

## Acknowledgments

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## Executive Summary

In the summer of 1996, Triton Environmental Consultants Ltd. was contracted by West Fraser Mills Ltd., Skeena Sawmills Division to perform reconnaissance level stream inventories of 17 watersheds within TFL 41 and FL A16820. This report describes the findings of the reconnaissance level stream inventory of the Upper Kemano River.

The Upper Kemano watershed is located ~ 30 km upstream from the mouth of the Kemano River at Kemano Bay. Three reaches in the Upper Kemano mainstem (Reaches 4 - 6) and four major tributaries were surveyed.

The Upper Kemano River and its tributaries are glacially sourced and are characterized by swift current and massive bedload movements. Resident and anadromous fish are present in Reaches 3 and 4 of the Kemano mainstem, these Reaches are classified as S1 under the FPC/RMA classification system. A chute barrier at ~45 km upstream from the ocean prevents access into Reaches 5 and 6 by anadromous fish. Reaches 5 and 6 were found to be non - fish bearing and are classified as S5. Tributaries to the Kemano River that were surveyed are typically fish bearing to the first significant barrier upstream of the mouth, and contain species consistent with the mainstem.

Readers should consult the accompanying photographs, SISS cards, fish catch data, and TRIM maps located in the appendices while reviewing the report.

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## 1. INTRODUCTION

Triton Environmental Consultants Ltd. (Terrace) was contracted by Skeena Sawmills in the summer of 1996 to inventory fish and fish habitat within 17 watershed areas of TFL 41 and FL A16820 (Table 1).

**Table 1: Watersheds Assessed in this Study**

Tree Farm Licence 41	Forest Licence A16820
<b>1996</b>	
Emsley Creek	West Hawkesbury (3 watersheds)
Wachwas Creek	Fraser Reach (4 watersheds)
Dahlaks	
Caribou Creek	
Upper Kemano River	
Eagle Creek	
Barrie Creek	
<b>1997</b>	
Davies	Kwinimass
Horetzky	Stagoo
Kowesas	
Wahoo	
<b>1998</b>	
Chist	
Wathl	

This report outlines the fish and fish habitat inventory of the upper Kemano River.

### 1.1 Background

The *Forest Practices Code* (FPC) requires that extensive planning be undertaken to determine the present physical and biological characteristics of our forest ecosystems. Reconnaissance level stream inventories form an integral part of the planning process and guide the establishment of Riparian Management Areas.

Development planning is guided by the stream classification process, through which streams are assigned Riparian Management Areas (RMA) based on fish presence and stream width. This can be a simple process, as only fish presence and stream width need to be known. However, a reconnaissance level stream inventory must provide more detailed information, such as relative abundance, species diversity and habitat descriptions at a watershed scale, that will not only aid in forest development planning, but be a valuable tool to resource planners in other fields.

## 1.2 Objectives

The objectives of this study are to:

- inventory and describe existing fish habitat conditions at a watershed level.
- provide classifications of all streams and major tributaries,

## 1.3 Location

The Upper Kemano River is located approximately 16 km upstream of the town of Kemano and 105 km southeast of Terrace (Fig. 1). The Kemano watershed contains 3 biogeoclimatic zones. These zones occur according to elevation and timber type and appear from the mouth of the creek to the headwaters as follows (MoF, 1988):

- Coastal Western Hemlock zone, very wet maritime subzone (CWHvm), wet subarctic montane subzone (CWHws2)
- Mountain Hemlock zone, subarctic forested subzone (MHb)
- Alpine Tundra Zone (AT)

## 1.4 Study Area

The Kemano River is a low to moderate gradient glacial system that drains approximately 1000 km<sup>2</sup> of the Kitimat Range in the Coast Mountains. The Kemano River flows southwest to the ocean at Kemano Bay in Barrie Reach. The mainstem length of the *upper* Kemano River is approximately 20 km, beginning at the Reach 2 - Reach 3 break, approximately 30 km upstream of the mouth. The length of the entire Kemano River is approximately 50 km. The mountains that form the watershed boundary are capped by large glaciers and include Mt. Atna (~2800m) the highest peak in the Kitimat Range (Holland, 1976).

The study area includes the upper Kemano River mainstem and 4 major tributaries: 2 left bank (looking downstream) at 42 and 44 km and 2 right bank at 33.2 and 31.7 km upstream from the ocean.

## 1.5 Access

Access into the lower Kemano River is by paved road from Kemano Bay. The upper Kemano River was accessed by helicopter. Access into Reaches 5 and 6 was limited due to extensive canyon sections and steep terrain.

## 1.6 Resource Use

Historical forest harvesting (10 blocks, ~300 ha) has occurred on both sides of the Kemano River for 11 km upstream from the town of Kemano. West Fraser Mills Ltd. TFL 41 Five Year Development Plan (1996-2001) for the Kemano River shows the following proposed cutblocks:

**Table 2: Proposed timber harvesting schedule, upper Kemano River.**

<b>Location</b>	<b>Area (ha)</b>	<b>Year</b>	<b>Proposed Harvesting Method</b>
Kemano east, ~9.5 km u/s of Kemano townsite	42	1999	Helicopter
Kemano east, ~7.5 km u/s of Kemano townsite	25	2000	Helicopter
Kemano east, ~11 km u/s of Kemano townsite	25	2000	Helicopter
Kemano west, ~15 km u/s of Kemano townsite	60	2000	Conventional Cable

Forestry road construction is planned to begin in 2000 on both sides of the Kemano River from 16 - 19 km upstream of Kemano townsite.

Hydroelectric power lines follow the Kemano River from the town of Kemano to 15 km upstream where they cross the river and continue overland to Kitimat. An existing powerline maintenance road extends from Kemano townsite 15 km on the east side of the Kemano River to a hydroelectric transformer station.

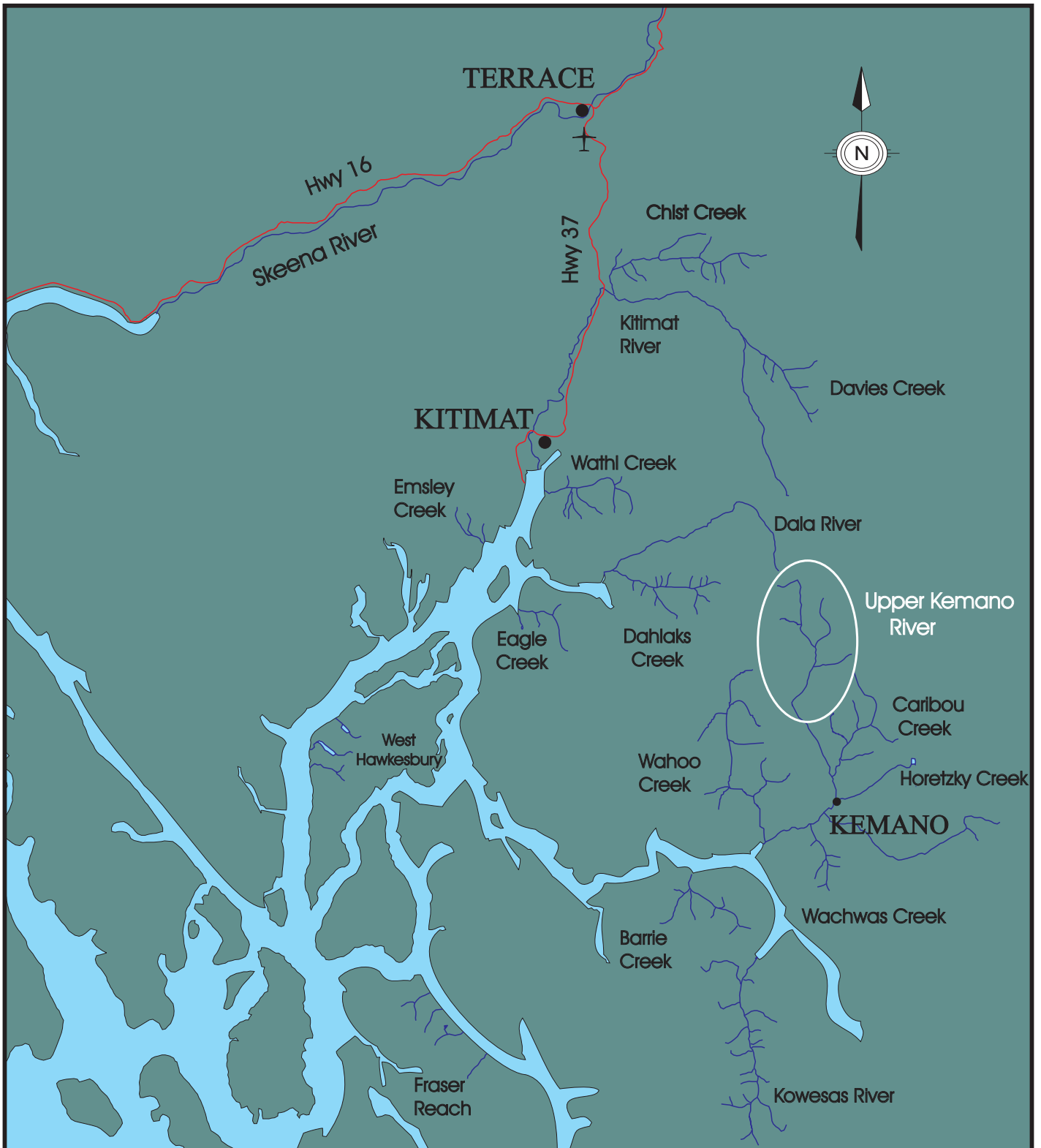


Figure 1: Study Area Map, Upper Kemano River

0 30 km

**Fish and Fish Habitat Inventory Project: TFL 41**

 **TRITON**  
Environmental Consultants Ltd.

## **2. METHODS**

### **2.1 Background Review**

Prior to commencement of field work, available background information was reviewed. The purpose of this exercise was to review existing fish and fish habitat information and adjust the level of field work required to complete a reconnaissance level fish inventory.

### **2.2 Reach Break Analysis**

All surveyed mainstem streams and tributaries were partitioned into reaches. Reaches were assigned during the background review and are based on fish access, gradient, stream confinement or other significant riparian, morphological or hydrological conditions. Reach breaks denote a significant change in one or more of these conditions. Locations of reach breaks were confirmed or modified based on ground or aerial surveys.

### **2.3 Field Assessments**

The upper Kemano River was surveyed on September 7 and October 25, 1996. Fish and fish habitat was assessed in the field using the stream inventory standards and procedures (MELP, 1995). Generally, the process we followed in the field was to:

- assess the watershed during a helicopter overflight to confirm reach boundaries, identify access points, and photograph reaches at a watershed scale.
- assess each reach on the ground by completing a SISS card, sampling for fish presence, and photographing representative habitats and reach breaks.

Stream widths were determined by measuring the channel width with a tape measure, or by visual estimate. At least 6 measurements were made within each reach, each one at least one channel width distance apart. These measurements were averaged to determine the average stream width.

### **2.4 SISS Cards**

Standard DFO/MELP Stream Inventory Summary System Cards (SISS) cards were completed for each reach sampled, and entered into the MS Access database program supplied by MELP. A hardcopy printout of these cards is in Appendix II. These digital data are on file with MELP and Triton.



## 2.5 Fish Sampling

Fish presence was determined by electrofishing at least 100m<sup>2</sup> of habitat in each reach using either a Smith Root Type VII, or a Smith Root Model 12 electroshoker. Captured fish were keyed out to species (if necessary) using the *Field Key to the Freshwater Fishes of British Columbia* (RIC, 1994). Our ability to assess relative abundance of fish present in the Kemano was limited by difficult electrofishing conditions. Opportunities for safe access into the stream channel for the electroshocker operator were limited (swift, deep water, canyons), and many fish shocked were immediately swept away or darted away from the operator. Gee-trapping was not a practical method of capturing fish due to weather constraints (poor weather limited our ability to fly into some reaches, and we chose not to set traps when it appeared weather would not allow us to retrieve them). As such, the fish sampling data collected in the Kemano River is limited to species diversity and size range.

## 2.6 RMA Classification

The field surveys and subsequent classifications are based on the following publications:

- FPC Regulations (MoF, 1995);
- Riparian Management Area Guidebook (MoF, 1995);
- Fish Stream Identification Guidebook (MoF, 1995).

RMA classification is determined through the procedure outlined in Figure 2 (RMA Guidebook).

No ←	Fish Stream or Community Watershed		→ Yes
↓			↓
Stream Width	Stream/Riparian Class	Stream Width	Stream/Riparian Class
> 3m	S5	> 20m	S1
≤ 3m	S6	> 5 - ≤ 20m	S2
		1.5 - ≤ 5m	S3
		< 1.5m	S4

**Figure 2: Process for Stream and Riparian Management Area Classification.**

Specific Riparian Management Areas (RMA) are designated for each stream class. The RMA adjacent to streams extends from the top of the stream bank to:

1. a slope distance as specified in Table 3, or;
2. the top of the inner gorge, or;
3. the outer edge of the active floodplain, or;
4. the outer edge of non classified wetlands or ponds contiguous with the RMA, whichever is greatest.

**Table 3: Specified minimum RMA slope distances for stream riparian classes.**

Riparian Class	Channel Width (m)	Reserve Zone Width (m)	Management Zone Width (m)	Total RMA Width (m)
S1 Large Rivers	> 100	0	100	100
S1	≥ 20	50	20	70
S2	> 5 - 20	30	20	50
S3	1.5 - 5	20	20	40
S4	< 1.5	0	30	30
S5	≥ 3	0	30	30
S6	< 3	0	20	20

## 2.7 Photography

Photography was used extensively to document existing conditions in the watershed. Two types of cameras were used: a Nikon N90, with a 20-40mm zoom lens, or a Ricoh ff-9 with a fixed 35mm lens. Film media was either Sensia 100ASA slide or Kodak Royal Gold 100 ASA print. All images were scanned onto CD ROM and have been forwarded to MELP.

## 2.8 Water Quality Testing

Water quality testing for this project was limited to measuring pH (with a LaMotte waterproof pH Tester 2) and conductivity (with a LaMotte TDS Tester 3). Results of measurements are noted on the SISS cards in Appendix II. Each meter was calibrated prior to use at each site with standard manufacturer issued calibration solutions.

## 2.9 Wildlife Observations

Amphibians observed or captured during the fish sampling process were identified and other wildlife signs or observations were noted. However, the focus of this survey was to inventory fish and fish habitat and no special efforts were made to inventory wildlife or wildlife habitat.

## 2.10 Mapping

Mapping base is 1:20,000 scale Terrain Inventory Resource Maps (TRIM). A PC based version of Arc View was used to label fish distribution, important habitat, sampling sites, reach breaks, barriers and stream classification. A hardcopy map is in Appendix IV, and digital TRIM maps are on file with Triton and MELP.

## 3. RESULTS

### 3.1 Background Review

Data or data sources identified in our review of background information are shown in Table 4.

**Table 4: Data and data sources identified in the background review.**

<b>Stream Name:</b>	Upper Kemano River	<b>Watershed Code</b>	910-6274
<b>1:50,000 NTS Maps</b>	103H/8,9 93E/12,13	<b>1:20,000 TRIM Maps</b>	93E.061, 071 103H.070,080,090.
<b>Aquatic biophysical maps</b>	Yes: 93E12, 103H9	<b>5 year development plan</b>	West Fraser Mills Ltd. TFL 41 1996 -2001 Update: Kemano
<b>Air Photos</b>	Source: West Fraser Mills Ltd Rolls: 5668/5669, Aug/96 Scale: 1:15 000 Alt: 17, 000'	Flight lines: 53233 /#400-405, 53274/#165-170, 53284/#185-190, 53293/#308-320, 53304/#330-344, 53313/#402-411, 53324/#424-430, 53334/#522-525	
<b>Other Info</b>	WSC Stations: 08FE001, 08FE002, 08FE003. AES:Kemano	<b>SEDS database<sup>1</sup></b>	Escapement Data in Appendix V.
<b>SISS review</b>	1987 -88: CH, CO - Spawning to 40 km u/s, CM - Spawning to 24.6 km, SK - in Kemano tailrace, PK - to Horetzky ST, DV Maps: 93E/12, 103H9		
<b>FISS review</b>	1994: Vulnerable CH, CO and ST stocks. CM, PK - escapements increasing due to stabilized flow from tailrace input. CH - Spawning throughout lower 20 km, to 40 km. CO - Major spawner concentrations in 4 km section below Caribou Cr, in upper river and below Seekwyakin Cr. Escapements have decreased since Kemano I diversion. CM - majority spawn in lower river. PK - majority spawn in lower river. SK - spawn in tailrace. ST - observed spawning in small tributaries. EU - lower Kemano supports a major eulachon population. Falls at 27.5 km passable to CH and CO only.		

<sup>1</sup> Salmon Escapement Data System (DFO)

Fish Species Codes: CO = coho, CH = chinook, CM = chum, PK = pink, SK = sockeye,  
DV = Dolly Varden, RB = rainbow trout, CT = cutthroat trout, ST = steelhead, CC = Sculpins.

### 3.2 Assessment of Stream Reaches

Our survey identified:

- 4 reaches in the Upper Kemano mainstem (Reaches 3 - 6),
- 4 reaches in an un-named tributary at 31.7 km,
- 3 reaches in an un-named tributary at 33.2 km,
- 1 reach in an un-named tributary at 42 km,
- 3 reaches in an un-named tributary at 44 km.

The results of our surveys of these reaches are described below.

#### 3.2.1 Reach 3

Site #	Photos	Length (km)	Gradient (%)	Average Est. Channel Width(m)	Fish Presence	RMA Class
No site	-	7.0	2	80	CO, CH, DV	S1

Reach 3 is the mainstem of the Kemano River, from ~ 30 - 37 km upstream of the ocean. It was not assessed as part of this study, as fish presence has been well documented (SISS) and was documented in upstream reaches in this study.

#### 3.2.2 Reach 4

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
1	1	7.2	2	66	CO,CH,DV	S1
3	2, 3	7.2	3	80	CO,(CH),DV	S1
4	4, 5, 6, 7	7.2	3	28	CO,(CH),DV	S1

Reach 4 starts approximately 37 km upstream from the mouth. This reach was surveyed in three locations, site numbers 1, 3 and 4. The reach is characterized by riffle-pool morphology with some aggradation of large substrate material. Spawning habitat is available throughout the reach, however there is limited adult holding cover. Rearing habitat is limited to the margins of the stream and off channel habitat where the flow is reduced. Coho, chinook and Dolly Varden were identified by electroshocking.

#### 3.2.3 Reach 5

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
7	8, 10, 13	7.0	4	20	NF	S5

Reach 5 is characterized by mainly a confined bedrock canyon. Access for fish sampling in this reach was only possible in one location (Site 7), a short section of braided stream that is not typical of the reach. Electroshocking over ~200m<sup>2</sup> of habitat in water temperature of 6.0°C produced no fish. A chute at km 45, (photo 13) is the upstream limit to anadromous and resident fish, just upstream of the Reach 4 - 5 break.

### 3.2.4 **Reach 6**

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
8	15, 16, 17	2.2	5	32	NF	S5

Reach 6 starts approximately 51.5 km from the mouth. This reach is near the glacial headwaters of the Kemano River. The reach is characterized by cascade-pool morphology and has moderate aggradation of boulder substrate. Electroshocking effort at site 8 for 476 seconds over ~ 250m<sup>2</sup> of habitat at settings (P)15 Hz, 1000 volts produced no fish.

The following factors limit fish presence in Reaches 5 and 6:

- A barrier chute at km 45 prevents upstream migration of fish.
- Confined stream channels and canyons limit refuge habitat during high water events.
- Direct glacial fed run-off limits stream productivity.

While none of these factors alone prevent fish from using Reaches 5 and 6, the combination of these factors, combined with the absence of fish during our sampling efforts, have led us to classify these reaches as non fish bearing.

### 3.2.5 **Km 31.7 Tributary**

This right bank tributary is 6.5 km in length. Four reaches were identified in this stream. Reaches 1, 2, and 4 were visited by ground surveys. A limited survey was done for Reach 3 by aerial estimation. The end of survey for this tributary is in Reach 4 at ~5.3 km upstream.

#### 3.2.5.1 **Reach 1**

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
13	20, 21	.4	2	100	CO, DV	S1

Reach 1 is a fluvial fan adjacent to the Kemano River. It has highly unstable bedload and limited spawning habitat. An adult coho carcass was found in Reach 1 and ~ 25 adult coho were observed holding immediately downstream of the confluence with the Kemano River.

#### 3.2.5.2 **Reach 2**

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
11	20,22,23	0.2	8	13	(DV)	S2

Reach 2 is a short section (200m) of stepped cascade type habitat, with small waterfall obstructions, assumed accessible to fish. At the top of the reach, the channel becomes entrenched and numerous waterfalls and chutes occur.

**3.2.5.3 Reach 3**

Site #	Photos	Length(km)	Gradient(%)	Average Est. Channel Width(m)	Fish Presence	RMA Class
No site	20	1.4	14	14	(NF)	S5

Reach 3 was inaccessible by helicopter. A low elevation aerial reconnaissance was used to survey this reach. It is an entrenched canyon which was not sampled and assumed to be non fish-bearing due to extensive chutes and waterfall barriers and the absence of fish upstream. The entrenched channel can be seen in Photo 20.

**3.2.5.4 Reach 4**

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
12	24,25	3.5	3	15	NF	S5

Reach 4 is characterized by riffle-pool morphology. It is a non fish-bearing reach, electrofishing in Site 12. Electroshocking effort of 366 seconds over 500m<sup>2</sup> of habitat at settings (K), 11 Hz, 700 volts produced no fish. Access into this reach is prevented by barriers in Reach 3. Suitable habitat for resident fish exists in this reach (cover, spawning and rearing habitat) however downstream barriers and the proximity to glaciers limit the potential for fish.

**3.2.6 Km 33 Tributary**

This right bank tributary is ~ 4 km in length, sourced at a small glacial lake. The Reach 1 - 2 break is a 3m high waterfall which is a barrier to anadromous fish. The end of survey for this tributary is in Reach 3 at ~ 3 km.

**3.2.6.1 Reach 1**

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
10	26, 27, 31, 32	.15	4	22.7	(CO, CH, DV)	S1

Reach 1 is a short section with limited spawning habitat which is accessible from the Kemano mainstem and is assumed to support fish species consistent with the mainstem.

**3.2.6.2 Reach 2**

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
No site	28, 29, 30	1.6	9	20(est.)	NF	S5

Reach 2 is accessible for fish to a 3m waterfall 0.15 km upstream of the reach 1 - 2 break. RMA classification would be S1 for the first 0.15 km and S5 for the remainder of the reach (based on fish absence upstream). The reach is mainly a confined bedrock canyon and was assessed by air due to limited access.

**3.2.6.3 Reach 3**

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
9	33,35	1.7	5	19	NF	S5

Reach 3 starts ~1.75 km upstream from the confluence with the Kemano River. The reach is characterized by cascade-pool morphology. Electroshocking effort at Site 9 for 336 seconds over ~200m<sup>2</sup> of habitat at settings (K)11 Hz, 700 volts produced no fish. Suitable habitat for resident fish exists in this reach (cover, spawning and rearing habitat) however downstream barriers and proximity to glaciers upstream limit the potential for fish.

**3.2.7 Km 42 Tributary****3.2.7.1 Reach 1**

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
2	36,37,38	1.0	10	36	DV	S1

This left bank tributary is ~ 7.2 km in length and becomes steep and entrenched at ~ 1 km upstream. A 5m high waterfall at ~1 km upstream is a barrier to fish; the stream is assumed to be non fish bearing beyond this point based on gradient (>20%) and the entrenchment of the channel. This tributary can be characterized as a high energy system, with stepped pool and cascade type habitat and large boulders throughout. Reach 1 is characterized by step-pool morphology with aggrading boulder substrate. Extensive shifting of channels near the mouth is evident. The survey area is from the mouth to ~ 1 km upstream, and is considered marginal fish habitat.

**3.2.8 Km 44 Tributary**

This left bank tributary has a total length of ~ 5 km, with three reaches. At the time of the survey, this tributary was contributing the majority of the turbid glacial water to the Kemano River. The entire tributary has been subject to massive bedload movement, a recent torrent has laid down over 2m of unsorted rock throughout the system. Fish habitat in this stream is marginal.

**3.2.8.1 Reach 1**

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
5	39,40	0.35	4	28	DV	S1

Reach 1 is confined and is fish bearing to a 10m waterfall barrier that is the Reach 1 - Reach 2 break. It is accessible to fish from Reach 4 of the Kemano River for 350m.

**3.2.8.2 Reach 2**

Site #	Photos	Length(km)	Gradient(%)	Average Est. Channel Width(m)	Fish Presence	RMA Class
No site	42	2.0		4 - 10	NF	S5

Reach 2 is completely entrenched and inaccessible. The general reach description is from a low level aerial reconnaissance. Reach 2 is assumed to be non-fish bearing due to a 10m waterfall barrier at the downstream reach break.

**3.2.8.3 Reach 3**

Site #	Photos	Length(km)	Gradient(%)	Average Channel Width(m)	Fish Presence	RMA Class
6	42, 43, 44	2.0	10	50	NF	S5

Reach 3 is a wide torrented stream section, comprised of stepped cascades with extensive deposition of large boulder substrate. Fish sampling was not done due to unsafe walking conditions caused by extremely unstable bedload material along the banks, and strong instream current. Recent bedload deposits through this reach were >2m deep and had buried trees along the bank. Upstream of the reach, the stream was covered in snow (photo 45) right up to its glacial origins. This stream is assumed to be non fish bearing due to downstream barriers, massive bedload movement and deposits, and proximity to the glacier.

**3.3 Fish Sampling**

Specific fish catch data for the Kemano River is in Appendix III. The following points summarize the fish populations of the watershed:

- Anadromous fish (chinook, coho and steelhead) have access to a chute barrier 45 km upstream from the mouth on the mainstem and to the noted barriers on each of the tributaries surveyed. Dolly Varden char have the same distribution within the watershed.
- No fish were found upstream of the chute barrier at km 45 or upstream of the barriers noted on the tributaries.

**3.4 Wildlife Observations**

No concerted effort was made to evaluate the wildlife values of the Kemano River watershed. Black and grizzly bear tracks were noted throughout the Kemano system. No amphibians were captured or observed during fish sampling efforts.



#### 4. SUMMARY

The Kemano River is a highly active system with extensive bedload movement throughout. The headwaters are glaciated and supply the majority of the flow to the river. The Kemano River has anadromous fish use up to a chute barrier 45 km upstream of the mouth. Chinook, coho and Dolly Varden were identified up to the barrier, and steelhead are assumed present. Reaches 5 and 6 were surveyed and were found to be non-fish bearing.

Reaches 3 and 4 of the Kemano mainstem are classified as S1 under the FPC/RMA classification system. Reaches 5 and 6 are classified as S5.

Tributaries to the Kemano River that were surveyed are typically fish bearing to the first significant barrier upstream of the mouth. Habitat within the tributaries is marginally capable of supporting all mainstem species, however Dolly Varden were usually the only species captured. RMA classifications for the tributaries are:

- Km 31.7 trib: Reach 1 is S1, Reach 2 is S2 and Reaches 4 - 5 are S5.
- Km 33 trib: Reach 1 is S1 and Reaches 2-3 are S5
- Km 42 trib: S1 to end of survey at 1 km upstream.
- Km 44 trib: Reach 1 is S1 and Reaches 2-3 are S5.

##### 4.1 Recommendations for Future Assessments

The Fish Stream Identification Guidebook indicates two fish sampling trials are required to establish fish absence. Follow-up sampling may be required in stream reaches where fish were not found, but have the potential to support fish. As well, future assessments may be needed for small streams that may not appear on 1:20,000 maps or were not assessed in this study, and for fisheries sensitive zones. The following table outlines the options for future assessments.

**Table 5: Recommendations for Future Assessments**

Stream Reach	Habitat Quality	Future Assessments	Priority	Comments
Kemano R. Reach 5	Marginal rearing habitat within an entrenched bedrock canyon.	Recommend second sampling	Low	No timber harvesting planned within 5 years.
Kemano R. Reach 6	Marginal rearing habitat, close to glaciers	Recommend second sampling	Low	No timber harvesting planned within 5 years.
Km 31.7 Trib. Reach 3	Marginal rearing habitat within a confined reach with cascade-pool habitat	Recommend second sampling (overnight G-trapping)	High	Timber harvesting planned adjacent to the reach within 5 years.
Km 33 Trib Reach 4	Marginal rearing habitat within a confined reach with cascade-pool habitat	Recommend second sampling (overnight G-trapping)	High	Timber harvesting planned adjacent to the reach within 5 years.

## **5. DISCLAIMER**

The Province and West Fraser Mills Ltd. have not accepted the contents of this product for the purposes of the Forest Practices Code, and reserve the right to dispute the validity of summarized results. The Province and Skeena Sawmills Ltd. do not necessarily agree with the classification, assigned to any individual stream reach, for use in logging plans, silviculture prescriptions or any other application.

## **6. REFERENCES**

- Department of Fisheries and Oceans, 1989. Fish Habitat Inventory and Information Program, Stream Summary Catalogue, Subdistrict #6S, Butedale Volume 1.
- Holland, S.S., Bulletin 48, 1976. Landforms of British Columbia: A Physiographic Outline.
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- Ministry of Forests 1994. Bill 40 - 1994. Forest Practices Code of British Columbia Act.
- Ministry of Forests 1995. Riparian Management Area Guidebook.
- Ministry of Forests 1995. Fish Stream Identification Guidebook.
- Ministry of Forests 1995. Forest Practices Code of British Columbia Act. Regulations

**Appendix I: Photographs**

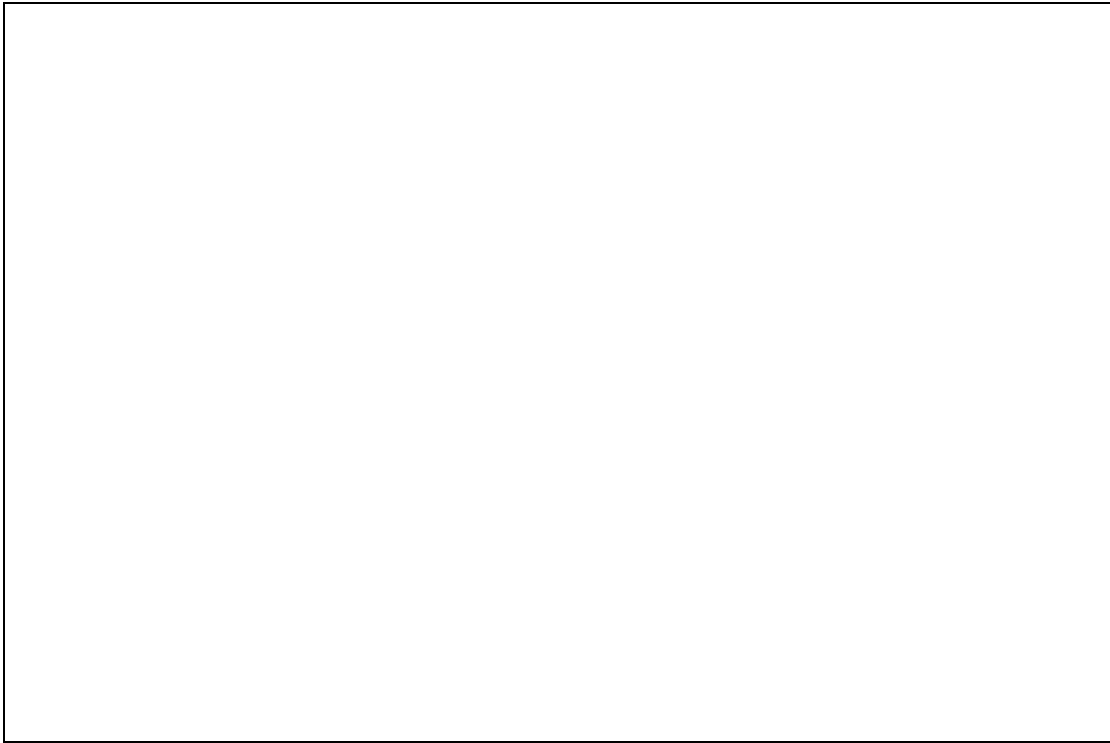


Photo 1: 

Reach 4	Site 1	Upstream view of Reach 3-4 break on the Kemano. Site 1 is immediately upstream of the rapids.	7-Sep-96	CD# 2292:	82
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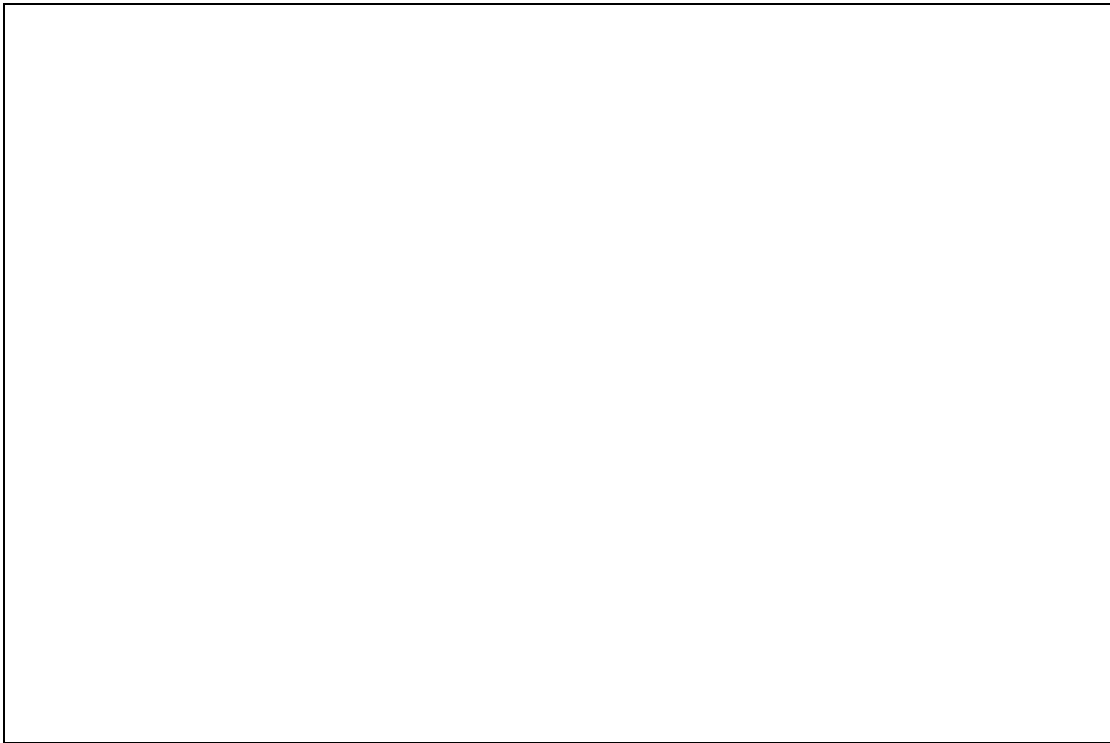


Photo 2: 

Reach 4	Site 3	Downstream view of Kemano River, Km 42	7-Sep-96	2292	41
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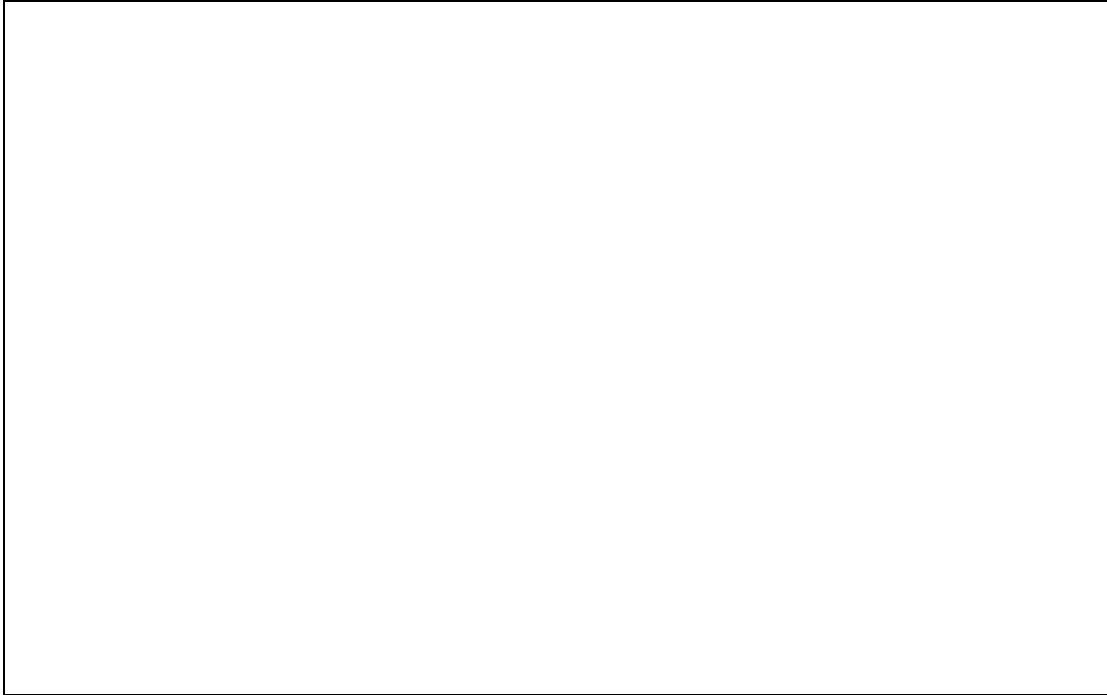


Photo 3: 

Reach 4	Site 3	Upstream view of Kemano River, Km 42	7-Sep-96	CD# 2292:	43
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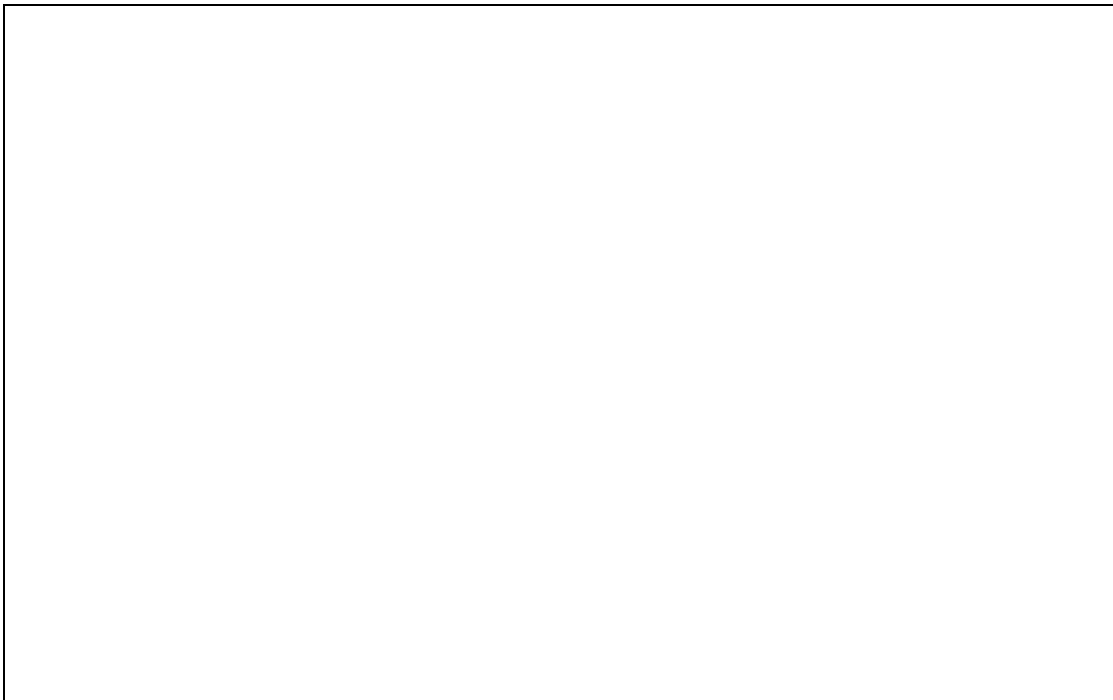


Photo 4: 

Reach 4	Site 4	Kemano River, upstream aerial view near km 43.	7-Sep-96	CD# 2292:	86
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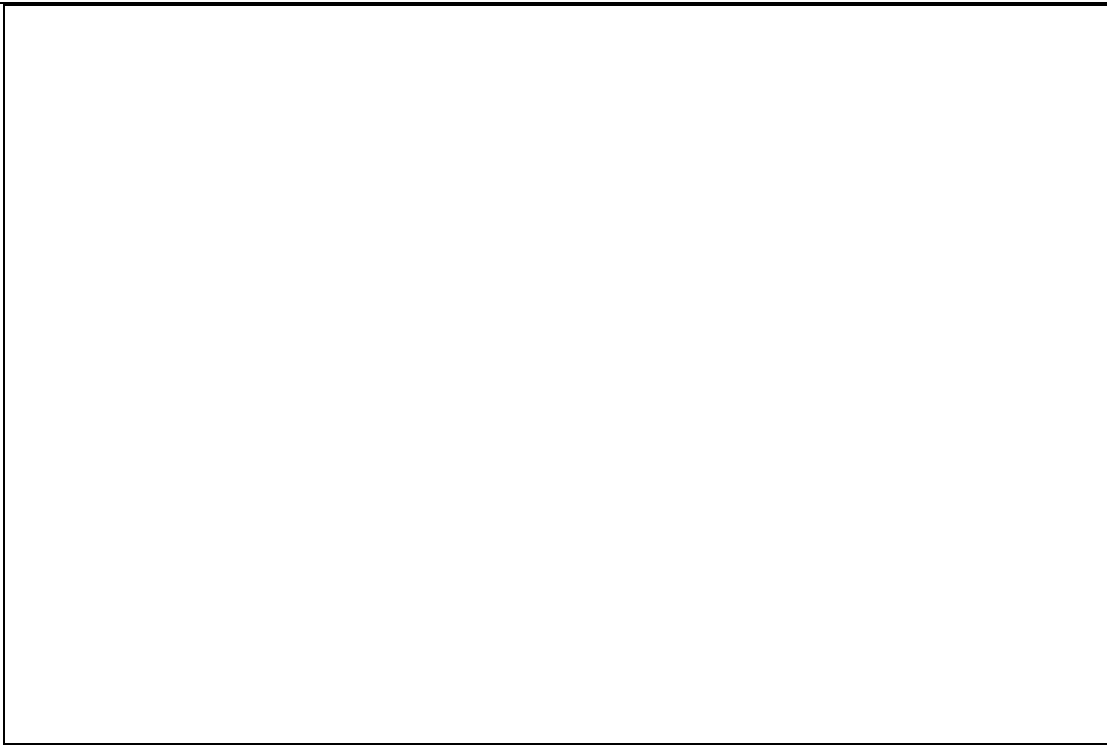


Photo 5: 

Reach 4	Site 4	Kemano River near km44, at upstream end of Reach 4.	7-Sep-96	CD# 2292:	52
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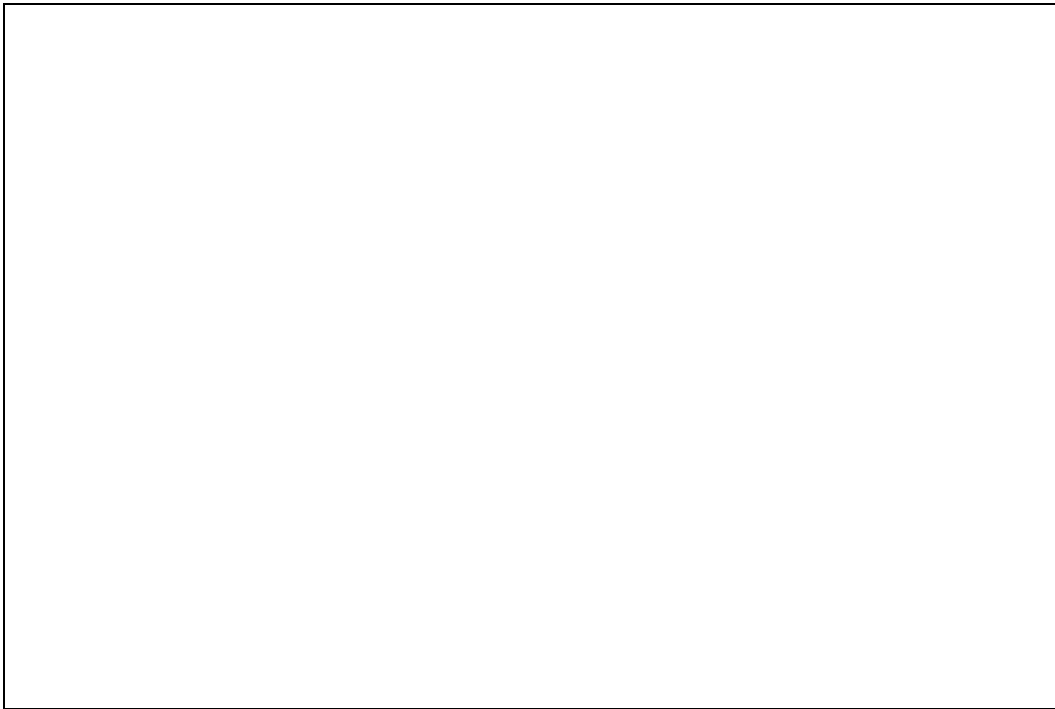


Photo 6: 

Reach 4	Site 4	Kemano River. Downstream view at confluence with km 44 trib.. Note the bedload berm further downstream at the confluence with the Km 43.8 trib.	7-Sep-96	CD# 2292:	53
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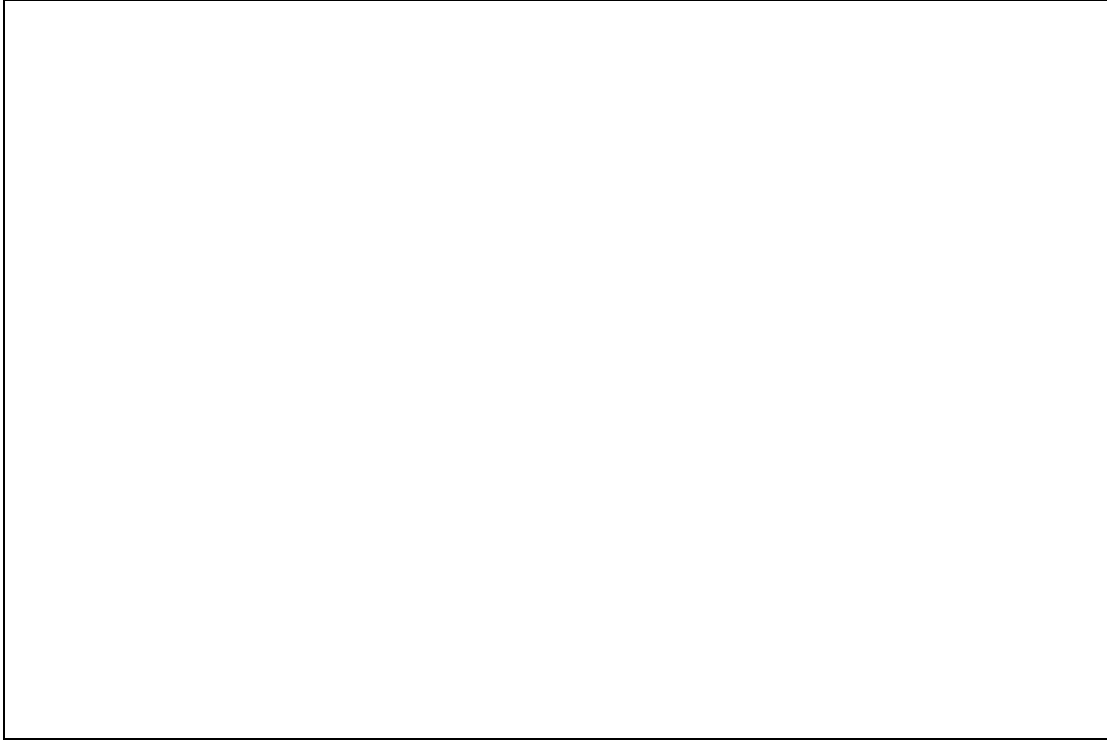


Photo 7: 

Reach 4	Site 4	Kemano River, downstream view near Km 44.	7-Sep-96	CD# 2292:	54
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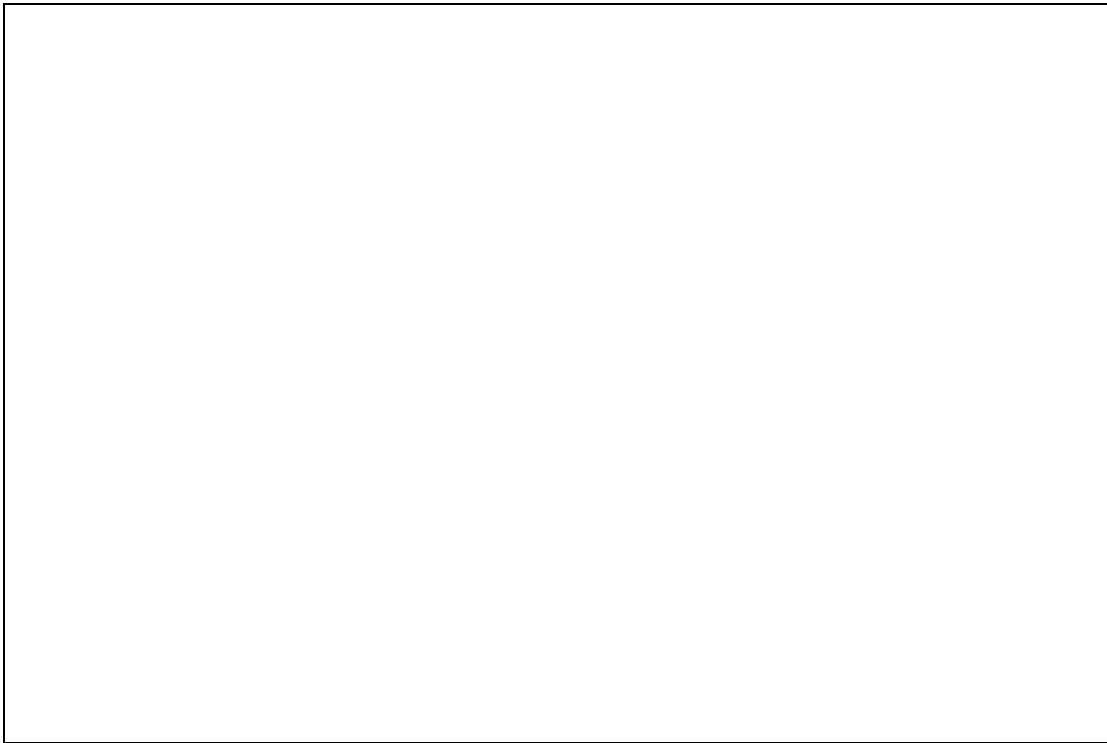


Photo 8: 

Reach 5	Site 7	Kemano River, upstream view near km 48.	7-Sep-96	CD# 2292:	56
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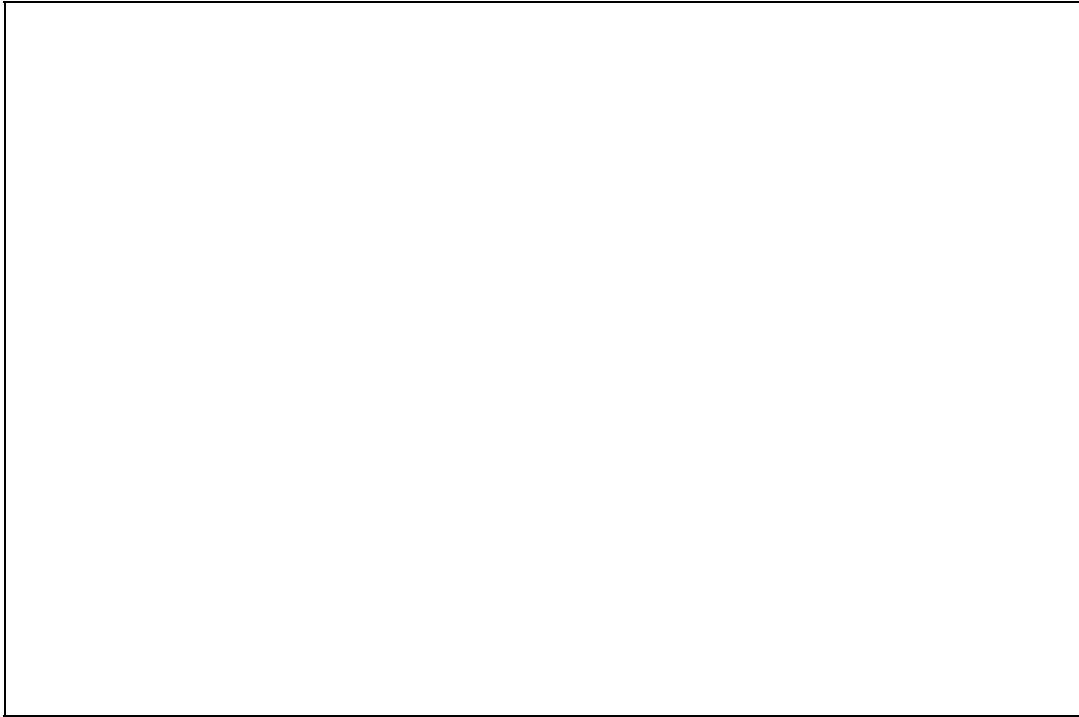


Photo 9:

R6		Aerial view of right bank tributary at km 54, upstream of Site 8. The confluence at the bottom left marks the upstream limit of the survey.	7-Sep-96	CD# 2292:	57
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Photo 10: 

R5	S7	Upstream view, above Site 7.	7-Sep-96	CD# 2292:	77
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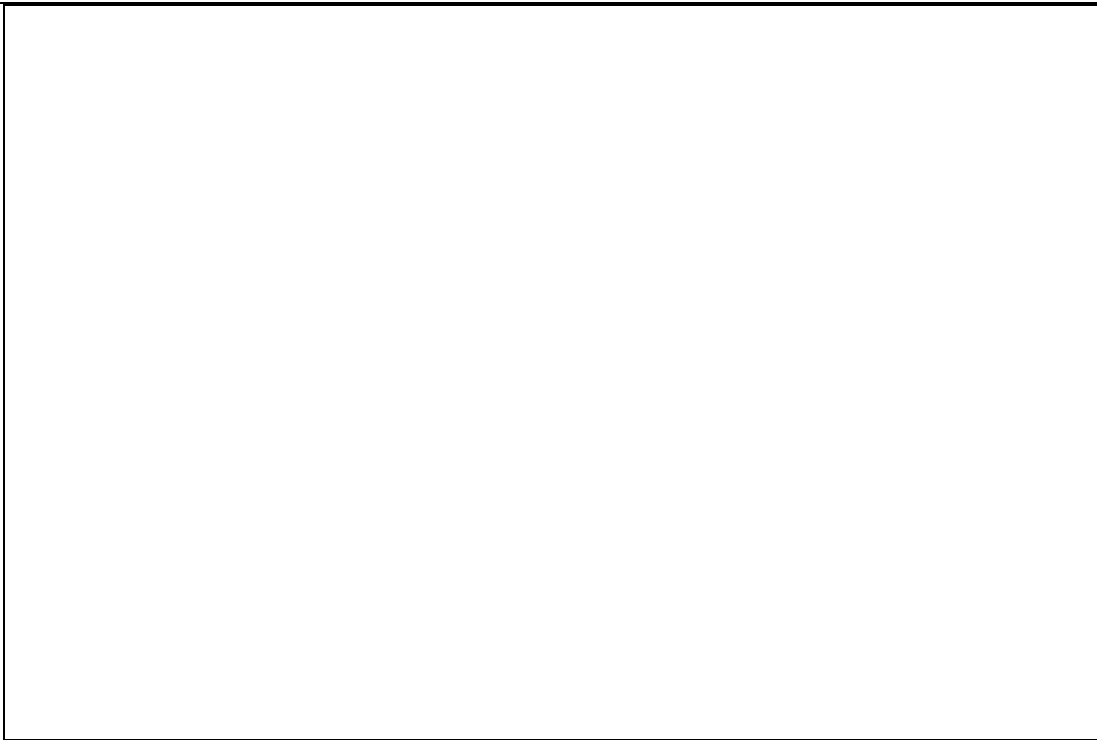


Photo 11: 

Reach 5		Downstream view of the landslide at km49. Site 7 is at the open section of the river ~2km/s of the slide.	7-Sep-96	CD# 2292:	96
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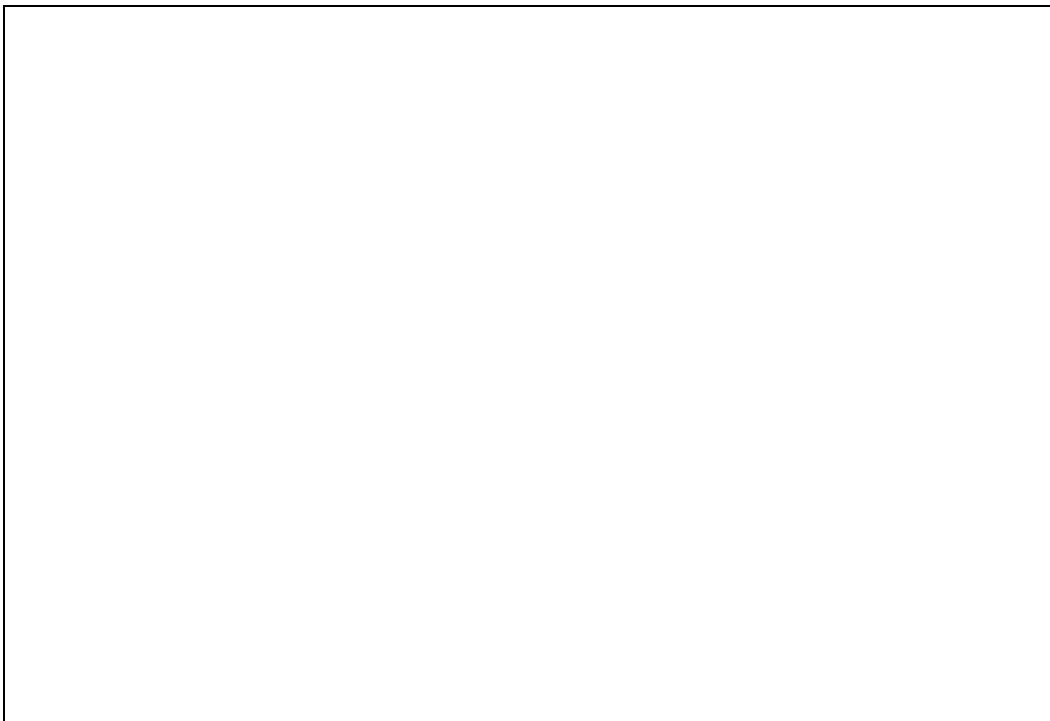


Photo 12: 

Reach 5		Upstream view. Note the landslide (at km49) on the right.	7-Sep-96	CD# 2292:	95
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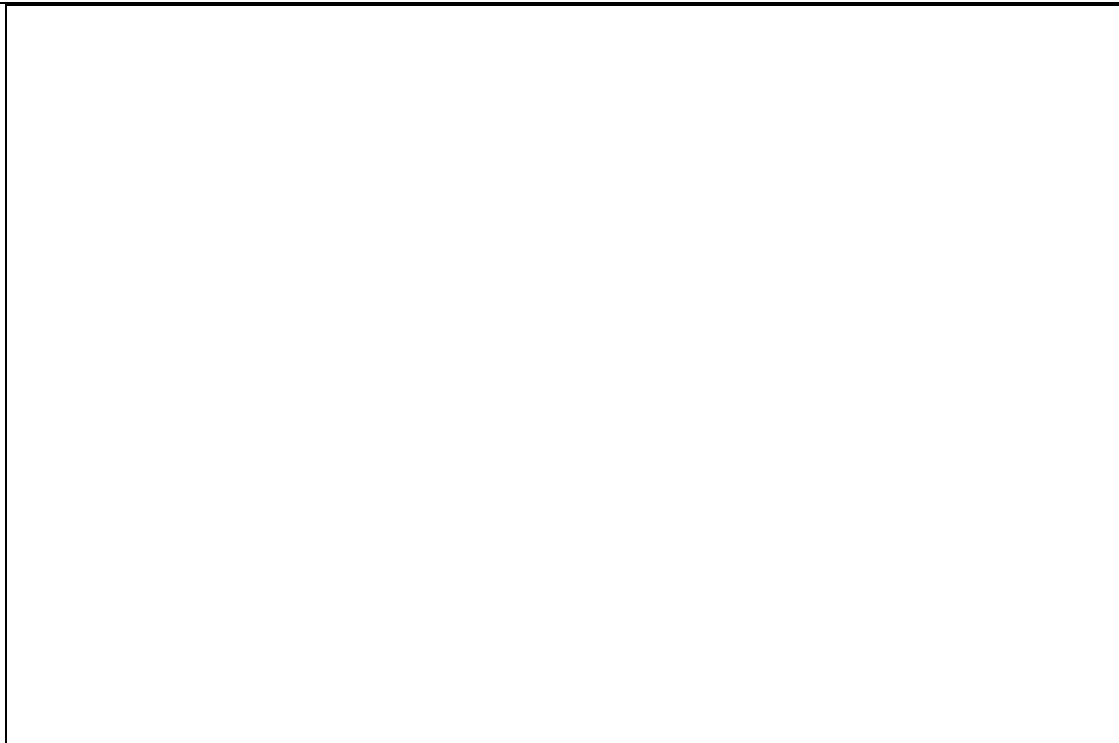


Photo 13: 

Reach 5		Kemano River at km45. This chute marks the upstream limit for anadromous salmon.	7-Sep-96	CD# 2292:	87
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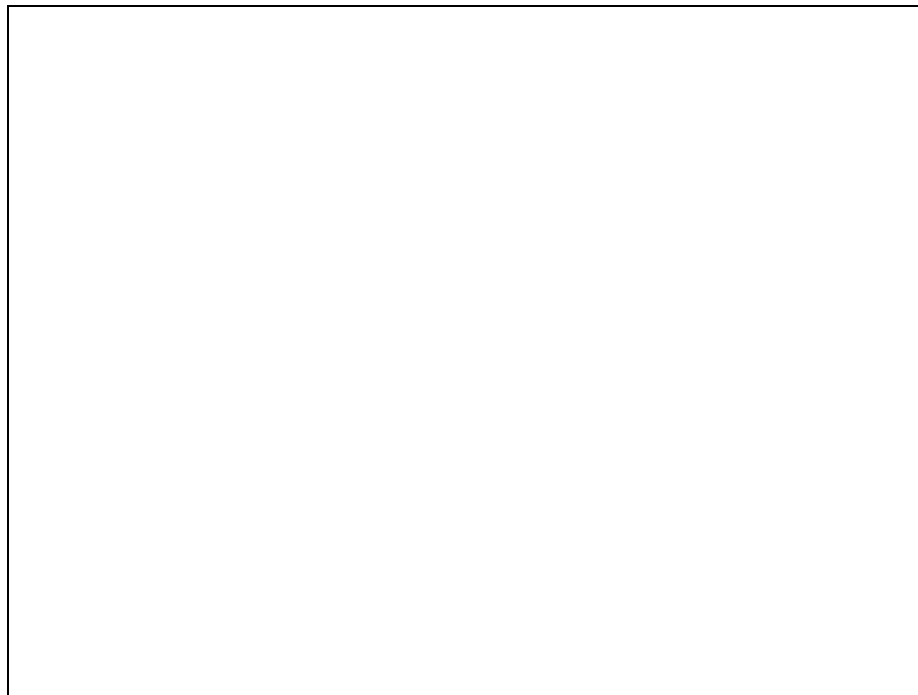


Photo 14: 

Reach 5		Recent landslide into the Kemano River at km49. Debris in the channel has backwatered flow.	7-Sep-96	CD# 2292:	88
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Photo 15: 

Reach 6	Site 8	Downstream view of Kemano River at km 54. The centre channel flows directly from a glacier 2 km upstream	7-Sep-96	CD# 2292:	90
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Photo 16: 

Reach 6	Site 8	Upstream view of the Kemano River at Km 54.	7-Sep-96	CD# 2292:	91
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Photo 17: 

Reach 6	Site 8	Upstream view of the Kemano River at Km 54.	7-Sep-96	CD# 2292:	92
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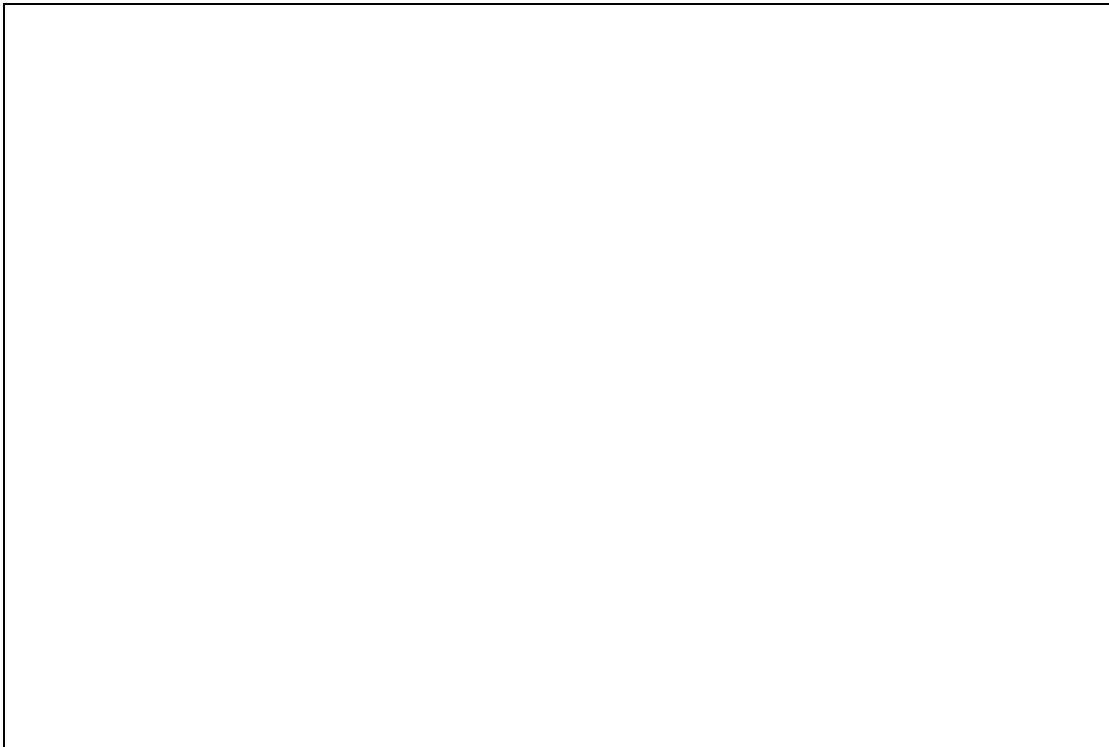


Photo 18: 

Upstream view of the headwaters of the Kemano River, 58 km upstream. (UTM 9.563000.5970000)	7-Sep-96	CD# 2292:	93
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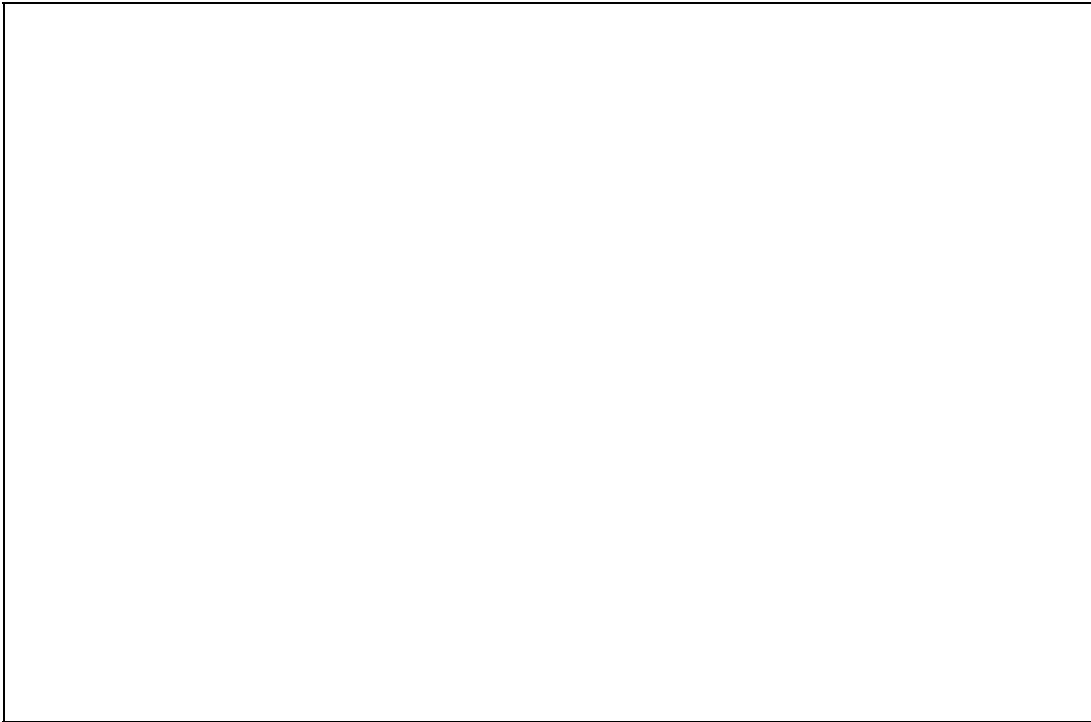


Photo 19: 

Downstream view of the headwaters of the Kemano River, 56 km upstream. (UTM 9.563000.5968000)	7-Sep-96	CD# 2292:	94
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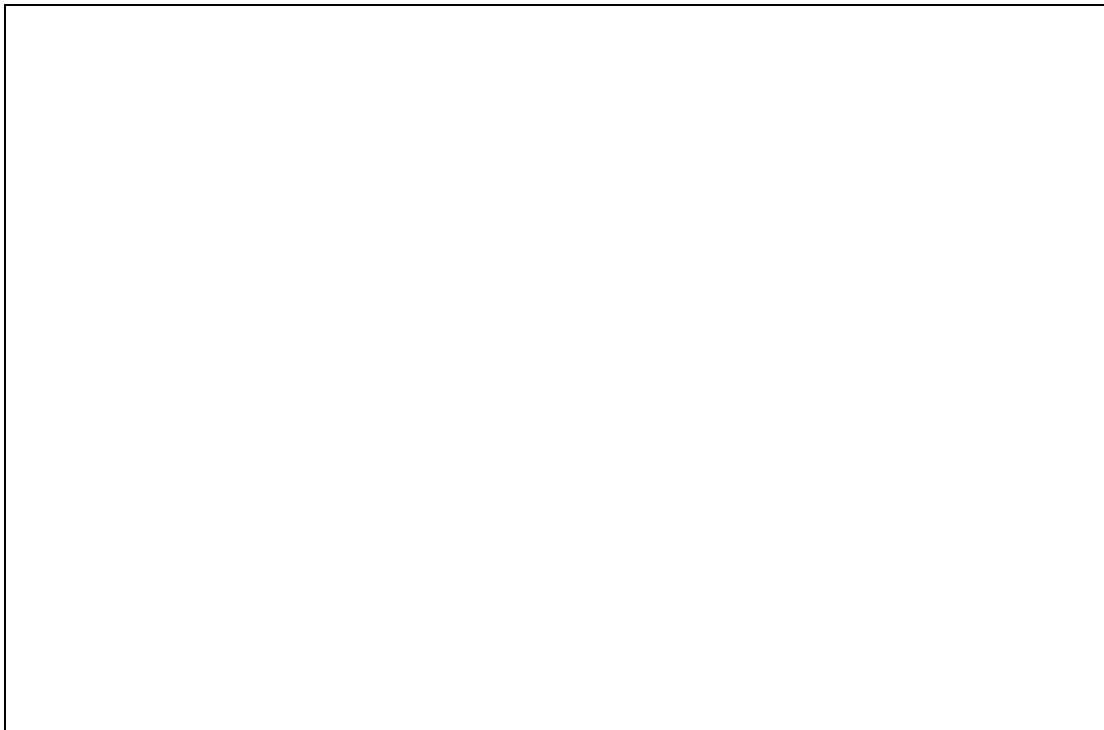


Photo 20: 

Aerial upstream view of km 31.7 trib (left) and km 33 trib (right).	7-Sep-96	CD# 2292:	100
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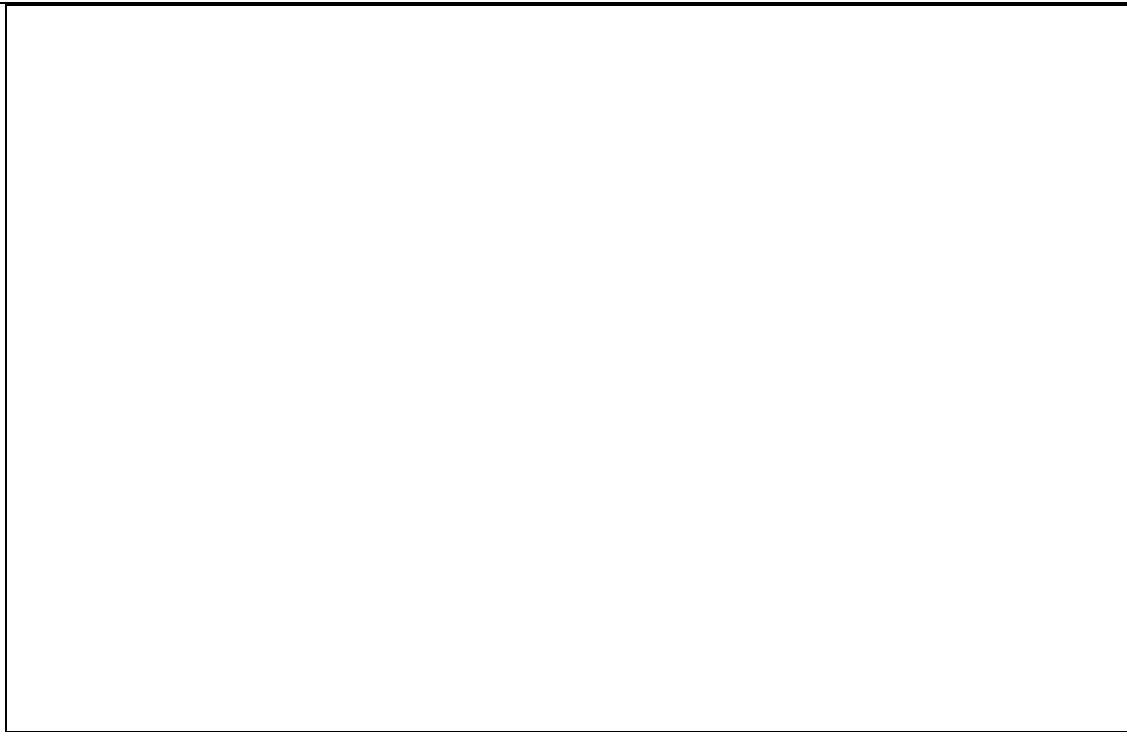


Photo 21: 

R1	S13	Km31.7 trib.	25-Oct-96	CD# 2292:	60
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Photo 22: 

R2	S11	Km31.7 trib.	25-Oct-96	CD# 2292:	59
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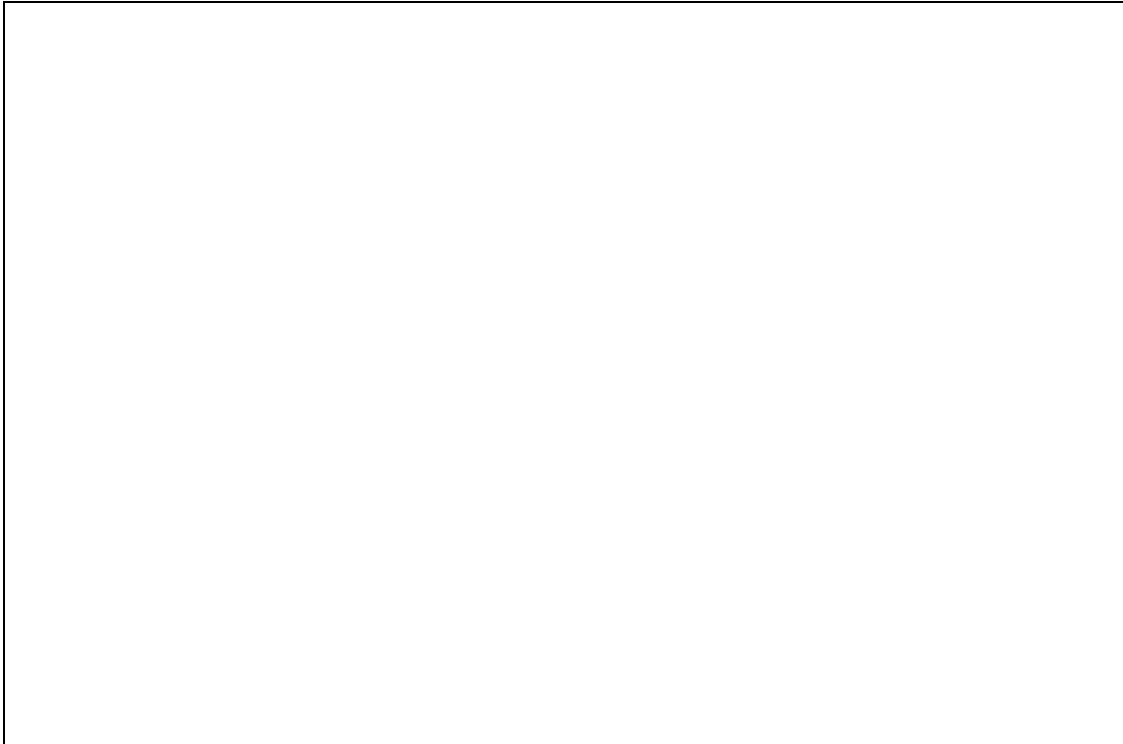


Photo 23: 

R2	S11	Km 31.7 trib. Upstream view.	25-Oct-96	CD# 2292:	66
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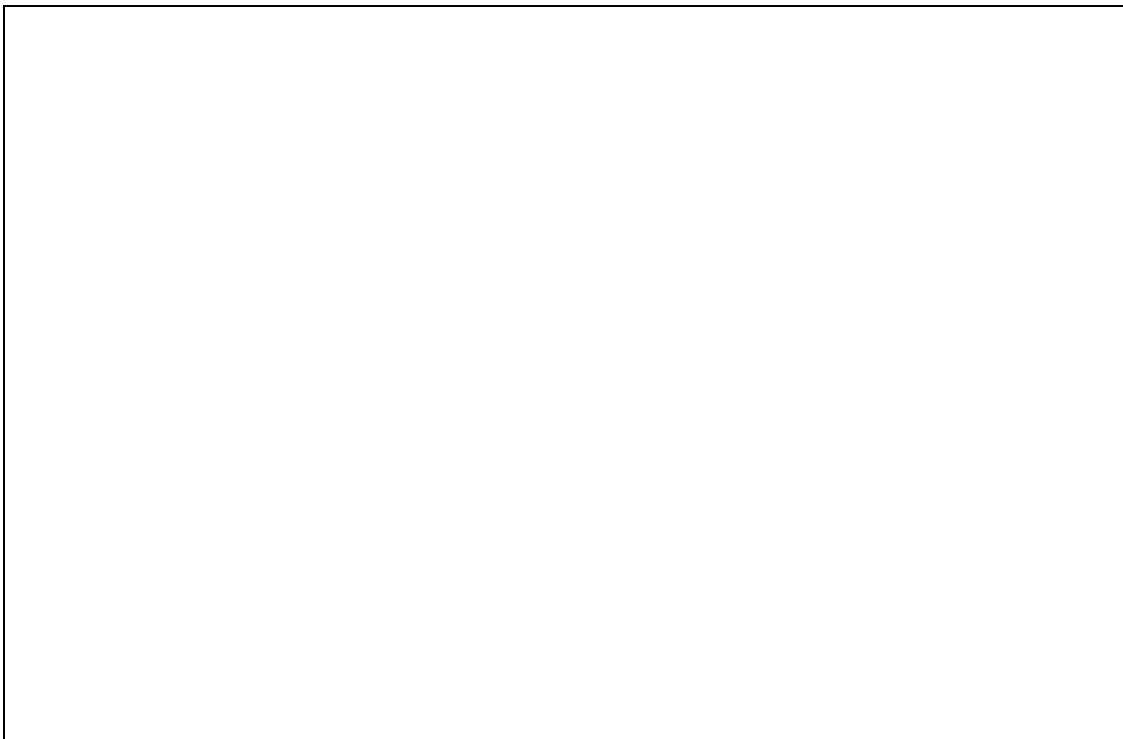


Photo 24: 

R4	S12	Km 31.7 trib. Upstream view.	25-Oct-96	CD# 2292:	64
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Photo 25: 

R4	S12	Km 31.7 trib. Downstream view.	25-Oct-96	CD# 2292:	65
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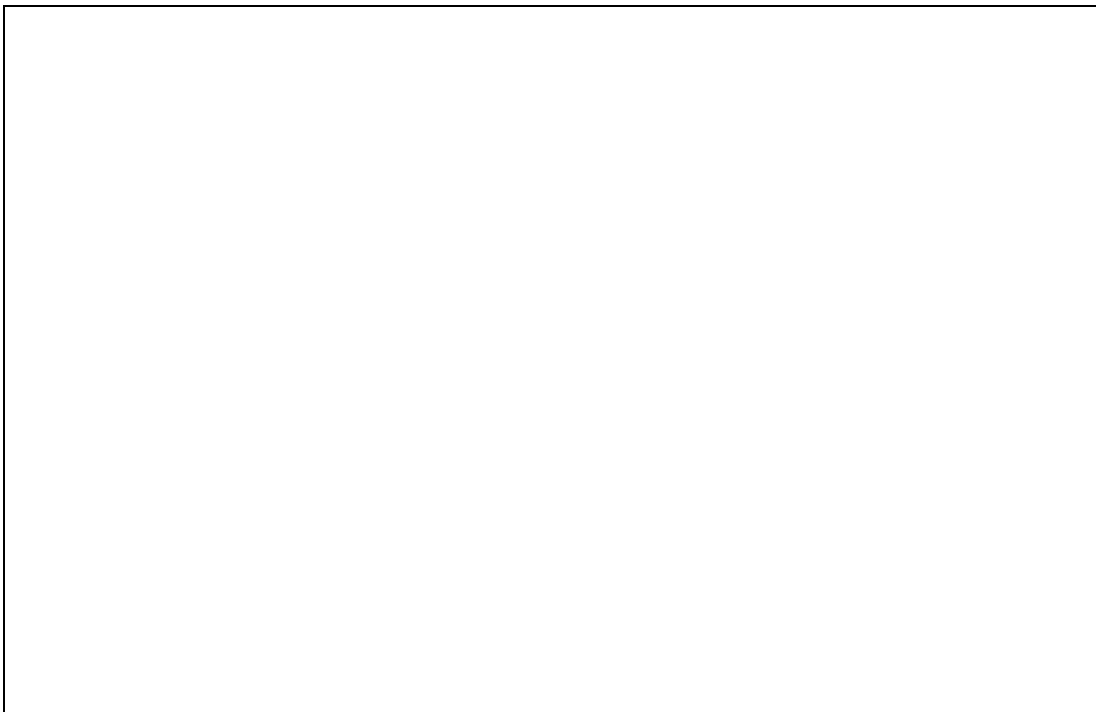


Photo 26: 

R1	S10	Km 33 trib. Aerial view of Reach 1, immediately upstream of Kemano. The canyon in Reach 2 starts at the right of the picture.	25-Oct-96	CD# 2292:	62
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Photo 27: 

R1	S10	Km 33 trib. Aerial upstream view of confluence with the Kemano.	25-Oct-96	CD# 2292:	63
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Photo 28: 

R2		Km33 trib.	25-Oct-96	CD# 2292:	70
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Photo 29: 

R2		Km.33 trib. Note the failing clay bank.	25-Oct-96	CD# 2292:	71
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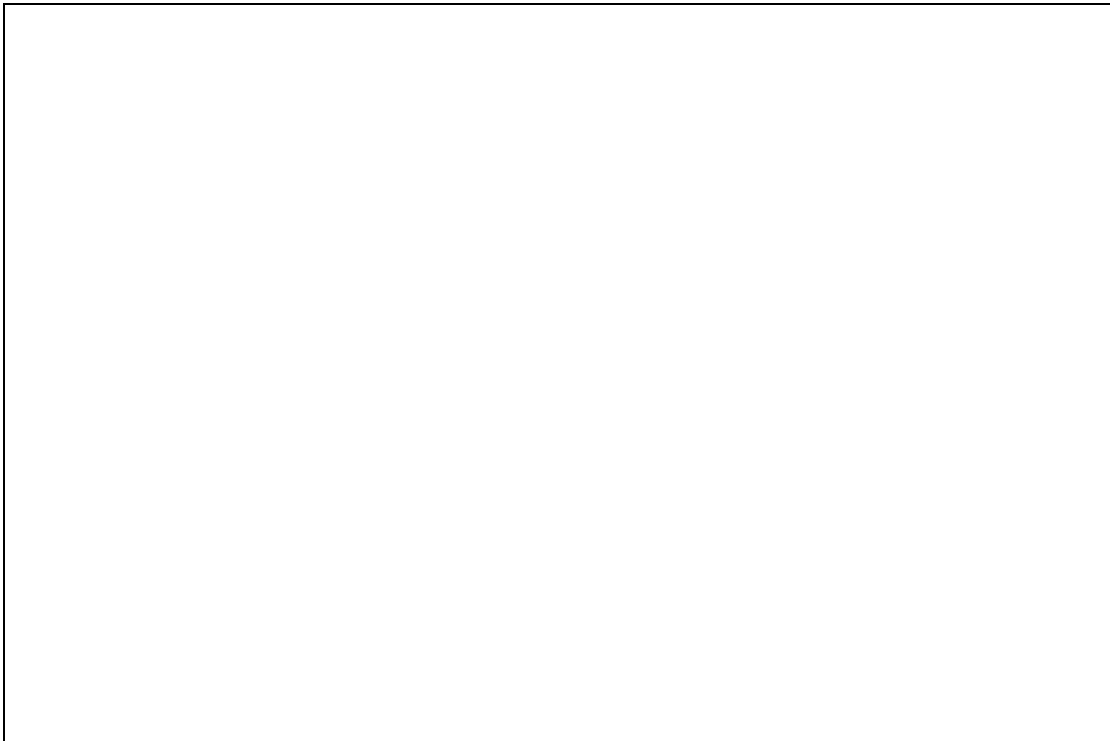


Photo 30: 

R1/2	S10	Km.33 trib. Downstream end of Reach 2 canyon.	25-Oct-96	CD# 2292:	73
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Photo 31: 

R1	S10	Km33 trib. Downstream view.	25-Oct-96	CD# 2292:	74
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Photo 32: 

R1	S10	Km 33 trib. Note the bedload retained by the LWD.	25-Oct-96	CD# 2292:	75
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Photo 33: 

R2/3	S9	Km33 trib. Upstreamview.	25-Oct-96	CD# 2292:	69
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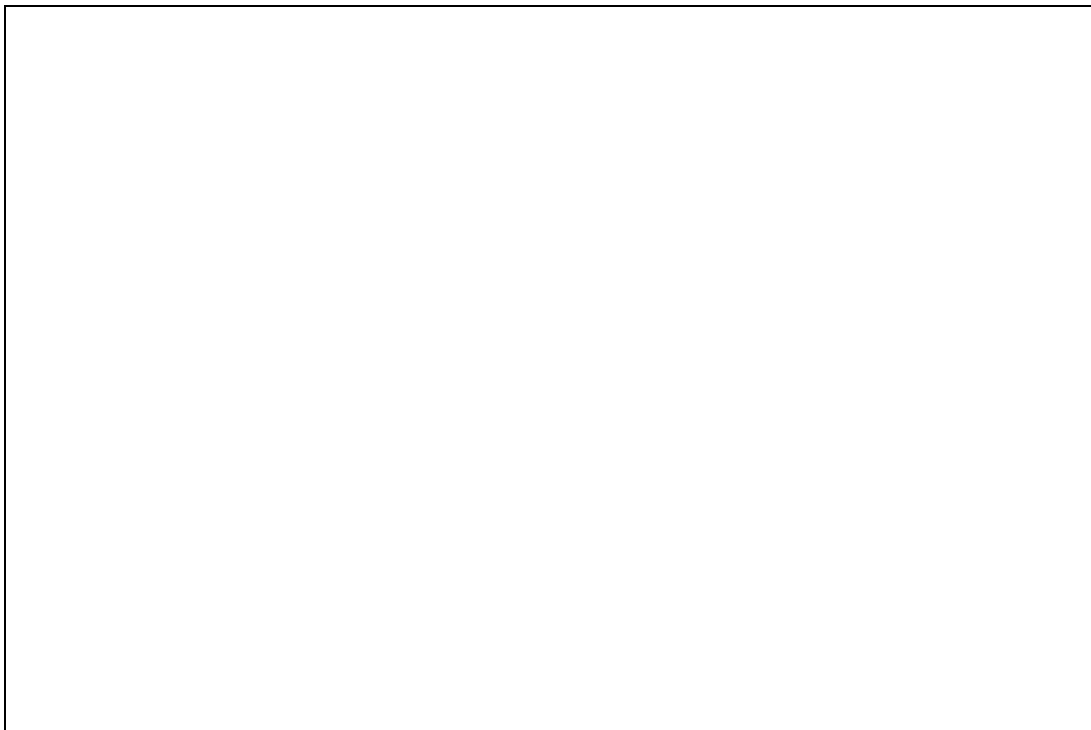


Photo 34: 

R3	S9	Km33 trib. Electroshocking.	25-Oct-96	CD# 2292:	72
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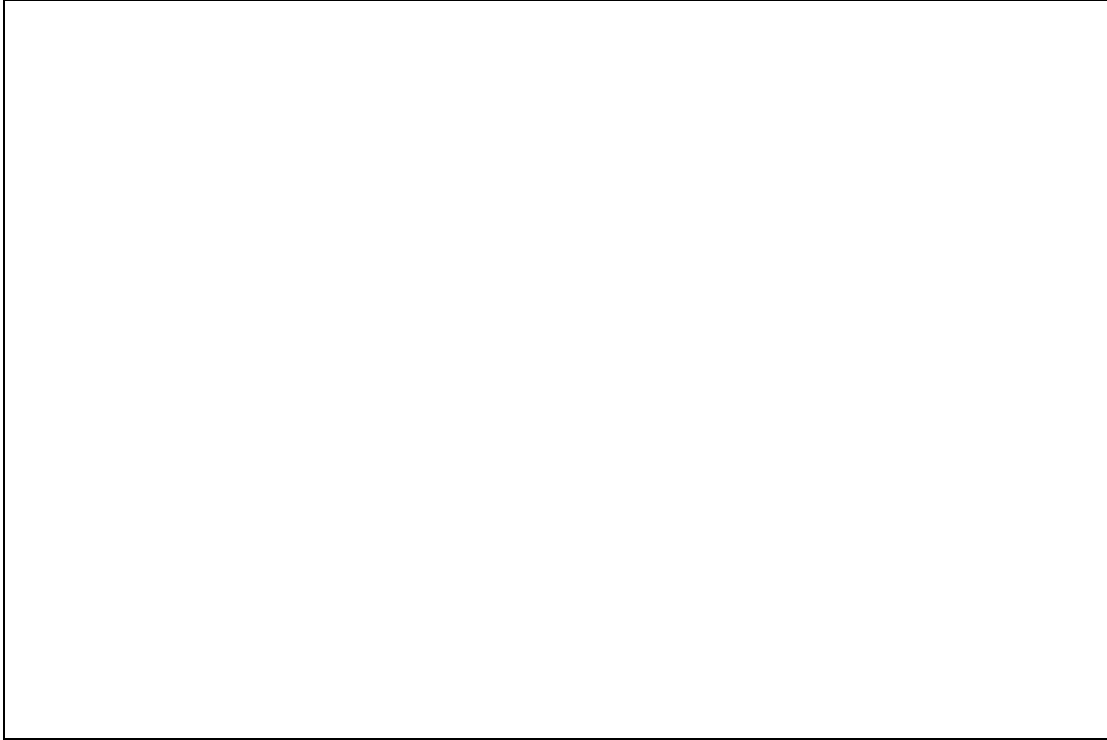


Photo 35: 

Reach 1	Site 2	Km42 trib.	7-Sep-96	CD# 2292:	44
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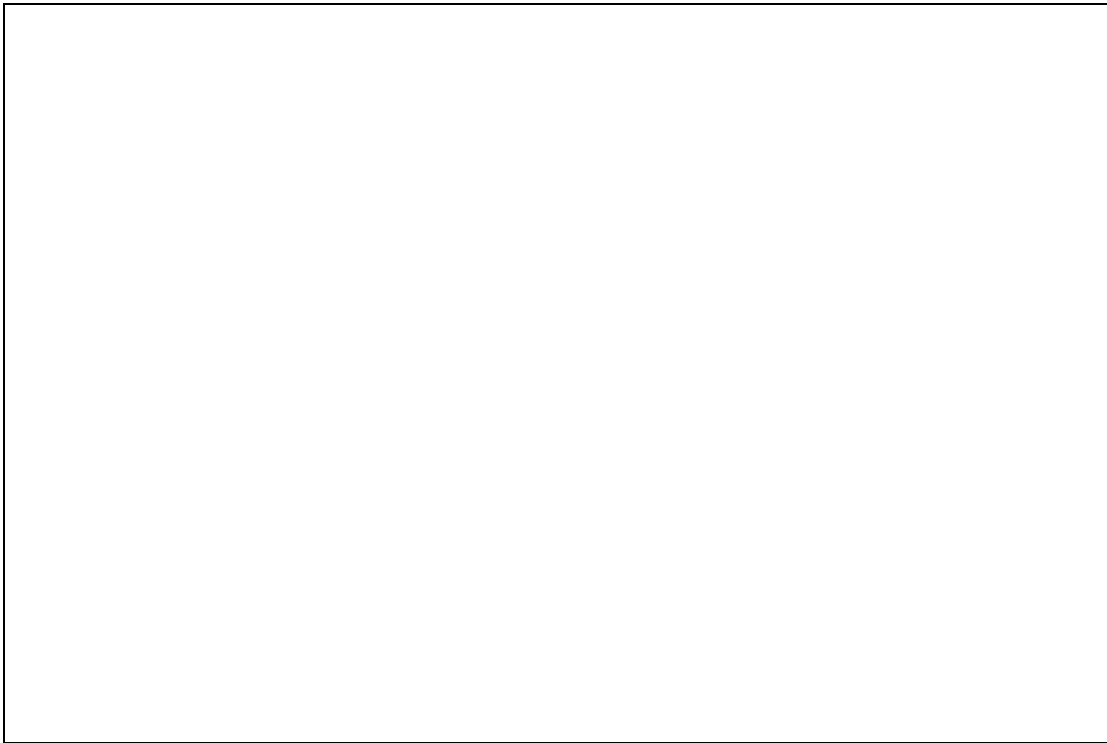


Photo 36: 

Reach 1	Site 2	Km42 trib.	7-Sep-96	CD# 2292:	45
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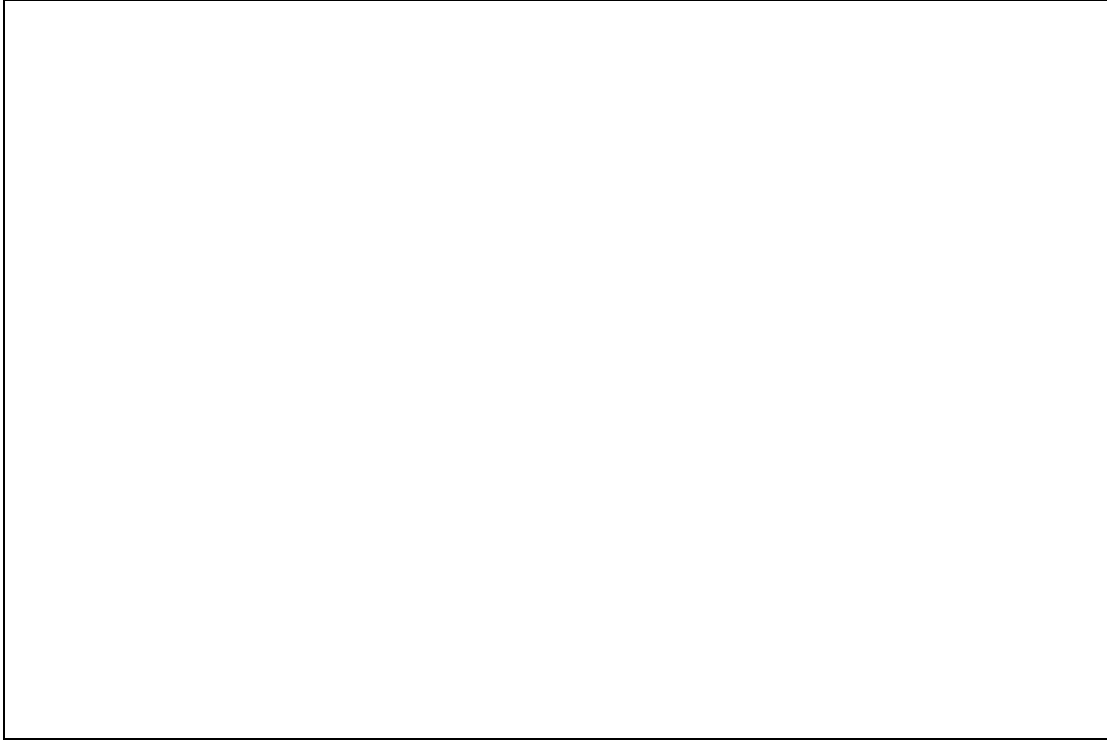


Photo 37: 

Reach 1	Site 2	Km 42 trib. Note the debris levee along the margin.	7-Sep-96	CD# 2292:	46
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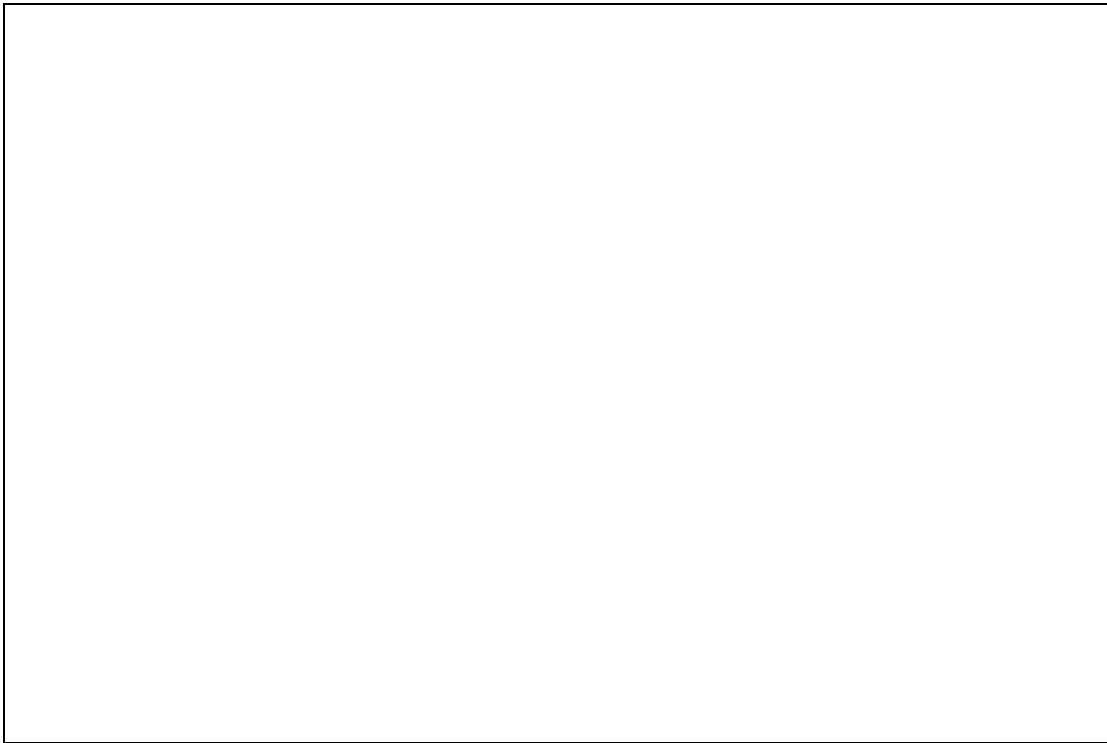


Photo 38: 

Reach 1	Site 2	Km42 trib.	7-Sep-96	CD# 2292:	47
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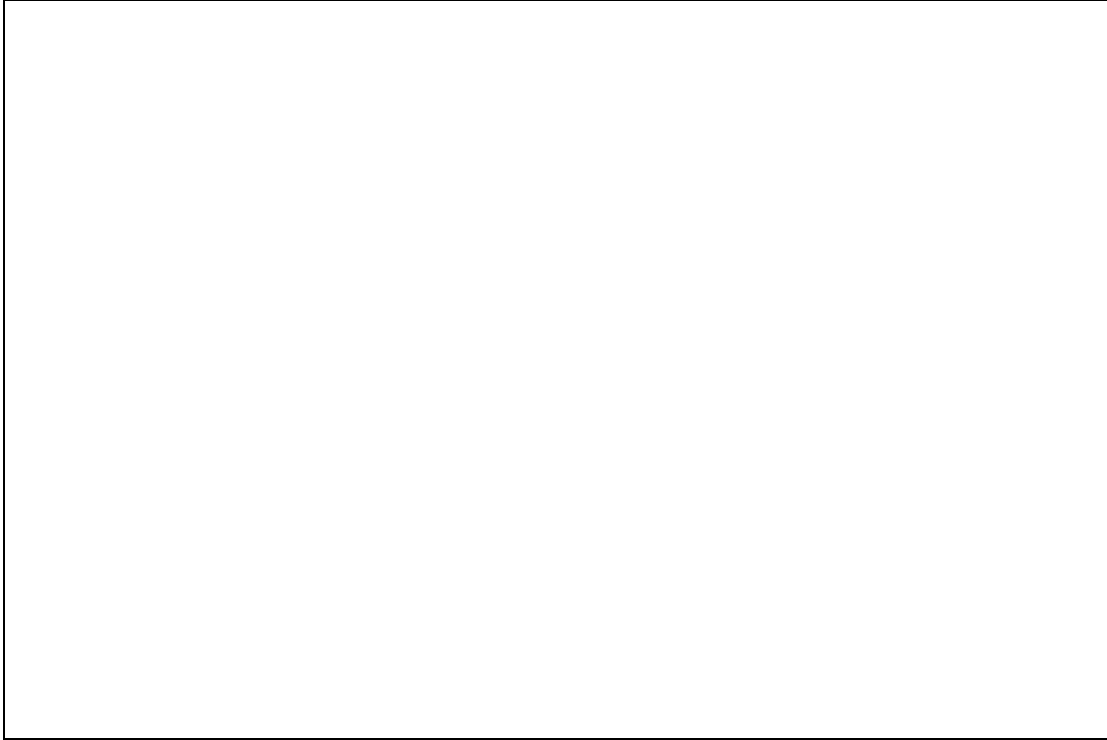


Photo 39: 

R1	S5	Km42 trib.	7-Sep-96	CD# 2292:	76
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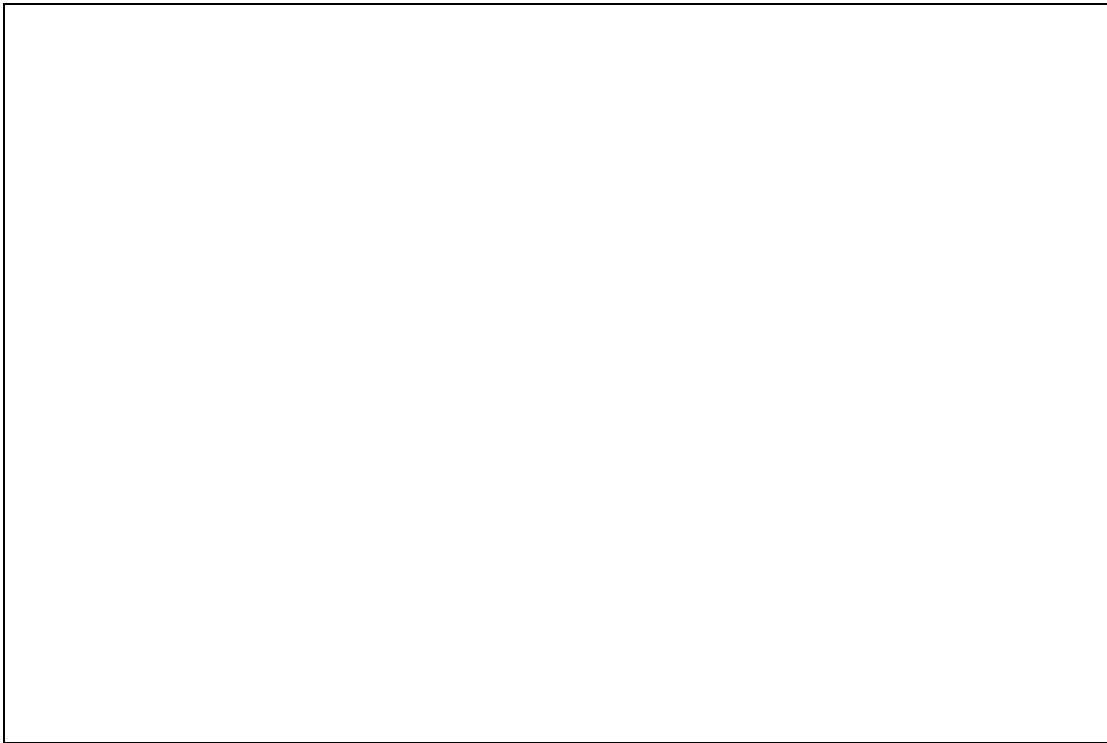


Photo 40: 

Reach 1	Site 5	Km 44 trib. Downstream view, ~300m upstream Kemano confluence.	7-Sep-96	CD# 2292:	50
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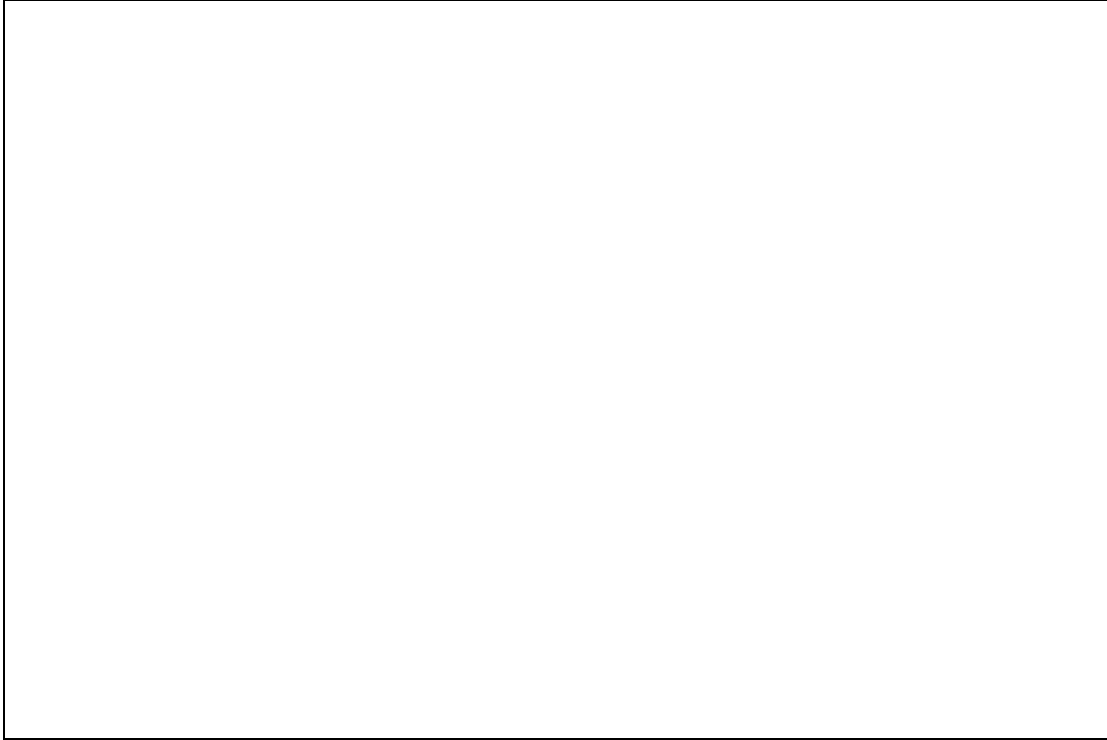


Photo 41: 

Reach 1	Site 5	Km44 trib. Downstream view to the Kemano	7-Sep-96	CD# 2292:	49
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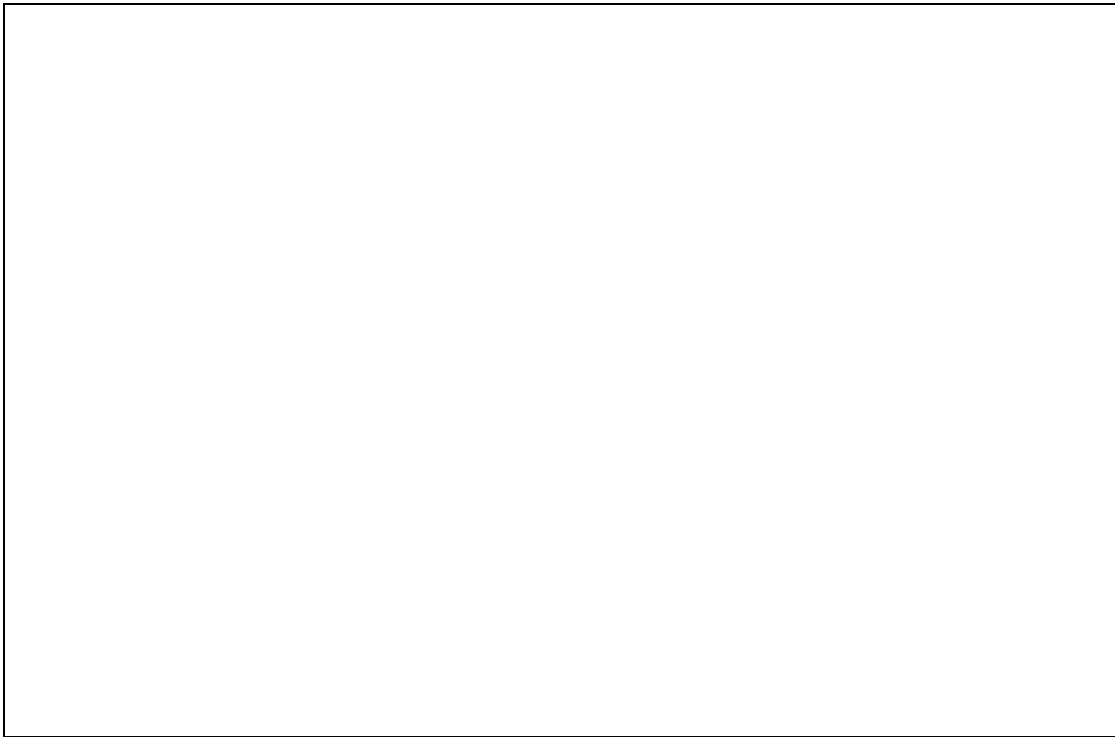


Photo 42: 

R2/3	S6	Km 44 trib, upstream view of canyon (reach 2). Reach 3 is visible further upstream	7-Sep-96	CD# 2292:	78
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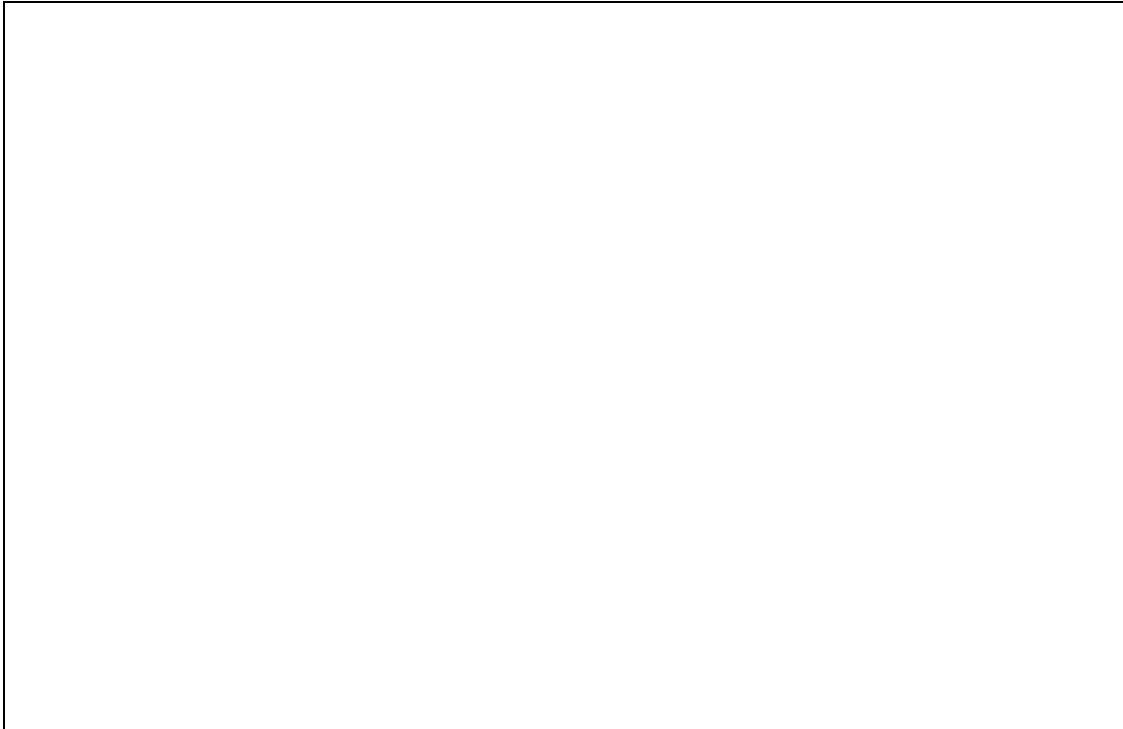


Photo 43: 

R3	S6	Km 44 trib. The waterfall marks the upstream end of our survey.	7-Sep-96	CD# 2292:	79
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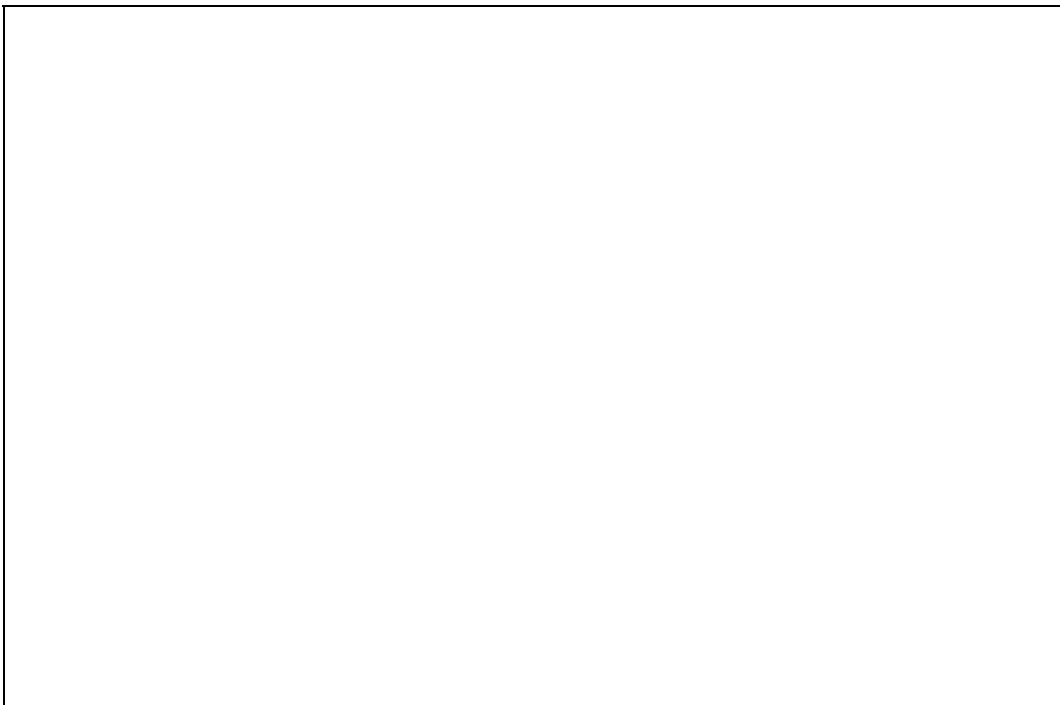


Photo 44: 

Reach 3	Site 6	Km 44 trib, upstream view. Note the bedload accumulation in the trees.	7-Sep-96	CD# 2292:	83
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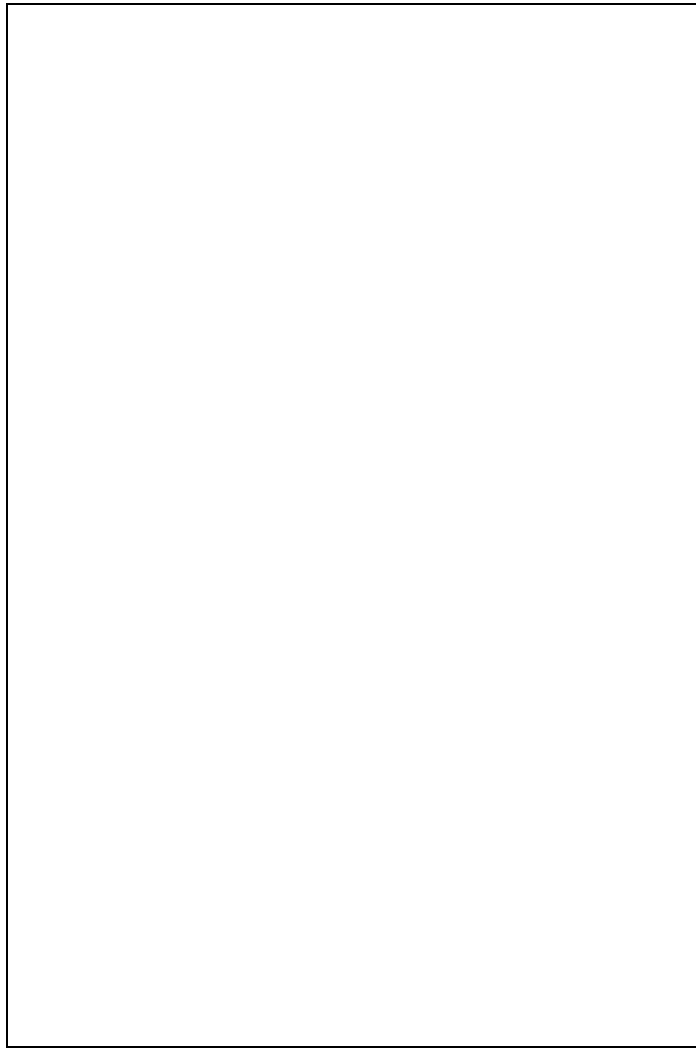


Photo 45: Km 44 trib, upstream view, upstream of Site 6. Sept. 7, 1996. CD 2295 # 84

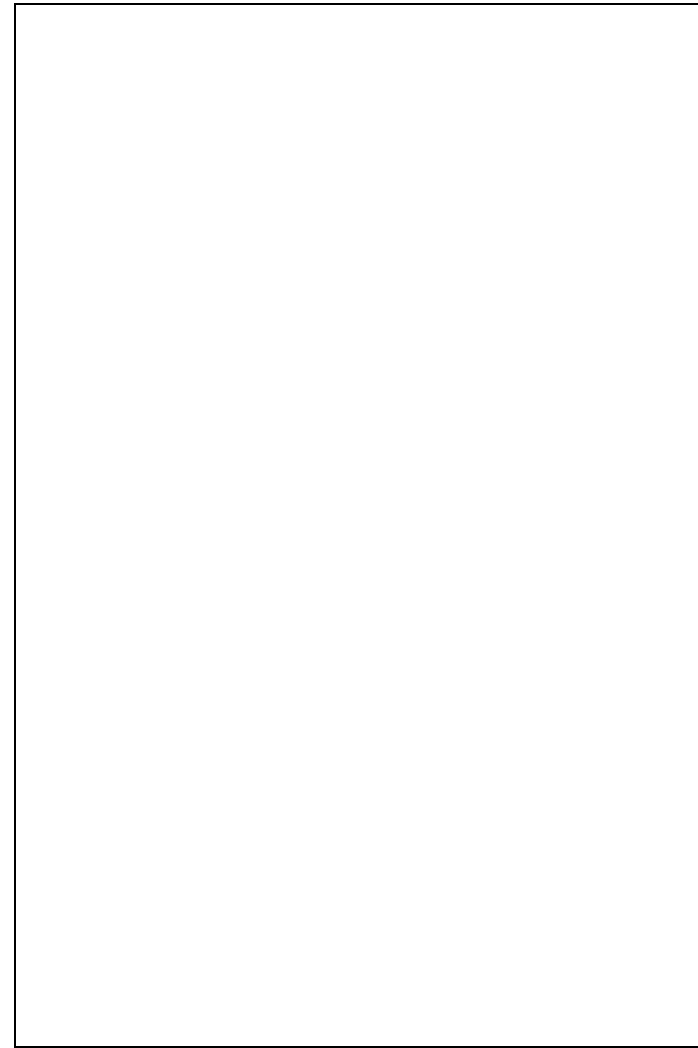


Photo 46: Km 44 trib, upstream aerial view of Reach 3, Site 6. Sept 7, 1996, CD #2295, #85

Kemano

Table with columns: Date, Agency, Crew, Local, Report photo #, CD #, Image #, Watershed Code, Stream, Site, Reach, Caption, Date, Map #, Zone, Easting, Northing, UTM Method, Lens Type, Picture Type, Photo Direction. Contains detailed field data for various river sites and reaches.

**Appendix II: SISS Habitat Data (hard copy stream cards)**

**Appendix III: Fish Catch Data**

## Fish Species Summary: Upper Kemanu River

Site	Reach	Species	Number	Length (mm)	Method
1	4	DV	1	120	EL
1	4	CH	1	98	EL
1	4	CH	1	70	EL
1	4	DV	1	83	EL
1	4	CO	1	55	EL
1	4	CO	1	55	EL
1	4	CO	1	58	EL
1	4	CO	1	63	EL
1	4	CO	1	55	EL
1	4	CO	1	55	EL
1	4	CO	1	61	EL
1	4	CO	1	55	EL
2	1	DV	3	36 - 71	EL/Trib
3	4	DV	1	61	EL
3	4	CO	1	49	EL
3	4	DV	1	58	EL
3	4	CO	1	66	EL
3	4	DV	1	110	EL
3	4	DV	1	119	EL
3	4	DV	1	131	EL
3	4	DV	1	109	EL
3	4	CO	1	47	EL
3	4	CO	1	61	EL
3	4	CO	1	39	EL
3	4	CO	1	67	EL
3	4	CO	1	48	EL
3	4	CO	1	52	EL
3	4	CO	1	48	EL
3	4	CO	1	53	EL
3	4	CO	1	44	EL
3	4	CO	1	49	EL
3	4	CO	1	45	EL
3	4	CO	1	47	EL
3	4	CO	1	39	EL
3	4	CO	1	40	EL
3	4	CO	1	47	EL
3	4	CO	1	46	EL
3	4	CO	1	42	EL
3	4	CO	1	45	EL
3	4	CO	1	44	EL
3	4	DV	1	61	EL
3	4	DV	1	81	EL
4	4	DV	1	93	EL
4	4	CO	1	46	EL
4	4	DV	1	37	EL
5	1	DV	3	150 - 200	VO/Trib
5	1	DV	1	35	EL/Trib
6	3	N/F	*	*	Trib
7	5	N/F	*	*	*
8	6	N/F	*	*	*
9	3	N/F	*	*	Trib
10	1	(DV,CO)	*	*	Trib
11	2	(DV)	*	*	Trib
12	4	N/F	*	*	Trib
13	1	CO	1	*	VO/Trib
13	1	(DV)	*	*	Trib

Sampling Methods: VO = Visual Observations MT = Minnow Trapping  
EL = Electrofishing



**Appendix IV: 1:20,000 Maps**

Paper and digital copies of the 1:20,000 TRIM maps are on file with:

West Fraser Mills Ltd., Skeena Sawmills Division	(250) 635-6336
Ministry of Environment, Lands and Parks	(250) 847-7591
Triton Environmental Consultants Ltd.	(250) 635-1494

## Appendix V: Spawning Escapement Data

In interpreting this data:

n/i is: not inspected for this species: This means that either a) this stream was not surveyed at all, or b) the Fishery Officer surveyed the stream but did not survey it for the species noted and then actually wrote n/i on the field form.

UNK is: unknown: This means that either: a) there is no information at all about this species for this year , or b) the space for this data in the Fishery Officer's field notebook was left blank.

0 is: no fish observed: This means that when the stream was surveyed, the Fishery Officer wrote down either a) 0 fish observed, or b) n/o (none observed) in the field notebook.

n/s is: Species does not spawn in this stream

a/p is: Adult fish present

(Pers. comm: G. Serbic)

**Salmon Escapement Data  
Kemano River**

<b>Year</b>	<b>Sockeye</b>	<b>Coho</b>	<b>Pink</b>	<b>Chum</b>	<b>Chinook</b>	<b>Steelhead</b>
1953	UNK	3500	3500	7500	3500	UNK
1954	UNK	3500	3500	7500	1500	UNK
1955	UNK	7500	1500	3500	3500	UNK
1956	UNK	15000	3500	1500	750	UNK
1957	6	1500	200	3500	750	200
1958	3	7500	3500	15000	750	UNK
1959	UNK	1500	200	1500	750	UNK
1960	UNK	750	400	400	750	UNK
1961	UNK	750	1500	1500	750	UNK
1962	UNK	3500	75000	35000	3500	UNK
1963	n/i	n/i	n/i	n/i	n/i	n/i
1964	UNK	7500	100000	15000	3500	UNK
1965	UNK	7500	15000	15000	3500	UNK
1966	UNK	8000	100000	100000	5000	UNK
1967	200	7500	7500	75000	3500	UNK
1968	UNK	7500	125000	125000	3500	UNK
1969	UNK	2500	750	12500	750	UNK
1970	0	3500	35000	15000	3500	UNK
1971	400	7500	3500	13500	3500	UNK
1972	25	7500	200000	100000	3500	UNK
1973	0	3000	5000	75000	UNK	UNK
1974	0	3000	75000	100000	1500	UNK
1975	20	7000	7500	18000	1000	UNK
1976	UNK	7000	180000	25000	500	UNK
1977	100	4000	4000	20000	500	UNK
1978	150	6000	200000	80000	1000	UNK
1979	25	3000	40000	20000	1000	UNK
1980	50	4000	100000	40000	500	UNK
1981	70	4000	40000	15000	300	UNK
1982	50	4000	80000	30000	1500	UNK
1983	25	4000	120000	6000	750	UNK
1984	50	4000	240000	25000	550	UNK
1985	100	3000	130000	30000	400	0
1986	50	5000	225000	60000	500	UNK
1987	100	1000	150000	16000	250	UNK
1988	100	4000	400000	80000	2000	UNK
1989	100	4000	70000	60000	300	UNK
1990	a/p	n/i	125000	30000	a/p	UNK
1991	UNK	2000	50000	20000	100	UNK
1992	100	1000	180000	10000	UNK	UNK
1993	200	a/p	10000	6000	a/p	UNK
1994	10	0	41000	25000	35	UNK
1995	40	a/p	13000	22000	15	UNK
<b>Totals</b>	<b>1974</b>	<b>177000</b>	<b>3165050</b>	<b>1360900</b>	<b>59450</b>	<b>200</b>