-basin were relatively low in elevation, and as a result fish were confirmed only up to 120 m in elevation (Table 7).

**Table 7. Summary of data from surveyed fish bearing reaches in Kleanza Creek watershed study area (September 8 - September 21, 1999).**

| Stream name                               | Watershed code      | Reach | Species            | Channel   |                   | *Site elevation (m) | Follow-up Sampling (y or n) | Comments |
|-------------------------------------------|---------------------|-------|--------------------|-----------|-------------------|---------------------|-----------------------------|----------|
|                                           |                     |       |                    | Width (m) | Site gradient (%) |                     |                             |          |
| Kleanza Creek Sub-basin                   |                     |       |                    |           |                   |                     |                             |          |
| Kleanza Creek                             | 400-231800-         | 2     | RB                 | 17.7      | 5                 | 180                 | n                           | NID 2000 |
| Kleanza Creek                             | 400-231800-         | 3     | RB                 | 25.5      | 3.5               | 360                 | n                           | NID 2001 |
| Kleanza Creek                             | 400-231800-         | 5     | RB                 | 15.1      | 2                 | 600                 | n                           | NID 2002 |
| Kleanza Creek                             | 400-231800          | 8     | -                  | 19.5      | 5                 | 680                 | n                           | NID 2003 |
| Kleanza Creek                             | 400-231800-         | 9     | RB                 | 5.6       | 1.5               | 720                 | n                           | NID 2004 |
| Kendal Creek                              | 400-231800-24100-   | 1     | RB                 | 6.8       | 6.5               | 260                 | n                           | NID 2005 |
| Mike Creek                                | 400-231800-37600-   | 1     | RB                 | 7.5       | 34.3              | 340                 | n                           | NID 2015 |
| Keap Creek                                | 400-231800-44600-   | 1     | RB                 | 9.2       | 6                 | 420                 | n                           | NID 2017 |
| Kipulta Creek                             | 400-231800-61200-   | 1     | BT                 | 11.9      | 5.5               | 600                 | n                           | NID 2027 |
| Unnamed Creek                             | 400-231800-83000-   | 1     | SP                 | 9.5       | 14.5              | 660                 | n                           | NID 2033 |
| Unnamed Creek                             | ILP 60171; 103I.060 | 1     | BT                 | 3.4       | 2                 | 740                 | n                           | NID 2042 |
| Unnamed Creek                             | 400-231800-39700-   | 2     | RB                 | 2         | 15                | 360                 | n                           | NID 2057 |
| Tributaries to the Skeena River Sub-basin |                     |       |                    |           |                   |                     |                             |          |
| Unnamed Creek                             | ILP 68002; 103I.068 | 1     | CO                 | 6.5       | 2                 | 100                 | n                           | NID 2066 |
| Unnamed Creek                             | ILP 68001; 103I.068 | 1     | CH, CO, MW, PK     | 11.9      | 0                 | 100                 | n                           | NID 2067 |
| Singlehurst Creek                         | 400-232100-         | 1     | CH, CO, CT, DV, RB | 5.1       | 3.5               | 80                  | n                           | NID 2068 |
| Unnamed Creek                             | ILP 69015; 103I.069 | 1     | CT, DV             | 1.3       | 6.5               | 120                 | n                           | NID 2069 |
| Noble Five Creek                          | 400-230200-         | 1     | CO                 | 3.0       | 0.8               | 80                  | n                           | NID 2070 |
| Fall Creek                                | 400-225000-         | 1     | DV, RB             | 8.2       | 5                 | 120                 | n                           | NID 2071 |

\*Site elevation estimated from nearest 20 m TRIM contour.

#### **4.5.2 Non-Fish Bearing Reaches**

A total of thirty-eight non-fish bearing reaches have been identified in this project (Table 8). This represents 51% of all sample sites and is a good indication of the relatively limited distribution of fish within the study area. This is particularly true within the Kleanza Creek sub-basin, where 35 of 64 sample sites (54.7%) were determined to be non-fish bearing.

Reaches were classified as non-fish bearing using a number of criteria. All non-fish bearing reaches have some kind of barrier to fish passage (including non visible channel). If there was limited overwintering habitat available above the barrier and a single sample found no fish, then the reach was considered to be non-fish bearing. If there was good overwintering habitat available then the reach was only considered non-fish bearing if two or more samples above the barrier, in good fish habitat, found no fish. For the interpretive maps associated with this project all reaches upstream of a sampled, non-fish bearing reach were also considered non-fish bearing.

The majority of non-fish bearing reaches in this project are over 1000 m in elevation. Based on the data from Table 7 and Table 8 it appears that there is very low potential for fish to be present in reaches above 1000 m in elevation. There are also a number reaches that have been classified as non-fish bearing that are between 360 m and 1000 m in elevation (Table 8); however, this elevation range overlaps with fish bearing reaches found in Table 7.

Out of the 75 sample sites selected from 1:20 000 TRIM in the office, 6 were found to have no defined channel. This represents an 8% error rate in identifying watercourses from the 1:20 000 TRIM maps. Based on the results from this study it appears the TRIM maps are reliable in identifying watercourses within this study area.

**Table 8. Summary of data from surveyed non-fish bearing reaches in the Kleanza Creek watershed study area (July 17 - September 8, 1999).**

| Stream name                  | Watershed code          | Reach | Gradient (%) | Electrofishing Specifications |          |           |          | *Site elevation (m) | Comments<br>(NID refers to sample site)                                             |
|------------------------------|-------------------------|-------|--------------|-------------------------------|----------|-----------|----------|---------------------|-------------------------------------------------------------------------------------|
|                              |                         |       |              | Dist. (m)                     | Time (s) | Cond (uS) | Temp (C) |                     |                                                                                     |
| Kelanza Creek Sub-basin      |                         |       |              |                               |          |           |          |                     |                                                                                     |
| Unnamed Creek                | 400-231800-25500-       | 2     | 12.3         | 115                           | 548      | 50        | 8        | 420                 | NID 1000; potential barrier at mouth of Reach 1.                                    |
| Unnamed Creek                | ILP 59041; 1031.059     | 2     | 20.7         | 100                           | 327      | 50        | 8        | 420                 | NID 1002; 50 m series of cascades within site (10 m in height)                      |
| Unnamed Creek                | 400-231800-24100-29600- | 2     | 11.5         | 140                           | 307      | 10        | 9        | 920                 | NID 2006; definitive falls barrier.                                                 |
| Unnamed Creek                | ILP 59047; 1031.059     | 2     | 15           | 40                            | 57       | 40        | 8        | 420                 | NID 2007; intermittent 40 m upstream of reach break. Falls barriers on mainstem.    |
| Bosco Creek                  | 400-231800-28200-       | 2     | 9            | 150                           | 600      | 20        | 8        | 880                 | NID 2010; downstream and upstream falls barriers.                                   |
| Bosco Creek                  | 400-231800-28200-       | 3     | 2.5          | 120                           | 478      | 0         | 5        | 1080                | NID 2011; falls barriers in Reaches 1 and 2.                                        |
| Unnamed Creek                | ILP 59062; 1031.059     | 1     | 2            | 110                           | 100      | 10        | 9        | 1220                | NID 2012; alpine site with no spawning, rearing or overwintering habitat.           |
| Unnamed Trib. to Bosco Creek | ILP 59071; 1031.059     | 1     | 4.5          | 150                           | 375      | 10        | 7        | 1060                | NID 2013; barriers downstream in Reaches 1 and 2 of Bosco Creek.                    |
| Unnamed Creek                | ILP 59058; 1031.059     | 3     | 6            | 290                           | 363      | 0         | 10       | 1220                | NID 2014; 1.5 m falls within site is an impediment to fish, + falls in Bosco Creek. |
| Unnamed Creek                | ILP 59104; 1031.059     | 1     | 1.5          | 100                           | 259      | 0         | 7        | 1220                | NID 2016; falls and cascades in Mike Ck.                                            |
| Keap Creek                   | 400-231800-44600-       | 2     | 6.5          | 100                           | 529      | 10        | 8        | 560                 | NID 2018; falls and cascade barriers located near Reach 1-2 break.                  |
| Keap Creek                   | 400-231800-44600-       | 3     | 9            | 200                           | 575      | 10        | 6        | 840                 | NID 2019; barriers located near Reach 1-2 break.                                    |
| Unnamed Creek                | 400-231800-44600-65500- | 1     | 11.5         | 110                           | 371      | 10        | 7        | 880                 | NID 2020; barriers downstream in Keap Ck.                                           |
| Unnamed Creek                | ILP 59122; 1031.059     | 1     | 8.5          | 100                           | 207      | 30        | 9        | 800                 | NID 2021; barriers downstream in Keap Ck.                                           |
| Unnamed Trib. to Keap Creek  | ILP 59147; 1031.059     | 1     | 17.5         | 120                           | 283      | 10        | 5        | 1020                | NID 2022; falls at upstream end of site. Cascade barrier in Reach 1 of mainstem.    |
| Unnamed Creek                | 400-231800-44600-37900- | 2     | 24           | 110                           | 363      | 0         | 7        | 1020                | NID 2023; 20 m cascade barrier in Reach 1.                                          |

Table 8. (continued).

| Stream name         | Watershed code          | Reach | Gradient (%) | Electrofishing Specifications |          |           |          | *Site elevation (m) | Comments<br>(NID refers to sample site)                                                                                             |
|---------------------|-------------------------|-------|--------------|-------------------------------|----------|-----------|----------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------|
|                     |                         |       |              | Dist. (m)                     | Time (s) | Cond (uS) | Temp (C) |                     |                                                                                                                                     |
| Unnamed Creek       | ILP 59169; 1031.059     | 1     | 31.5         | 100                           | 159      | 40        | 8        | 500                 | NID 2024; high gradient stream with continuous bedrock cascades/chutes.                                                             |
| Unnamed Creek       | ILP 60011; 1031.060     | 1     | NVC          |                               |          |           |          | 480                 | NID 2025; no visible channel.                                                                                                       |
| Unnamed Creek       | ILP 60012; 1031.060     | 1     | 34           | 120                           | 258      | 20        | 6        | 1120                | NID 2026; gradient barrier in Reach 2.                                                                                              |
| Unnamed Creek       | 400-231800-70000-       | 2     | 11.5         | 100                           | 266      | 20        | 10       | 780                 | NID 2030; cascade barrier in Reach 1.                                                                                               |
| Unnamed Creek       | ILP 60081; 1031.060     | 1     | 37.5         | 140                           | 504      | 10        | 8        | 600                 | NID 2031; high gradient site with several small downstream obstructions.                                                            |
| Unnamed Creek       | ILP 60084; 1031.060     | 1     | NVC          |                               |          |           |          | 800                 | NID 2034; no visible channel.                                                                                                       |
| Unnamed Creek       | ILP 60163; 1031.060     | 2     | 7            | 100                           | 322      | 10        | 5        | 1140                | NID 2041; 25 m falls located in Reach 1.                                                                                            |
| North Kleanza Creek | 400-231800-80300-       | 2     | 11           | 125                           | 320      | 0         | 4        | 1080                | NID 2045; falls located downstream.                                                                                                 |
| North Kleanza Creek | 400-231800-80300-       | 3     | 17           | 125                           | 302      | 0         | 4        | 1140                | NID 2046; falls barriers in Reach 1.                                                                                                |
| Unnamed Creek       | 400-231800-80300-50400- | 2     | 2            | 150                           | 213      | 10        | 14       | 1080                | Temporary/partial in-site falls barrier..                                                                                           |
| Unnamed Creek       | 400-231800-70900-36800- | 2     | 17.5         | 100                           | 249      | 20        | 8        | 1020                | NID 2048; falls barriers in North Kleanza mainstem.                                                                                 |
| Unnamed Creek       | 400-231800-68400-       | 4     | 6.5          | 100                           | 203      | 0         | 20       | 1020                | NID 2051; 10 m falls in Reach 1 of this stream.                                                                                     |
| Unnamed Creek       | 400-231800-63800-       | 2     | 5            | 100                           | 286      | 0         | 9        | 1100                | NID 2052; 50 m cascades in lower reaches of creek.                                                                                  |
| Unnamed Creek       | ILP 60245; 1031.060     | 2     | 13.5         | 100                           | 183      | 60        | 14       | 940                 | NID 2053; falls in Reach 1 of creek.                                                                                                |
| Unnamed Creek       | 400-231800-48300-       | 1     | 19.3         | 271                           | 716      | 50        | 9        | 420                 | NID 2054; poor fish habitat (seepage, minimal flow), gradient barrier (38.5%) in Reach 1.                                           |
| Unnamed Creek       | 400-231800-39700-       | 1     | 15           | 325                           | 365      | 80        | 10       | 360                 | NID 2056; 1.5 m falls just upstream of confluence and section of dry channel 80-240 m above confluence.                             |
| Unnamed Creek       | 400-231800-39700-       | 1     | 15           | 325                           | 365      | 80        | 10       | 360                 | NID 2057; cascade 10 m upstream from confluence with Reach 3 of Kleanza is a partial barrier and falls 125 m downstream of road are |

Table 8. (continued).

| Stream name                               | Watershed code      | Reach | Gradient (%) | Electrofishing Specifications |          |           |          |      | *Site elevation (m) | Comments<br>(NID refers to sample site)          |
|-------------------------------------------|---------------------|-------|--------------|-------------------------------|----------|-----------|----------|------|---------------------|--------------------------------------------------|
|                                           |                     |       |              | Dist. (m)                     | Time (s) | Cond (uS) | Temp (C) |      |                     |                                                  |
|                                           |                     |       |              |                               |          |           |          |      |                     | a further barrier.                               |
| Unnamed Creek                             | ILP 59021; 103I.059 | 2     | NVC          |                               |          |           |          |      | 380                 | NID 2059; no visible channel.                    |
| Unnamed Creek                             | ILP 59016; 103I.059 | 1     | 33.3         | 100                           | 314      | 50        | 9        | 420  |                     | NID 2060; gradient at site is a barrier to fish. |
| Fall Creek                                | 400-225000-         | 5     | 11.5         | 200                           | 381      | 0         | 14       | 1320 |                     | NID 2073; 50 m falls in Reach 4 of this system.  |
| Tributaries to the Skeena River Sub-basin |                     |       |              |                               |          |           |          |      |                     |                                                  |
| Unnamed Creek                             | ILP 69001; 103I.069 | 1     |              | NVC                           |          |           |          |      | 100                 | NID 2061; no visible channel.                    |
| Unnamed Creek                             | ILP 69003; 103I.069 | 1     |              | NVC                           |          |           |          |      | 100                 | NID 2062; no visible channel.                    |
| Unnamed Creek                             | ILP 68002; 103I.068 | 3     |              | NVC                           |          |           |          |      | 100                 | NID 2065; no visible channel.                    |

\*Site elevation estimated to nearest 20 m TRIM contour line.

### 4.5.3 Follow-up Sampling Required

A total of nineteen reaches have been identified for follow-up sampling (Table 9). The majority of the sites are located in the Kleanza Creek sub-basin and are sample sites where no fish were captured but no barrier was observed, or sites where low water levels at time of sampling may have affected the ability of fish to access the site. With the majority of sites follow-up sampling may not change the classification, as most have a direct connection to a fish bearing reach and no permanent barrier. As a result, a second sampling can only confirm presence, not confirm non-fish bearing classification, unless a barrier can be identified.

**Table 9. Follow-up sampling required for classification of non-fish bearing reaches in the Kleanza Creek watershed study area (July 17 - September 8, 1999).**

| Stream Name                  | Watershed Code          | Reach | Timing    | Methods | Comments (NID refers to sample site)                                                                                                        |
|------------------------------|-------------------------|-------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Kleanza Creek sub-basin      |                         |       |           |         |                                                                                                                                             |
| Unnamed                      | 400-231800-61200-48600- | 1     | May/June  | EF      | NID 2028; potential overwinter habitat. Second sample to confirm no fish.                                                                   |
| Unnamed Trib. to Kipulta Ck. | ILP 60063; 103I.060     | 1     | May/June  | EF      | NID 2029; potential overwinter habitat. Second sample to confirm no fish.                                                                   |
| Unnamed                      | 400-231800-76900-       | 1     | May/ June | EF      | NID 2032, high gradient, but requires second sample as overwinter habitat is present..                                                      |
| Call Creek                   | 400-231800-86000-       | 1     | May/ June | EF      | NID 2035; no barrier observed.                                                                                                              |
| Call Creek                   | 400-231800-86000-       | 1     | May/ June | EF      | NID 2036; no barrier observed.                                                                                                              |
| Unnamed                      | ILP 60116; 103I.060     | 1     | May/ June | EF      | NID 2037;;no barrier observed                                                                                                               |
| Unnamed Creek                | ILP 60091; 103I.060-    | 1     | May/ June | EF      | NID 2038; no barrier observed                                                                                                               |
| South Kleanza                | 400-231800-87700-       | 2     | May/ June | EF      | NID 2039; no barrier observed                                                                                                               |
| Unnamed Creek                | ILP 60145; 103I.060     | 1     | May/June  | EF      | NID 2040; overwinter habitat, second sample required.                                                                                       |
| Unnamed Creek                | ILP 60173; 103I.060     | 1     | May/ June | EF      | NID 2043 low water during initial sampling.                                                                                                 |
| North Kleanza Creek          | 400-231800-80300-       | 1     | May/June  | EF      | NID 2044; second sample required.                                                                                                           |
| Unnamed Creek                | ILP 60180; 103I.060     | 1     | May/June  | EF      | NID 2047; overwinter habitat, second sample required to confirm no fish.                                                                    |
| Unnamed Creek                | ILP 60204; 103I.060     | 1     | May/ June | EF      | NID 2049 no barrier observed.                                                                                                               |
| Unnamed Creek                | ILP 60205; 103I.060     | 1     | May/ June | EF      | NID 2050; low water at time of sampling.                                                                                                    |
| Unnamed Creek                | ILP 60243; 103I.060     | 1     | May/June  | EF      | NID 2055; suspended culvert, several high gradient segments and 1 m falls at upstream end of site; however, fish should be fish below road. |
| Unnamed Creek                | ILP 59088; 103I.059     | 1     | May/ June | EF      | NID 2058; dry, intermittent stream. Resample during higher flows.                                                                           |
| South Kleanza Creek          | 400-231800-87700-       | 1     | May/ June | EF      | NID 2074 no barriers observed.                                                                                                              |

**Table 9. (continued).**

| Stream Name                               | Watershed Code      | Reach | Timing    | Methods | Comments (NID refers to sample site)                                      |
|-------------------------------------------|---------------------|-------|-----------|---------|---------------------------------------------------------------------------|
| Tributaries to the Skeena River watershed |                     |       |           |         |                                                                           |
| Unnamed Creek                             | 400-242300-         | 1     | May/ June | EF      | NID 2063 access to Skeena is limited to high water. Sample at high water. |
| Unnamed Creek                             | ILP 69004; 103I.069 | 1     | May/ June | EF      | NID 2064; fish access on the mainstem is limited to high water.           |

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## **Appendix 1. Reach cards, site cards, fish forms and site specific photographs.**

Sites are arranged by site number located in the top right-hand corner of the Site Card. The site number is equivalent to the NID referred to in this report and associated map sheets. Each sample site has an associated Site Card, Fish Form, Reach Card and site photographs and is separated from the next site by coloured paper. For obstructions in reaches that were not sampled there is no Site Card or Fish Form and the Reach Cards are arranged at the back of this appendix by watershed code or ILP.

**Appendix 2. Photo documentation spreadsheet.**