

RECONNAISSANCE (1:20,000) FISH AND FISH HABITAT INVENTORY IN THE UPPER MORICE WATERSHED

WSC 460-600600

Prepared for:

Northwood Pulp and Timber Ltd.

PO Box 158
Houston, BC
V0J 2N0

January 2000

Prepared by:



PROJECT REFERENCE INFORMATION

FDIS Project Number:	06-MORR-0103-0103-1999
MELP Project Number:	NWD_C151_010_2000
FRBC Project Number:	10448
FRBC Region:	Skeena-Bulkley Region
MELP Region:	06
MELP District:	Skeena
FW Management Unit:	6-9
Fisheries Planning Unit:	North Coast
DFO Sub-district:	4D
Forest Region:	Prince Rupert
Forest District:	Morice
Forest Licensee and Tenure #:	Northwood Pulp and Timber Ltd., Morice TSA 20
First Nation Traditional Area:	Wet'suwet'en Nation, Broman Lake Band, Skin Tyee Band

WATERSHED INFORMATION

Watershed Group:	Morice River
Watershed Code:	180-600600-00000-00000-0000
UTM at Mouth:	NA
Watershed Area:	644 km ²
Total of All Stream Lengths:	986.49 km
Stream Order:	NA
NTS Map:	93L/02, 93L/03, 93L/04, 93L/13, 93L/14
TRIM Map:	93L.003, 93L.004, 93L.005, 93L.006, 93L.014, 93E.095, 93L.013, 93L.015, 93E.094, 93L.016, 93E.092, 93E.093, 93E.082, 93E.083, 93L.024
BGC Zone:	SBS
Air Photos:	BCC96050 #91-105, #171-185 BCC96071 #66-79 BCC96123 #162-184 BCC96138 #29-53, #180-202 BCC96156 #53-72, #134-156 BCC96148 #60-83

SAMPLE DESIGN SUMMARY

Total number of Reaches:	1421
Random Sampling Sites:	61
Biased Sampling Sites:	157
Fish Sampling Sites:	10
Total Sampling Sites:	228
Field Sampling Dates:	August 10 - October 6, 1999
Fish Species Captured During Survey:	BT; CAL; CAS; CH; CO; CT; DV; LKC; LNC; LSU; MW; NSC; PL; RB; RSC; WSU

CONTRACTOR INFORMATION

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DISCLAIMER

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

* Product refers to the information detailed in the following pages of this report.

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Attachment II	Field Notes
Attachment III	Collected Fish Aging Structures
Attachment IV	Voucher DNA Sample Table
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ACKNOWLEDGMENTS

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1.0 INTRODUCTION

Triton Environmental Consultants Ltd. (Triton, Terrace) was retained by Northwood Pulp and Timber Ltd. (Northwood) to conduct a Reconnaissance (1:20,000 scale) Fish and Fish Habitat Inventory in Northwood's Morice South operating area which is located within the Morice Timber Supply Area (T.S.A. 20).

This project commenced as a result of BC Fisheries and Ministry of Environment Lands and Parks (MELP) initiatives to gather information about fish distribution, population status, and the condition and capability of stream habitats (Anonymous, 1998). Forest Renewal of British Columbia (FRBC) funding and MELP supervision facilitated the commencement of this sample-based survey of the sub-basins outlined within the study area. The inventory provides information regarding the characteristics, the distribution and the relative abundance of fish species, as well as information on biophysical lake and stream data. This information can be used for the interpretation of habitat sensitivity and fish production capability (Anonymous, 1998). The results of the inventory may be applied to initial Riparian Management Area (RMA) and lake classification under the Forest Practices Code for forest development planning, watershed restoration, and for the establishment of some landscape-level biodiversity objectives (Anonymous 1998).

1.1 Study Objectives

Fish and fish habitat values were the primary components of the inventory:

- Fish
 - identify and map fish-bearing stream reaches and lakes using existing information and new field information (field inventory).
- Fish Habitat
 - identification and coding of all waterbodies.
 - identification and characterization of stream reaches utilizing topographic maps and aerial photographs, with confirmation via field sampling.

The results of the inventory are presented on 1:20,000 scale TRIM based maps, BC Ministry of Environment, Lands and Parks (MELP) Field Data Information Summary (FDIS) data forms, and in the body of this report.

2.0 STUDY AREA

2.1 Location

Northwood's Morice South operating area is comprised of 3 major watersheds and smaller tributaries to the Morice River (WSC 460-600600); Nanika River, (WSC 460-600600-64400), Lamprey Creek (WSC 460-600600-36400), and McBride Creek (WSC 460-600600-63200). The study area includes tributaries entering from the south bank of

the Morice River (between Lamprey Creek and the Nanika River) which is part of the Skeena River drainage. The Morice Study Area is outlined in Figure 1, and is located approximately 40 km southwest of Houston, B.C.

The Study Area is situated in the Central Interior Ecoprovince. The watershed lies in the broad rolling plateau that comprises the Fraser Plateau Ecoregion, in the Bulkley Ranges, and Nechako Plateau Ecosections.

Demarchi (1996) describes the climate within the Central Interior Ecoprovince:

The area has a typically continental climate: cold winters, warm summers, and a precipitation maximum in late spring or early summer. The area lies in a rainshadow leeward of the Coast Mountains. There is intense surface heating and convective showers in summer and in winter there are frequent outbreaks of Arctic air.

The biogeoclimatic zonation for the Study Area is predominantly Sub-boreal Spruce (Demarchi, 1996). Engelmann Spruce - Subalpine Fir zones occur on the middle slopes and Alpine Tundra Zones occur on the upper mountain slopes (Demarchi, 1996).

2.2 Access

Houston, the closest community to the study area, is situated approximately 40 km to the northeast of the study area. Sampling sites within the watershed were accessed by both road and air.

Directions from Houston to the Study Area are as follows:

- From Houston drive south 27 km on the Morice River Forest Service Road (FSR). At 27 km turn right (west) and stay on the Morice River FSR .
- Drive 17 km west on the Morice River FSR into the Study Area.
- Sample sites were accessed off the Morice West FSR, Morice River FSR, Nanika FSR, Bill Nye FSR and associated spur roads.

Sites located in the study area that did not possess road networks were accessed by helicopter.

3.0 RESOURCE INFORMATION

Resource values within the Sub-boreal Spruce (SBS) biogeoclimatic zone include forest harvesting. Northwood has current logging operations within the study area. Most of the SBS has low capability for agriculture due to adverse climate, topography, bedrock,

Fig.1

stoniness or poor drainage. Fur harvest from this zone is among the highest in the province.

The traditional area of the Wet'suwet'en Nation, Broman, Lake Band, and Skin Tyee Band lie in and adjacent to the study area. Culturally modified trees have been identified within the study area adjacent to Con Lake at the base on Nadina Mountain (Norcan, 1998).

In addition, the surrounding forested areas are used for hunting, hiking, snowmobiling, camping, and cross-country skiing (Meidinger & Pojar, 1991). The Nanika-Kidprice canoe route starts and finishes within the study area. Short portage trails, starting at Lamprey Lake, link 4 lakes (Lamprey, Anzac, Stepp, and Kidprice) together. The route can be finished by traveling down the Nanika River to Morice Lake.

The study area is located within the Central Interior ecoprovince which supports moose (*Alces alces*), caribou (*Rangifer tarandus*), mule deer (*Odocoileus hemionus hemionus*), whitetail deer (*O. virginianus*) and mountain goat (*Oreamnos americanus*) habitats. In addition, black bears (*Ursus americanus*), wolves (*C. lupis*), fisher (*Martes pennanti*), and lynx (*Lynx canadensis*) are widely distributed throughout the ecoprovince. Common herptiles include the western garter snake (*Thamnophis elegans*), the spotted frog (*Rana pretiosa*) and the western toad (*Bufo boreas*) (Campbell et al., 1990).

No existing water quality data was identified during the pre-field planning stages.

4.0 METHODS

The 1:20,000 Scale Fish Stream Identification inventory was completed in six phases:

- Phase 1: Existing Data Review
- Phase 2: Map and Air Photo Analysis
- Phase 3: Sampling Design and Project Plan
- Phase 4: Field Data Collection
- Phase 5: Data Compilation
- Phase 6: Report and Map preparation.

The methods employed for each phase of the project followed those outlined in the *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures, April 1998* (Anonymous 1998). Alterations were made to the project plan in Phase 4 and are outlined in the sections below.

4.1 Phase 4: Field Data Collection

The following sections describe the methods and approaches taken to complete field sampling and data collection.

4.1.1 Pre-field Preparation

Stream reaches to be inventoried were identified by two methods: random sites generated by the FDIS planning tool and biased sites identified by Northwood and Triton. The latter sites are selected to address gaps in the random sampling plan, fish distribution and stream reaches potentially affected by forest planning and harvesting activities. The final sample sites incorporated into the contract were reviewed by John Brockley (Northwood), Todd Mahon (FRBC Coordinator), Paul Giroux (FIS, MELP Skeena Region 6), and Triton (Terrace) to ensure the sample sites meet the requirements of Northwood, MELP and the FDIS planning model.

Required fish collection permits were obtained from MELP and DFO prior to the commencement of field activities.

4.1.2 Field Procedures

All sampling procedures followed those outlined in the *Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures, April 1998* (Anonymous 1998) and the *Forest Practices Code Fish Stream Identification Guidebook*, (Anonymous 1995).

Field work was conducted by three field crews each consisting of two people. In watersheds where road access was available, the crews used 4X4 pick-up trucks or ATV's to travel from site to site. In watersheds where road access was unavailable transportation was provided by Westland Helicopter's Bell Jet Ranger helicopter.

Prior to the commencement of field activities each crew was equipped with the following:

- Smith-Root Model 12A backpack electrofisher
- electrofisher safety gear (leak proof waders, wading belts, Linesman's gloves, hat with a brim, polarized sunglasses)
- minnow traps and bait
- backpacks
- clinometer
- compass
- hip chain
- 50 m tape

- meter stick
- VHF radio
- first aid kit
- water quality kit (hand held pH and conductivity meters)
- thermometer
- Canon waterproof camera and slide film
- voucher specimen container
- MELP Site cards
- MELP Fish collection forms
- MELP Individual fish data cards
- field maps

Fish sampling within stream reaches was conducted using three primary sampling techniques: electrofishing, minnow trapping, and visual observation. Electrofishing is the most efficient method of sampling in shallow stream habitats and was the preferred sampling method for all habitat types in small streams and shallow water habitats. In these habitats and where using an additional sampling method would not provide additional information (i.e. species, relative abundance), it was the only fish sampling technique employed. In a few cases, minnow traps baited with salmon roe were employed in streams of greater depth and in ponded habitats. Visual observation was also used when other methods failed to catch fish. A combination of techniques were employed where the use of only one method would not have effectively sampled all habitats and in areas that were not suited to electroshocking (deep pools, wetlands, etc.). Where appropriate, and where return visits were practical, minnow traps baited with salmon roe were set and allowed to soak for a 24 hour period.

4.1.3 Field Data Compilation

Following each field day, field crews met to compile field notes, review field data and summarize the field findings onto hard copy maps. This system ensured that all information was thoroughly documented, allowing for preliminary stream classifications and changes to the sampling plan to be made. Field crews were in constant contact with Paul Giroux (Fisheries Inventory Specialist) and Andy Witt (Forest Ecosystem Specialist) when the originally proposed plan needed modifications. In most cases sites downstream of known fish bearing reaches were moved to reduce sampling redundancy, address potential barriers, identify species composition, establish fish distribution and provide additional sampling data.

5.0 RESULTS

5.1 Existing Information

FISS (1995a) records indicate that rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*O. clarkii*), coho (*O. kisutch*), pink (*O. gorbuscha*), chinook (*O. tshawytscha*), sockeye (*O. nerka*), lake chub (*Couesius plumbeus*), longnose sucker (*Catostomus columbianus*), longnose dace (*Rhinichthys cataractae*), Dolly Varden (*Salvelinus malma*), lake trout (*Salvelinus namaycush*), and Rocky Mountain whitefish (*Prosopium williamsoni*) are present in the Nanika River drainage. FISS (1995a) records indicate that the McBride Creek drainage contains: redbside shiner (*Richardsonius balteatus*), prickly sculpin (*Cottus asper*), Burbot (*Lota lota*), Largescale sucker (*Catostomus macrocheilus*), peamouth chub (*Mylocheilus caurinus*), Rocky Mountain whitefish, longnose dace, lake whitefish (*Coregonus clupeaformis*), lake trout, chinook, coho, cutthroat trout, and Dolly Varden. FISS (1995a) also indicates that the Lamprey Creek drainage contains: cutthroat trout, rainbow trout, coho, chinook, Dolly Varden, Rocky Mountain whitefish, prickly sculpin, lake chub, redbside shiner, burbot, peamouth chub, longnose dace, and longnose sucker.

MoELP Skeena Region 6 Smithers files support the species identified in the FISS (1995a) records and include white sucker (*Catostomus commersoni*) and Pacific lamprey (*Lampetra tridentata*) as being present within the Study Area.

5.2 Survey Information

Table 1 provides an overview of the survey information compiled for the Morice Study Area.

Table 1. Summary Survey Information for the Study Area.

Major Watershed Code:	180-600600-00000-00000-0000-0000-000-000-000-000-			
Watershed Name:	Morice River			
Drainage:	Morice River→ Bulkley River→Skeena River			
NTS Maps:	93L/02, 93L/03, 93L/04, 93L/13, 93L/14			
TRIM Maps:	93L.003	93L.013	93E.092	93E.082
	93L.004	93L.014	93E.093	93L.024
	93L.005	93L.015	93E.094	93E.083
	93L.006	93L.016	93E.095	
Total Number of Lakes:	25			
Total Number of Reaches:	1421			
Stream Field Sampling Dates:	August 10 - October 6, 1999			
Number of Random Sites Sampled:	61			
Number of Bias Sites Sampled:	157			
Number of Fish Sampling Sites:	10			
Total Number of Sampling Sites:	228			

5.3 Field Data

5.3.1 Site Cards

Site Cards and Reach forms were entered into MELP's FDIS database following the completion of the Phase 4 field inventory. Hard copy versions of the Reach/Site Cards are presented in Appendix I.

5.3.2 Fish Collection Cards

The Fish Collection Cards were entered into MELP's FDIS database following the completion of the Phase 4 field inventory. A hard copy of the Fish Collection Forms are presented in Appendix I following the Reach/Site cards.

5.4 Survey Comments

5.4.1 Logistics

Weather conditions were variable over the field sampling dates. Heavy rain caused some turbidity and high water in several sample sites. Field crews often made the decision to sample streams which were not affected by the high runoff. The turbid streams were then revisited when sampling conditions were favorable. Frequent precipitation over the sampling dates helped reduce the number of dry/intermittent streams. The number of dry intermittent streams was relatively low for this time of year (43 of 218 sample sites were classified as dry/intermittent). Poor driving conditions were encountered on secondary roads and crews often had to use winches to make it through muddy sections of road. The use of an ATV was employed when road conditions were not drivable or walking distances were too great. No sites were dropped from the sample plan due to lack of access.

5.4.2 Fish Comments

Fish were captured in 81 of 228 sample locations. Table 2 provides a summary of the of the reaches in which fish were captured. Rainbow trout, bull trout (*Salvelinus confluentus*), coastrange sculpin (*Cottus aleuticus*), prickly sculpin, chinook, coho, cutthroat trout, Dolly Varden, lake chub, northern squawfish (*Ptycheilus oregonesis*), mountain whitefish, longnose sucker, pacific lamprey, white suckers, redbelt shiner, and longnose dace were captured in the study area. Length frequency distributions are provided in the figures below for sport species with adequate numbers for graphic representation. Length vs age is also demonstrated in the following figures for the sport species from which ageing data was collected.

Table 2. Fish Capture Locations with the Upper Morice

Site	WSC/ILP	Reach	Order	Species	Stage	Number	Minimum Length (mm)	Maximum Length (mm)
131	1071	2	1	RB	F	5	20	30
132	39700-0440	1	2	DV	J	3	80	110
133	36400-39700	3	4	RB	J	5	60	110
136	36400-26300	2	2	DV	A	3	100	110
152	36400-39700	5	4	WSU	J	16	50	60
153	36400-39700	7	4	WSU	J	38	40	90
156	36400-39700	4	4	RB	10	10	50	110
159	36400-39700	17	3	WSU	J	2	60	65
161	36400-39700	11	4	LKC	J	6	40	80
				WSU	J	29	50	90
164	1454	3	2	DV	J	7	50	90
165	1453	3	1	DV	F	4	30	35
				DV	J	4	80	95
232	1031	2	2	CT	F	6	25	30
233	1033	1	1	CT	F	3	25	30
238	1427	6	1	CT	F	9	25	30
239	1489	3	2	DV	A	9	135	168
240	64400-28100	4	3	DV	A	12	110	154
241	64400-28100	5	3	DV	A	8	110	150
243	64400-28100	11	2	DV	A	8	115	168
246	1419	3	3	DV	A	12	110	195
250	64100-2380	4	2	RB	F	3	25	30
256	600600-53900	1	2	CT	A	7	80	120
266	36400-26300	2	2	DV	J	1	101	101
279	50200-0640	1	3	CT	J	3	53	60
301	1401	1	2	DV	F	1	28	28
				DV	J	14	54	126
				DV	A	1	189	189
302	64400-22700	2	3	DV	J	7	48	86
304	1500	3	4	RB	J	3	63	93
				RB	A	3	100	156
				DV	F	3	36	39
				DV	A	1	111	111
305	64400-18300	4	4	RB	J	2	65	72
				DV	A	2	149	196
				CO	J	4	36	47
				CH	J	2	49	56
				LSU	J	3	41	66
307	1276	3	1	RB	J	4	58	87
314	11700-5110	3	3	CT	J	1	72	72
315	1011	1	1	CAS	J	1	86	86
				LSU	J	1	64	64
316	600600-63200	8	4	CT	J	1	121	121
				RB	F	3	39	44
				RB	J	5	58	165
				CAS	A	3	82	118
				MW	J	1	85	85
				LSU	J	5	49	87
				PL	J	2	87	92
319	11700-5660	4	2	DV	J	3	62	81
326	62200-2180	3	2	RSC	A	1	132	132
331	600600-57600	5	2	RB	F	12	35	46
				RB	J	6	80	170
				RB	A	2	96	120
332	1180	5	2	CAS	A	2	62	76
336	57600-31800	3	1	NSC	J	1	129	129
340	66200-1840	4	1	CT	J	3	65	92
341	63200-66200	2	3	CT	F	10	22	32
				CT	J	8	89	126
				DV	J	1	90	90
342	66200-3100	2	1	CT	F	4	24	36
				CT	J	2	67	76

Table 2. Fish Capture Locations with the Upper Morice

Site	WSC/ILP	Reach	Order	Species	Stage	Number	Minimum Length (mm)	Maximum Length (mm)
344	63200-75900	1	2	CT	F	1	31	31
				CT	J	3	120	137
348	36400-88900	2	1	CT	F	4	34	46
				CT	J	2	71	89
350	600600-36400	24	1	RB	J	7	79	100
				CT	F	5	31	39
				CT	J	2	71	89
351	600600-63200	13	2	CT	J	7	64	86
392	36400-72600	6	1	CT	F	4	29	33
				CT	J	5	48	57
394	72600-5970	6	1	CT	J	6	42	73
398	63200-66200	3	2	CT	J	7	59	123
399	1405	1	2	DV	J	3	125	142
				CT	F	2	31	33
				CT	J	3	46	69
405	1393	1	2	DV	J	3	98	121
406	1278	1	2	CO	F	1	42	42
422	62200-2180	2	2	CT	J	9	48	95
425	36400-00800	5	2	CT	F	20	35	46
				CT	J	4	69	82
466	36400-39700	17	3	LKC	J	3	27	67
				WSU	J	6	75	161
475	36400-39700	1	4	RB	J	8	78	152
				DV	J	4	78	92
				CT	J	2	150	155
				PL	J	20	45	83
668	36400-64100	16	3	RSC	A	2	55	71
				CAL	A	1	86	86
				LKC	J	4	15	82
669	1034	1	2	LKC	J	6	24	27
670	1038	1	1	CT	J	4	42	66
672	36400-64100	9	3	CT	J	3	38	73
				RSC	J	2	42	47
674	36400-64100	13	3	RB	F	8	41	51
675	64400-18300	6	4	CT	J	4	87	123
				CH	J	12	54	114
				RSC	A	8	80	105
				LNC	J	1	55	55
				CAL	J	1	86	86
677	1269	2	3	CT	J	5	35	67
				DV	J	1	61	61
678	64400-18300	9	3	CT	J	2	65	71
679	1268	1	2	CT	F	2	25	29
				CT	J	2	59	70
681	1273	3	1	CT	J	4	60	69
682	1221	1	2	CT	J	1	120	120
685	1500	2	4	DV	J	8	43	183
				CT	J	4	120	143
690	1246	1	1	DV	J	1	85	85
				CT	J	1	85	85
691	18300-3800	2	3	DV	J	10	85	145
				CT	J	7	30	128
692	63200-09800	1	2	DV	J	1	70	70
693	63200-09800	3	2	DV	J	1	75	75
900	64400-28100	2	3	RB	J	8	86	221
				BT	J	14	42	172
				MW	A	4	256	415
901	64400-28100	9	3	DV	J	9	122	177

Figure 2. Length frequency distribution for rainbow trout captured in the study area (n=97).

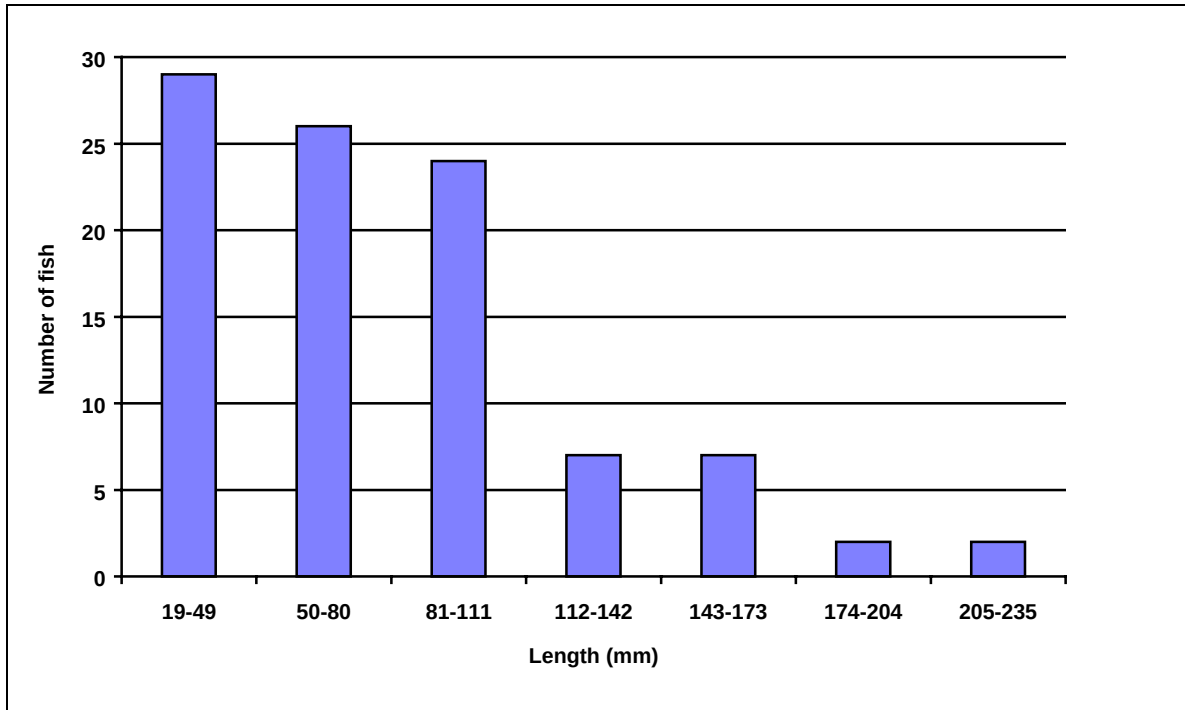


Figure 3. Length frequency distribution for cutthroat trout captured in the study area (n=186).

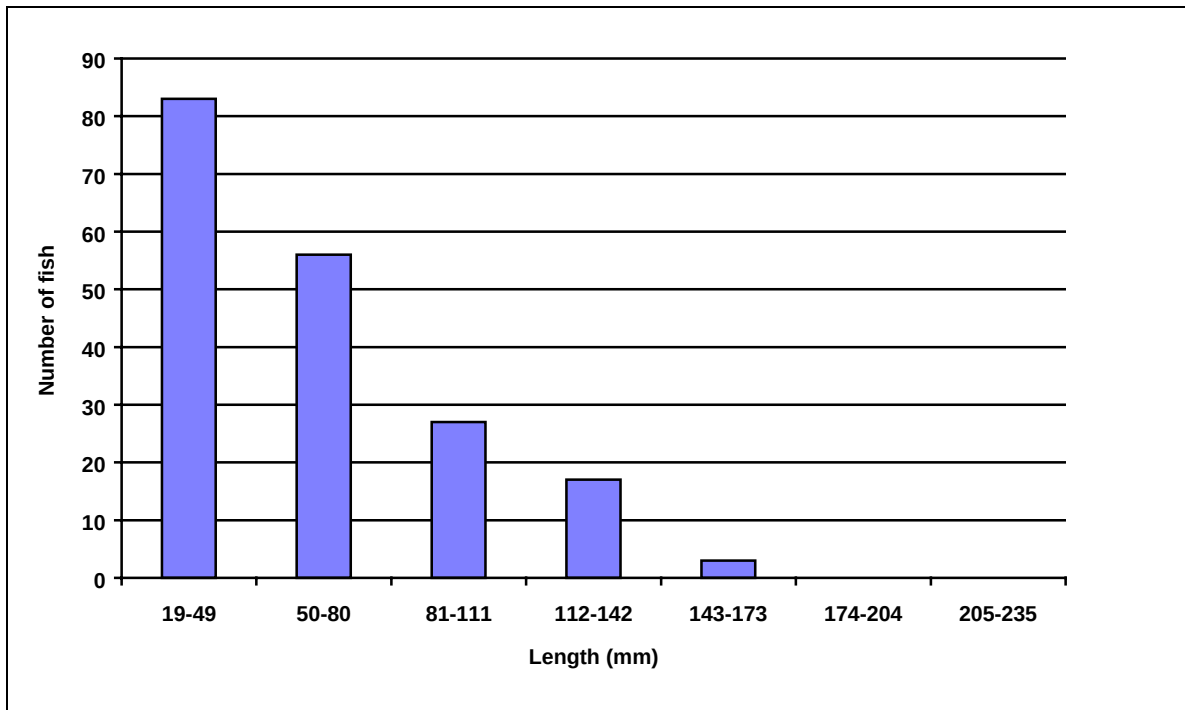


Figure 4. Length frequency distribution for bull trout captured in the study area (n=14).

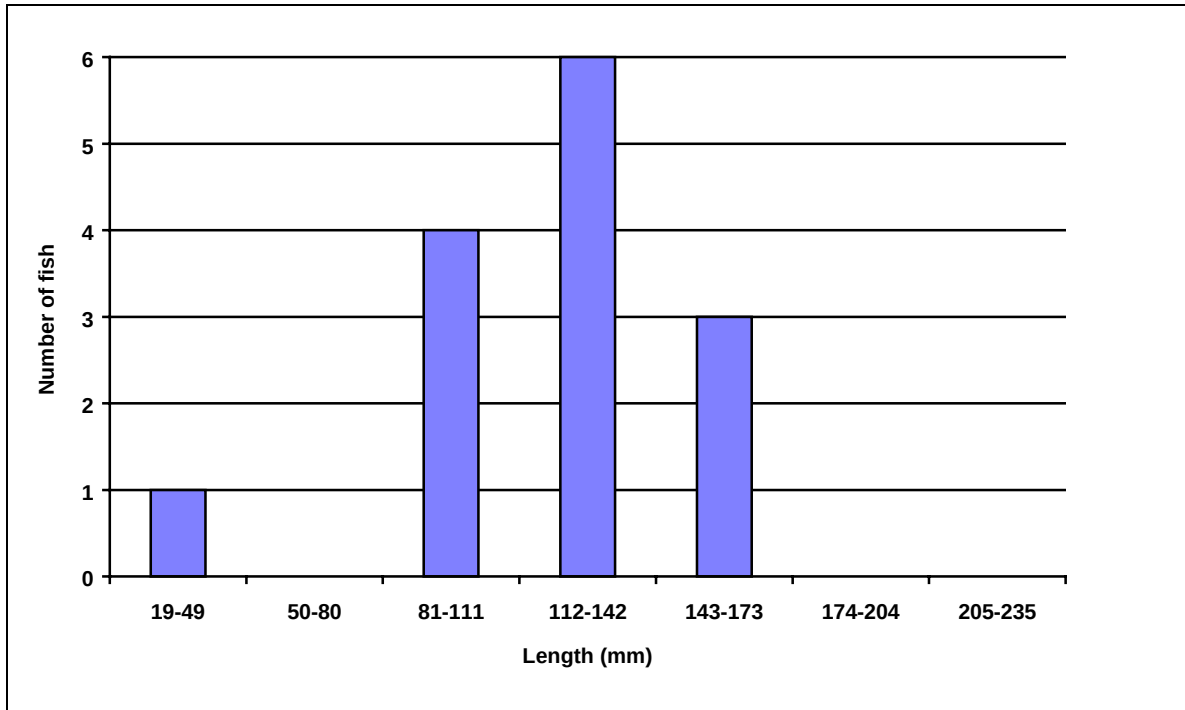


Figure 5. Length frequency distribution for Dolly Varden captured in the study area (n=151).

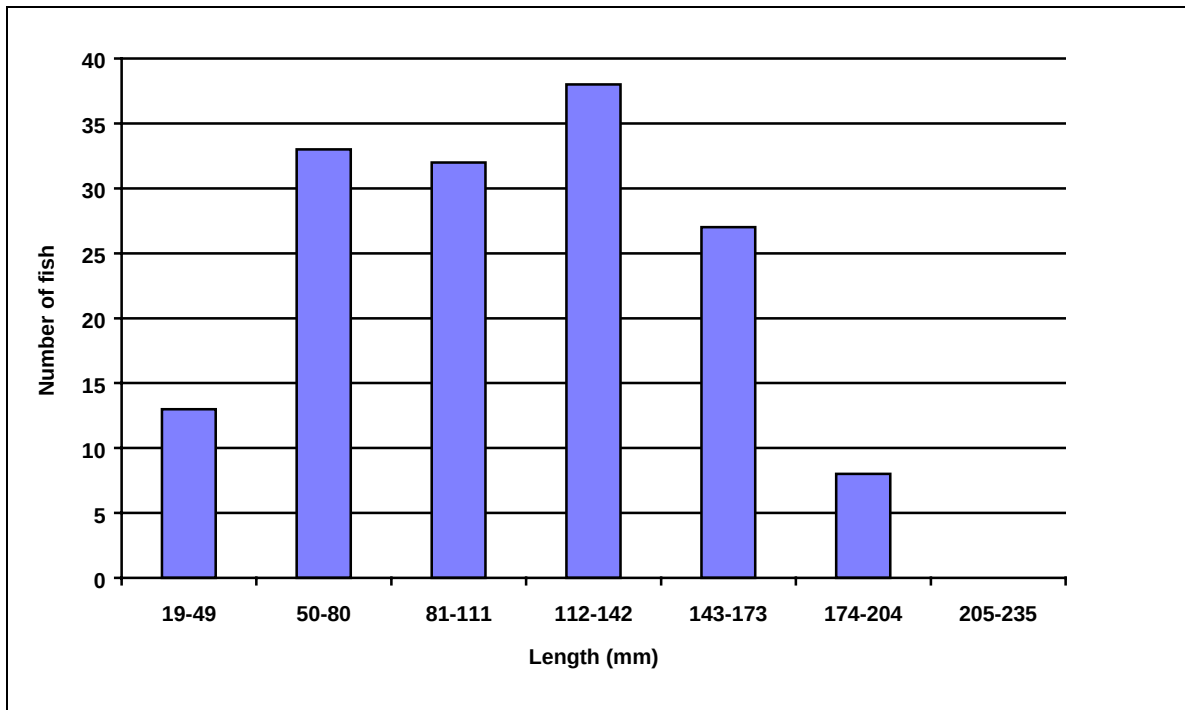


Figure 6. Length frequency distribution for chinook captured in the study area (n=14).

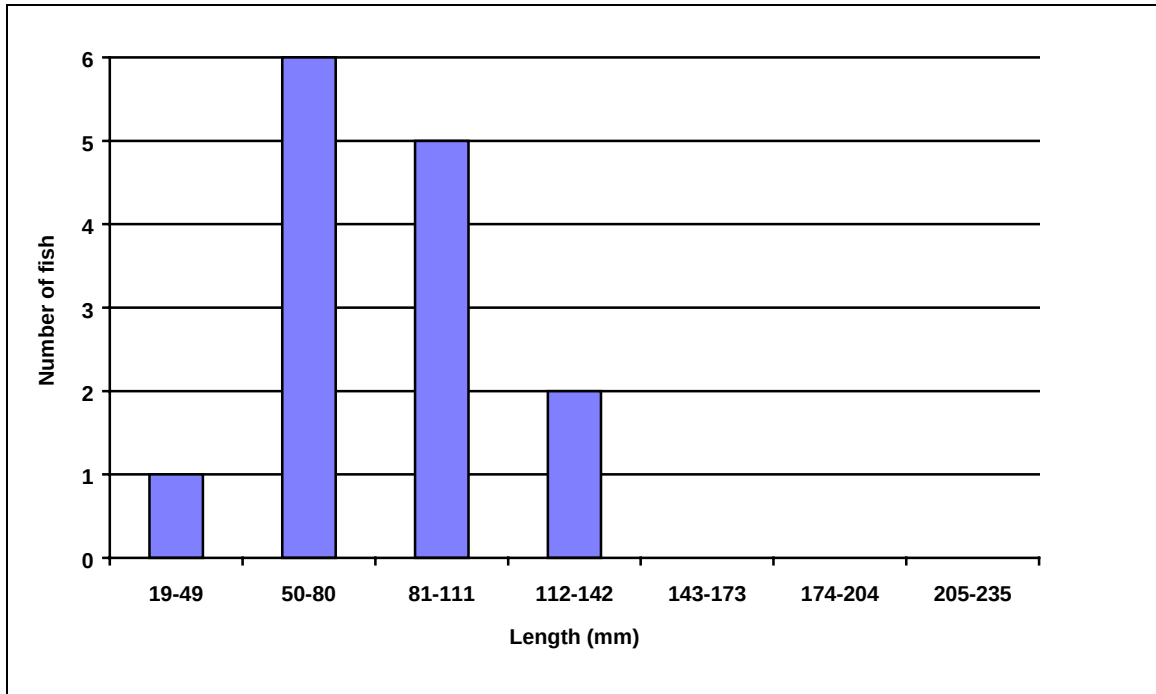


Figure 7. Length vs Age for rainbow trout captured within the Study Area (n=34).

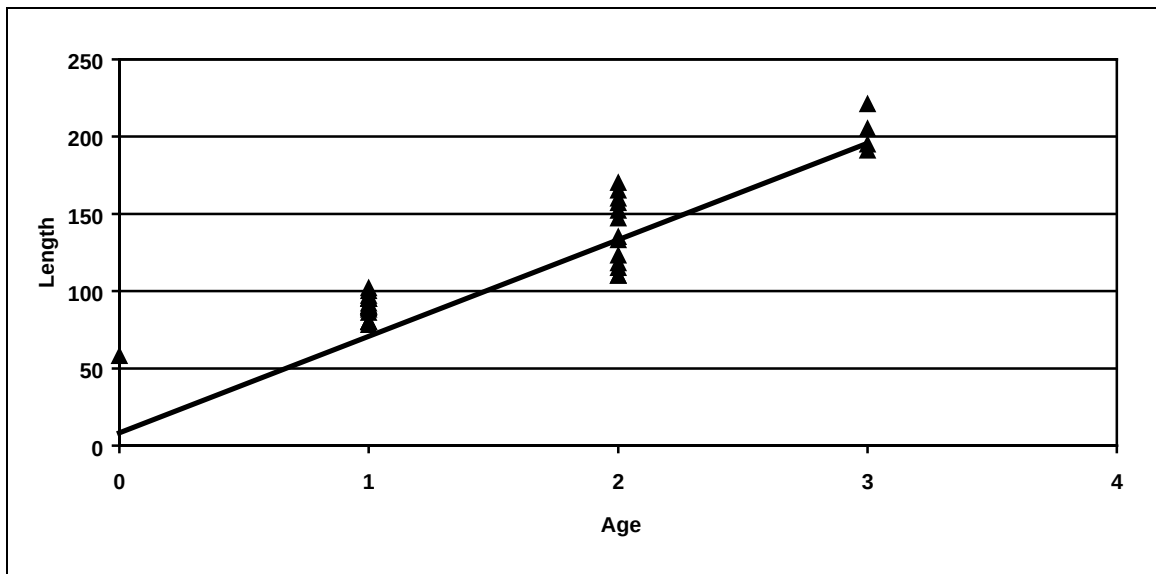


Figure 8. Length vs Age for cutthroat trout captured within the Study Area (n=16).

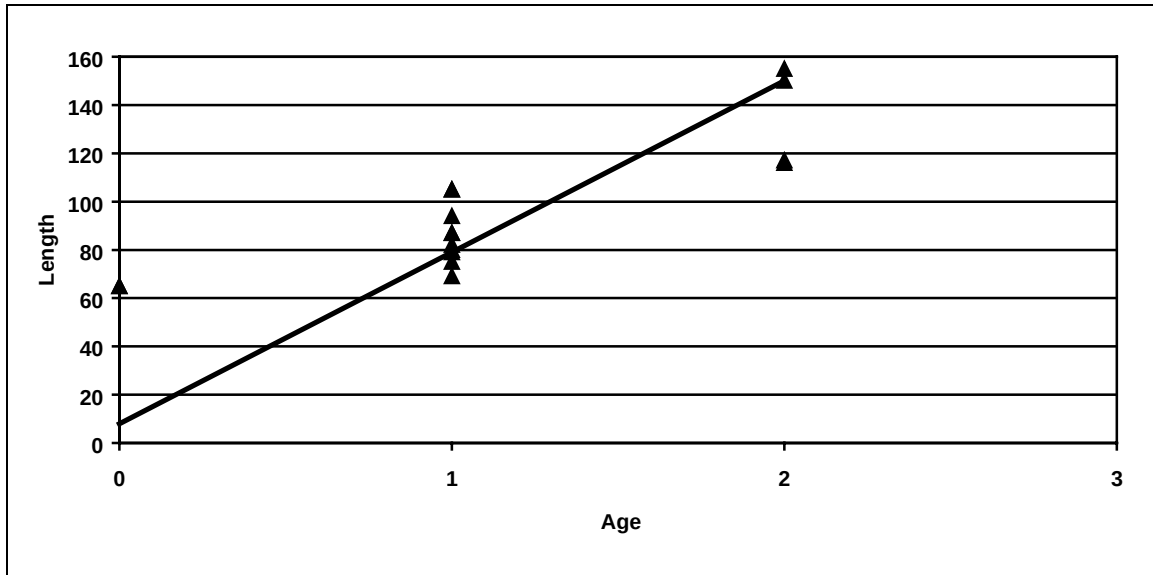


Figure 9. Length vs Age for Dolly Varden captured within the Study Area (n=9).

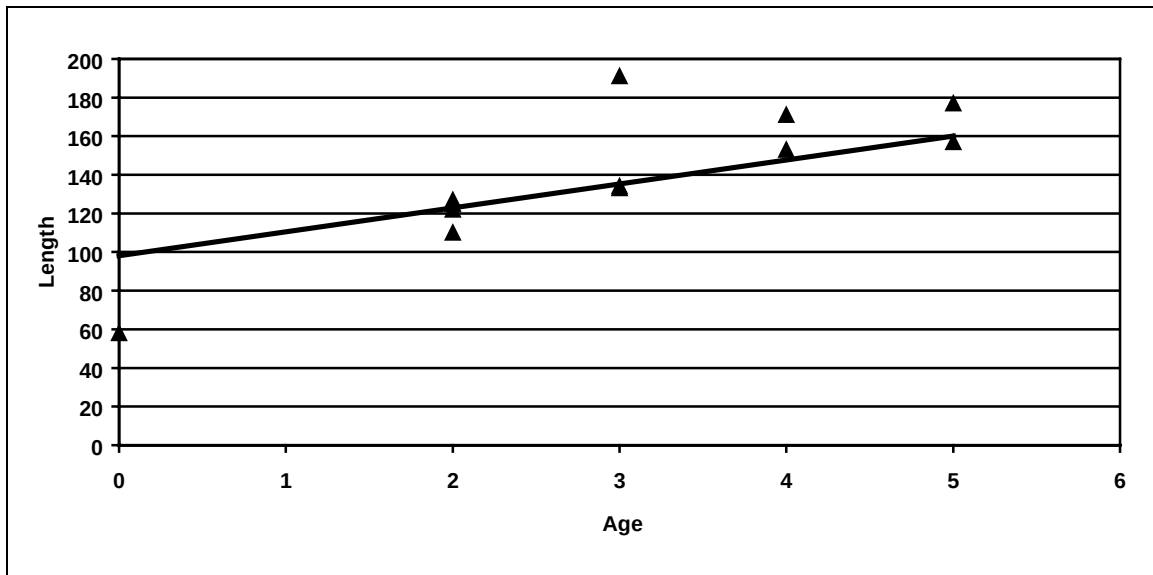
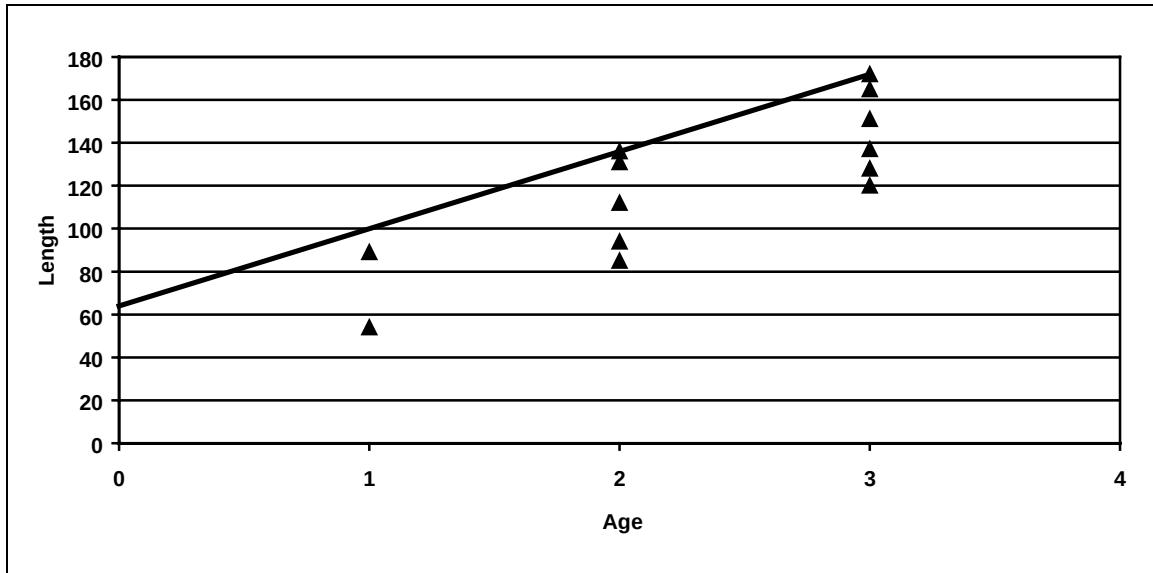


Figure 10. Length vs Age for bull trout captured within the Study Area (n=13).



Rainbow trout

Rainbow trout, captured during this survey, were found to utilize small to moderately large streams, which have moderate flows, gravel substrates, riffle pool morphology and shallow depths. Spawning for rainbow trout usually occurs from mid-April to late June with fry emergence occurring from mid-June to mid-August (Scott & Crossman 1985).

White sucker

The white sucker captured within the Morice study area were all associated with the resident lake populations within the Pimpernel Creek drainage. The highest concentrations of white sucker were found adjacent to overwintering habitats provided by large wetlands and lakes. No white sucker were captured in any of the tributary streams to Pimpernel Creek, which suggests that the white sucker are confined to areas adjacent to the perennial fish habitat provided by the lakes and wetlands.

White sucker are generally characterized as inhabiting shallow warm lakes and some slower stream habitats. White sucker reach sexual maturity between 5 and 8 years and tend to spawn in slow shallow water with gravel substrates during the spring (early May to June). Adults do not create redds and deposit their eggs freely to adhere to gravel substrates or to drift downstream to suitable substrates in slower water. The eggs hatch in about 2 weeks with the fry emerging from the gravel in another 1-2 weeks. White sucker have been known to live for up to 17 years (Scott & Crossman 1985).

Redside shiner

The redside shiner captured within the Morice study area were captured in stream habitats immediately below small shallow lakes. Although the lake habitats were not sampled it would be safe to infer that the stream residents likely downseed from upstream headwater lakes. All of the redside shiner captured within the streams were found to be adults which were most likely taking advantage of the adjacent stream habitats during the summer months.

Redside shiner can tolerate a wide range of temperatures and trophic conditions and area generally known inhabit lakes, small ponds, and moderately fast streams. Redside shiner live up to 7 years and reach sexual maturity in approximately 3 years. Spawning takes place in streams or lakes in the early summer (May to early August). No nest is built and the eggs are released to adhere to gravel, vegetation or other suitable substrates. The eggs hatch in 1-2 weeks and the fry emerge from the gravel 1-2 weeks later (Scott & Crossman 1985).

Cutthroat trout

Cutthroat were captured in a variety of habitats throughout the study area. They were most often found in the smaller streams adjacent to overwintering habitat provided by larger mainstems and lakes. The majority of the cutthroat captured were fry and juveniles which indicates they likely utilizing the small stream habitat for juvenile rearing and, or refuge. Adults were only captured in the larger mainstems (usually third order or larger).

Cutthroat live to a maximum of 10 years and can reach sexual maturity in as little as 2 years. Spawning takes place in the spring (February to May) in streams with adequate gravel substrates. Redds are constructed and the eggs hatch within 6-7 weeks. Fry emerge from the redds in 1-2 weeks (Scott & Crossman 1985).

Pacific lamprey

Pacific lamprey ammocoete's were captured in two locations (Lamprey Creek and McBride Creek) within the study area. In both cases the lampreys were captured in the sandy/muddy substrates occurring in the back eddies of moderate sized pools. The lamprey captured, responded poorly to electrofishing effort and often settings on the electrofisher needed to be changed to draw them out of the fine substrates.

The ammocoete's stream habitat usually consists of sandy or muddy substrates adjacent to riffles. Ammocoetes spend 5-6 years in the freshwater stream habitat before transforming into parasitic adult lampreys and migrating downstream to the sea in the spring or early summer. After 12-20 months as parasites they migrate back to freshwater in the summer to early fall (July to September). The lampreys hide under rocks resting until spawning in the spring (April to July) (Scott & Crossman 1985).

Dolly Varden

Within the Morice study area Dolly Varden were found in habitats ranging from high energy glacial streams to low gradient stagnant pools. Fry and juvenile Dolly Varden were found to inhabit the smaller secondary streams adjacent to overwintering habitat (larger mainstems and lakes), and the larger (mature) Dolly Varden were found in mainstem and larger tributary habitats.

Dolly Varden reach sexual maturity in 3-6 years and spawn in streams with cobble/gravel substrates and moderate flows. The fry hatch in the spring and reside (3-4 years) in the stream they were spawned until reaching a size large enough to move downstream into larger bodies of water. Northern and high elevation populations are often stunted and rarely exceed 30 cm. Dolly Varden are a relatively long lived species reaching ages of 10-12 years (Scott & Crossman 1985).

Mountain whitefish

The mountain whitefish captured within the study area were found in two different habitats types. One capture location was located immediately upstream of the Nanika River in a high energy glacial stream. This capture location produced large adult whitefish that may have come up from the Nanika River to spawn in the smaller tributary stream. The second capture location was McBride Creek which is characterized by low gradient sections with abundant beaver activity. This McBride Creek fish likely downseeded from the upstream population in McBride Lake.

Within the Skeena drainage mountain whitefish are most abundant in shallow eutrophic lakes. Mountain whitefish reach sexual maturity in 3-4 years and are late fall to early winter spawners. Spawning takes place over gravel or cobble substrates and no nest is built. The maximum age for mountain whitefish is reported at 17 or 18 years (Scott & Crossman 1985).

Longnose sucker

Longnose suckers were captured in several locations within the study area. They are common throughout the Skeena drainage occurring in lakes and streams. Longnose sucker reach sexual maturity at 5-7 years and spawn in the spring in streams or on shallow lakeshore habitat. The fry hatch in approximately 2 weeks and remain in the gravel for an additional 1-2 weeks before emerging into the stream habitat (Scott & Crossman 1985). Within the McBride Creek drainage longnose sucker were captured in the slow water adjacent to beaver dams and ponds. Longnose sucker were also found in the slower stream habitat below a large wetland complex located on a large tributary to the Nanika River. No adult longnose sucker were captured which indicates they are most likely utilizing the lake and pond habitats within these systems.

Longnose dace

Longnose dace are known to inhabit swift flowing streams with boulder or gravel substrates and are often present near inshore habitats of lakes containing boulder and gravel bottoms. Relatively little is known about the spawning characteristics of the longnose dace although spawning is considered to take place in the spring or early summer (May to July) within stream riffles containing gravel substrates (Scott & Crossman 1985). One longnose dace was captured below a small lake located on a tributary to the Nanika River. This fish was a juvenile found to be utilizing the rearing habitat adjacent to the lake.

Coastrange sculpin

Two (2) streams located directly below lakes contained coastrange sculpins. These fish are most likely from the lake population and are utilizing the available habitat adjacent to the lake. The coastrange sculpin is known to inhabit the fast water of streams containing gravel/cobble substrates and the shallow inshore areas of lakes. Coastrange sculpin spawn in the spring (February to mid June) underneath rocks. The eggs are attached to rock's surface in an adhesive mass (Scott & Crossman 1985).

Prickly sculpin

Prickly sculpin were captured in stream habitats within the study area. The prickly sculpin is known to inhabit the quiet, slower flowing portions of streams and the shoreline areas of lakes. Spawning takes place in the spring from mid March to mid July. Streams containing boulder/cobble and flat rock substrates seem to be the preferred habitat for spawning. The eggs are attached in an adhesive mass to the underside of a boulder or flat rock. Prickly sculpin were captured in a small tributary immediately upstream of Collins Lake and within McBride Creek. Both fish were found rearing in slow stagnant water containing woody debris.

Northern squawfish

One (1) northern squawfish was captured at the outlet of a small lake. This fish was most likely associated with an upstream lake population. Northern squawfish are mainly a lake species but are often found in the slower moving water of streams and sloughs. Sexual maturity is reached in approximately 6 years and spawning takes place in the shallows on gravelly lake shore substrates and in stream habitats adjacent to lakes (May to July). Northern squawfish are a long lived species with a life expectancy of 15-20 years.

Coho salmon

Coho juveniles were captured in the Nanika River drainage. Coho are fall to early winter (October to January) spawners and spawning habitat can be characterized as smaller rivers and tributaries containing gravelly substrates. Coho fry emerge from the gravel in

the spring and early summer (March to July) and juveniles usually remain in freshwater habitat for 1-2 years before migrating (downstream) to the ocean for 1 to 3 years. Coho juveniles were captured in a side channel to the Nanika river. These fish were observed and captured while rearing in this channel at the mouth of a small tributary. Coho were also captured below a large wetland complex in a larger tributary to the Nanika River. Both capture locations had good cover and provide good rearing habitat for these juveniles. It is unlikely that mature coho are spawning at these capture locations due to fine substrates. These coho juveniles likely moved upstream to these habitats, from the mainstem, to rear until outward migration.

Chinook Salmon

Chinook juveniles were captured in the Nanika River drainage. Chinook salmon are late summer to late fall spawners (August to October). Spawning habitat can be characterized as the larger rivers and tributaries containing moderate to large gravels. The fry emerge from the gravel in the spring and rear for up to 1 year in the freshwater before migrating to the ocean for 2-5 years. Chinook juveniles were captured in a larger tributary to the Nanika River. It is most likely that the adult chinook are spawning in the Nanika River and the juveniles are rearing within this smaller tributary until outward migration.

Bull trout

Bull trout were captured in a large tributary to the Nanika River. Bull trout are known to occupy a wide spectrum of habitat types. Bull trout often occupy unproductive habitats where rainbow and cutthroat do not thrive. Within the study area there is the possibility of 3 different bull trout life histories:

- the stream resident that spends its entire life within small headwater streams, often above physical barriers;
- the large river type which spends its adult life within large rivers and spawns in smaller tributaries. The large river offspring rear in these smaller tributaries until they grow large enough to compete within the large river habitat; and,
- the lake type, which spends its adult life in a lake habitat and uses the tributary streams for rearing and spawning.

Bull trout are fall spawners and reach maturity in 3 to 7 years. It is believed that the bull trout captured within the glacial tributary to the Nanika River are of the large river type. In this tributary (WSC 64400-28100) only juvenile bull trout were captured immediately upstream of the Nanika River. Further sample sites upstream of Reach 3, indicated that only Dolly Varden were present. Bull trout adults most likely use the lower reaches of this stream for spawning and the juveniles rear in this stream until large enough to survive in the Nanika River mainstem.

Lake chub

Several lake chub were captured within the study area. Lake chub were found within the Pimpnel Creek drainage below “Con Lake” and below another small lake within a large tributary to Lamprey Creek. This species was associated with low gradient habitat adjacent to suitable overwintering areas (i.e. upstream or downstream of small lakes and ponds). The lake chub is a large minnow, commonly reaching sizes in excess of 102 mm. Studies indicate that the fish mature in their third or fourth year and probably seldom survived beyond 5 years, females lake chub are known to grow faster and live longer than the males. Lake chub usually undergo a spawning migration from lakes to tributary streams early in the spring. In British Columbia, the lake chub range extends from the Columbia and Fraser to the Skeena, Peace and Liard (Scott & Crossman 1985).

Quantitative abundance figures were not generated in this study as sampling methods to determine abundance were not utilized.

Field crews were constantly on the lookout for high value sport fishing opportunities within the study area. Sport fishing is conducted within the study area on several of the lakes and in the mainstem Morice and Nanika Rivers. High value sport fishing exists just outside the study area on the Morice and Bulkley Rivers, which are world famous for steelhead angling.

5.4.3 Fish Habitat

Fish were captured in 1st to 4th order streams and fish distribution was generally associated with perennial fish habitat. Perennial habitat includes the presence of overwintering, spawning, and rearing habitat. Instream overwintering habitat was identified as containing residual pool depths greater than 0.5 m. Other overwintering habitat included wetlands and lakes with depths greater than 0.5 m. Spawning habitat was characterized by the presence of suitable spawning substrates and adequate flows. Rearing habitat was characterized as containing water where fish can live and grow.

Fish bearing 1st order streams were not located far from perennial fish habitat. Habitat quality within these 1st order reaches was generally poor with smaller average channel widths and low water flows. Field observations indicated that the small channel widths and ephemeral nature of these streams likely limit or prevent their ability to sustain fish populations, particularly throughout the year. It is unlikely that these reaches are used by fish, unless they flow into a major system (i.e. 3rd or 4th order), due to the short duration of water flows and lack of suitable fish habitat.

No fish were captured in reaches with an average channel width of less than 0.57 m, or with an average gradient greater than 11.3%. Fish bearing 1st order streams had an average channel width of 1.58 m. Fish-bearing 2nd order streams had an average channel width of 3.18 m. Fish-bearing 3rd and 4th order streams had average channel widths of 7.91 m and 6.74 m respectively.

Significant fisheries values within the project area are largely associated with the limited occurrence of high quality spawning and rearing habitats for rainbow trout. Nanika River, Lamprey Creek, Nado Creek (WSC 460-600600-57600), and McBride Creek provide these high quality spawning and rearing habitats. The prevalence of very shallow stream habitat and low overall habitat complexity, appear to be the primary limiting factors for spawning and rearing habitats. The general lack of deep pool habitats and perennial flow in tributary streams limits the occurrence of suitable habitats for resident trout.

In 2 cases non sport fish species were captured above a physical barrier to upstream fish migration. One (1) northern squawfish was captured in a lake outlet above a 3.5 m falls on a tributary (WSC 460-600600-57600-31800, Site 336) to Nado Creek. Extensive electrofishing within this stream produced only 1 northern squawfish although numerous fish were observed in the small lake located upstream of the site. Lake chub and white sucker were also captured above a 25 m falls on Pimpernel Creek (WSC 460-600600-36400-39700). Pimpernel Creek is a moderately large 4th order drainage containing 2 small lakes. No sport fish species were captured above these falls with adequate stream sampling and a secondary lake survey of Con Lake (Reach 18 of Pimpernel Creek). Lake chub and white sucker are primarily found in lake habitats although they will inhabit larger streams and ponds. The lake chub and white sucker within this system were only captured in the mainstem of Pimpernel Creek and in Con Lake. Several tributary streams to Pimpernel Creek above the falls were sampled and in all cases no fish were caught.

Fish species were captured in 81 of the 124 reaches classified as fish-bearing (Table 3). Fifty-six (56) reaches in the fish bearing classification table were classified as fish bearing by default. Twenty-eight (28) of these reaches were identified as accessible from downstream fish bearing waters and could be utilized for a portion of the year. It was determined that fish can access these reaches (from downstream fish bearing waters) and further sampling is not recommended.

The fish bearing status of streams may be directly supported by sampling data or indirectly inferred based on fish captures in associated reaches, or habitat quality and the occurrence or lack of barriers to fish passage. For example, if the habitats within a given reach are suitable for rearing and/or spawning but no fish were captured and no barriers were observed, the reach would be classed as fish bearing. If the habitats were inadequate to provide suitable rearing habitat, or where barriers prevent fish from accessing and utilizing the reach, it would be classified as non-fish bearing.

Inferred fish bearing status was given to reaches not sampled with the following criteria:

- 1) The average stream gradient was less than 20 % (through map interpretation) and access to fish bearing waters is present.

Tab 3

Table 3. Upper Morice Fish Bearing Table

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
131	1071	2	1.65	4.5	RB	S3	n	Good spawning and rearing habitat. No overwintering habitat.
132	39700-0440	1	2.08	7.5	DV	S3	n	Poor spawning and rearing habitat. No overwintering habitat.
133	36400-39700	3	7.15	5.5	RB	S2	n	Good spawning, rearing and overwintering habitat.
136	36400-26300	2	2.85	5.8	DV	S3	n	No permanent barriers to upstream fish migration were identified. Fish captured in the upstream portion of this reach at Site 266.
138	1148	3	0.32	12.2	NS	S4*/S6	n	Fish may access the lower portion of this reach.
141	1152	1	1.35	16.5	NS	S4/S6	n	Lower 600 m is fish bearing based on access. Above that point habitat becomes too poor to sustain fish.
147	50200-0640	3	2.05	4	NS	S3*	y	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
148	1154	1	1.38	4	NFC	S4*	n	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
152	36400-39700	5	5.73	4.5	WSU	S5	n	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.
153	36400-39700	7	4.58	4.5	WSU	S5	n	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.
156	36400-39700	4	7	7.5	RB	S2/S5	n	Falls (25 m) are a barrier to upstream sport fish migration. Adequate sampling indicates only non sport fish are present above the falls.
157	1497	2	1.21	14.5	NFC	S4*	y	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
158	36400-00800	2	2.43	4.5	NFC	S3	n	Fish captured in upstream reach. Fish bearing based on access.
159	36400-39700	17	2.59	4.5	WSU	S6	n	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.
161	36400-39700	11	6.58	1.5	LKC, WSU	S5	n	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.
164	1454	3	3.05	10.5	DV	S3	n	Good spawning and rearing habitat. No overwintering habitat present.
165	1453	3	3.67	11.3	DV	S3	n	Good rearing habitat. Spawning habitat present. No overwintering habitat.
166	1452	2	2.8	16	NS	S3*	y	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
167	1469	2	2.27	8	NFC	S3*	y	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
168	1467	1	0.62	17.8	NFC	S4*/S6	n	Lower 100 m of this reach is fish bearing based on access. The remainder of this stream is non fish bearing based on gradient and channel characteristics.
232	1031	2	1.35	4.5	CT	S4	n	Moderate spawning and rearing habitat. No overwintering habitat.
233	1033	1	0.57	4	CT	S4	n	Poor spawning and rearing habitat. No overwintering habitat.
236	36400-59800	2	0.82	3.5	NFC	S4*	y	No permanent barriers were identified. Fish stream based on access.
237	600600-36400	28	1	4	NS	S4*	n	No permanent barriers were identified. Fish stream based on access.
238	1427	6	1.72	5.5	CT	S3	n	Moderate spawning and rearing habitat. Poor overwintering habitat.
239	1489	3	10.43	5	DV	S2/S5	n	Cascade (30 m) prevents upstream fish migration. Sampling upstream of the cascade confirms non fish bearing status.
240	64400-28100	4	36.1	7.5	DV	S1	n	Moderate spawning, rearing, and overwintering habitat.
241	64400-28100	5	30.5	7.5	DV	S1	n	Moderate spawning, rearing, and overwintering habitat.

Table 3. Upper Morice Fish Bearing Table

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
243	64400-28100	11	14.1	8	DV	S2/S5	n	Falls (4 m) and a cascade (3 m) prevent upstream fish migration. Sampling upstream of the falls confirms non fish bearing status.
246	1419	3	3.02	8	DV	S3/S5	n	Cascade (6 m) prevents upstream fish migration. Sampling upstream of the cascade confirms non fish bearing status.
250	64100-2380	4	0.82	1.5	RB	S4	n	Poor rearing. No spawning or overwintering habitat.
251	39700-0440	2	0.89	5	NFC	S4*	n	No permanent barriers identified. Fish stream based on access.
253	1169	2	1.3	4.5	NFC	S4*	y	No permanent barriers identified. Fish stream based on access.
256	600600-53900	1	2.75	7	CT	S3/S5	n	Falls (20 m) prevent upstream fish migration.
258	5020-0640	5	1.38	7	NFC	S4*	y	No permanent barriers to upstream fish migration were identified. Fish bearing based on access.
261	1180	9	1.18	3	NFC	S4*	y	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
266	36400-26300	2	3.37	8	DV	S3/S6	n	Cascade (2 m) prevents upstream fish migration. Fish were captured below the cascade.
270	1150	1	0.92	20.3	NFC	S4*/S6	n	Lower 50 m of this reach is fish bearing based on access. Gradient prevents fish access to the remainder of the stream.
271	1158	2	0.65	26.5	NS	S4*/S6	n	Lower 20 m of this reach is fish bearing based on access. The remainder of this reach is non fish bearing (high gradient prevents access).
273	1442	1	0.72	5.8	NS	S4*	n	Fish stream based on access.
279	50200-0640	1	1.72	4.3	CT	S3	n	Good rearing habitat. No spawning habitat or overwintering habitat.
301	1401	1	1.98	1.9	DV	S3	n	Excellent spawning habitat. Moderate rearing habitat. No overwintering habitat.
302	64400-22700	2	3.77	3	DV	S3	n	Good spawning and rearing habitat. Overwintering habitat present.
304	1500	3	6.58	1.3	RB, DV	S2	n	Excellent spawning habitat. Moderate rearing habitat. Overwintering habitat present.
305	64400-18300	4	3.57	2.8	CO, CH, DV, RB, LSU	S3	n	Excellent rearing habitat. Poor spawning habitat. Overwintering habitat present.
307	1276	3	1.39	21.5	RB	S4/S6	n	Falls (1.9 m) prevent upstream fish migration into this reach. The portion of stream below the falls is fish bearing based on access.
314	11700-5110	3	3.42	6.5	CT	S3	n	Fair rearing habitat. Poor spawning habitat. No overwintering habitat.
315	1011	1	1.45	1	CAS, LSU	S4*	n	Non sport fish captured. Sport fish access is possible.
316	600600-63200	8	5.38	1.3	CT, RB, CAS, MW, LSU, PL	S2	n	Excellent spawning and rearing habitat. Overwintering habitat present.
317	63200-29100	3	0.96	4	NFC	S4*	y	No permanent barriers identified. Fish stream based on access.
318	1420	2	2.62	13	NFC	S3*	y	Fish stream based on access. Gradient is low enough to allow fish access.
319	11700-5660	4	2.38	21.25	DV	S3/S6	n	Above road crossing the gradient becomes too steep to allow fish passage.
320	4190-1340	1	1.15	1.8	NFC	S4*	n	Fish may access this reach during high flows.
325	1485	1	1.58	3.3	NS	S3*	n	Fish stream based on access.
326	62200-2180	3	2.4	1.3	RSC	S3*	y	Non sport fish captured. Upstream lake may contain sport fish. Fish stream based on access.

Table 3. Upper Morice Fish Bearing Table

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
329	1185	1	0.86	11	NS	S4*/S6	n	The lower 100 m of stream is fish bearing based on access. Above that point the fish habitat deteriorates until there is no possibility of fish use.
330	1478	2	1.49	3.5	NFC	S4*	y	Fish stream based on access.
331	600600-57600	5	3.89	2.5	RB	S3	n	Excellent spawning and rearing habitat. Overwintering habitat present.
332	1180	5	4.01	2.8	CAS	S3*	y	Fish may access this reach from Collins Lake. Non sport fish captured.
336	57600-31800	3	1.48	4	NSC	S4*	y	Non sport fish were captured within reach. Fish stream based on access.
340	66200-1840	4	1.33	1.3	CT	S4	n	Fair spawning and rearing habitat. Poor overwintering habitat.
341	63200-66200	2	5.28	1.3	CT, DV	S2	n	Excellent spawning habitat. Moderate rearing habitat. Overwintering habitat present.
342	66200-3100	2	1.01	2.5	CT	S4	n	Poor rearing and spawning habitat. No overwintering habitat.
344	63200-75900	1	3.61	4	CT	S3	n	Moderate spawning and rearing habitat. No overwintering habitat.
345	63200-75900	3	1.45	5.5	NFC	S4*	y	Fish stream based on access. Culvert in Reach 1 may block fish access.
348	36400-88900	2	1.44	4.8	CT	S4	n	Good rearing habitat. Fair spawning habitat. No overwintering habitat.
349	1054	1	1.16	3.3	NFC	S4*	n	Fish stream based on access. Beaver activity downstream may have temporarily blocked access to this reach.
350	600600-36400	24	2.82	3.5	RB, CT	S3	n	Excellent rearing habitat. Moderate spawning habitat. No overwintering habitat.
351	600600-63200	13	2.14	3.5	CT	S3	n	Excellent spawning habitat. Moderate rearing habitat. No overwintering habitat.
392	36400-72600	6	1.21	4.4	CT	S4/S6	n	400 m upstream of road crossing the gradient becomes too high (22%) to allow fish passage. Fish captured in lower portion of reach.
394	72600-5970	6	1.4	2.8	CT	S4	n	Moderate rearing habitat. Poor spawning habitat. No overwintering habitat.
398	63200-66200	3	3.49	4.3	CT	S3/S5	n	Falls (8 m) are a barrier to upstream fish migration. Fish captured easily below falls.
399	1405	1	2.14	2	DV, CT	S3	n	Moderate spawning and rearing habitat. No overwintering habitat identified.
405	1393	1	1.68	11.3	DV	S3	n	Moderate rearing habitat. Poor spawning habitat. No overwintering habitat. Fish caught in lower portion of this reach.
406	1278	1	2.62	16.5	CO	S3/S6	n	The lower 20 m of this stream is fish bearing. Cascade (4 m) and falls (12 m) prevent upstream fish access.
407	1027	2	1.3	5.3	NFC	S4*/S6	n	Cascade (2.4 m) prevents upstream fish migration. Fish bearing below the cascade based on access.
408	1500	9	1.53	1.3	NFC	S3*	n	Fish stream based on access. Beaver activity in the area has caused temporary barriers to upstream fish migration. Fish were observed rising downstream of this reach in a beaver pond.
410	1196	1	1.33	2.8	NFC	S4*	y	No barriers to upstream fish migration were identified. Fish stream based on access.
411	63200-62200	5	2.46	2.4	NFC	S3*	y	No barriers to upstream fish migration were identified. Fish stream based on access.
412	63200-62200	3	3.36	2.8	NFC	S3*	y	No barriers to upstream fish migration were identified. Fish stream based on access.
414	1239	1	1.99	20.3	NFC	S3*/S6	n	The lower 150 m of this stream is fish bearing based on access. Above that point gradient prevents upstream fish migration.
416	64400-09200	1	1.5	2.5	NFC	S3*	n	Fish stream based on access. No barriers to upstream fish migration were observed.

Table 3. Upper Morice Fish Bearing Table

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
419	62200-2180	5	1.29	4.1	NFC	S4*	n	Fish bearing stream based on access. Fish were observed rising in downstream lake. No barriers to upstream fish migration were identified.
420	1484	1	0.75	2.5	NFC	S4*	n	Fish stream based on access. No barriers to upstream fish migration were observed.
422	62200-2180	2	NA	NA	CT	NA	n	Fish sampling site.
424	36400-00800	7	1.53	2.9	NFC	S3*	y	Fish stream based on access. Fish captured in downstream reach. No barriers to fish passage observed.
425	36400-00800	5	1.55	1.8	CT	S3	n	Moderate rearing and spawning habitat. No overwintering habitat
437	1275	1	1.2	4	NFC	S4*	n	Fish stream based on access. Fish may use this stream during higher flows.
440	1014	1	1.18	1.3	NS	S4*	n	Fish may access this reach from McBride Lake.
441	1012	1	0.59	1.9	NS	S4*/S6	n	Lower portion of reach below the road crossing can be classified as fish bearing based on access. Above the road crossing habitat is too poor to sustain fish.
442	1501	1	0.87	3	NFC	S4*	y	Fish bearing based on access. Upstream lake should be resampled to confirm fish absence.
456	1204	1	1.81	9.5	NFC	S3*	n	Fish bearing stream based on access. No barriers to fish migration were identified.
457	600600-54900	4	1.22	5.5	NFC	S4*	y	Fish bearing stream based on access. Possible fish use during higher flows.
466	36400-39700	17	NA	NA	LKC, WSU	NA	n	Fish sampling site.
467	1183	1	1.37	1.8	NFC	S4*	n	Culvert has blocked fish access upstream.
475	36400-39700	1	NA	NA	RB, DV, CT, PL	NA	n	Fish sampling site.
667	1046	1	0.75	4.5	NS	S4*/S6	n	The lower 30 m of this stream is fish bearing based on access. Above that point the channel deteriorates and has no connectivity to the downstream portion.
668	36400-64100	16	1.55	1.6	RSC, CAL, LKC	S3*	y	Non sport fish captured. Fish bearing based on access.
669	1034	1	1.42	0.8	LKC	S4*	y	Non sport fish captured. Fish bearing based on access.
670	1038	1	1.2	4	CT	S4	n	Moderate spawning and rearing habitat. Poor overwintering habitat.
672	36400-64100	9	3.8	1.1	CT, RSC	S3	n	Low spawning potential. Moderate rearing habitat. High quality overwintering habitat.
674	36400-64100	13	2.7	3.3	RB	S3	n	Moderate spawning habitat. High quality rearing habitat. Poor overwintering habitat.
675	64400-18300	6	7.31	0.3	RSC, CT, CH, LNC, CAL	S2	n	High quality overwintering and rearing habitat. Spawning habitat present.
676	64400-18300	10	1.1	4	NFC	S4*	n	Fish stream based on access. No permanent barriers observed.
677	1269	2	6.73	5.3	CT, DV	S2	n	Abundant spawning and rearing habitat. Overwintering habitat present.
678	64400-18300	9	1.37	4	CT	S4	n	Good rearing and spawning habitat. Moderate overwintering habitat.
679	1268	1	1.97	4.5	CT	S3	n	Moderate spawning, rearing and overwintering habitat.
681	1273	3	1.32	4.5	CT	S4	n	Moderate spawning habitat. Good rearing potential. No overwintering habitat present.
682	1221	1	3.25	10.5	CT	S3	n	Good overwintering and rearing habitat present. Moderate spawning habitat.

Table 3. Upper Morice Fish Bearing Table

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Species	Stream Class	Follow-up Sampling (y or n)	Comments
684	1221	1	2.78	4.5	NFC	S3*	y	A small cascade (0.8 m) may prevent upstream fish migration. Fish bearing until resampling is conducted above the cascade.
685	1500	2	NA	NA	DV, CT	NA	n	Fish sampling site.
690	1246	1	1.58	4.9	DV, CT	S3	n	Moderate spawning and rearing habitat. No overwintering habitat.
691	18300-3800	2	8.3	3	DV, CT	S2	n	High to moderate rearing habitat. Spawning and overwintering habitat present.
692	63200-09800	1	1.66	0.6	DV	S3	n	No spawning or overwintering habitat. Poor rearing habitat.
693	63200-09800	3	1.7	1	DV	S3	n	No spawning or overwintering habitat. Moderate rearing habitat.
699	1009	1	2	0.9	NFC	S3*/S6	n	Fish bearing based on access. The channel dissipates to nothing within the top 1/3 of this reach. This section is non fish bearing based on channel characteristics and no available fish habitat.
701	64400-09200	2	2.17	8.3	NFC	S3*/S6	n	Cascade (5 m) prevents fish access to the upper portion of this reach. Fish bearing based on access below the cascade.
702	4190-1340	3	1.02	4.8	NFC	S4*	y	Fish stream based on access. Potential fish use in upstream lake.
704	1447	2	1.92	3.4	NFC	S3*	n	Fish bearing based on possible fish access through adjacent wetland during periods of high flow.
801	1479	1	1.51	2.5	NFC	S3*	n	Fish stream based on access. Potential spawning habitat during high flows.
802	600600-57600	10	1.82	5.5	NFC	S3*	y	Fish bearing based on access. No permanent barriers to upstream fish migration were identified.
806	600600-57600	10	1.51	6.8	NFC	S3*/S6	n	Cascade (4 m) prevents upstream fish migration. Fish bearing based on access below the cascade. Non fish bearing above the cascade.
900	64400-28100	2	NA	NA	RB, BT, MW	NA	n	Fish sampling site.
901	64400-28100	9	NA	NA	DV	NA	n	Fish sampling site.

2) Stream sections below a headwater lake.

High gradient, cascades and falls were the dominant physical barriers to upstream fish migration in the study area. Other features affecting fish habitat in the study area included beaver dams, dewatered stream sections, bridges, general crossings, fisheries sensitive zone, debris jams, and culverts (Table 4).

5.4.4 Rehabilitation Opportunities

Eleven (11) culverts (Table 4) were identified as barriers or partial barriers to upstream fish migration. In most cases a culvert outlet was perched above the outlet pool creating a barrier at low flows. One (1) culvert was placed at an angle that is too high, creating a water velocity barrier to upstream fish migration. One (1) culvert was blocked with debris blocking upstream fish migration. Removal of the debris would restore fish access through this culvert. Restoration of the natural watercourses through culvert removal is also a possible restoration option where road access is no longer needed. Culvert replacement or outflow pool modification can be used to restore access where road access is required. Outflow pools can be backflooded through the use of a water control structure or weir. Backflooding may improve fish access by raising the water levels at the outlet of the culvert. Increased water levels at the outlet will minimize jump height and allow for a greater pool and standing wave height.

A bridge crossing (Table 4) was identified as being in poor shape during the time of the survey. The use of rock armoring around this crossing site would limit the amount of sediment entering the stream during higher flows. Possible restoration for this site includes, the establishment of vegetation around the crossing site and possible bridge removal after harvesting activities.

A collapsed wooden bridge (Table 4) was identified as a partial barrier to upstream fish migration. Removal of this crossing structure would restore fish access to this reach under all flow conditions.

Beaver activity is relatively extensive in the project area and may act to limit or reduce habitat values for salmonids, however remedial action is not appropriate in this case. Trapping beaver, blowing dams etc., are short term solutions that would not generate any long-term benefits to fish.

5.4.5 Fisheries Sensitive Zones

A side channel located at the bottom of ILP 1278 (Reach 1) contains sensitive coho rearing habitat. ILP 1278 flows directly into this side channel and then into the Nanika River. Off channel rearing and cover is abundant within the side channel and juvenile coho were present in high densities in the channel and at the mouth of ILP 1278.

Table 4. Features within the Upper Morice

Site	ILP/ WSC	Reach #	Feature Type	Feature Height (m)	Feature Length (m)	Comment
148	1154	1	CV	1	9	Hanging wood culvert (1.8 m drop).
156	36400-39700	4	F	25	1	Falls, barrier to fish migration.
157	1497	2	CV	1	7	Partial barrier.
163	600600-38000	2	CV	1	8	Perched culvert (2 m).
167	1469	2	CV	1	8	Perched culvert (1 m).
239	1489	3	C	30	80	Cascade with 12 m falls.
243	64400-28100	11	C	3	4	Contains 2 vertical drops of 1 m each.
243	64400-28100	11	F	4	NS	Located at top of the canyon.
246	1419	3	C	6	8	Cascade contains a vertical drop of 2 m.
249	600600-53900	1	F	3		Falls located near the edge of the cutblock.
253	1169	2	CV	0.5	8	Culvert is perched 0.3 m.
256	600600-53900	1	F	20	4	Falls are a barrier to upstream fish migration.
265	1146	1	X			Debris jam.
266	36400-26300	2	C	2	1	Cascade prevents upstream fish migration.
301	1401	1	BG	0	5	General crossing.
302	64400-22700	2	BG	0	5	Ford (winter road).
304	1500	3	BR	3	20	Full span bridge.
305	64400-18300	4	BR	4	30	Bridge.
307	1276	3	F	1.9	2	Falls.
309	1231	2	CV	1	14	Well placed culvert.
311	1220	2	CV	1.4	15	Culvert is perched 2 m.
312	1217	3	CV	1	14	Culvert.
315	1011	1	CV	0.3	8	Inlet pinched.
317	63200-29100	3	CV	0.8	10	Culvert.
318	1420	2	BR	3	15	Bridge in bad shape. Sediment source.
319	11700-5660	4	CV	1	15	Culvert is a barrier to upstream fish migration.
320	4190-1340	1	CV	1	15	Well placed for fish access.
325	1485	1	CV	0.6	7	Culvert outlet is pinched.
329	1185	1	CV	0.5	18	Wood Culvert. Barrier to upstream fish migration.
330	1478	2	CV	0.8	17	Perched culvert.
332	1180	1	BG	1	7	Collapsed wood bridge. Now used as a general crossing. Partial barrier to upstream fish migration.
332	1180	1	CV	1.1	18	Wood culvert.
335	1209	4	F	2	1	Falls covered in logging slash. Barrier to upstream fish migration.
336	57600-31800	3	F	3.5	4	Falls impassable to upstream fish migration.
338	1213	2	CV	0.6	8	Blocked with debris.
339	1213	1	CV	0.6	10	Slightly perched culvert.
340	66200-1840	4	CV	0.8	8	Culvert.
341	63200-66200	2	CV	2.9	10	Slightly perched culvert.
344	63200-75900	1	CV	1	12	Culvert - barrier to upstream fish migration. Velocity barrier at low flows.
349	1054	1	CV	1	10	Located on upper road crossing
350	600600-36400	24	CV	1	10	Old box culvert.
351	600600-63200	13	CV	1	15	Culvert.
392	36400-72600	6	CV	0.4	8	Culvert is blocked with debris. Barrier to upstream fish migration.
394	72600-5970	6	BD	1.5	30	Beaver dam. Temporary barrier to fish migration.
397	63200-66200	4	C	2	4	Cascade
398	63200-66200	3	F	8	2	Falls are a barrier to upstream fish migration.
406	1278	1	F	12	3	Falls are a barrier to upstream fish migration.
406	1278	1	C	4	4	Cascades located immediately below 12 m falls.
406	1278	1	FSZ	NS	NS	Side channel located off Nanika River. Juvenile coho identified in large numbers.
407	1027	2	C	2.4	2	Cascade is a barrier to upstream fish migration.
408	1500	9	BD	1.2	25	Temporary barrier to fish migration.
436	1235	2	C	1.2	2	Cascade is a barrier to upstream fish migration.
436	1235	2	F	1.8	1	Falls are a barrier to upstream fish migration.
438	1277	1	CV	1.2	10	Culvert.
467	1183	1	CV	0.5	12	Culvert inlet is blocked.

Table 4. Features within the Upper Morice

Site	ILP/ WSC	Reach #	Feature Type	Feature Height (m)	Feature Length (m)	Comment
668	36400-64100	16	BD	0.4	NS	Beaver dam.
678	64400-18300	9	F	1.2		Falls.
682	1221	1	C	0.8	0	Cascade.
687	64400-18300	11	FLD	NS	200	Dewatered channel.
687	64400-18300	11	X	1	NS	LWD barrier.
688	1263	1	FLD	3	20	
688	1263	1	C	0.6	0	Cascade.
688	1263	1	C	2	1	Cascade.
688	1263	1	C	4	1	Cascade.
701	64400-09200	2	C	5	5	Cascade.
701	64400-09200	2	C	0.5	0	Cascade.
806	600600-57600	10	C	4	3	Cascade.

5.4.6 Additional Sampling Recommendations

Thirty-one (31) reaches were recommended for additional sampling (Table 5). Additional sampling will clarify fish presence/absence and establish if any barriers exist in downstream reaches. No sport fish were captured in reaches recommended for additional sampling.

Many of the reaches selected for additional sampling represent small tributaries with limited habitat values, and most exhibit ephemeral flows. Based on additional sampling efforts in the past, these reaches often provide limited values for salmonids, and even under optimal conditions, fish are often present at low densities and are not always captured. The reaches selected for additional sampling were required by default due to a lack of water, or negative sampling results. The lack of barriers and gradients less than 20% also increased the additional sampling number. As it is not practical, or necessary, to resample every reach selected in the additional sampling table, additional sampling sites should be selected strategically to optimize additional sampling results.

The timing of additional sampling efforts is critical to ensuring optimal conditions and maximizing the potential for fish to occur. In particular, additional sampling should be conducted in the spring immediately following peak runoff, which usually occurs in the early part of May. Reaches classified as fish bearing and selected for additional sampling could also be deferred by accepting this default classification, however the reaches selected for additional sampling would contribute valuable information to aid in determining fish presence and distribution for future stream classification work.

5.4.7 Non-Fish Bearing Status

A non-fish bearing status was assigned to 125 of the 218 sample sites within the study area (Table 6). A non-fish bearing classification has been assigned to all sampled reaches within the non-fish bearing table. Non-fish bearing classifications are associated with reaches that lack suitable habitat to sustain salmonids or are inaccessible to fish. Non-fish bearing status was assigned to reaches where:

- The stream was labeled a non-visible channel containing no potential fish habitat;
- The stream was deemed inaccessible from fish bearing waters and did not have perennial fish habitat;
- Gradient prevented upstream fish migration and the stream did not have perennial fish habitat upstream;
- Permanent barriers (cascades, falls, etc.) prevented upstream fish migration and the stream did not have perennial fish habitat upstream;

Table 5

Table 5. Upper Morice Additional Sampling Summary

Site	ILP/WSC	Reach	Width (m)	Gradient (%)	Species	Stream Class	Comments	Additional Sampling Recommendations
317	63200-29100	3	0.96	4	NFC	S4*	No permanent barriers identified. Fish stream based on access.	Second pass sampling in the lower 200 m of this reach.
318	1420	2	2.62	13	NFC	S3*	Fish stream based on access.	Second pass sampling to confirm fish presence or absence.
326	62200-2180	3	2.4	1.3	RSC	S3*	Non sport fish captured. Upstream lake may contain sport fish.	Additional sampling of unnamed lake in Reach 4 to confirm presence or absence of sport fish.
329	1185	1	0.86	11	NS	S4*	Fish stream based on access.	Second pass sampling to confirm fish presence or absence.
330	1478	2	1.49	3.5	NFC	S4*	Fish stream based on access.	Second pass sampling to confirm fish presence or absence.
332	1180	5	4.01	2.8	CAS	S3*	Fish may access this reach from Collins Lake. Non sport fish captured.	Second pass sampling to confirm fish presence or absence of sport fish.
336	57600-31800	3	1.48	4	NSC	S4*	Non sport fish were captured within reach. Fish stream based on access.	Additional sampling of unnamed lake in Reach 4 to confirm presence or absence of sport fish.
345	63200-75900	3	1.45	5.5	NFC	S4*	Fish stream based on access. Culvert in Reach 1 may block upstream fish access.	Additional sampling in Reach 2 to assess fish access to this reach.
410	1196	1	1.33	2.8	NFC	S4*	No barriers to upstream fish migration were identified. Fish stream based on access.	Second pass sampling to confirm fish presence or absence.
411	63200-62200	5	2.46	2.4	NFC	S3*	No barriers to upstream fish migration were identified. Fish stream based on access.	Second pass sampling of Reach 3 to confirm fish presence or absence.
412	63200-62200	3	3.36	2.8	NFC	S3*	No barriers to upstream fish migration were identified. Fish stream based on access.	Second pass sampling to confirm fish presence or absence.
419	62200-2180	5	1.29	4.1	NFC	S4*	Fish bearing stream based on access. Fish were observed rising in downstream lake. No barriers to upstream fish migration were identified.	Additional sampling of unnamed lake in Reach 4 to confirm presence or absence of fish.
420	1484	1	0.75	2.5	NFC	S4*	Fish stream based on access. No barriers to upstream fish migration were observed.	Additional sampling of unnamed lake in Reach 4 to confirm presence or absence of fish.
424	36400-00800	7	1.53	2.9	NFC	S3*	Fish stream based on access. Fish captured in downstream reach. No barriers to fish passage observed.	Second pass sampling to confirm fish presence or absence.
442	1501	1	0.87	3	NFC	S4*	Fish bearing based on access. Upstream lake should be resampled to confirm fish absence.	Second pass sampling to confirm fish presence or absence.
457	600600-54900	4	1.22	5.5	NFC	S4*	Fish bearing stream based on access. Possible fish use during higher flows.	Second pass sampling to confirm fish presence or absence.
668	36400-64100	16	1.55	1.6	RSC, CAL, LKC	S3*	Non sport fish captured. Fish bearing based on access. Potential sport fish use in upstream lake.	Additional sampling of unnamed lake in Reach 17 to confirm the presence or absence of sport fish.
669	1034	1	1.42	0.8	LKC	S4*	Non sport fish captured. Fish bearing based on access. Potential sport fish use in upstream lake.	Additional sampling of unnamed lake in Reach 17 (WSC 36400-64100) to confirm presence or absence of sport fish.
684	1221	1	2.78	4.5	NFC	S3*	A small cascade (0.8 m) may prevent upstream fish migration. Fish bearing until adequate resampling is conducted above the cascade.	Second pass sampling to confirm fish presence or absence.
702	4190-1340	3	1.02	4.8	NFC	S4*	Fish stream based on access. Potential fish use of upstream lake.	Additional sampling of Reach 2 to assess fish access to this reach.
802	600600-57600	10	1.82	5.5	NFC	S3*	Fish bearing based on access. No permanent barriers to upstream fish migration were identified.	Additional sampling of Reach 9 to assess fish access to this reach.

- No fish habitat was present;
- The stream lacked a continuous definable channel.

Inferred non- fish bearing status was given to reaches with the following criteria:

- The average stream gradient was greater than or equal to 20% (through map interpretation) with no headwater lake present;
- Reaches above a stream section with an gradient greater than or equal to 20% (through map interpretation) with no headwater lake present.

Often the non fish bearing status of stream reaches with average gradients less than 20% is supported by evidence concerning the accessibility to potential fish bearing water. Obvious barriers such as falls, cascades and high gradient sections are measured and adequate sampling is conducted above the potential barrier to confirm that the portion of stream above the barrier is non fish bearing. Many of the headwater reaches and smaller streams reaches draw from such a small watershed area that they lack sufficient discharge volume required to develop significant channels and habitat complexity. These reaches are often ephemeral, containing shallow water depths, subsurface flows, lack of significant pools and have a predominance of organic and fine substrates.

Insufficient discharge often results in a lack of connectivity between the channelized portion of stream and downstream watercourses. Lack of connectivity can be described as the channelized portion of stream being isolated from downstream watercourses in which no surface connection or subsurface channel exists (joining the two at any time of the year). Evidence of no surface connection includes a lack of surface scour, no alluvial substrates, no evidence of surface ponding or seasonal flooding. These small streams with no connectivity to fish bearing waters were adequately sampled upstream of the loss of connectivity to verify fish presence or absence.

Reaches that are classified as NVC (NCD, non RIC term used by the timber industry) are not streams due to the fact that they do not possess the criteria necessary to classify them as such. The reaches classified as NVC are largely drainages that are mapped incorrectly and no stream exists where the map indicates. They may also be watercourses which lack evidence of surface scour, contain no continuous definable channel, lack alluvium deposits, and exhibit no evidence of extensive ponding. Wetlands with extensive ponding and wetlands that lack surface water are both considered NVC as they do not possess stream channels or properties of streams. It should be recognized that a NVC classification does not necessarily mean that the reach is not fish bearing unless otherwise stated. For example, a ponded wetland reach could sustain fish but be classified NVC due to the lack of a continuous definable channel and fluvial substrates. In cases where ponded wetland reaches (NVC) are identified as fish bearing they should not be treated as streams because they do not meet the criteria of a stream. They should be managed to

maintain the integrity of the fisheries resources identified within that reach. In most cases the level of concern is low with respect to protecting fish habitats sustained within NVC reaches due to the poor habitat values (for salmonids) associated with wetland habitats. However, the maintenance of fish passage is a concern.

6.0 STREAM CLASSIFICATION SUMMARY

Table 7 provides a summary of stream inventory information collected during the project.

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type		
														Heavily vegetated channel, small catchment, subsurface flows, isolated pools (few) and an intermittent discontinuous channel in lower end. Stream lacks evidence of surface flow through heavily vegetated sections.	Spawning: None, 100% Fine substrates, no gravel accumulations, highly ephemeral and insufficient discharge. Rearing: None, no riffle, run or pool habitat during all flows. Overwintering: None, no pools, high BOD due to organic substrates.
134	1079	2	0.35	2.5	S6	99/08	NA	NA	NA	Low	NA	NA	NA		No evidence of surface scour or ponding.
135	1078	2	NA	6.5	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	Channel is heavily braided and discontinuous. No fish habitat present and system is extremely flashy. Gradient break/cascade in downstream reach is >30%/50 m (over bedrock).	Spawning: None, high gradient. Rearing: None, high gradient, no flows, flashy with no resting pools. Overwintering: None, no pools.
137	1144	2	0.84	18.5	S6	99/08	NA	NA	NA	Low	NA	NA	NA		Spawning: None, predominantly large cobbles and boulders. Rearing: Limited, to a few interstitial cracks between boulders and cobbles, no open water habitat. Overwintering: None, no pools present in stream.
138	1148	3	0.32	12.2	S4*/S6	99/08	NA	NA	NA	Low	NA	NA	NA	Gradient prevents fish access to this reach. No spawning, rearing or overwintering habitat. Sampling downstream (Site 270) indicates that this section of stream is non fish bearing.	Spawning: None, 100% fine, organic substrates with no accumulation of gravel. Rearing: None, channel is choked with vascular plants, no pools and gradients >20%. Overwintering: None, no pools.
139	1150	1	0.27	20	S6	99/08	NA	NA	NA	Low	NA	NA	NA	Gradient prevents fish access to this reach. No spawning, rearing or overwintering habitat. Heavily braided and vegetated channel with sections of subsurface flows.	Spawning: None, gradients too steep. Rearing: None, no riffles, runs or pools, extremely flashy. Overwintering: None, no pools.
140	1151	2	0.34	20.8	S6	99/08	NA	NA	NA	Low	NA	NA	NA		

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type		
141	1152	1	1.35	16.5	S4/S6	99/08	NA	NA	NA	Low	NA	NA	NA	Lower 600 m is fish bearing based on gradient only. Above that point stream becomes NVC. High gradient sections (17%) and a heavily vegetated (choked) channel limit access.	Spawning: Possible in lower end (based on substrates only), though access and gradients do not support spawning in this stream type. Rearing: None, no pools or resting habitat present. Overwintering: None, no pools.
142	1498	4	0.5	11.5	S6	99/08	NA	NA	NA	Low	NA	NA	NA	Small catchment only 200 m of mapped stream above this reach. Subsurface flows and limited connectivity throughout reach. Numerous (>20) debris jams and sediment wedges located throughout (.5 m drops).	Spawning: Limited to a few patches of gravel. Rearing: None, small 20-30 cm2 pools, no resting/holding water, flashy and unstable. Overwintering: None, no evidence of pools.
143	36400-27600	3	1.52	21.8	S6	99/08	NA	NA	NA	Low	NA	NA	NA	No spawning, rearing, or overwintering habitat. Gradient prevents access to this reach.	Spawning: None, gradients too steep. Rearing: None, no riffles, runs or pools, extremely flashy. Overwintering: None, no pools.
144	1499	3	0.6	19.3	S6	99/08	NA	NA	NA	Low	NA	NA	NA	No connectivity to fish bearing water. Gradient up to 22%/100 m and channel characteristics prevent fish access to this reach.	Spawning: None, angular substrates. Rearing: None, stream is highly ephemeral. Channel has moss covered rocks and is heavily choked with vascular vegetation. Overwintering: None, no pools.
145	1499	4	0.93	23	S6	99/08	NA	NA	NA	Low	NA	NA	NA	No spawning, rearing, or overwintering habitat. Gradient prevents access to this reach.	Spawning: None, gradients too steep. Rearing: None, no riffles, runs or pools, extremely flashy. Overwintering: None, no pools.

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type	Effort	
146	1177	2	0.47	4.5	S6	99/08	NA	NA	NA	Low	NA	NA	NA	NA	No spawning, rearing, or overwintering habitat. Small catchment (400 m of mapped stream above this reach), subsurface flows and a discontinuous channel. Reach is located 1600 m from fish bearing water.
149	1087	2	NA	6	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	NA	
150	1086	1	0.42	6	S6	99/08	280	140	80	Med	Clr	9	NA	NA	
151	1089	2	3.02	4.8	S5	99/08	1200	1621	80	Low	Clr	10	NA	NA	Stream does not flow into sport fish bearing waters. Falls (25 m) on Pimpernel Creek prevent upstream sport fish migration.
152	36400-39700	5	5.73	4.5	S5	99/08	1140	1450	90	Med	Clr	14	NA	NA	Stream does not flow into sport fish bearing waters. Falls (25 m) on Pimpernel Creek prevent upstream sport fish migration. Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.
153	36400-39700	7	4.58	4.5	S5	99/08	630	950	90	Med	Clr	14	MT	11	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.
154	39700-3240	3	1.79	7.5	S6	99/08	300	786	80	Med	Clr	12	MT	6	Stream does not flow into sport fish bearing waters. Falls (25 m) on Pimpernel Creek prevent upstream sport fish migration.
155	39700-2910	4	2.9	6.2	S6	99/08	1800	1068	90	Med	Clr	13	NA	NA	Stream does not flow into sport fish bearing waters. Falls (25 m) on Pimpernel Creek prevent upstream sport fish migration.
156	36400-39700	4	7	7.5	S2/S5	99/08	800	709	90	Med	Clr	14	NA	NA	Falls (25 m) are a barrier to upstream sport fish migration. Adequate sampling indicates only non sport fish are present above the falls.

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale	
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type			Effort
159	36400-39700	17	2.59	4.5	S6	99/08	490	465	80	Med	Clr	14	MT	6	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.	Sampling upstream of falls confirms non fish bearing status (non-sport fish).
160	39700-6230	2	2.43	5.5	S6	99/08	850	942	90	Med	Clr	14	NA	NA	Stream does not flow into sport fish bearing waters. Falls (25 m) on Pimpernel Creek prevent upstream sport fish migration.	Sampling upstream of falls confirms non fish bearing status (non-sport fish).
161	36400-39700	11	6.58	1.5	S5	99/08	200	300	80	Med	Clr	14	MT	15	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.	Sampling upstream of falls confirms non fish bearing status (non-sport fish).
162	1160	4	NA	7.8	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	NA	No evidence of surface scour or ponding.	
163	600600-38000	2	2.6	20.5	S6	99/08	700	655	80	Med	Clr	14	NA	NA	Gradient break (25% & 30%/50 m) immediately upstream of the Morice River prevents upstream fish migration to this reach.	Sampling upstream of gradient (700 m) confirms non fish bearing status.
168	1467	1	0.62	17.8	S4*/S6	99/08	200	110	90	Med	Clr	12	NA	NA	Lower 100 m of reach is fish bearing based on gradient only. The remainder of this stream is non fish bearing based on gradient >20% and channel characteristics. Isolated pools and residual pool depths <10 cm. Total stream length is 900 m.	Sampling upstream of gradient (200 m) confirms non fish bearing status.
169	1466	1	0.51	4.5	S6	99/08	NA	NA	NA	Low	NA	NA	NA	NA	Spawning: None, no significant accumulation of gravels, primarily fine substrates. Rearing: Poor, isolated, shallow stagnant pools with algae growth. Overwintering: None, no pools deep enough.	Spawning: None, no significant accumulation of gravels, primarily fine substrates. Rearing: Poor, isolated, shallow stagnant pools with algae growth. Overwintering: None, no pools deep enough.
170	1463	2	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	NA	Vegetated seepage area.	
171	1459	1	1.35	22	S6	99/08	300	531	70	Med	Clr	12	NA	NA	Gradient prevents fish access to this reach.	Sampling upstream of gradient confirms non fish bearing status.

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale		
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type			Effort	
234	1037	4	0.61	2.5	S6	99/09	150	180	70	Med	Clr	9	NA	NA	Reach 1 (Site 671) of this stream has no visible channel and no connectivity to fish bearing water. Sampling at Site 234 (Reach 4) indicates this reach is non fish bearing.	Spawning: None, no accumulation of gravels, fine substrates mixed with organics (needles). Rearing: Poor, low flows and subsurface sections. Overwintering: None, no pools in reach.	
235	1068	3	NA	48.3	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	NA			Vegetated seepage area.
																	Cascade (30/80 m) prevents upstream fish migration. Within cascade there is a 12 m falls. 100-200 mm DV captured below cascade.
239	1489	3	10.43	5	S2/S5	99/09	890	723	110	Med	Lt	3	NA	NA		Sampling upstream of cascade (1700 m) confirms non fish bearing status.	
																Sampling upstream of cascade (1700 m) confirms non fish bearing status.	
242	1489	4	6.52	3.5	S5	99/09	800	430	120	Med	Lt	3	NA	NA		Sampling upstream of cascade (1000 m) confirms non fish bearing status.	
243	64400-28100	11	14.1	8	S2/S5	99/09	780	310	110	Med	Clr	4	NA	NA		Sampling upstream of cascade (1000 m) confirms non fish bearing status.	
																Sampling upstream of cascade (1000 m) confirms non fish bearing status.	
244	64400-28100	12	7.3	8	S5	99/09	200	380	110	Med	Clr	4	NA	NA		Sampling upstream of cascade (1000 m) confirms non fish bearing status.	
																Sampling upstream of cascade (1000 m) confirms non fish bearing status.	
245	1419	5	0.73	20.3	S6	99/09	200	480	110	Med	Clr	8	NA	NA		Sampling upstream of cascade (4 sites) confirms non fish bearing status.	
																Sampling upstream of cascade (4 sites) confirms non fish bearing status.	
246	1419	3	3.02	8	S3/S5	99/09	400	342	110	Med	Clr	8	NA	NA		Sampling upstream of cascade (4 sites) confirms non fish bearing status.	
																Sampling upstream of cascade (4 sites) confirms non fish bearing status.	
248	1422	1	3.83	8.5	S5	99/09	100	210	110	Med	Clr	8	NA	NA		Sampling upstream of cascade (4 sites) confirms non fish bearing status.	
249	600600-53900	1	2.45	6.5	S6	99/09	300	820	70	Low	Clr	9	NA	NA		Sampling upstream of falls confirms non fish bearing status.	

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type		
252	1085	2	0.41	2	S6	99/09	NA	NA	Low	NA	NA	NA	NA	No spawning, rearing or overwintering habitat. Isolated pools, vegetated channel and subsurface flows. No connectivity to fish bearing water.	Spawning: None, 100% fine, organic substrates with no accumulations of gravel. Rearing: None, channel is choked with vascular plants (carex), and pools are isolated by subsurface flows. Overwintering: None, no pools.
254	1169	3	1.53	18	S6	99/09	NA	NA	NA	NA	NA	NA	NA	High gradient (25%/50 m). Numerous small cascades over boulder habitat. No open water habitat. No fish captured downstream with extensive electrofishing effort.	Spawning: None, gradients too high, system is flashy and substrates are highly angular (boulders and cobbles). Rearing: None, no pools or resting areas. Overwintering: None, no pools.
255	1470	2	0.65	26.5	S6	99/09	NA	NA	NA	NA	NA	NA	NA	No spawning, rearing, or overwintering habitat. Gradient prevents upstream fish migration.	Spawning: None, gradients too high, system is flashy and substrates are not suitable (too large). Rearing: None, no pools or resting areas. Overwintering: None, no pools.
256	600600-53900	1	2.75	7	S3/S5	99/09	900	1220	110	Low	Clr	9	NA	Falls (20 m) prevent upstream fish migration. 100-200 mm CT captured downstream of falls.	Sampling upstream of falls (2 sites) confirms non fish bearing status.
257	1136	2	NA	4	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
259	1439	2	NA	17.5	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
264	36400-26300	3	1.38	7.5	S6	99/09	600	537	30	Med	Clr	7	NA	Bedrock cascade (2/1 m) in Reach 2 prevents upstream fish migration. 100-200 mm DV captured downstream of barrier.	Sampling upstream of cascade (4 sites) confirms non fish bearing status.
265	1146	1	0.9	15	S6	99/09	120	127	20	Low	Clr	9	NA	Bedrock cascade (2/1 m) downstream (Site 266) prevents fish access to this reach.	Sampling upstream of cascade (4 sites) confirms non fish bearing status.

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale	
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type			Effort
266	36400-26300	2	3.37	8	S3/S6	99/09	600	437	30	Low	Clr	7	NA	NA	Bedrock cascade (2/1 m) downstream (Site 266) prevents fish access to this reach.	Sampling upstream of cascade (4 sites) confirms non fish bearing status.
267	1147	1	1.65	21.8	S6	99/09	200	189	30	Low	Clr	7	NA	NA	Bedrock cascade (2/1 m) downstream (Site 266) prevents fish access to this reach.	Sampling upstream of cascade (4 sites) confirms non fish bearing status.
268	1446	2	0.67	38.5	S6	99/09	NA	NA	NA	Low	NA	NA	NA	NA	Gradient prevents fish access to this reach.	Dry intermittent channel.
269	41800-41700	2	1.87	32	S6	99/09	NA	NA	NA	Low	Clr	NA	NA	NA	Gradient prevents fish access to this reach.	Dry intermittent channel.
270	1150	1	0.92	20.3	S4*/S6	99/09	200	183	30	Low	Clr	8	NA	NA	Lower 50 m of this reach is fish bearing based on access.	Gradient prevents fish access to the remainder of the reach.
271	1158	2	0.65	26.5	S4*/S6	99/09	NA	NA	NA	Low	Clr	NA	NA	NA	Lower 20 m of this reach is fish bearing based on access.	Gradient prevents fish access to the remainder of the reach.
274	1441	1	NA	2.3	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
275	1462	1	1.03	8.5	S6	99/09	NA	NA	NA	Low	Clr	NA	NA	NA	Subsurface flows and isolated pools. No connectivity to fish bearing water, channel fans out into sphagnum filled depressions with no overland connection. Upper portion of reach below road contains a 50%/50 m gradient section.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs. Overwintering: None, no pools.
276	36400-36600	1	0.87	10	S6	99/09	NA	NA	NA	Low	Clr	NA	NA	NA	Lower section of stream is a wet boggy mat with no definable channel or overland flow. Numerous isolated pools, subsurface flows, fine organic substrates and a poorly defined channel.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs. Overwintering: None, no pools.

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments	Additional Rationale
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type	Effort		
277	1175	2	0.46	6.8	S6	99/09	NA	NA	NA	Low	NA	NA	NA	No spawning, rearing or overwintering habitat. Channel filled with moss and vascular plants. No connectivity to fish bearing water. Ephemeral stream reach located 1200 m from known fish bearing water.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs. Overwintering: None, no pools.	
278	1176	3	0.35	7	S6	99/09	NA	NA	NA	Low	NA	NA	NA	No salmonid habitats present. Highly ephemeral stream, channel contains moss, leaf litter and fines. No connectivity to fish bearing water (discontinuous channel). Reach is located 700 m from known fish bearing water.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs. Overwintering: None, no pools.	
303	1406	1	0.82	2.5	S6	99/08	NA	NA	NA	Low	NA	NA	NA	No spawning, rearing or overwintering habitat. Heavily vegetated and intermittent channel with isolated pools which fan out into sphagnum filled depressions. No connectivity to fish bearing water.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs. Overwintering: None, no pools.	
306	95959	1	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.	
307	1276	3	1.39	21.5	S4/S6	99/08	400	294	50	Low	Clr	8	NA	Falls (1.9 m) prevent upstream fish migration into this reach. The portion of stream below the falls is fish bearing based on access.	Sampling upstream of falls (300 M) confirms non fish bearing status.	
308	18300-0720	2	2.36	27.3	S6	99/08	200	145	50	Low	Clr	8	NA	Gradient prevents access to this reach.	Sampling upstream of gradient confirms non fish bearing status.	
309	1231	2	1.2	11.8	S6	99/08	NA	NA	NA	Low	Clr	NA	NA	Gradient (42%/60 m) prevents upstream fish migration to this reach.	No fish habitat present upstream of gradient section. Highly ephemeral stream.	
310	1227	2	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.	

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale	
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type			Effort
311	1220	2	0.89	10.5	S6	99/08	300	236	40	Med	Clr	8	NA	NA	No connectivity to fish bearing water (discontinuous channel with no surface or subsurface connection). Channel fans out at the toe of the slope becoming heavily vegetated with accumulations of detrital materials. Sampling confirms non-fish status.	Spawning: None, channel is heavily vegetated and highly ephemeral. Rearing: Poor, lack of channel development, no riffle, run habitat, isolated pools. Overwintering: None, no pools.
312	1217	3	0.48	3.4	S6	99/08	300	269	50	Med	Lt	10	NA	NA	No connectivity to fish bearing water. Channel fans out into a vegetated depression. Downstream reach (Reach 1) is classified as non fish bearing. Sampling confirms non-fish status (300 m site length).	Spawning: None, channel is heavily vegetated and highly ephemeral. Rearing: Poor, lack of channel development, no riffle, run habitat, isolated pools. Overwintering: None, no pools.
313	63200-09800	7	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
319	11700-5660	4	2.38	21.25	S3/S6	99/08	300	363	90	Med	Clr	10	NA	NA	Above road crossing the gradient becomes too steep to allow fish passage.	Sampling upstream of gradient confirms non fish bearing status.
321	1007	2	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
322	1006	2	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
323	1002	1	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
324	1013	1	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
327	1193	1	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
328	1188	1	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
333	57600-18800	3	0.99	1.3	S6	99/08	NA	NA	NA	Low	NA	NA	NA	NA	No spawning, rearing, or overwintering habitat. No access or suitable fish habitat. Downstream meadow prevents upstream fish passage. No possible fish passage through dry sedge filled meadow.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs. Overwintering: None, no pools.

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type		
334	1208	1	0.72	3.5	S6	99/08	NA	NA	Low	Clr	NA	NA	No connectivity to fish bearing water. Discontinuous channel in the lower portion of this reach. Channel fans out and seeps into sphagnum filled depressions before entering a dry sedge filled meadow. Gradient and falls (2 m) prevent fish access.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.	
335	1209	4	1.33	20.3	S6	99/08	NA	NA	Low	NA	NA	NA		Highly ephemeral stream with no fish habitat.	
337	1211	2	NA	NA	NVC	99/08	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.	
338	1213	2	0.78	1.8	S6	99/08	NA	NA	Low	NA	NA	NA	No connectivity to fish bearing water (discontinuous channel). No spawning, rearing or overwintering habitat. Downstream site (339) is non fish bearing.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.	
339	1213	1	0.73	1.8	S6	99/08	NA	NA	Low	NA	NA	NA	No connectivity to fish bearing water (discontinuous channel). Channel fans out into sphagnum filled depressions (bog) with no overland flow or connection. Highly ephemeral stream with a vegetated channel and fine substrates.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.	
343	63200-66200	6	0.89	2.5	S6	99/09	400	297	60	Low	Clr	10	NA	Falls (8 m) in Reach 3 prevent upstream fish migration. 100-300 mm CT/DV captured downstream of falls.	Sampling upstream of falls (5 sites) confirms non fish bearing status.
346	66200-5580	1	1.6	1.5	S6/ NVC	99/08	400	421	50	Med	Clr	10	NA	Falls (8 m) downstream prevent upstream fish migration.	Sampling upstream of falls (5 sites) confirms non fish bearing status.

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale	
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type			Effort
347	1050	2	1.4	2.1	S6	99/08	400	467	60	Med	Clr	10	NA	NA	No connectivity to fish bearing water. Habitat not suitable for fish. Subsurface flows and sections of discontinuous channel covered with sphagnum moss. Highly ephemeral stream with a vegetated channel and fine substrates.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.
392	36400-72600	6	1.21	4.4	S4/S6	99/08	400	316	60	Med	Clr	8	NA	NA	400 m upstream of road crossing gradient becomes too high (22%/100 m) to allow fish passage.	Sampling upstream of gradient confirms non fish bearing status.
																Spawning: None, 100% Fine substrates, no gravel accumulations, highly ephemeral and insufficient discharge. Rearing: None, no riffle, run or pool habitat during all flows. Overwintering: None, no pools, high BOD due to organic substrates.
393	1028	2	0.84	1.8	S6/ NVC	99/09	150	315	50	Low	Clr	8	NA	NA	The lower 100 m of this reach has a definable channel (barely classifiable) with no connectivity to fish bearing water. Channel flows into a sphagnum filled depression (bog) becoming a seepage. The remainder of the reach is classified as NVC.	No evidence of surface scour or ponding.
395	1039	6	NA	1.3	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	NA	No visible channel.	Sampling upstream of falls confirms non fish bearing status.
396	66200-5930	5	1.49	1.8	S6	99/09	400	431	70	Low	Clr	8	NA	NA	Stream does not flow into fish bearing water. Downstream falls (8 m) in mainstem prevents upstream fish migration.	Sampling upstream of falls confirms non fish bearing status.
397	63200-66200	4	2.8	4.9	S6	99/09	600	727	60	Low	Clr	9	NA	NA	Stream does not flow into fish bearing water. Downstream falls (8 m) in mainstem prevents upstream fish migration.	Sampling upstream of falls confirms non fish bearing status.
398	63200-66200	3	3.49	4.3	S3/S5	99/09	500	1123	70	Med	Clr	8	NA	NA	Stream does not flow into fish bearing water. Downstream falls (8 m) in mainstem prevents upstream fish migration.	Sampling upstream of falls confirms non fish bearing status.

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications					Other Methods		Comments	Additional Rationale	
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type			Effort
400	1237	3	0.56	4.5	S6	99/09	300	237	60	Low	Clr	7	NA	NA	Highly ephemeral stream with small catchment. No spawning or overwintering habitat. Sections of subsurface flow, isolated pools, fine substrates and sphagnum filled depressions (discontinuous). Reach is located 600 m from known fish bearing water.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: Poor, lack of channel development, small isolated pools, heavily vegetated channel. Overwintering: None, no pools.
401	1287	1	NA	20.5	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	NA	No evidence of surface scour or ponding.	
402	64400-27000	2	3.03	10.3	S5	99/09	400	420	30	Low	Clr	7	NA	NA	A high gradient section (25% for 100 m) immediately above the Nanika River prevents fish access to this reach.	Sampling upstream of gradient confirms non fish bearing status.
	64400-27800	2	2.81	11.1	S6	99/09	200	328	30	Low	Clr	6	NA	NA	A high gradient section (25% for 100 m) in Reach 1 prevents fish access to this reach.	Sampling upstream of gradient confirms non fish bearing status.
403															A high gradient section (26% for 100 m) prevents fish access to this reach.	Sampling upstream of gradient confirms non fish bearing status.
404	1394	1	1.28	11.8	S6	99/09	300	353	40	Low	Clr	7	NA	NA		
															The lower 20 m of this stream is fish bearing. A cascade (4/4 m) and falls (12 m), prevent upstream fish access. Juvenile coho, captured downstream of falls.	Sampling upstream of barrier confirms non fish bearing status.
406	1278	1	2.62	16.5	S3/S6	99/09	200	209	30	Med	Clr	8	NA	NA		
															Bedrock cascade (2.4/2 m) prevents upstream fish migration. Fish bearing below the cascade based on access (Habitat suitable for 100-200 mm salmonids).	Sampling upstream of barrier (150 m) confirms non fish bearing status.
407	1027	2	1.3	5.3	S4*/S6	99/09	200	131	50	Low	Clr	7	NA	NA		
409	57600-31800	8	NA	1.8	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	NA	No evidence of surface scour or ponding.	
															The lower 150 m of this stream is fish bearing based on access. Above that point gradient prevents upstream fish migration.	Sampling upstream of gradient confirms non fish bearing status.
414	1239	1	1.99	20.3	S3*/S6	99/09	300	609	60	Low	Clr	7	NA	NA	Falls (12 m) in Reach 1 prevent upstream fish migration.	Sampling upstream of barrier (2 sites) confirms non fish bearing status.
415	1278	2	2.62	10.5	S6	99/09	400	415	70	Low	Clr	7	NA	NA		

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments	Additional Rationale
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type	Effort		
417	1217	1	1.27	1.5	S6	99/09	NA	NA	Low	NA	NA	NA	NA	Habitat not suitable for fish. Highly ephemeral stream, with a heavily vegetated channel, fine substrates and no connectivity to fish bearing water (discontinuous channel). Extensive upstream and downstream electrofishing with no fish captured.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.	
418	1000	1	NA	2.5	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.	
421	1484	2	0.59	8	S6	99/09	NA	NA	Low	NA	NA	NA	NA	No connectivity to Reach 1. Poorly defined channel with subsurface flows and isolated pools. Heavily vegetated channel with a high accumulation of fines. 300 m site in downstream reach 1 captured no fish with extensive electrofishing effort.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.	
423	600600-53900	2	2.61	4.8	S6	99/09	400	622	70	Low	Clr	7	NA	Falls (20 m) in Reach 1 prevent upstream fish migration.	Sampling upstream of barrier confirms non fish bearing status.	
427	1156	3	NA	1.8	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.	
428	1152	2	NA	2.3	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.	
429	1157	1	0.51	44.5	S6	99/09	NA	NA	NA	Low	NA	NA	NA	Gradient is too high to allow fish access to this reach.	No fish habitat present within reach.	
436	1235	2	1.41	15	S6	99/09	200	328	60	Low	Clr	6	NA	Falls (1.8 m) and high gradient (30%) prevent fish access to this reach.	Sampling upstream of barrier confirms non fish bearing status.	
438	1277	1	1.38	5	S6	99/09	100	106	90	Low	Clr	6	NA	The channel fans out into a sphagnum filled depression in the lower portion of the reach. No definable channel in this section. No evidence of surface flow at discontinuity.	Spawning: Poor, highly ephemeral stream. Rearing: None, lack of channel diversity, limited pools, riffles or runs. Overwintering: None, no pools.	

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments	Additional Rationale
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type	Effort		
439	1228	2	0.44	5	S6	99/09	NA	NA	NA	Low	NA	NA	NA	Poorly defined channel with sections of heavily vegetated discontinuous channel, and isolated pools. No connectivity to fish bearing water. Habitat too poor to sustain fish. No evidence of surface flow at discontinuity.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.	
441	1012	1	0.59	1.9	S4*/S6	99/09	NA	NA	NA	Low	NA	NA	NA	Lower portion of reach below the road can be classified as fish bearing based on access. Above the road, habitat is too poor to sustain fish. No evidence of surface flow at discontinuous sections.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.	
455	1475	1	1.1	16	S6/ NVC	99/09	NA	NA	NA	Low	NA	NA	NA	Upper portion of reach can be classified as no visible channel. Lower portion of reach has no connectivity to the Morice River. Channel fans out into a vegetated depression. Ephemeral stream with only 150 m of definable channel.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.	
667	1046	1	0.75	4.5	S4*/S6	99/09	NA	NA	NA	Low	Clr	NA	NA	The lower 50 m is fish bearing based on access. Above that point the channel deteriorates and has no connectivity to fish bearing water. Fine substrates, sphagnum filled depressions with no evidence of surface flow at discontinuity.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.	
671	1037	1	NA	4.5	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.	
673	1039	3	NA	1.3	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.	

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments	Additional Rationale
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type	Effort		
680	1272	1	0.28	13.5	S6	99/09	NA	NA	Low	NA	NA	NA	NA	High gradient and small channel size. Highly ephemeral stream with heavily vegetated channel, 100% organic substrates and no spawning, rearing or overwintering habitat present. Discontinuous, intermittent channel with subsurface sections.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: None, no pools.	
683	1222	1	0.35	13.5	S6	99/09	100	200	20	Low	Clr	7	NA	NA	High Gradient (32%) drop into mainstem prevents upstream fish migration. Sections of subsurface flow and isolated pools upstream of gradient break.	Sampling upstream of gradient confirms non fish bearing status.
687	64400-18300	11	7.15	13.5	S5	99/09	150	311	90	Med	Clr	6	NA	NA	Channel is dewatered for 200 m in the downstream portion of this reach. Sampling above the dewatered section confirms non fish presence.	No fish were captured in one site 500 m downstream. All reaches upstream of this site have gradient >20%.
688	1263	1	3.01	18	S5	99/09	200	257	40	Med	Clr	6	NA	NA	Cascades (4/1 m, 2/5 m and .6/3 m) and downstream dewatered section, prevent fish migration upstream into this reach.	Sampling upstream of cascades confirms non fish bearing status.
689	1264	1	1.33	23.5	S6	99/09	100	327	40	Med	Clr	6	NA	NA	Gradient prevents fish access to this reach.	Sampling upstream of gradient confirms non fish bearing status.
699	1009	1	2	0.9	S3*/S6	99/09	200	717	20	Med	Clr	8	NA	NA	Channel becomes discontinuous within the top 1/3 of this reach. This section is non fish bearing based on channel characteristics (heavily vegetated channel with organic substrates). The lower section is fish bearing based on access only.	Spawning: None, no accumulations of gravels, insufficient discharge and highly ephemeral. Rearing: (u/s of 100 m) None, lack of channel development, no pools, riffles or runs, heavily vegetated channel. Overwintering: (u/s of 100 m) None, no pools.
700	64400-09200	3	1.75	6.1	S6	99/09	100	198	30	Low	Clr	6	NA	NA	Cascade (5/5 m) in reach 2 prevents fish access to this reach.	Sampling upstream cascade (2 sites) confirms non fish bearing status.

Table 6. Upper Morice Non Fish Bearing Status

Site	WSC/ILP	Reach	Width (m)	Gradient (%)	Stream Class	Date	Electrofishing Specifications						Other Methods		Comments	Additional Rationale
							Dist. (m)	Time (s)	Cond. (uS)	Stage (vis)	Turb. (vis)	Temp. (C)	Type	Effort		
701	64400-09200	2	2.17	8.3	S3*/S6	99/09	700	556	30	Med	Clr	6	NA	NA	Cascade (5/5 m) prevents fish access to the upper portion of this reach. Fish bearing based on access below the cascade. Habitat suitable for 100-200 mm salmonids.	Sampling upstream of cascade confirms non fish bearing status.
703	600600-41800	5	NA	1.8	NVC	99/09	NA	NA	NA	NA	NA	NA	NA	NA	No visible channel.	No evidence of surface scour or ponding.
806	600600-57600	10	1.51	6.8	S3*/S6	99/10	300	530	40	Med	Clr	6	NA	NA	Cascade (4/3 m) prevents upstream fish migration. Fish bearing based on access below the cascade. Habitat suitable for 100-200 mm salmonids.	Sampling upstream of cascade confirms non fish bearing status.
2340	1065	1	1	4.5	S6	99/09	NA	NA	NA	NA	NA	NA	NA	NA	No spawning, rearing or overwintering habitat. Subsurface flows, isolated pools discontinuous sections of channel, and numerous small cascades downstream of reach.	30-40, .5/1m cascades over debris jam and piles create numerous impassable barriers. 30-40, 10-20 m subsurface sections. Substrates are moss and debris covered.

Table 7. Upper Morice Stream Classification Summary

Site	ILP/WSC	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
131	1071	2	93L.005	1.65	4.5	RB	S3	Good spawning and rearing habitat. No overwintering habitat.
132	39700-0440	1	93L.015	2.08	7.5	DV	S3	Poor spawning and rearing habitat. No overwintering habitat.
133	36400-39700	3	93L.015	7.15	5.5	RB	S2	Good spawning, rearing and overwintering habitat.
134	1079	2	93L.015	0.35	2.5	NS	S6	No spawning, rearing, or overwintering habitat. Subsurface flows and limited connectivity.
135	1078	2	93L.015	NA	6.5	NA	NVC	No visible channel. No evidence of surface scour or ponding.
136	36400-26300	2	93L.015	2.85	5.8	DV	S3	Cascade (2 m) prevents upstream fish migration. Fish were captured below the cascade at Site 266. Sampling upstream of cascade confirms non fish bearing status.
137	1144	2	93L.015	0.84	18.5	NS	S6	Subsurface flows. Vegetated channel. No fish habitat present.
138	1148	3	93L.015	0.32	12.2	NS	S4*/S6	Fish may access the lower portion of this reach. No fish habitat and no connectivity in upper portion of reach.
139	1150	1	93L.015	0.27	20	NS	S6	Gradient prevents fish access to this reach. No spawning, rearing or overwintering habitat.
140	1151	2	93L.015	0.34	20.8	NS	S6	Gradient prevents fish access to this reach. No spawning, rearing or overwintering habitat.
141	1152	1	93L.015	1.35	16.5	NS	S4*/S6	Lower 600 m is fish bearing based on access. Above that point habitat becomes too poor to sustain fish.
142	1498	4	93L.015	0.5	11.5	NS	S6	No fish habitat present. Subsurface flows and no connectivity to fish bearing water.
143	36400-27600	3	93L.015	1.52	21.8	NS	S6	No spawning, rearing, or overwintering habitat. Gradient prevents access to this reach.
144	1499	3	93L.015	0.6	19.3	NS	S6	No connectivity to fish bearing water. Gradient and channel characteristics prevent fish access to this reach.
145	1499	4	93L.015	0.93	23	NS	S6	No spawning, rearing, or overwintering habitat. Gradient prevents access to this reach.
146	1177	2	93L.015	0.47	4.5	NS	S6	No spawning, rearing, or overwintering habitat. Small catchment, ephemeral stream, and intermittent channel. No connectivity to fish bearing water.
147	50200-0640	3	93L.015	2.05	4	NS	S3*	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
148	1154	1	93L.015	1.38	4	NFC	S4*	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
149	1087	2	93L.005	NA	6	NA	NVC	No visible channel. Vegetated seepage area.
150	1086	1	93L.005	0.42	6	NFC	S6	Stream does not flow into sport fish bearing waters. Falls (25 m) on Pimperl Creek prevent upstream sport fish migration.
151	1089	2	93L.005	3.02	4.8	NFC	S5	Stream does not flow into sport fish bearing waters. Falls (25 m) on Pimperl Creek prevent upstream sport fish migration.
152	36400-39700	5	93L.005	5.73	4.5	WSU	S5	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.
153	36400-39700	7	93L.005	4.58	4.5	WSU	S5	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.
154	39700-3240	3	93L.005	1.79	7.5	NFC	S6	Stream does not flow into sport fish bearing waters. Falls (25 m) on Pimperl Creek prevent upstream sport fish migration.
155	39700-2910	4	93L.015	2.9	6.2	NFC	S6	Stream does not flow into sport fish bearing waters. Falls (25 m) on Pimperl Creek prevent upstream sport fish migration.
156	36400-39700	4	93L.005	7	7.5	RB	S2/S5	Falls (25 m) are a barrier to upstream sport fish migration. Sampling indicates only non sport fish are present above the falls.

Table 7. Upper Morice Stream Classification Summary

Site	ILP/WSC	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
157	1497	2	93L.015	1.21	14.5	NFC	S4*	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
158	36400-00800	2	93L.015	2.43	4.5	NFC	S3	Fish captured in upstream reach. Fish bearing based on access.
159	36400-39700	17	93L.006	2.59	4.5	WSU	S6	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.
160	39700-6230	2	93L.006	2.43	5.5	NFC	S6	Stream does not flow into sport fish bearing waters. Falls (25 m) on Pimpernel Creek prevent upstream sport fish migration.
161	36400-39700	11	93L.005	6.58	1.5	LKC, WSU	S5	Falls (25 m) in Reach 4 prevent upstream sport fish migration. Non sport fish captured.
162	1160	4	93L.015	NA	7.8	NA	NVC	No visible channel. No fish habitat present.
163	600600-38000	2	93L.015	2.6	20.5	NFC	S6	Gradient break immediately upstream of the Morice River prevents upstream fish migration to this reach.
164	1454	3	93L.014	3.05	10.5	DV	S3	Good spawning and rearing habitat. No overwintering habitat present.
165	1453	3	93L.014	3.67	11.3	DV	S3	Good rearing habitat. Spawning habitat present. No overwintering habitat.
166	1452	2	93L.014	2.8	16	NS	S3*	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
167	1469	2	93L.014	2.27	8	NFC	S3*	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
168	1467	1	93L.014	0.62	17.8	NFC	S4*/S6	Lower 100 m of this reach is fish bearing based on access. The remainder of this stream is non fish bearing based on gradient and channel characteristics.
169	1466	1	93L.014	0.51	4.5	NS	S6	Subsurface flows, braided channel, and no connectivity to fish bearing water.
170	1463	2	93L.014	NA	NA	NA	NVC	No visible channel. Vegetated gully with no evidence of surface scour.
171	1459	1	93L.014	1.35	22	NFC	S6	Gradient prevents fish access to this reach.
232	1031	2	93L.005	1.35	4.5	CT	S4	Moderate spawning and rearing habitat. No overwintering habitat.
233	1033	1	93L.005	0.57	4	CT	S4	Poor spawning and rearing habitat. No overwintering habitat.
234	1037	4	93L.005	0.61	2.5	NFC	S6	No fish access to this reach. Reach 1 has no visible channel and no connectivity to fish bearing water.
235	1068	3	93L.005	NA	48.3	NA	NVC	No visible channel. Dry gully.
236	36400-59800	2	93L.005	0.82	3.5	NFC	S4*	No permanent barriers were identified. Fish stream based on access.
237	600600-36400	28	93L.004	1	4	NS	S4*	No permanent barriers were identified. Fish stream based on access.
238	1427	6	93L.004	1.72	5.5	CT	S3	Moderate spawning and rearing habitat. Poor overwintering habitat.
239	1489	3	93E.092	10.43	5	DV	S2/S5	Cascade (30 m) prevents upstream fish migration. Sampling upstream of the cascade confirms non fish bearing status.
240	64400-28100	4	93E.093	36.1	7.5	DV	S1	Moderate spawning, rearing, and overwintering habitat.
241	64400-28100	5	93E.093	30.5	7.5	DV	S1	Moderate spawning, rearing, and overwintering habitat.
242	1489	4	93E.092	6.52	3.5	NFC	S5	Cascade (30 m) in Reach 3 prevents upstream fish migration.
243	64400-28100	11	93E.092	14.1	8	DV	S2/S5	Falls (4 m) and a cascade (3 m) prevent upstream fish migration. Sampling upstream of the falls confirms non fish bearing status.
244	64400-28100	12	93E.092	7.3	8	NFC	S5	Falls (4 m) and a cascade (3 m) in Reach 11 prevent upstream fish migration.
245	1419	5	93L.004	0.73	20.3	NFC	S6	Cascade (6 m) in Reach 3 prevents upstream fish migration.

Table 7. Upper Morice Stream Classification Summary

Site	ILP/WSC	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
246	1419	3	93L.004	3.02	8	DV	S3/S5	Cascade (6 m) prevents upstream fish migration. Sampling upstream of the cascade confirms non fish bearing status.
247	1419	4	93L.004	NA	NA	NFC	NA	Fish sampling site.
248	1422	1	93L.004	3.83	8.5	NFC	S5	Cascade (6 m) downstream prevents upstream fish migration to this reach.
249	600600-53900	1	93L.014	2.45	6.5	NFC	S6	Falls (20 m) in lower portion of this reach prevent upstream fish migration. Sampling upstream of falls confirms non fish bearing status upstream of falls.
250	64100-2380	4	93L.005	0.82	1.5	RB	S4	Poor rearing. No spawning or overwintering habitat.
251	39700-0440	2	93L.005	0.89	5	NFC	S4*	No permanent barriers identified. Fish stream based on access.
252	1085	2	93L.005	0.41	2	NS	S6	No spawning, rearing, or overwintering habitat. No connectivity to fish bearing water.
253	1169	2	93L.015	1.3	4.5	NFC	S4*	No permanent barriers identified. Fish stream based on access.
254	1169	3	93L.015	1.53	18	NS	S6	No spawning, rearing, or overwintering habitat.
255	1470	2	93L.014	0.65	26.5	NS	S6	No spawning, rearing, or overwintering habitat. Gradient prevents upstream fish migration.
256	600600-53900	1	93L.014	2.75	7	CT	S3/S5	Falls (20 m) prevent upstream fish migration. Sampling upstream of falls confirms non fish bearing status.
257	1136	2	93L.015	NA	4	NA	NVC	No visible channel. Vegetated gully. Seepage area.
258	5020-0640	5	93L.015	1.38	7	NFC	S4*	No permanent barriers to upstream fish migration were identified. Fish bearing based on access.
259	1439	2	93L.015	NA	17.5	NA	NVC	No visible channel. No evidence of surface scour or ponded water. Seepage area.
260	1443	3	93L.015	0.71	5	NS	S4*	No permanent barriers to upstream fish migration were identified. Fish bearing based on access.
261	1180	9	93L.015	1.18	3	NFC	S4*	No permanent barriers to upstream fish migration were identified. Fish stream based on access.
264	36400-26300	3	93L.015	1.38	7.5	NFC	S6	Cascade (2 m) in Reach 2 prevents upstream fish migration.
265	1146	1	93L.015	0.9	15	NFC	S6	Cascade (2 m) downstream prevents fish access to this reach.
266	36400-26300	2	93L.015	3.37	8	DV	S3/S6	Cascade (2 m) prevents upstream fish migration. Fish were captured below the cascade. Sampling upstream of the cascade confirms non fish bearing status.
267	1147	1	93L.015	1.65	21.8	NFC	S6	Gradient prevents fish from accessing this reach.
268	1446	2	93L.014	0.67	38.5	NFC	S6	Gradient prevents fish access to this reach. Dry intermittent channel.
269	41800-41700	2	93L.014	1.87	32	NFC	S6	Gradient prevents fish access to this reach. Dry intermittent channel.
270	1150	1	93L.015	0.92	20.3	NFC	S4*/S6	Lower 50 m of this reach is fish bearing based on access. Gradient prevents fish access to the remainder of the stream.
271	1158	2	93L.015	0.65	26.5	NS	S4*/S6	Lower 20 m of this reach is fish bearing based on access. The remainder of this reach is non fish bearing. High gradient prevents access.
272	1443	1	93L.014	1.23	6.5	NS	S4*	No permanent barriers to upstream fish migration were identified. Fish bearing based on access.
273	1442	1	93L.014	0.72	5.8	NS	S4*	Fish stream based on access.
274	1441	1	93L.014	NA	2.3	NA	NVC	No visible channel. No potential fish habitat. Vegetated depression.
275	1462	1	93L.014	1.03	8.5	NFC	S6	No spawning, rearing or overwintering habitat. No connectivity to fish bearing water.
276	36400-36600	1	93L.015	0.87	10	NS	S6	No spawning, rearing or overwintering habitat. No connectivity to fish bearing water.

Table 7. Upper Morice Stream Classification Summary

Site	ILP/WSC	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
277	1175	2	93L.015	0.46	6.8	NS	S6	No spawning, rearing or overwintering habitat. No connectivity to fish bearing water.
278	1176	3	93L.015	0.35	7	NS	S6	No spawning, rearing or overwintering habitat. No connectivity to fish bearing water.
279	50200-0640	1	93L.015	1.72	4.3	CT	S3	Good rearing habitat. No spawning or overwintering habitat.
301	1401	1	93E.093	1.98	1.9	DV	S3	Excellent spawning habitat. Moderate rearing habitat. No overwintering habitat.
302	64400-22700	2	93L.003	3.77	3	DV	S3	Good spawning and rearing habitat. Overwintering habitat present.
303	1406	1	93L.003	0.82	2.5	NS	S6	No spawning, rearing or overwintering habitat. No connectivity to fish bearing water.
304	1500	3	93L.003	6.58	1.3	RB, DV	S2	Excellent spawning habitat. Moderate rearing habitat. Overwintering habitat present.
305	64400-18300	4	93L.003	3.57	2.8	CO, CH, DV, RB, LSU	S3	Excellent rearing habitat. Poor spawning habitat. Overwintering habitat present.
306	95959	1	93L.003	NA	NA	NA	NVC	No visible channel. This site is part of a wetland complex and not a stream. No flows at any time. No fish habitat.
307	1276	3	93L.003	1.39	21.5	RB	S4/S6	Falls (1.9 m) prevent upstream fish migration into this reach. The portion of stream below the falls is fish bearing based on access.
308	18300-0720	2	93L.003	2.36	27.3	NFC	S6	Gradient prevents access to this reach.
309	1231	2	93L.003	1.2	11.8	NFC	S6	Gradient (42% for 60 m) prevents upstream fish migration to this reach.
310	1227	2	93L.003	NA	NA	NA	NVC	No visible channel. No potential fish habitat. Vegetated gully.
311	1220	2	93L.003	0.89	10.5	NFC	S6	No connectivity to fish bearing water. Channel fans out at the toe of the slope.
312	1217	3	93L.003	0.48	3.4	NFC	S6	No connectivity to Nanika River downstream. Ephemeral stream with a vegetated channel.
313	63200-09800	7	93L.004	NA	NA	NA	NVC	No visible channel. No potential fish habitat. Vegetated seepage.
314	11700-5110	3	93L.004	3.42	6.5	CT	S3	Fair rearing habitat. Poor spawning habitat. No overwintering habitat.
315	1011	1	93L.004	1.45	1	CAS, LSU	S4*	Non sport fish captured. Sport fish access is possible.
316	600600-63200	8	93L.004	5.38	1.3	CT, RB, CAS, MW, LSU, PL	S2	Excellent spawning and rearing habitat. Overwintering habitat present.
317	63200-29100	3	93L.004	0.96	4	NFC	S4*	No permanent barriers identified. Fish stream based on access.
318	1420	2	93L.004	2.62	13	NFC	S3*	Fish stream based on access. Gradient is low enough to allow fish access.
319	11700-5660	4	93L.004	2.38	21.25	DV	S3/S6	Above road crossing the gradient becomes too steep to allow fish passage.
320	4190-1340	1	93L.004	1.15	1.8	NFC	S4*	Fish may access this reach during high flows.
321	1007	2	93L.004	NA	NA	NA	NVC	No visible channel or evidence of surface scour. Vegetated seepage. No potential fish habitat.
322	1006	2	93L.013	NA	NA	NA	NVC	No visible channel or evidence of surface scour. Vegetated seepage. No potential fish habitat.
323	1002	1	93L.013	NA	NA	NA	NVC	No visible channel or evidence of surface scour. Vegetated seepage. No potential fish habitat.
324	1013	1	93L.004	NA	NA	NA	NVC	No visible channel or evidence of surface scour. Vegetated seepage. No potential fish habitat.
325	1485	1	93L.004	1.58	3.3	NS	S3*	Fish stream based on access.
326	62200-2180	3	93L.004	2.4	1.3	RSC	S3*	Non sport fish captured. Upstream lake may contain sport fish. Fish stream based on access.
327	1193	1	93L.004	NA	NA	NA	NVC	Stream does not exist. No potential fish habitat.

Table 7. Upper Morice Stream Classification Summary

Site	ILP/WSC	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
328	1188	1	93L.004	NA	NA	NA	NVC	No visible channel. No potential fish habitat. Vegetated gully with no evidence of surface scour.
329	1185	1	93L.004	0.86	11	NS	S4*	Fish stream based on access.
330	1478	2	93L.014	1.49	3.5	NFC	S4*	Fish stream based on access.
331	600600-57600	5	93L.014	3.89	2.5	RB	S3	Excellent spawning and rearing habitat. Overwintering habitat present.
332	1180	5	93L.014	4.01	2.8	CAS	S3*	Fish may access this reach from Collins Lake. Non sport fish captured.
333	57600-18800	3	93L.014	0.99	1.3	NS	S6	No spawning, rearing, or overwintering habitat. No access or suitable fish habitat.
334	1208	1	93L.014	0.72	3.5	NS	S6	No connectivity to fish bearing water. There is no continuous channel in the lower portion of this reach.
335	1209	4	93L.014	1.33	20.3	NS	S6	Gradient prevents fish access. Ephemeral stream.
336	57600-31800	3	93L.014	1.48	4	NSC	S4*	Non sport fish were captured within reach. Fish stream based on access.
337	1211	2	93L.014	NA	NA	NA	NVC	No visible channel or evidence of surface scour. No potential fish habitat.
338	1213	2	93L.014	0.78	1.8	NS	S6	No connectivity to fish bearing water. No spawning, rearing or overwintering habitat.
339	1213	1	93L.014	0.73	1.8	NS	S6	No connectivity to fish bearing water. No spawning, rearing or overwintering habitat.
340	66200-1840	4	93L.004	1.33	1.3	CT	S4	Fair spawning and rearing habitat. Poor overwintering habitat.
341	63200-66200	2	93L.004	5.28	1.3	CT, DV	S2	Excellent spawning habitat. Moderate rearing habitat. Overwintering habitat present.
342	66200-3100	2	93L.004	1.01	2.5	CT	S4	Poor rearing and spawning habitat. No overwintering habitat.
343	63200-66200	6	93L.004	0.89	2.5	NS	S6	Falls (8 m) in Reach 3 prevents upstream fish migration. Adequate sampling above the falls indicates this portion of stream is non fish bearing.
344	63200-75900	1	93L.004	3.61	4	CT	S3	Moderate spawning and rearing habitat. No overwintering habitat.
345	63200-75900	3	93L.004	1.45	5.5	NFC	S4*	Fish stream based on access. Culvert in Reach 1 may block upstream fish migration.
346	66200-5580	1	93L.004	1.6	1.5	NFC	S6/ NVC	Falls (8 m) downstream prevent upstream fish migration. The upper 200 m of this reach is a vegetated seepage with no definable channel.
347	1050	2	93L.004	1.4	2.1	NFC	S6	No connectivity to fish bearing water. Habitat not suitable for fish.
348	36400-88900	2	93L.004	1.44	4.8	CT	S4	Good rearing habitat. Fair spawning habitat. No overwintering habitat.
349	1054	1	93L.004	1.16	3.3	NFC	S4*	Fish stream based on access. Beaver activity downstream may have temporarily blocked access to this reach.
350	600600-36400	24	93L.004	2.82	3.5	RB, CT	S3	Excellent rearing habitat. Moderate spawning habitat. No overwintering habitat.
351	600600-63200	13	93L.004	2.14	3.5	CT	S3	Excellent spawning habitat. Moderate rearing habitat. No overwintering habitat.
392	36400-72600	6	93L.005	1.21	4.4	CT	S4/S6	400 m upstream of road crossing the gradient becomes too high (22%) to allow fish passage. Fish captured in lower portion of reach.
393	1028	2	93L.005	0.84	1.8	NFC	S6/ NVC	The lower 100 m of this reach has a definable channel although there is no connectivity to fish bearing water. The remainder of the reach can be classified as no visible channel with no potential fish habitat.
394	72600-5970	6	93L.005	1.4	2.8	CT	S4	Moderate rearing habitat. Poor spawning habitat. No overwintering habitat.
395	1039	6	93L.005	NA	1.3	NA	NVC	No visible channel. No potential fish habitat. No evidence of surface scour or fluvial substrates.

Table 7. Upper Morice Stream Classification Summary

Site	ILP/WSC	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
396	66200-5930	5	93L.004	1.49	1.8	NFC	S6	Stream does not flow into fish bearing water. Sampling above falls (8 m) in mainstem (downstream) confirms non fish bearing status.
397	63200-66200	4	93L.004	2.8	4.9	NFC	S6	Falls (8 m) in Reach 3 prevent upstream fish migration. Sampling upstream of the falls confirms non fish bearing status.
398	63200-66200	3	93L.004	3.49	4.3	CT	S3/S5	Falls (8 m) are a barrier to upstream fish migration. Fish captured below falls.
399	1405	1	93E.093	2.14	2	DV, CT	S3	Moderate spawning and rearing habitat. No overwintering habitat identified.
400	1237	3	93E.093	0.56	4.5	NFC	S6	Ephemeral stream. No spawning or overwintering habitat. Sections of subsurface flow. Isolated pools.
401	1287	1	93E.093	NA	20.5	NA	NVC	No visible channel. No potential fish habitat. Vegetated seepage. No evidence of ponding or surface scour.
402	64400-27000	2	93E.093	3.03	10.3	NFC	S5	A high gradient section (25%/100 m) immediately above the Nanika River prevents fish access to this reach.
403	64400-27800	2	93E.093	2.81	11.1	NFC	S6	High gradient section (25%/100 m) in Reach 1 prevents fish access to this reach.
404	1394	1	93E.093	1.28	11.8	NFC	S6	A high gradient section (26 %) prevents fish access to this reach.
405	1393	1	93E.093	1.68	11.3	DV	S3	Moderate rearing habitat. Poor spawning habitat. No overwintering habitat. Fish caught in lower portion of this reach.
406	1278	1	93E.093	2.62	16.5	CO	S3/S6	The lower 20 m of this stream is fish bearing. A cascade (4 m) and falls (12 m) prevent upstream fish access. Sampling above the falls confirms non fish bearing status.
407	1027	2	93L.004	1.3	5.3	NFC	S4*/S6	Cascade (2.4 m) prevents upstream fish migration. Fish bearing below the cascade based on access.
408	1500	9	93L.004	1.53	1.3	NFC	S3*	Fish stream based on access. Beaver activity in the area has caused temporary barriers to upstream fish migration. Fish were observed downstream of this reach in a beaver pond.
409	57600-31800	8	93L.014	NA	1.8	NA	NVC	No visible channel. No potential fish habitat. Rooted vegetation across depression. No connectivity to fish bearing water. No evidence of surface scour.
410	1196	1	93L.004	1.33	2.8	NFC	S4*	No barriers to upstream fish migration were identified. Fish stream based on access.
411	63200-62200	5	93L.014	2.46	2.4	NFC	S3*	No barriers to upstream fish migration were identified. Fish stream based on access.
412	63200-62200	3	93L.004	3.36	2.8	NFC	S3*	No barriers to upstream fish migration were identified. Fish stream based on access.
413	63200-62200	4	93L.004	NA	NA	NFC	NA	Fish sampling site
414	1239	1	93E.093	1.99	20.3	NFC	S3*/S6	The lower 150 m of this stream is fish bearing based on access. Above that point gradient prevents upstream fish migration.
415	1278	2	93E.093	2.62	10.5	NFC	S6	Falls (12 m) in Reach 1 prevent upstream fish migration.
416	64400-09200	1	93L.003	1.5	2.5	NFC	S3*	Fish stream based on access. No barriers to upstream fish migration were observed.
417	1217	1	93L.003	1.27	1.5	NS	S6	Habitat not suitable for fish. Ephemeral stream with no spawning habitat.
418	1000	1	93L.003	NA	2.5	NA	NVC	No visible channel. Vegetated seepage. No potential fish habitat.
419	62200-2180	5	93L.014	1.29	4.1	NFC	S4*	Fish bearing stream based on access. Fish were observed rising in downstream lake. No barriers to upstream fish migration were identified.

Table 7. Upper Morice Stream Classification Summary

Site	ILP/WSC	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
420	1484	1	93L.014	0.75	2.5	NFC	S4*	Fish stream based on access. No barriers to upstream fish migration were observed.
421	1484	2	93L.014	0.59	8	NS	S6	No connectivity to Reach 1. Poorly defined channel and subsurface flows. Habitat not suitable for fish.
422	62200-2180	2	93L.004	NA	NA	CT	NA	Fish sampling site.
423	600600-53900	2	93L.014	2.61	4.8	NFC	S6	Falls (20 m) in Reach 1 prevent upstream fish migration. Sampling above the falls confirms non fish bearing status.
424	36400-00800	7	93L.015	1.53	2.9	NFC	S3*	Fish stream based on access. Fish captured in downstream reach. No barriers to fish passage observed.
425	36400-00800	5	93L.015	1.55	1.8	CT	S3	Moderate rearing and spawning habitat. No overwintering habitat
427	1156	3	93L.015	NA	1.8	NA	NVC	No visible channel. No evidence of surface scour or potential fish habitat. Vegetated seepage.
428	1152	2	93L.015	NA	2.3	NA	NVC	No visible channel. No evidence of surface scour or potential fish habitat. Vegetated seepage.
429	1157	1	93L.015	0.51	44.5	NS	S6	Gradient is too high to allow fish access to this reach.
436	1235	2	93E.093	1.41	15	NFC	S6	Falls (1.8 m) and high gradient (30%) prevent fish access to this reach.
437	1275	1	93L.003	1.2	4	NFC	S4*	Fish stream based on access. Fish may use this stream during higher flows.
438	1277	1	93L.003	1.38	5	NFC	S6	The channel fans out in the lower portion of the reach. No connectivity to fish bearing water.
439	1228	2	93L.003	0.44	5	NS	S6	Poorly defined channel with sections of subsurface flow. No connectivity to fish bearing water. Habitat too poor to sustain fish.
440	1014	1	93L.004	1.18	1.3	NS	S4*	Fish may access this reach from McBride Lake.
441	1012	1	93L.004	0.59	1.9	NS	S4*/S6	Lower portion of reach below the road crossing can be classified as fish bearing based on access. Above the road crossing habitat is too poor to sustain fish.
442	1501	1	93L.004	0.87	3	NFC	S4*	Fish bearing based on access. Upstream lake should be sampled to confirm fish absence.
455	1475	1	93L.014	1.1	16	NS	S6/ NVC	Upper portion of reach can be classified as no visible channel. Lower portion of reach has no connectivity to the Morice River. Ephemeral stream with only 150 m of definable channel.
456	1204	1	93L.014	1.81	9.5	NFC	S3*	Fish bearing stream based on access. No barriers to fish migration were identified.
457	600600-54900	4	93L.014	1.22	5.5	NFC	S4*	Fish bearing stream based on access. Possible fish use during higher flows.
465	36400-39700	19	93L.016	NA	NA	NFC	NA	Fish sampling site.
466	36400-39700	17	93L.006	NA	NA	LKC, WSU	NA	Fish sampling site.
467	1183	1	93L.014	1.37	1.8	NFC	S4*	Culvert has blocked fish access. The remainder of this reach is fish bearing based on access.
475	36400-39700	1	93L.015	NA	NA	RB, DV, CT, PL	NA	Fish sampling site.
476	1501	2	93L.004	NA	NA	NFC	NA	Fish sampling site. Lake was sampled with 6 minnow traps.
667	1046	1	93L.005	0.75	4.5	NS	S4*/S6	The lower 30 m of this stream is fish bearing based on access. Above that point the channel deteriorates and has no connectivity to the downstream portion.
668	36400-64100	16	93L.005	1.55	1.6	RSC, CAL, LKC	S3*	Non sport fish captured. Fish bearing based on access.
669	1034	1	93L.005	1.42	0.8	LKC	S4*	Non sport fish captured. Fish bearing based on access.

Table 7. Upper Morice Stream Classification Summary

Site	ILP/WSC	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
670	1038	1	93L.005	1.2	4	CT	S4	Moderate spawning and rearing habitat. Poor overwintering habitat.
671	1037	1	93L.005	NA	4.5	NA	NVC	No visible channel. No potential fish habitat. No evidence of surface scour or connectivity to fish bearing water.
672	36400-64100	9	93L.005	3.8	1.1	CT, RSC	S3	Low spawning potential. Moderate rearing habitat. High quality overwintering habitat.
673	1039	3	93L.005	NA	1.3	NA	NVC	No visible channel. No potential fish habitat. No evidence of surface scour or connectivity to fish bearing water.
674	36400-64100	13	93L.005	2.7	3.3	RB	S3	Moderate spawning habitat. High quality rearing habitat. Poor overwintering habitat.
675	64400-18300	6	93L.003	7.31	0.3	RSC, CT, CH, LNC, CAL	S2	High quality overwintering and rearing habitat. Spawning habitat present.
676	64400-18300	10	93L.003	1.1	4	NFC	S4*	Fish stream based on access. No permanent barriers observed.
677	1269	2	93L.003	6.73	5.3	CT, DV	S2	Abundant spawning and rearing habitat. Overwintering habitat present.
678	64400-18300	9	93L.003	1.37	4	CT	S4	Good rearing and spawning habitat. Moderate overwintering habitat.
679	1268	1	93L.003	1.97	4.5	CT	S3	Moderate spawning, rearing and overwintering habitat.
680	1272	1	93L.003	0.28	13.5	NS	S6	No fish access to this reach. vegetated channel with no spawning, rearing, or overwintering habitat present.
681	1273	3	93L.003	1.32	4.5	CT	S4	Moderate spawning habitat. Good rearing potential. No overwintering habitat present.
682	1221	1	93L.003	3.25	10.5	CT	S3	Good overwintering and rearing habitat present. Moderate spawning habitat.
683	1222	1	93L.003	0.35	13.5	NFC	S6	High Gradient (32%) drop into mainstem prevents upstream fish migration. No connectivity within stream. Sections of subsurface flow and isolated pools.
684	1221	1	93L.003	2.78	4.5	NFC	S3*	A small cascade (0.8 m) may prevent upstream fish migration. Fish bearing until adequate resampling is conducted above the cascade.
685	1500	2	93L.003	NA	NA	DV, CT	NA	Fish sampling site.
687	64400-18300	11	93E.093	7.15	13.5	NFC	S5	Channel is dewatered for 200 m in the downstream portion of this reach. No fish access through this section. Sampling above the dewatered section indicates fish cannot access this reach.
688	1263	1	93E.093	3.01	18	NFC	S5	Cascades (4 m, 2 m and .6 m) along with dewatering at the stream mouth prevent fish migration upstream into this reach.
689	1264	1	93E.093	1.33	23.5	NFC	S6	Gradient prevents fish access to this reach.
690	1246	1	93E.093	1.58	4.9	DV, CT	S3	Moderate spawning and rearing habitat. No overwintering habitat.
691	18300-3800	2	93E.093	8.3	3	DV, CT	S2	High to moderate rearing habitat. Spawning and overwintering habitat present.
692	63200-09800	1	93L.003	1.66	0.6	DV	S3	No spawning or overwintering habitat. Poor rearing habitat.
693	63200-09800	3	93L.003	1.7	1	DV	S3	No spawning or overwintering habitat. Moderate rearing habitat.
699	1009	1	93L.003	2	0.9	NFC	S3*/S6	Fish bearing based on access. The channel dissipates to nothing within the top 1/3 of this reach. This section is non fish bearing based on channel characteristics and no available fish habitat.

Table 7. Upper Morice Stream Classification Summary

Site	ILP/WSC	Reach	Map Number	Width (m)	Gradient (%)	Species	Stream Class	Comments
700	64400-09200	3	93L.003	1.75	6.1	NFC	S6	Cascade (5 m) in reach 2 prevent fish access to this reach.
701	64400-09200	2	93L.003	2.17	8.3	NFC	S3*/S6	Cascade (5 m) prevents fish access to the upper portion of this reach. Fish bearing based on access below the cascade.
702	4190-1340	3	93L.003	1.02	4.8	NFC	S4*	Fish stream based on access. Potential fish use in upstream lake.
703	600600-41800	5	93L.014	NA	1.8	NA	NVC	No visible channel. No potential fish habitat. No connectivity to fish bearing water.
704	1447	2	93L.014	1.92	3.4	NFC	S3*	Fish bearing based on possible fish access through adjacent wetland during periods of high flow.
801	1479	1	93L.014	1.51	2.5	NFC	S3*	Fish stream based on access. Potential spawning habitat during high flows.
802	600600-57600	10	93L.014	1.82	5.5	NFC	S3*	Fish bearing based on access. No permanent barriers to upstream fish migration were identified.
806	600600-57600	10	93L.014	1.51	6.8	NFC	S3*/S6	Cascade (4 m) prevents upstream fish migration. Fish bearing based on access below the cascade. Non fish bearing above the cascade.
900	64400-28100	2	93E.093	NA	NA	RB, BT, MW	NA	Fish sampling site.
901	64400-28100	9	93E.092	NA	NA	DV	NA	Fish sampling site.
2340	1065	1	93L.005	1	4.5	NS	S6	No spawning, rearing, or overwintering habitat. Subsurface flows and numerous small cascades throughout reach.

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APPENDIX I

Reach Cards/Site Cards/Fish Collection Forms and Photographs

APPENDIX II

Project Overview Map

APPENDIX III

Project Maps

APPENDIX IV

Fisheries Interpretive Maps