OVERVIEW FISH AND FISH HABITAT INVENTORY

UPPER MUSKWA RIVER WATERSHED GROUP

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PROJECT REFERENCE INFORMATION

FDIS Project Number	4220
MELP Region	07
MELP District	Fort St. John
FW Management Units	7-42, 7-49, 7-50
Forest Region	Prince George
Forest District	Fort Nelson
First Nations Claim Area	Treaty 8

WATERSHED INFORMATION

Watershed Group	Upper Muskwa River
Watershed Name	Muskwa River
Watershed Code	212-580800
NTS Maps	94F/9, 10, 15, 16 94G/12, 13 94K/1, 2 94J/4
BEC Zone	BWBS, SWB, AT
Access	Helicopter

CONTRACTOR INFORMATION

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1.0 INTRODUCTION

The Muskwa River watershed is a major sub-basin of the Fort Nelson River system and drains a vast area of northeastern British Columbia, including significant portions of the east slopes of the Rocky Mountains and western edge of the Alberta plateau.

The Muskwa River drainage is divided into three watershed groups, as defined by the British Columbia Watershed Atlas. These include the Lower Muskwa River Watershed Group, the Middle Muskwa River Watershed Group and the Upper Muskwa River Watershed group.

The Middle and Upper Muskwa River Watershed Groups lie almost entirely within the Muskwa-Kechika Management Area (M-KMA), a block of land given special management status due to its extremely high wildlife, wilderness and recreational values.

During the past several years, information on fisheries habitat and fish distribution was collected within the Middle Muskwa River Watershed Group, which encompasses the Tetsa, Chischa and Tuchodi River drainages. This included data collected during an overview inventory by BC Environment (MELP 1998), and an assessment of potential conflicts between riverboats and bull trout *(Salvelinus confluentus)* on the Tuchodi River, funded by BC Parks in 2000 (DES 2000).

In contrast, little fisheries information was available for the Upper Muskwa River Watershed Group. While lake surveys had been completed for Fern, Kluachesi and "Grizzly" Lakes (MELP 1993, MELP 1984, MELP 1999) no information had been collected for riverine habitats and fluvial fish populations. The absence of fluvial fisheries information within this watershed group was a serious impediment to the management and protection of local fish populations. Limited anecdotal information suggested that regionally important sub-populations of migratory bull trout might be present but no data on population status or critical habitats was available. Bull trout are blue-listed (i.e., vulnerable) in British Columbia and are of special management concern throughout their North American range.

Overview (1:50,000) Fish and Fish Habitat Inventory (Overview Inventory) is a useful and cost-effective method of gathering general baseline fisheries data over large areas while simultaneously identifying critical habitats for management and protection. In August and September 2001, Diversified Environmental Services completed an Overview Inventory of the Upper Muskwa River Watershed Group, hereafter referred to as the Upper Muskwa project area (Fig. 1).

2.0 PROJECT AREA

The Muskwa River originates in the Rocky Mountains of northeastern British Columbia, approximately 170 km southwest of Fort Nelson. The river flows eastward through the Eastern Muskwa Ranges and Muskwa Foothills ecosections, then swings north along the Muskwa Plateau ecosection, before joining the Fort Nelson River within the Fort Nelson Lowlands ecosection. The project area consists of the Upper Muskwa

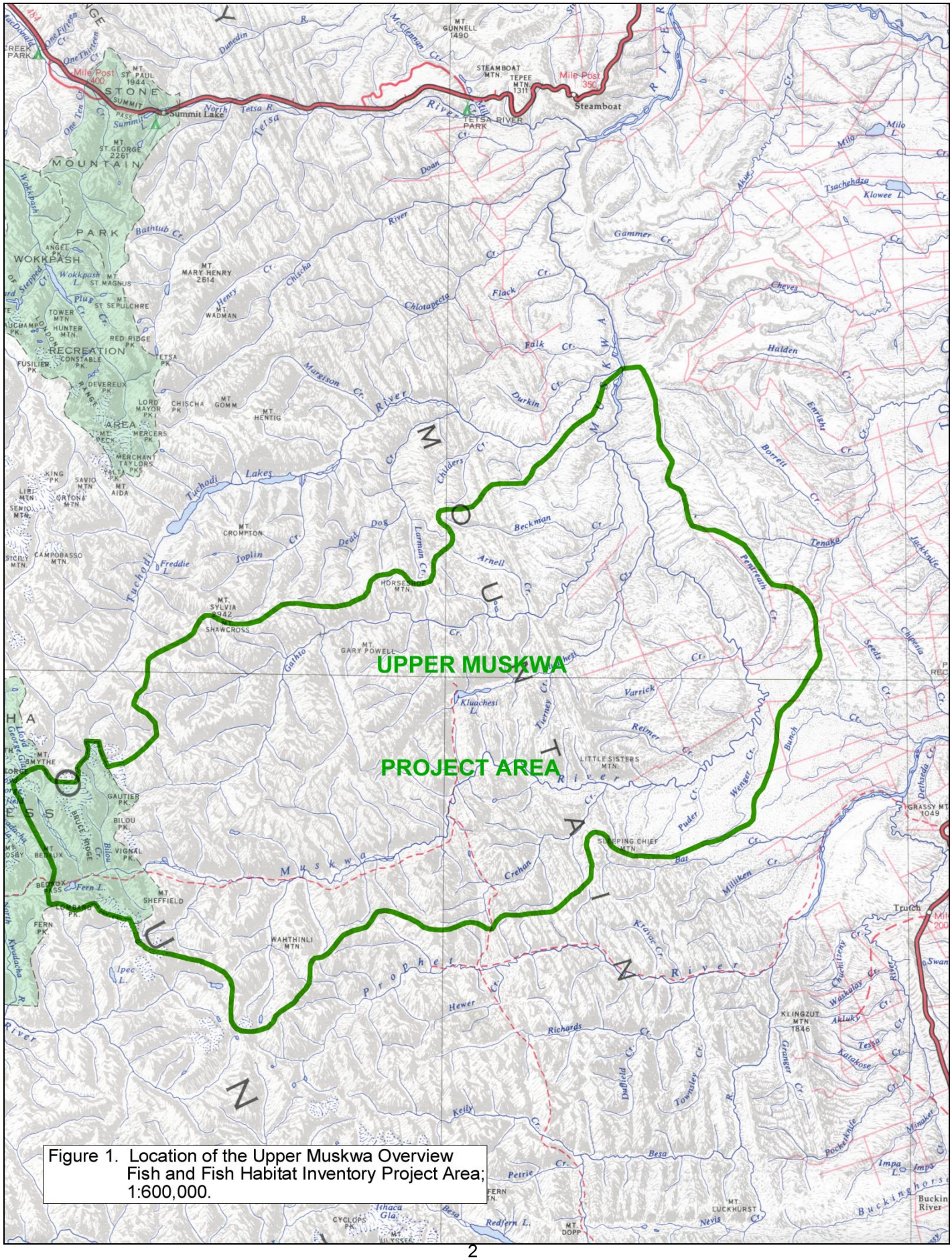

Figure 1. Location of the Upper Muskwa Overview Fish and Fish Habitat Inventory Project Area; 1:600,000.

Watershed Group, as defined by the British Columbia Watershed Atlas, and spans the upper three of these four ecosections.

The project area includes all portions of the Muskwa River drainage lying upstream of the confluence with the Tuchodi River and accounts for the upper 155 km of the 290 km Muskwa River mainstem. Significant sub-basins within the project area include Gathto Creek, Kluachesi Creek and Crehan Creek.

Rugged mountains with significant expanses of rock and ice dominate the western portion of the area. The topography becomes much less severe to the east where terrestrial habitats are dominated by forested ridges, subalpine parkland and vegetated alpine. Early seral vegetative communities, resulting from prescribed fire, are common on south-facing slopes along river valleys. The project area is represented by portions of the Alpine Tundra (AT), Spruce-Willow-Birch (SWB), and Boreal White and Black Spruce (BWBS) biogeoclimatic zones.

The project area lies almost entirely within the M-KMA, the only exception being a narrow strip of land along the east side of the Muskwa mainstem. The western three quarters of the project area is encompassed by Northern Rockies Provincial Park (NRPP) and Kwadacha Wilderness Park. The strip of land between the eastern park boundary and the east M-KMA boundary forms part of the Muskwa oil and gas pre-tenure planning area.

Although the eastern edge of the project area is accessible by winter road, the majority of the watershed can only be reached by aircraft and horseback. Riverboats provide seasonal access along the Muskwa River mainstem and lower Gathto Creek, subject to flow conditions.

Recreation is the primary land use and currently accounts for virtually all human activity. Commercial activities are associated with recreational use by both residents and non-residents, and include guide-outfitting, packing and wilderness accommodations. With the exception of limited past seismic exploration there is currently no industrial land use.

3.0 METHODS

Historical fisheries information, including existing fish sampling data, anecdotal information and local knowledge, was reviewed prior to the commencement of fieldwork. Existing information was limited to sampling data collected from Fern Lake, Kluachesi Lake and “Grizzly Lake” during lake surveys conducted by BC Environment and information supplied by past and present guide/outfitters.

During the pre-field planning phase, 39 stream sample sites were initially selected within the project area using site selection guidelines detailed in *Overview Fish and Fish Habitat Inventory Methodology (RIC 1999)*. Minor modifications were made to the sampling regime to account for fish distribution patterns unique to the region, anticipated species composition, and seasonal flow patterns. It was expected that a number of sample sites would be shifted or deleted and others added during the course of the fieldwork, as migration obstructions and habitat use patterns were identified and flow-dependent seasonal access limitations were noted. Site locations were adjusted in the field to maximize the efficiency of sampling effort and increase the amount of fish

distribution data collected. Final site selection was also dependent on the availability of suitable helicopter landing sites.

All access within the project area was by Bell 206B helicopter. Flight paths were generally low-level along stream channels or high-altitude over surrounding terrain, with specific avoidance of the activities of guide-outfitters, resident hunters and wildlife.

A standard Resources Inventory Committee (RIC) site card was completed at each stream sample site, in accordance with *Reconnaissance 1:20,000 Fish and Fish Habitat Inventory: Standards and Procedures (RIC 1998, Errata March 1999).* Photographs of representative habitat and channel features were taken at each sample site, including upstream and downstream ground perspectives and aerial views. Representatives of sport-fish species were also photographed. In addition to photographic records of individual sample sites, aerial basin-view photographs were taken of many unsampled reaches and tributaries drainages. Significant barriers to fish migration were also photographed.

A fish species inventory was undertaken at each sample site using a Coffelt Mark X gas-generator, backpack electro-fisher. All electro-fishing was conducted using pulse frequency settings of 60 hertz. Output voltages of 250 to 300 volts were normally used, with adjustments made for water depth, conductivity, and length of fish being sampled. Juvenile rearing habitat was sampled during single-pass electro-fishing within each site. Angling with spoons, spinners, and roe was conducted in habitat likely to hold adult salmonids, including deep pools associated with bedrock confinement or large woody debris (LWD). Sample sites ranged in length from 100 m to 300 m.

To reduce handling stress, fish were anaesthetized in a 40 mg/l clove oil solution (0.3 ml clove oil dissolved in 1.0 ml ethanol, then dissolved in 8 litres of water). All fish were revived before release back into the stream.

Sampling specifications, species, and fork length for all fish captured were recorded on RIC Fish Collection Forms and Individual Fish Data Forms (RIC 1999). Scale samples were taken from representatives of all age classes of Arctic grayling (*Thymallus arcticus)*, mountain whitefish (*Prosopium williamsoni*), and bull trout (*Salvelinus confluentus*). Scale samples were placed in scale envelopes and later mounted between glass slides and read on a Micron 780 microfiche reader. A pelvic fin ray was collected from all mature bull trout, mounted, and aged by North-South Consulting Inc., Winnipeg, MB.

No lakes were sampled, no water samples were collected from any streams, and no voucher specimens were collected during this inventory.

A list of sampling equipment used during field surveys appears in Table 1.

Table 1. List of field equipment used during the Upper Muskwa Overview Inventory.

Equipment	Parameter	Make and Model
Electro-fisher	fish species present	Coffelt Mark X
Abney Level	site gradient	Can-measure 5X
Meter Sticks	channel and wetted width, impasse height, pool depth	2-metre folding
Thermometer	water temperature	Fisher alcohol
Range Finders	channel and wetted width	Ranging 120, Ranging 620
Hip Chain	site length	Chainman II
Camera	photodocumentation	Pentax ME SLR w/50mm Canon SureShot A1 w/32mm
GPS Receiver	field site-referencing	Garmin GPS II PLUS

4.0 RESULTS

Field assessments of 39 stream sample sites were completed between July 23 and August 27, 2001.

4.1 Logistics

All site access was by Bell 206B helicopter and all sample site assessments were completed by the same two-person field crew. All field operations within the project area were staged from Muskwa Safari's base camp on the Muskwa River at Sleeping Chief Mountain. No logistical problems relating to access, weather, or timing were encountered during the course of the field program. Discharge rates in some streams were higher than seasonal averages due to a significant storm event that occurred in mid-July; overall fish distribution did not appear to be affected.

4.2 Habitat and Fish Distribution

Thirty-nine stream sample sites were established and evaluated in the field. These sites were distributed uniformly throughout the project area, which included all portions of the Muskwa River watershed upstream of the confluence with the Tuchodi River.

The transition between the Northern Boreal Mountains ecoprovince and the Taiga Plains ecoprovince forms a north-south line through the eastern third of the project area which roughly corresponds to the east boundary of Northern Rockies Provincial Park. Although channel morphology and water quality vary widely on each side of this transition, fluvial aquatic habitats are generally characterized by moderate-gradient, riffle/pool configurations, with coarse granular substrates.

The Muskwa River mainstem originates on the Lloyd George Icefield to the north of Fern Lake. Both the upper mainstem reach (Plate 1) and the adjacent Bilou Creek drainage exhibit extreme turbidity during periods of glacial melt, due to sediment inputs. This glacial turbidity appears to affect the entire Muskwa mainstem within the project area for most of the summer period, with occasional improvements in water clarity during periods of dry, cool weather. The extreme headwaters of the Gathto Creek mainstem flow from the same glacier complex. However, the volume of glacial meltwater contributing

Plate 1: Glacially turbid upper reach of the Muskwa River mainstem; upstream aerial view (note the toe of Lloyd George glacier in the distance).

to the Gathto Creek drainage appears proportionately smaller than in the upper Muskwa mainstem and the effects on water quality in lower Gathto Creek appear limited to occasional suspended sediment spikes during summer storm events and periods of hot weather.

The majority of other Muskwa River tributary drainages, within the mountainous section of the project area, appear to be largely groundwater-fed and have correspondingly low suspended sediment levels and high water clarity. As a result, typical tributary confluences within this portion of the project area are characterized by the relatively clear discharge from tributaries entering the turbid water of the Muskwa mainstem (Plate 2). Habitat in these tributaries is typified by moderate to high-gradient, riffle/pool configurations, dominated by cobble and boulder substrates with a low proportion of fines. Boulder cover and bedrock controlled pools and runs comprise the majority of rearing and refuge cover, with large woody debris accounting for a relatively small component.

Tributary habitats on the Taiga Plains portion of the project area are typically characterized by much lower gradients and gravel/cobble substrates with a high proportion of fines. Turbidity levels are generally higher than in the west due to suspended sediment resulting from natural instability and erodibility of streambed and streambank materials and from tannic coloration. The majority of rearing cover is associated with small and large woody debris; boulder pockets also provide rearing cover on some reaches.

Plate 2: Typical tributary confluence on the upper Muskwa River mainstem; upstream aerial view at unnamed tributary 212-580800-77600.

Barriers to fish movement are common, particularly in the more mountainous, western parts of the project area, and preclude fish use of significant portions of several drainages. The most notable of these are upper Gathto Creek and the upper Muskwa River.

A 3-metre barrier, located on the Muskwa mainstem just upstream of a tributary locally referred to as “Southfork Creek” (WSC 212-580800-86800), appears to prevent all fish movement into the upper 40 km of mainstem. Five additional mainstem barriers, ranging in height from 2 m to 20 m, occur upstream of this lower impasse (Plate 3). In addition, access to almost all tributary habitats upstream of the confluence with Crehan Creek is restricted by impassable barriers along the sides of the Muskwa River valley.

An impassable chute and bedrock constriction on the Gathto Creek mainstem prevents fish use of the upper 40% of the drainage and access to three of Gathto Creek’s four largest tributaries is restricted by barriers.

A summary of all barriers to fish movement documented within the project area appears in Table 2.

Bull trout, Arctic grayling and mountain whitefish were the only sport-fish species captured in fluvial habitats within the project area. These species appear to be widely distributed at varying densities. Bull trout generally exhibit the most “upstream” distribution pattern of the three sport-fish species encountered, and were commonly found in cooler and clearer waters of the upper two-thirds of the project area.

Plate 3: Third in a series of five barriers on the upper Muskwa River mainstem; upstream aerial view immediately downstream of the boundary between NRPP and Kwadacha Wilderness Park.

Prior to the commencement of the survey, local and anecdotal information suggested that Crehan Creek and Gathto Creek might support spawning runs of fluvial, migratory bull trout. This suspicion was confirmed in both cases by the presence of spawning adult fish and young-of-the-year (YOY) and yearling juveniles.

Arctic grayling distribution within the project area closely follows patterns found in other mountain and foothills systems within northeastern British Columbia, including the Prophet, Halfway and Sukunka River drainages. Almost all juvenile grayling encountered were captured in the warmer, more turbid, lower-gradient tributary habitats of the Taiga Plains while older sub-adult and adult fish were found upstream in the cooler and clearer tributary habitats to the west. In May, mature Arctic grayling typically move into tributary spawning habitats in the lower portions of foothills systems, not far from their mainstem over-wintering habitat. After spawning, they generally migrate upstream to summer in cooler, less turbid mountain-fed mainstem and tributary habitats. High quality adult summer habitat within the project area appears limited by glacial turbidity in the upper Muskwa mainstem and barriers to seasonal access on most suitable tributaries.

Mountain whitefish appear to be the most abundant and widely distributed fish species within the project area, using almost all seasonally accessible portions of the project area for adult summer habitat, spawning and juvenile rearing. Young-of-the-year

Table 2. Summary of barriers to fish movement within the Upper Muskwa Overview Inventory project area.

Stream Name	Watershed Code	NTS Map	Type	Height	UTM East	UTM North	Image #	Comments
Muskwa River	212-580800	94F/16	F	3m	418172	6402120	179	Lowermost mainstem barrier; limit of upstream fish movement.
Muskwa River	212-580800	94F/16	F	2m	411094	6403212	176	Upstream of lowermost mainstem impasse.
Muskwa River	212-580800	94F/15	F	2m	402342	6404638	173	Upstream of lowermost mainstem impasse.
Muskwa River	212-580800	94F/15	F	10m	402330	6404609	173	Upstream of lowermost mainstem impasse.
Muskwa River	212-580800	94F/15	F	2m	401717	6403962	172	Upstream of lowermost mainstem impasse.
Muskwa River	212-580800	94F/15	F	20m	397345	6404123	219	Upstream of lowermost mainstem impasse.
Muskwa River	212-580800	94F/15	F	20m	394695	6403256	-	Upstream of lowermost mainstem impasse.
Muskwa River	212-580800	94F/15	F	20m	393498	6402596	166	Series of impassable barriers at outlet to Fern Lake.
Gathto Creek	212-580800-44400	94J/04	BC	-	446060	6437571	211	Bedrock confinement; possible partial barrier smaller fish; BT and adult GR and MW captured upstream.
Gathto Creek	212-580800-44400	94K/01	CH CN	4m	423784	6433892	190 191	Impassable chute at top of bedrock canyon; upstream limit of fish distribution on Gathto Creek.
Gathto Creek	212-580800-44400	94F/16	F	4m	419786	6428789	198	Barrier on non fish-bearing reach (upstream of lower mainstem impasse)
Gathto Creek	212-580800-44400	94F/16	F	4m	419805	6428834	198	Barrier on non fish-bearing reach (upstream of lower mainstem impasse)
Gathto Creek	212-580800-44400	94F/16	F	2m	417659	6421806	195	Barrier on non fish-bearing reach (upstream of lower mainstem impasse)
Gathto Creek	212-580800-44400	94F/16	F	2m	417663	6421783	195	Barrier on non fish-bearing reach (upstream of lower mainstem impasse)
Trib to Gathto Creek	212-580800-44400-30900	94J/04	F	20m	451343	6433898	210	Impassable barrier; upper limit of potential fish distribution.
Arnell Creek	212-580800-44400-31200	94J/04	F	1.5m	451117	6439537	32	Likely limits upstream movement of GR and MW; higher impasse upstream.
Trib to Gathto Creek	212-580800-44400-37500	94J/04	F	4m	446006	6438696	209	Impassable barrier; upper limit of potential fish distribution.
Trib to Gathto Creek	212-580800-44400-39400	94J/04	F	2.5m	444813	6435149	208	Impassable barrier; upper limit of potential fish distribution.
Trib to Gathto Creek	212-580800-44400-39400	94J/04	F	2.5m	444816	6435112	208	50m upstream of lower impassable barrier.
Trib to Gathto Creek	212-580800-44400-45200	94F/16	F	35m	434851	6423978	207	Impassable barrier; upper limit of potential fish distribution.
Trib to Gathto Creek Trib	-44400-5200-5210	94F/16	F	3m	435391	6426886	203	Impassable barrier; upper limit of potential fish distribution.
Trib to Gathto Creek	212-580800-44400-47200	94K/01	F	4m	436749	6435633	202	Impassable barrier; upper limit of potential fish distribution.

F=falls; C=cascade; BC=bedrock confinement; CH=chute; CN=canyon

Table 2 cont. Summary of barriers to fish movement within the Upper Muskwa Overview Inventory project area.

Stream Name	Watershed Code	NTS Map	Type	Height	UTM East	UTM North	Image #	Comments
Trib to Gathto Creek	212-580800-44400-60500	94K/01	F	35m	425337	6433096	201	Impassable barrier upstream of Site 11; upper limit of fish distribution.
Trib to Gathto Creek	212-580800-44400-66700	94K/01	F	5m	419423	6432062	199	Impassable barrier on non fish-bearing reach (upstream of lower mainstem impasse).
Trib to Gathto Creek	212-580800-44400-66700	94K/01	F	4m	419065	6431827	200	Impassable barrier on non fish-bearing reach (upstream of lower mainstem impasse)
Trib to Gathto Creek	212-580800-44400-66700	94K/01	F	4m	419163	6431896	200	Impassable barrier on non fish-bearing reach (upstream of lower mainstem impasse).
Trib to Gathto Creek	212-580800-44400-66700	94K/01	F	10m	419009	6431816	200	Impassable barrier on non fish-bearing reach (upstream of lower mainstem impasse).
Trib to Gathto Creek	212-580800-44400-75800	94F/16	F	4m	417459	6422970	192	Impassable barrier on non fish-bearing reach (upstream of lower mainstem impasse).
Trib to Crehan Creek Trib	212-580800-71000-77600	94F/09	F	20m	444756	6397258	215	Impassable barrier; upper limit of potential fish distribution.
Trib to Muskwa River	212-580800-73100	94G/13	F	20m	451414	6415319	214	Lowermost impasse on outlet of “Grizzly” Lake; limit of upstream fish movement; lake-resident GR upstream.
Trib to Muskwa River	212-580800-73100	94G/13	F	10m	451404	6435112	214	Upstream of lower impasse on outlet of “Grizzly” Lake; lake-resident GR upstream.
Trib to Muskwa River	212-580800-73100	94G/13	F	20m	451428	6415322	214	Upstream of lower impasse on outlet of “Grizzly” Lake; lake-resident GR upstream.
Trib to Muskwa River	212-580800-77600	94F/16	F	20m	440493	6413652	213	Impassable barrier upstream of Site 33; upper limit of fish distribution.
Trib to Muskwa River	212-580800-77600	94F/16	F	60m	440454	6413645	-	Impassable barrier on non fish-bearing reach (upstream of lower impasse).
Trib to Muskwa River	212-580800-80100	94F/16	F/C	100m	439634	6408983	188	Impassable barrier on lower reach; upper limit of potential fish distribution.
Trib to Muskwa River	212-580800-82100	94F/16	F	70m	434594	6405269	187	Impassable barrier on lower reach; upper limit of potential fish distribution.
Trib to Muskwa River	212-580800-83400	94F/16	F	10m	430074	6403922	185	Impassable barrier on lower reach; upper limit of potential fish distribution.
Trib to Muskwa River	212-580800-83400	94F/16	F	4m	430112	6404063	185	Immediately upstream of lower impassable barrier
Trib to Muskwa River	212-580800-83500	94F/16	CH	1-2m	428484	6406981	182	Chutes through large rubble; may be passable to adult bull trout but little spawning potential upstream.
Trib to Muskwa River	212-580800-83500	94F/16	CH	1-2m	428340	6407315	183	Chutes through large rubble; may be passable to adult bull trout but little spawning potential upstream.
Trib to Muskwa River	212-580800-83500	94F/16	F	4m	427107	6409768	184	Impassable barrier upstream of Site 35; upper limit of potential fish distribution.
Trib to Muskwa River	212-580800-84300	94F/16	F	-	425817	6404888	-	Impassable barrier on small tributary with marginal fisheries potential.

Table 2 cont. Summary of barriers to fish movement within the Upper Muskwa Overview Inventory project area.

Stream Name	Watershed Code	NTS Map	Type	Height	UTM East	UTM North	Image #	Comments
Trib to Muskwa River	212-580800-86300	94F/16	F	4m	422769	6403003	149	Impassable barrier upstream of Site 36; upper limit of fish distribution.
Trib to Muskwa River	212-580800-86500	94F/16	F	20m	421890	6403689	180	Impassable barrier on lower reach; upper limit of potential fish distribution.
Trib to Muskwa River	212-580800-86800	94F/16	F	3m	420127	6401972	155	Impassable barrier upstream of Site 37; upper limit of fish distribution.
Trib to Muskwa River	212-580800-86800	94F/16	F	10m	420131	6401829	155	100m upstream of lower impassable barrier.
Trib to Muskwa River	212-580800-88500	94F/16	F	15m	415694	6402124	177	Impassable barrier; upstream of lowermost Muskwa mainstem impasse.
Trib to Muskwa River	212-580800-88800	94F/16	F	-	414858	6404072	-	Impassable barrier; upstream of lowermost Muskwa mainstem impasse.
Trib to Muskwa River	212-580800-89000	94F/16	F	-	414107	6403688	-	Impassable barrier; upstream of lowermost Muskwa mainstem impasse.
Trib to Muskwa River	212-580800-89800	94F/16	F	-	411793	6402426	-	Impassable barrier; upstream of lowermost Muskwa mainstem impasse.
Trib to Muskwa River	212-580800-90400	94F/15	F	30m	409757	6402514	-	Impassable barrier; upstream of lowermost Muskwa mainstem impasse.
Trib to Muskwa River	212-580800-90400	94F/15	F	50m	409750	6402479	-	Impassable barrier on non fish-bearing reach.
Trib to Muskwa River	212-580800-91600	94F/15	F	-	405623	6406555	-	One in series of impassable barriers; upstream of lowermost Muskwa mainstem impasse.
Trib to Muskwa River	212-580800-91600	94F/15	F	80m	405612	6406600	174 175	One in series of impassable barriers; upstream of lowermost Muskwa mainstem impasse.
Trib to Muskwa River	212-580800-91600	94F/15	F	-	405642	6406684	-	One in series of impassable barriers; upstream of lowermost Muskwa mainstem impasse.
Trib to Muskwa River	212-580800-91600	94F/15	F	-	405287	6407264	-	One in series of impassable barriers; upstream of lowermost Muskwa mainstem impasse.
Trib to Muskwa River	212-580800-94200	94F/15	F	3m	398712	6403728	170	Part of a series of impassable barriers upstream of Site 39.
Trib to Muskwa River	212-580800-94200	94F/15	F	5m	398693	6403783	170	Part of a series of impassable barriers upstream of Site 39.
Trib to Muskwa River	212-580800-94300	94F/15	F	-	398439	6404757	-	Impassable barrier on minor tributary with marginal habitat potential.
Bilou Creek	212-580800-94500	94F/15	F	3m	397410	6404564	169	Part of a series of impassable barriers on lower reach.
Trib to Muskwa River	212-580800-95200	94F/15	F	-	395354	6403386	-	Impassable barrier on minor tributary with marginal habitat potential.

whitefish were captured in both the upper Muskwa River and Gathto Creek indicating successful mainstem spawning. Juvenile and adult whitefish were found throughout a wide variety of mainstem and tributary habitats throughout the project area.

Three lake surveys, conducted prior to the current overview assessment, identified two additional sport-fish species that may exist only as lake-resident populations. Burbot (*Lota lota*) were captured in Kluachesi Lake during sampling by BC Environment in 1984 (MELP 1984) and rainbow trout *(Oncorhynchus mykiss)* have been recorded in Fern Lake and "Grizzly" Lake (MELP 1983, MELP 1999).

Rainbow trout are not native to the Fort Nelson River system and were initially introduced to Fern Lake during an unofficial transplant in 1966, the lake is believed to have been barren prior to this. Since then, seven additional stockings have been conducted by BC Environment (Woods 2001). The population appears to have remained entirely lake-resident and spawns in a 30-metre section of stream at the outlet of the lake, immediately upstream of a series of major impasses which descend into the upper Muskwa River mainstem (J. Burrows, pers. com.) (Plate 4).

Plate 4: Impassable barriers between the outlet of Fern Lake and the upper Muskwa River mainstem; aerial view upstream to Fern Lake.

Rainbow trout were also unofficially introduced to "Grizzly" Lake in 1964 and 1972, and although are reported to have thrived for a period of several years (Woods 2001), appear absent now (MELP 1999). Arctic grayling were the only species sampled in "Grizzly" Lake during a lake survey conducted in 1999 (MELP 1999). This lake-resident population is reported to have descended from three fish transported by horseback from Crehan Creek in 1960 (Woods 2001).

Slimy sculpin (*Cottus cognatus*) were the most widely distributed non-sport species in the project area and were often found in association with one or more spot-fish species. Additional non-sport species were sampled only in the lower portion of the project area and include longnose sucker (*Catostomus catostomus*), lake chub (*Couesius plumbeus*), and longnose dace (*Rhinichthys cataractae*).

A summary of fish sampling results for the 39 stream sample sites appears in Table 3. Site data cards, individual fish data, and site photographs appear in Appendices I through XXXIX. A complete index of all photodumentation recorded during the current survey is included in Appendix XL. Project maps (1:95,000 scale) summarizing sample site location, barriers, historical sampling data and fish distribution are included in Appendix XLI. A brief description of fish distribution and general habitat values for each of the major sub-drainages within the project area is presented below.

4.2.1 Upper Muskwa Mainstem

For the purposes of this assessment, the "upper Muskwa mainstem" refers to that portion of the Muskwa River drainage lying upstream of the mouth of Crehan Creek. This portion of the watershed falls within the Northern Boreal Mountains ecoprovince, and is generally confined within a steep-sided valley. Constraints on fisheries potential include glacial turbidity in the mainstem and migrational impasses on both the mainstem and the majority of tributaries.

No fish were captured or observed during electro-fishing in one mainstem and two tributary sample sites located upstream of the lower mainstem barrier. This 3 m barrier is the lowermost in a series of impassable waterfalls and prevents fish access to the upper 40 km of mainstem. Although the presence of an isolated upstream-resident bull trout population is unlikely, due to low habitat suitability and complexity, it is possible that naturalized rainbow trout from the introduced Fern Lake population may exist at low densities.

Impassable waterfalls along the Muskwa River valley walls restrict access to all but the lower several hundred metres of most tributaries having seasonal habitat potential (Plate 5).

Mountain whitefish were the most common fish species encountered, with a range of age classes represented. The presence of yearling juveniles suggests some mainstem spawning activity.

Arctic grayling use appears to be limited to over-summering of adults; habitat suitability is restricted by reduced feeding efficiency related to glacial turbidity. Both mountain whitefish and Arctic grayling adults likely emigrate from the upper drainage by mid-November to over-winter in mainstem habitats downstream.

No suitable bull trout spawning habitat was noted in the upper drainage and bull trout presence appears limited to sporadic seasonal use by post-yearling sub-adults.

Table 3. Summary of fish sampling results from 39 stream sample sites in the Upper Muskwa Overview Inventory project area.

Stream Name	Site #	Fish Species	Comments
Muskwa River	1	MW CCG	BT and GR also assumed present
Muskwa River	2	NFC	No access from downstream; upstream of mainstem barriers
Gathto Creek	3	BT GR MW CCG	Downstream of first bedrock confinement
Gathto Creek	4	BT MW	6 km downstream of lower mainstem impasse; high densities of YOY and yearling BT; YOY and yearling MW also present.
Gathto Creek	5	NFC	Non fish-bearing; upstream of lowermost mainstem impasse
Beckman Creek	6	GR MW CCG	Suitability for BT limited; GR and MW rearing habitat
Beckman Creek	7	MW	Suitability for BT limited; GR and MW rearing habitat
Arnell Creek	8	GR MW	Summer habitat for GR and MW; possible limited seasonal use by juvenile BT; upstream fish movement restricted by barriers
Trib to Gathto Creek	9	BT GR	Adult and yearling BT and adult GR present at low densities
Trib to Gathto Creek	10	NFC	Juvenile BT assumed seasonally present at low densities
Trib to Gathto Creek	11	BT	Juvenile BT moderately abundant; GR and MW also assumed present; impassable barrier upstream
Trib to Gathto Creek	12	NFC	Non fish-bearing; upstream of lowermost mainstem impasse
Trib to Gathto Creek	13	NFC	Non fish-bearing; upstream of lowermost mainstem impasse
Trib to Gathto Creek	14	NFC	Non fish-bearing; upstream of lowermost mainstem impasse
Kluachesi Creek	15	GR MW CCG	Moderate rearing potential for GR and MW; BT also assumed present but suitability limited
Kluachesi Creek	16	BT GR MW CCG	Moderate rearing potential for GR and MW; suitability for BT limited
Trib to Kluachesi Cr	17	GR	Good seasonal rearing for GR and MW; low suitability for BT
Tierney Creek	18	GR MW CCG	Good seasonal rearing for GR and MW; low suitability for BT
Tierney Creek	19	GR MW	Moderate seasonal rearing for GR and MW; low suitability for BT
Varrick Creek	20	GR LSU CCG	Moderate seasonal rearing for GR and MW; low suitability for BT
Varrick Creek	21	GR MW CCG LNC	Good seasonal rearing for GR and MW; low suitability for BT
Trib to Varrick Creek	22	GR MW	Good seasonal rearing for GR and MW; low suitability for BT
Trib to Muskwa River	23	GR MW CCG	Moderate seasonal rearing for GR and MW; low suitability for BT
Wenger Creek	24	GR LKC LNC CCG	Moderate seasonal rearing for GR and MW; low suitability for BT
Wenger Creek	25	CCG	GR MW assumed seasonally present
Trib to Muskwa River	26	GR MW CCG	Moderate seasonal rearing for GR and MW; low suitability for BT
Reimer Creek	27	GR MW CCG	Good seasonal rearing for GR and MW; low suitability for BT
Puder Creek	28	GR MW	Good seasonal rearing for GR and MW; low suitability for BT
Crehan Creek	29	BT MW CCG	Moderate to high quality seasonal habitat for BT MW and GR
Trib to Crehan Creek	30	BT MW GR	Critical BT spawning habitat
Trib to Crehan Creek	31	BT GR	Moderate seasonal rearing for juvenile BT
Trib to Crehan Creek	32	GR MW	Low gradient meandering reach downstream may limit BT use
Trib to Muskwa River	33	MW GR	BT also assumed seasonally present
Trib to Muskwa River	34	BT MW	Adult GR also assumed seasonally present
Trib to Muskwa River	35	NFC	Chutes downstream; may be accessible to sub-adult BT
Trib to Muskwa River	36	MW CCG	Moderate seasonal habitat for MW GR BT; impasse upstream
Trib to Muskwa River	37	MW GR CCG	Moderate seasonal habitat for MW GR BT; impasse upstream
Trib to Muskwa River	38	NFC	No access from downstream; upstream of mainstem barriers
Trib to Muskwa River	39	NFC	No access from downstream; upstream of mainstem barriers

BT=bull trout MW=mountain whitefish GR=Arctic grayling CCG=slimy sculpin LKC=lake chub LNC=longnose dace
LSU=longnose sucker NFC=no fish caught

Plate 5: Impassable barrier limiting fish access to upper “Southfork Creek” (212-580800-86800); aerial view immediately upstream of site 37.

4.2.2 Gathto Creek

Gathto Creek is the largest Muskwa River tributary surveyed; the drainage comprises approximately one third of the project area. The mainstem is approximately 100 km in length and spans three biophysical areas, representing mountains, foothills and plains. All three sport-fish species present in the project area were captured in Gathto Creek.

A 4-metre chute at the head of a narrow bedrock confinement, 65 km upstream from the mouth, defines the limit of fish distribution on the mainstem (Plate 6). Four additional mainstem barriers, between 2 m and 4 m in height, occur upstream of this impasse. Four mainstem and tributary sites were sampled upstream of the lower impasse. No evidence was found suggest the presence of an isolated upstream-resident population, despite the presence of suitable habitat.

Bull trout, Arctic grayling and mountain whitefish are present along the length of the accessible portion of the Gathto mainstem. Tributaries to the lower mainstem, including Beckman Creek and the lower portion of Arnell Creek (below impasse) provide seasonal rearing habitat for juvenile Arctic grayling and mountain whitefish as well as summer feeding habitat for adults and sub-adults. A bedrock constriction on the Gathto mainstem, located 6.5 km upstream of Arnell Creek, may pose a velocity barrier to some species and age classes at moderate to high flow stages (Plate 7). No slimy sculpin were sampled upstream; juvenile bull trout and mountain whitefish present above this feature are assumed to be the result of upstream spawning activity.

Plate 6: Impassable barrier defining the upstream limit of fish distribution on Gathto Creek; upstream aerial view.

Plate 7: Bedrock constriction on middle Gathto Creek mainstem 6.5 km upstream of the mouth of Arnell Creek; upstream aerial view.

Only adult Arctic grayling were captured in the middle Gathto mainstem, supporting the contention that most grayling spawning takes place in lower tributaries before adults move upstream for the summer. All age classes of mountain whitefish, including YOY and yearlings, were sampled between the lower constriction and the lower impassable barrier (site 4), indicating mainstem spawning prior to fall emigration.

On July 24, 2001, high densities of YOY and yearling bull trout were sampled 6 km downstream of the lower impasse (site 4), confirming anecdotal information suggesting that Gathto Creek provides critical spawning habitat for a migratory Muskwa River sub-population. On August 27, 2001, spawning adults and active redds were enumerated on a side channel upstream of site 4, as part of the Muskwa River Bull Trout Spawning Assessment (DES 2002).

Several significant tributaries offering potential seasonal rearing habitat flow into the middle mainstem. Fish access to all but one of these tributaries (WSC -44400-39400) is restricted by impassable barriers on their respective lower reaches.

4.2.3 Kluachesi Creek

The Kluachesi Creek drainage is a lake-headed system originating from Kluachesi Lake. Sampling during a 1984 lake survey recorded bull trout, burbot, Arctic grayling, longnose sucker and white sucker (MELP 1983). Prior to the current assessment, no information on fluvial aquatic habitats existed.

Five sample sites were evaluated within mainstem and tributary habitats (including Tierney Creek) downstream of Kluachesi Lake on July 25, 2001. Arctic grayling and mountain whitefish were found to be abundant.

Arctic grayling samples represented all age classes between YOY and 5+, with moderate densities of YOY and yearling juveniles suggesting the system's importance as grayling spawning habitat.

Age 2+ and 3+ sub-adults accounted for the majority of mountain whitefish captured within the Kluachesi drainage, with the balance representing adults between 4+ and 6+. The absence of YOY and yearling age classes from the sample appears to indicate a lack of spawning activity although significant seasonal use by adults and sub-adults. Suitable fall spawning habitat for mountain whitefish may exist in the lower mainstem and YOY and yearling juveniles potentially present there may have been missed during mainstem sampling due to moderate turbidity at the time of the survey.

A single juvenile bull trout (age 3+) was captured in Kluachesi Creek and no suitable bull trout spawning habitat was noted during the survey. Bull trout use appears to be limited to occasional seasonal use by feeding sub-adults.

No migrational impasses were noted in the Kluachesi Creek drainage; grayling and mountain whitefish distribution appears limited only by the suitability of seasonal rearing habitat and seasonal flow conditions.

4.2.4 Lower Tributaries (Varrick, Pentreath, Wenger, Reimer and Puder Creeks)

Muskwa River tributaries in the lower portion of the project area lie within the Taiga Plains ecoprovince, to the immediate east of the Rocky Mountain foothills. Light to moderate turbidity levels result from suspended sediment and organic stain. Streambed substrates typically contain a significant proportion of fines and summer water temperatures are slightly warmer than in the western section (Plate 8).

These factors contribute to limitations on suitability for bull trout and none were encountered during the survey. Seasonal rearing potential for Arctic grayling and mountain whitefish is moderate to high and both these species were found to be relatively abundant, with a wide range of age classes represented.

Plate 8: Typical Taiga Plains seasonal rearing habitat occupied by juvenile Arctic grayling and mountain whitefish; view upstream on unnamed Muskwa tributary adjacent to Pentreath Creek (site 23).

Spring spawning by Arctic grayling likely occurs in the lower and middle reaches of these tributaries, with some over-wintering of YOY and yearling juveniles also possible.

Use by juvenile and adult mountain whitefish is probably strictly seasonal with late fall flow conditions restricting spawning activity to the Muskwa mainstem.

No permanent barriers to fish movement were noted and distribution of juvenile grayling and mountain whitefish appears limited only by the availability of seasonal rearing habitat and seasonal flow conditions.

4.2.5 Crehan Creek

Crehan Creek drains rugged terrain in the vicinity of Sleeping Chief Mountain and enters the Muskwa mainstem along the eastern edge of the Rocky Mountain foothills. It is the third largest tributary in the project area, and the only significant tributary in the upper portion of the drainage where access to potential fish habitat is not limited by impassable barriers.

The lower mainstem and tributaries flowing from the south are characterized by moderate-gradient, riffle pool/configurations, with gravel, cobble and boulder substrates. The upper two reaches of the mainstem meander at low gradients through a broad mid-elevation valley. Riffle-dominated habitats on these reaches are rare and substrates contain a high proportion of fines.

Anecdotal information (T. Vince, pers. com.) suggested that Crehan Creek contained critical spawning habitat used by fluvial, migratory bull trout. On July 26, 2001, a sexually mature adult female and a YOY juvenile were captured on the lower reach of the mainstem (site 29) confirming this suspicion. On August 27, an aerial search of potential bull trout spawning habitat within the Crehan Creek drainage was conducted in conjunction with the Muskwa River bull trout spawning assessment (DES 2002). Moderate densities of spawning adult fish and active redds were located on a 600 m section of unnamed tributary 212-580800-71000-47800 (site 30) (Plate 9).

Plate 9: 700mm male bull trout spawning in unnamed tributary to Crehan Creek (212-580800-71000-47800) (site 30).

Adult and sub-adult Arctic grayling and mountain whitefish were also captured or observed in the lower Crehan mainstem and tributary sample sites, indicating seasonal

use by these species. The low-gradient, meandering, upper mainstem reaches were not sampled during this survey, however, both grayling and mountain whitefish were captured in riffle-dominated habitat upstream (site 32).

4.3 Fish Age and Growth

Aging structures were collected from representatives of sport-fish species captured within the Upper Muskwa Overview Inventory project area between July 23 and August 27, 2001. These included bull trout, Arctic grayling and mountain whitefish.

A complete analysis of growth is precluded by small sample sizes and the absence of representatives from some age classes for some species. A brief discussion of each of the three sport-fish species follows. Length-frequency and age-at-length plots are presented, however, the limitations of sample size and sampling bias are acknowledged.

4.3.1 Arctic Grayling

Sixty-four Arctic grayling were captured within the project area in both mainstem and tributary habitats. Aging structures from 55 of these were collected and analyzed. Sampled fish were distributed sparsely through the YOY to 5+ age classes.

Table 4 summarizes the age-length relationship of Arctic grayling for which aging structures were analyzed. A length-frequency plot for the combined sample is presented in Figure 2.

Table 4. Age-length relationship of Arctic grayling captured in the Upper Muskwa Overview Inventory project area between July 23 and August 27, 2001.

	Assigned Age						
	0+	1+	2+	3+	4+	5+	6+
Mean F.L. (mm)	74	100	160	224	254	321	-
Range (mm)	66-78	80-126	122-210	200-261	275-234	312-332	-
n = 55	4	15	17	8	7	4	-

F.L. = fork length

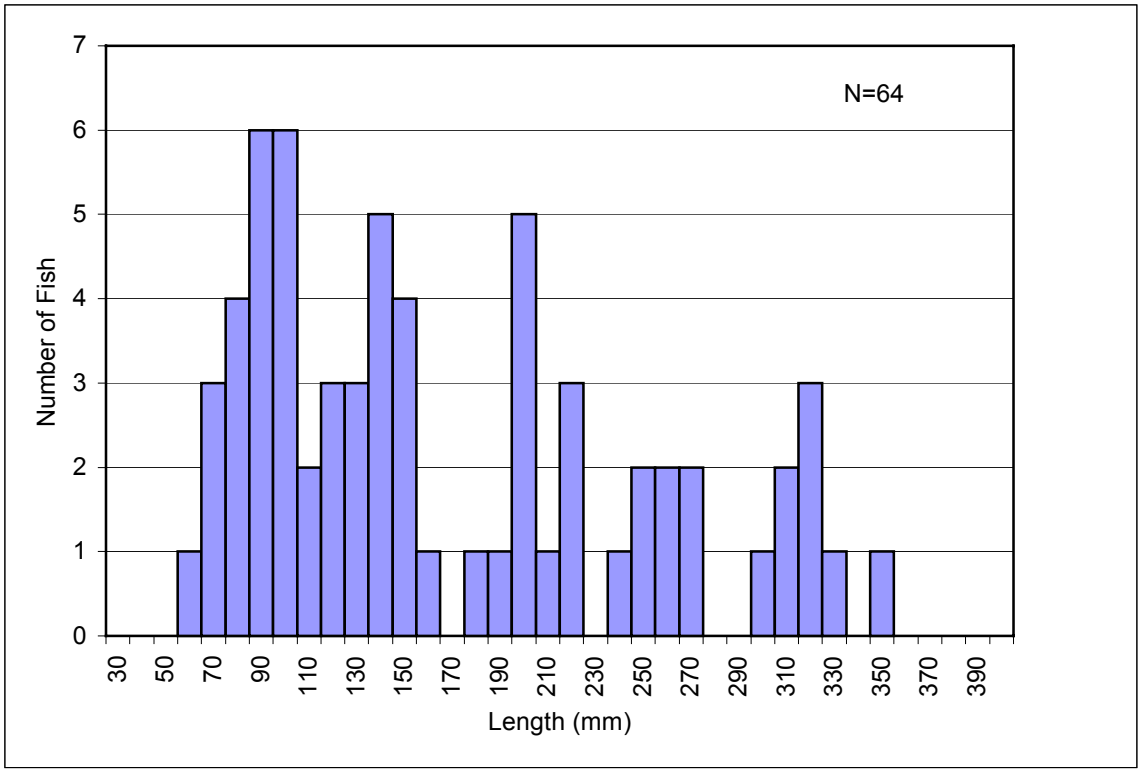

Figure 2. Length-frequency relationship of Arctic grayling captured in the Upper Muskwa Overview Inventory project area between July 23 and August 27, 2001.

4.3.2 Mountain Whitefish

A total of 114 mountain whitefish were captured within the project area in both mainstem and tributary habitats. Sixty-nine aging structures from a full range of length classes were collected and analyzed. YOY were assigned 0+ ages in the field, based on length class and developmental stage.

A length-frequency plot for the entire sample is presented in Figure 3. Table 6 summarizes the age-length relationship of mountain whitefish for which ages were assigned.

The majority of the sample consisted of post-yearling juveniles and sub-adults (ages 2+ to 4+) captured in tributary habitats. Sampling was likely biased against YOY and mature adults, which typically inhabit larger water where fewer sites were sampled and electro-fishing efficiency was lower.

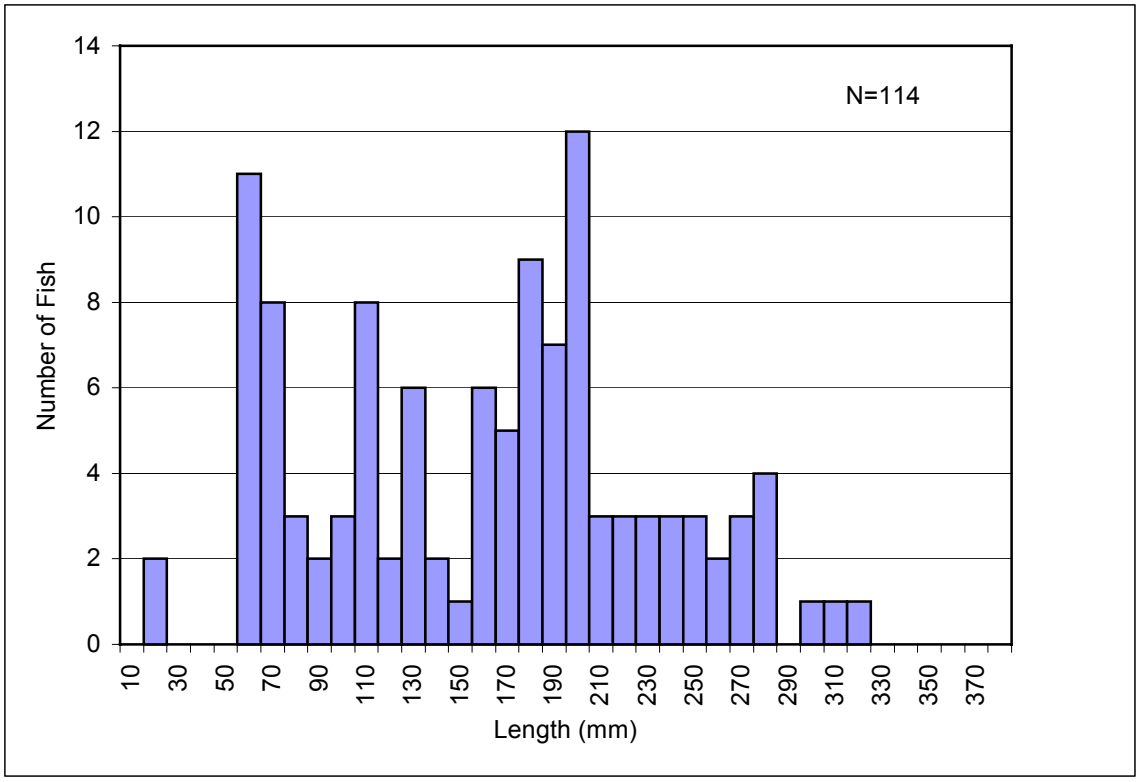

Figure 3. Length-frequency relationship of mountain whitefish captured in the Upper Muskwa Overview Inventory project area between July 23 and August 27, 2001.

Table 5. Age-length relationship of mountain whitefish captured in the Upper Muskwa Overview Inventory project area between July 23 and August 27, 2001.

	Assigned Age							
	0+	1+	2+	3+	4+	5+	6+	7+
Mean F.L. (mm)	28	74	122	180	199	254	268	239
Range (mm)	27-29	65-96	101-166	150-205	176-229	214-305	241-320	-
N = 71	2	8	15	16	16	8	5	1

F.L. = fork length

4.3.3 Bull Trout

A total of sixty-seven bull trout were captured within the project area. Thirty-six aging structures, from a complete range of length classes were analyzed. All 31 fish for which aging structures were not collected were from the 1+ length class (67-96 mm).

Yearling juveniles accounted for the majority of the sample (71%). The remainder of the sample consisted of YOY and mature adults captured in Crehan Creek and Gathto Creek, as well as several 2+ and 3+ juveniles which were distributed more widely over the project area.

Figure 4 represents the length-frequency relationship of the combined sample, while Table 6 summarizes age-at-length.

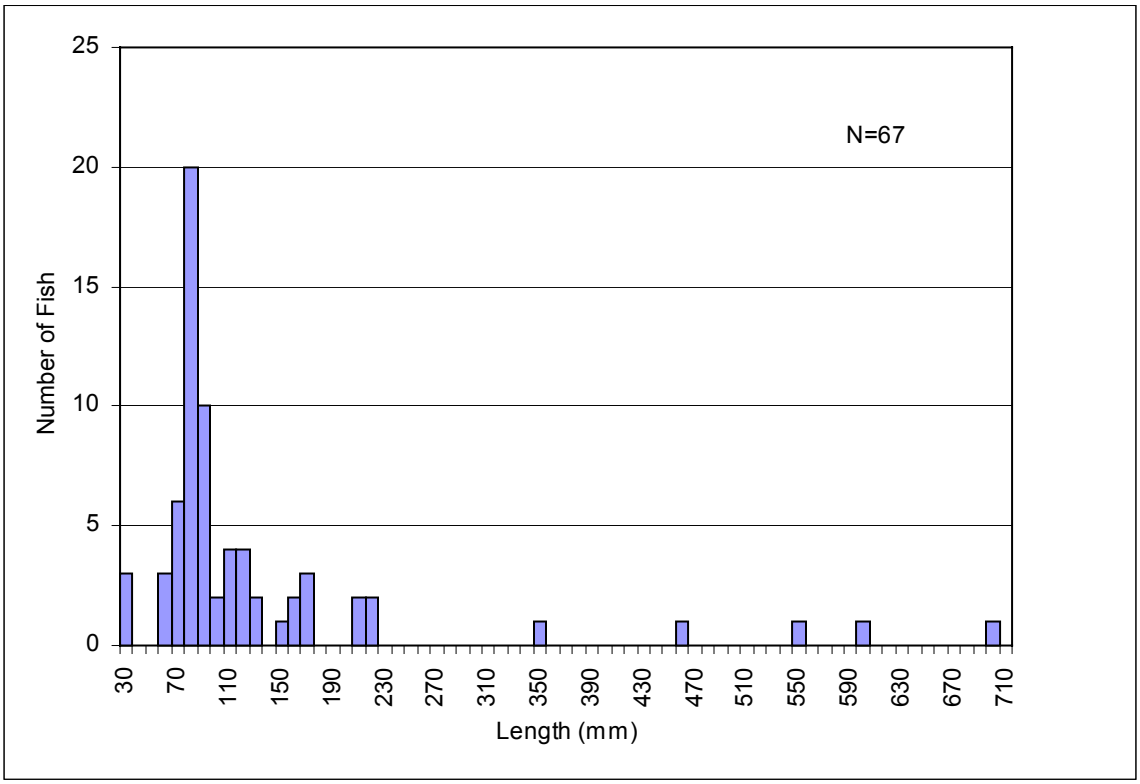

Figure 4. Length-frequency relationship of bull trout captured in the Upper Muskwa Overview Inventory project area between July 23 and August 27, 2001.

Table 6. Age-length relationship of bull trout captured in the Upper Muskwa Overview Inventory project area between July 23 and August 27, 2001.

	Assigned Age								
	0+	1+	2+	3+	7+	9+	11+	12+	13+
Mean F.L. (mm)	42	102	157	192	351	466	550	605	700
Range (mm)	35-60	75-128	138-175	161-218	-	-	-	-	-
n=36	4	17	6	4	1	1	1	1	1

F.L. = fork length

4.4 Significant Features and Fisheries Observations

Waterfalls and chutes associated with bedrock confinements restrict seasonal fish access to large portions of the upper Muskwa River and upper Gathto Creek drainages. No evidence of isolated upstream-resident populations of native sport-fish species was found above impassable barriers within the project area. Introduced rainbow trout may be present above impasses on the upper Muskwa mainstem, but none were captured during this survey.

Due to their blue-listed status in British Columbia and large-scale declines over their North American range, bull trout are of special management concern in northeastern B.C. Bull trout are much more specific in their spawning habitat requirements than spring spawning species (e.g., Arctic grayling) or fall broadcast spawners (e.g., mountain whitefish) and often make extended pre-spawning migrations to access segments of stream where conditions allow the successful over-wintering of their incubating eggs.

Three critical spawning zones use by migratory, fluvial bull trout have been identified in the Middle and Upper Muskwa River watershed groups. The Dead Dog Creek spawning site was identified during 2000 (DES 2000) in the Tuchodi River drainage. The Crehan and Gathto Creek spawning sites were identified during 2001, in conjunction with this assessment.

Limited radio-telemetry data from the Dead Dog Creek sub-population suggest that fish migrating to spawning habitat in upper Dead Dog Creek are a component of a broader Muskwa River fluvial population which over-winters in the lower and middle Muskwa mainstem (DES 2000). While no such data is available for the Upper Muskwa River watershed group, it is presumed that the Crehan and Gathto Creek spawning runs are components of the same broader Muskwa River population.

4.5 Future Research Recommendations

Limited radio-telemetry data has been collected for the Dead Dog Creek bull trout spawning run. An expanded bull trout telemetry project, which includes the Gathto and Crehan Creek sub-populations should be conducted. Information is needed to identify and protect possible areas of bull trout concentration and vulnerability during pre-spawning migration, as well as critical adult over-wintering habitat in the lower and middle Muskwa mainstem.

Estimates of the Dead Dog, Crehan and Gathto bull trout spawning runs derived from data collected in 2001 (DES 2002) should be periodically replicated to provide an index into long term population trends for the Muskwa River fluvial, migratory population.

In addition, an assessment of bull trout use of the Tetsa River system should be conducted to determine if that drainage contains critical spawning zones supporting a fourth component of the Muskwa River fluvial, migratory population.

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PERSONAL COMMUNICATIONS

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Vince, Tom. Long-time local resident and guide. Fort St. John, B.C.

APPENDIX I

MUSKWA RIVER
(212-580800)

Sample Site 1

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Muskwa River											FIELD COORDINATES	57° 54.40' 123° 50.39'				
LOCATION	Upstream of "Grizzly Creek'																
NTS MAP #	94G/13	NID NO		WATERSHED CODE	212-580800												
REACH #		SITE #	1	SITE UTM	10	450183	6418069	SITE LENGTH	500	METH	RF	ACCESS	H				
DATE	2001/07/26	TIME	740	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	70.00	100.00	120.00	97.00	88.00	132.00	101.17	meth	AL
WETTED WIDTH	RF	70.00	67.00	110.00	97.00	83.00	120.00	91.17	1.5	
RES POOL DEPTH	MS	C1							1.5	
Wb DEPTH	0.80	0.90	0.95	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	8.0	TURBIDITY	
Ph		Turbid	
FLOOD SIGNS	0.6 m		

COVER

COVER Total: Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	T	T	T	N	D	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: None

MORPHOLOGY

BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	20
D (cm)	12
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	Occasional
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Low to moderate summer refuge potential for adult MW and GR, and sub-adult BT (deep pool/run habitat, LWD accumulations).
Low to moderate seasonal rearing for juvenile MW in side channels at present flows
Side channels not an abundant feature in this reach.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM8	13	wd	u	view u/s from bottom of site
UM8	14	wd	u	view u/s from centre of site
UM8	15	wd	d	view d/s from top of site
UM8	16	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk		

COMMENTS

C1	Too deep for residual pool measurements.
CX1	Electro-fishing effort: 738 seconds @ 250 volts. MW and CCG captured.

FISH COLLECTION FORM

STREAM NAME	Muskwa River							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION	Upstream of "Grizzly Creek"					WATERSHED CODE	212-580800			
WATERBODY ID		NTS MAP	94G/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	1	FISH PERMIT #	SC2001-002			
DATE	2001/07/26 to 2001/07/26	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	CON	TURB	COMMENTS
1			10.450183.6418069	EF	1	8.0		T	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
1	EF/1	1	MW			5	66	170	Rearing	
1	EF/1	1	CCG			8	60	81	Rearing	

GEAR SPECS

								NET / TRAP SPECIFICATIONS					
C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	1	EF/1	1	745	800	738	500	86.0	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE AGE	COMMENTS
	1	EF/1	1	MW	116				Scale	1-1	2+	
	1	EF/1	1	MW	116				Scale	1-2	2+	
	1	EF/1	1	MW	170				Scale	1-3	3+	
	1	EF/1	1	MW	66				Scale	1-4	1+	
	1	EF/1	1	MW	74				Scale	1-5	1+	
	1	EF/1	1	CCG	81							
	1	EF/1	1	CCG	62							
	1	EF/1	1	CCG	81							
	1	EF/1	1	CCG	76							
	1	EF/1	1	CCG	71							
	1	EF/1	1	CCG	70							
	1	EF/1	1	CCG	60							
	1	EF/1	1	CCG	61							

Muskwa River
Site 1: View upstream from bottom of site
(Roll UM8 - Exp 13; CD 1 - Im 1)

Muskwa River
Site 1: Aerial view upstream
(Roll UM8 - Exp 16; CD 1 - Im 4)

APPENDIX II

MUSKWA RIVER
(212-580800)

Sample Site 2

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Muskwa River												FIELD COORDINATES	57° 45.93' 124° 32.35'			
LOCATION	Upstream of mainstem barriers																
NTS MAP #	94F/15	NID NO		WATERSHED CODE	212-580800												
REACH #		SITE #	2	SITE UTM	10	408352	6403841	SITE LENGTH	500	METH	RF	ACCESS	H				
DATE	2001/07/23	TIME	1327	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	100.00	300.00	230.00	110.00	150.00	170.00	176.67	meth	AL
WETTED WIDTH	RF	90.00	180.00	95.00	60.00	85.00	90.00	100.00	1.5	
RES POOL DEPTH	MS	C1							1.5	
Wb DEPTH	0.85	0.90	0.65	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	8.5	TURBIDITY	
Ph		Turbid	

COVER

4	COVER	Total	Trace (5%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	T	T	N	N	D	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Clumped
LB SHAPE	Sloping	RB SHAPE	Sloping
TEXTURE	Gravel/Cobble	TEXTURE	Gravel/Cobble
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	0.65 m		
BED MATERIAL			
Dominant	Gravel (2-64 mm)		
Subdom.	Fines (<2 mm)	2	
D95 (cm)	12	D (cm)	6
Morph.	Riffle-pool	3	

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
		■		■	■			

C3	C4	C5	S1	S2	S3	S4		
	■					■		

PATTERN	Sinuous
ISLANDS	Frequent
BARS	Side/Diag/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS	UTM		
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

No seasonal access for native species due to mainstem barriers downstream.

Limited potential for introduce RB (Fern Lake) due to high turbidity and fines. Side channel habitat abundant however turbid, high fines, cold.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM2	7	wd	u	view u/s from bottom of site
UM2	8	wd	u	view u/s from centre of site
UM2	9	wd	d	view d/s from top of site
UM2	10	wd	u	aerial view upstream
UM2	11	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk tracks		

COMMENTS

C	
C1	Too deep for residual pool measurements.
C2	Some cobble (trace).
C3	Extensive braiding with multiple bars and vegetated islands.
C4	Limited cover except deep mainstem channel; abundant side channel habitat.
CX1	Electro-fishing effort: 413 seconds @ 350 volts. No fish captured.
CX2	No seasonal access due to mainstem barriers downstream.

FISH COLLECTION FORM

STREAM NAME	Muskwa River				[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Upstream of mainstem barriers			WATERSHED CODE	212-580800		
WATERBODY ID		NTS MAP	94F/15	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	2	FISH PERMIT #	SC2001-002
DATE	2001/07/23 to 2001/07/23	AGENCY	Diversified Environmental Services	CREW	BC/TE	[ ] RE-SAMPLE	

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION: TEMP	CON	TURB	COMMENTS
2			10.408352.6403841	EF	1	8.5		T	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
2	EF/1	1	NFC			0				

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	2	EF/1	1	1333	1355	413	500	100.0	O	350	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE: STR	SAMPLE #	AGE	COMMENTS

Muskwa River
Site 2: View upstream from bottom of site
(Roll UM2 - Exp 7; CD 1 - Im 5)

Muskwa River
Site 2: Aerial view upstream
(Roll UM2 - Exp 11; CD 1 - Im 8)

APPENDIX III

GATHTO CREEK
(212-580800-44400)

Sample Site 3

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Gathto Creek (lower)											FIELD COORDINATES	58° 04.55' 123° 47.05'				
LOCATION	Downstream of Arnell Creek																
NTS MAP #	94J/4	NID NO		WATERSHED CODE	212-580800-44400												
REACH #		SITE #	3	SITE UTM	10	453745	6437421					SITE LENGTH	500	METH	RF	ACCESS	H
DATE	2001/07/25	TIME	740	AGENCY	Diversified Environmental Services							CREW	BC/TE	FISH FORM	Y	X	N

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	75.00	70.00	85.00	95.00	110.00	115.00	91.67	meth	AL
WETTED WIDTH	RF	60.00	35.00	45.00	75.00	75.00	65.00	59.17	1.5	
RES POOL DEPTH	MS	0.45	0.25	0.12	0.12	0.15	0.45	0.26	1.5	
Wb DEPTH	1.50	1.40	1.45	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	7.0	TURBIDITY	
Ph		Mod turbid	

FLOOD SIGNS: 1.5 m - debris

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	N	N	T	N	D	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	None	DIST		INSTREAM VEGETATION	None
LB SHAPE	Sloping	RB SHAPE	Vertical		
TEXTURE	Gravel/Cobble	TEXTURE	Fines/Bedrock		
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous		
STAGE	Mature Forest	STAGE	Mature Forest		

MORPHOLOGY

BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	42	D (cm)	22
Morph.	Riffle-pool		

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	Frequent
BARS	Side/Mid-stream
COUPLING	Decoupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate over-summering potential for adult BT, GR and MW.

Abundant side channel habitat for juvenile BT, GR and MW.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM6	22	wd	u	view u/s from bottom of site
UM6	23	wd	u	view u/s from centre of site
UM6	24	wd	d	view d/s from top of site
UM6	25	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk		

COMMENTS

C	
C1	Trace boulders present.
CX1	Electro-fishing effort: 525 seconds @ 250 volts. BT, GR, MW and CCG captured.
CX2	Residual pool depths measured from side channel pools.

FISH COLLECTION FORM

STREAM NAME	Gathto Creek (lower)						LAKE	X STREAM	WETLAND
LOCATION	Downstream of Arnell Creek				WATERSHED CODE	212-580800-44400			
WATERBODY ID		NTS MAP	94J/4	NID NO		SITE/LAKE CARD ATTACHED	X Y		N
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	3	FISH PERMIT #	SC2001-002		
DATE	2001/07/25 to 2001/07/25	AGENCY	Diversified Environmental Services			CREW	BC/TE		RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
3			10.453745.6437421	EF	1	7.0		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
3	EF/1	1	MW			2	202	237	Rearing	
3	EF/1	1	GR			2	181	264	Rearing	
3	EF/1	1	BT			3	161	218	Rearing	
3	EF/1	1	CCG			8	52	86	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	3	EF/1	1	740	755	525	500	59.2	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	3	EF/1	1	MW	202				Scale	3-1	4+	
	3	EF/1	1	MW	237				Scale	3-2	5+	
	3	EF/1	1	GR	181				Scale	3-3	2+	
	3	EF/1	1	GR	264				Scale	3-4	4+	
	3	EF/1	1	BT	215				Scale	3-5	3+	
	3	EF/1	1	BT	218				Scale	3-6	3+	
	3	EF/1	1	BT	161				Scale	3-7	3+	
	3	EF/1	1	CCG	83							
	3	EF/1	1	CCG	62							
	3	EF/1	1	CCG	58							
	3	EF/1	1	CCG	73							
	3	EF/1	1	CCG	75							
	3	EF/1	1	CCG	86							
	3	EF/1	1	CCG	59							
	3	EF/1	1	CCG	52							

Gathto Creek
Site 3: View upstream from bottom of site
(Roll UM6 - Exp 22; CD 1 - Im 9)

Gathto Creek
Site 3: Aerial view upstream
(Roll UM6 - Exp 25; CD 1 - Im 12)

APPENDIX IV

GATHTO CREEK
(212-580800-44400)

Sample Site 4

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Gathto Creek (mid)			FIELD COORDINATES	58° 03.72' 124° 12.36'		
LOCATION	6.5 km downstream of mainstem barrier						
NTS MAP #	94K/1	NID NO		WATERSHED CODE	212-580800-44400		
REACH #		SITE #	4	SITE UTM	10 428681 6436377	SITE LENGTH	400 METH RF ACCESS H
DATE	3001/07/24	TIME	1300	AGENCY	Diversified Environmental Services	CREW	BC/TE FISH FORM Y X N

CHANNEL (m)	meth						avg	GRADIENT %	
CHANNEL WIDTH	RF	110.00	95.00	90.00	85.00	115.00	110.00	100.83	meth AL
WETTED WIDTH	RF	60.00	42.00	45.00	55.00	45.00	62.00	51.50	0.5
RES POOL DEPTH	MS	0.23	0.10	0.46	0.30	0.47	0.50	0.34	0.5
Wb DEPTH	1.20	1.50	1.10	STAGE	Moderate		No Vis Chan		Dry/Int
							Dewater		Tribs

WATER	
EMS	
COND	
TEMP (°C)	11.5
TURBIDITY	Mod turbid
Ph	

COVER	Total	Trace (5%)				
type	SWD	LWD	B	U	DP	OV	IV
amt	N	N	N	N	D	N	N
loc	P	P	P	P	P	P	P

LWD FNC	None	DIST	
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Fines/Gravel	TEXTURE	Fines/Gravel
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	1.5 m
BED MATERIAL	
Dominant	Gravel (2-64 mm)
Subdom.	Fines (<2 mm)
D95 (cm)	17
D (cm)	8
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1 B1 **B2** B3 D1 D2 D3 C1 C2
C3 **C4** C5 S1 S2 S3 S4

PATTERN	Sinuous
ISLANDS	Frequent
BARS	Side/Mid-stream
COUPLING	Partially Coupled
1 CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO		COMMENTS	UTM
						R	F		
						R	F		
						R	F		

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate rearing potential for BT and MW.
Few pools, mostly deep runs or riffle.
No boulder or LWD cover in mainstem. Abundant cover in side-channels.
High BT YOY and yearling densities indicate spawning upstream.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM5	13	wd	u	view u/s from bottom of site
UM5	14	wd	u	view u/s from centre of site
UM5	15	wd	d	view d/s from top of site
UM5	16	wd	u	aerial view upstream
UM5	17	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
C1	Wide braided section of Gathto Creek.
CX1	Electro-fishing effort: 1137 seconds @ 300 volts. BT and MW captured.

FISH COLLECTION FORM

STREAM NAME	Gathto Creek (mid)						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	6.5 km downstream of mainstem barrier				WATERSHED CODE	212-580800-44400			
WATERBODY ID		NTS MAP	94K/1	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	4	FISH PERMIT #	SC2001-002		
DATE	2001/07/24 to 2001/07/24	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE	

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	STREAM CONDITION CON	STREAM CONDITION TURB	COMMENTS
4			10.428681.6436377	EF	1	11.5		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
4	EF/1	1	BT			34	35	128	Rearing	
4	EF/1	1	MW			13	27	160	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	4	EF/1	1	1300	1330	1137	400	51.5	O	300	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE AGE	COMMENTS
	4	EF/1	1	MW	160				Scale	4-1	3+	
	4	EF/1	1	MW	115				Scale	4-2	2+	
	4	EF/1	1	MW	65				Scale	4-3	1+	
	4	EF/1	1	MW	65				Scale	4-4	1+	
	4	EF/1	1	BT	89				Scale	4-5	1+	
	4	EF/1	1	BT	128				Scale	4-6	1+	
	4	EF/1	1	BT	75				Scale	4-7	1+	
	4	EF/1	1	BT	80				Scale	4-8	1+	
	4	EF/1	1	MW	29							
	4	EF/1	1	MW	68							
	4	EF/1	1	MW	69							
	4	EF/1	1	MW	67							
	4	EF/1	1	MW	65							
	4	EF/1	1	MW	27							
	4	EF/1	1	MW	61							
	4	EF/1	1	MW	72							
	4	EF/1	1	MW	70							
	4	EF/1	1	BT	84							
	4	EF/1	1	BT	96							
	4	EF/1	1	BT	89							
	4	EF/1	1	BT	89							
	4	EF/1	1	BT	42							

INDIVIDUAL FISH DATA												
C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	4	EF/1	1	BT	35							
	4	EF/1	1	BT	86							
	4	EF/1	1	BT	93							
	4	EF/1	1	BT	86							
	4	EF/1	1	BT	80							
	4	EF/1	1	BT	73							
	4	EF/1	1	BT	94							
	4	EF/1	1	BT	92							
	4	EF/1	1	BT	94							
	4	EF/1	1	BT	80							
	4	EF/1	1	BT	84							
	4	EF/1	1	BT	92							
	4	EF/1	1	BT	84							
	4	EF/1	1	BT	77							
	4	EF/1	1	BT	71							
	4	EF/1	1	BT	73							
	4	EF/1	1	BT	92							
	4	EF/1	1	BT	67							
	4	EF/1	1	BT	81							
	4	EF/1	1	BT	83							
	4	EF/1	1	BT	69							
	4	EF/1	1	BT	72							
	4	EF/1	1	BT	85							
	4	EF/1	1	BT	39							
	4	EF/1	1	BT	36							

Gathto Creek
Site 4: View upstream from bottom of site
(Roll UM5 - Exp 13; CD 1 - Im 13)

Gathto Creek
Site 4: Aerial view upstream
(Roll UM5 - Exp 17; CD 1 - Im 16)

APPENDIX V

GATHTO CREEK
(212-580800-44400)

Sample Site 5

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Gathto Creek (upper)											FIELD COORDINATES	57° 00.41' 124° 20.84'						
LOCATION	Upstream of lower mainstem impasse																		
NTS MAP #	94K/1	NID NO		WATERSHED CODE	212-580800-44400														
REACH #		SITE #	5	SITE UTM	10	420324	6430233	SITE LENGTH	400	METH	RF	ACCESS	H						
DATE	2001/07/24	TIME	955	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N						

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	43.00	59.00	46.00	66.00	41.00	51.00	51.00	meth	AL
WETTED WIDTH	RF	31.00	39.00	46.00	31.00	31.00	22.00	33.33	1.0	
RES POOL DEPTH	MS	0.32	0.40	0.28	0.40	0.36	0.45	0.37	1.0	
Wb DEPTH	1.20	1.00	1.40	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	6.0	TURBIDITY	
Ph		Lightly Turbid	

COVER

	COVER Total	Moderate (5-20%)					
type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	D	N	S	T	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Clumped
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Cobble/Boulder	TEXTURE	Fines/Cobble
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	1.0 m - rafted
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	50
D (cm)	60
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	Occasional
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate rearing potential for BT and MW.
No seasonal access; upstream of lower Gathto Creek impasse - apparently non fish-bearing.
Primarily boulder pocket and margin cover - few pools.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM4	21	wd	u	view u/s from bottom of site
UM4	22	wd	u	view u/s from centre of site
UM4	23	wd	d	view d/s from top of site
UM4	24	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C

CX1 Electro-fishing effort: 296 seconds @ 300 volts. No fish captured or observed.

FISH COLLECTION FORM

STREAM NAME	Gathto Creek (upper)			[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION	Upstream of mainstem impasse			WATERSHED CODE	212-580800-44400		
WATERBODY ID		NTS MAP	94K/1	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	5	FISH PERMIT #	SC2001-002
DATE	2001/07/24 to 2001/07/24	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ] RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	CON	TURB	COMMENTS
5			10.420324.6430233	EF	1	6.0		L	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
5	EF/1	1	NFC			0				

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	5	EF/1	1	1000	1020	296	400	33.3	O	300	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE	COMMENTS

Gathto Creek
Site 5: View downstream from top of site
(Roll UM4 - Exp 23; CD 1 - Im 19)

Gathto Creek
Site 5: Aerial view upstream
(Roll UM4 - Exp 24; CD 1 - Im 20)

APPENDIX VI

BECKMAN CREEK
(212-580800-44400-05700)

Sample Site 6

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Beckman Creek											FIELD COORDINATES	58° 11.63' 123° 38.27'				
LOCATION	Lower Beckman Creek																
NTS MAP #	94J/4	NID NO		WATERSHED CODE	212-580800-44400-05700												
REACH #		SITE #	6	SITE UTM	10	462528	6450427	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/07/25	TIME	850	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	12.00	15.00	17.50	9.50	16.00	15.00	14.17	meth	AL
WETTED WIDTH	RF	12.00	13.50	17.50	9.50	16.00	15.00	13.92	1.0	
RES POOL DEPTH	MS	0.18	0.36	0.20	0.24	0.22	0.42	0.27	1.0	
Wb DEPTH	0.60	0.70	0.65	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

EMS	COND
TEMP (°C) 5.0	TURBIDITY
Ph	Mod turbid

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	S	S	D	S	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%		
	0	1	2	3	4	5		

LWD FNC	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	0.6 m - debris
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	50
D (cm)	16
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	Occasional
BARS	Side
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS	UTM		
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing for GR and MW.
Moderate spawning potential for GR.
Suitability for BT limited

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM7	1	wd	u	view u/s from bottom of site
UM7	2	wd	u	view u/s from centre of site
UM7	3	wd	d	view d/s from top of site

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C
C1 Also significant boulder and fines components.
CX1 Electro-fishing effort: 466 seconds @ 200 volts. GR, MW and CCG were captured.

FISH COLLECTION FORM

STREAM NAME	Beckman Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Lower Beckman Creek				WATERSHED CODE	212-580800-44400-05700			
WATERBODY ID		NTS MAP	94J/4	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	6	FISH PERMIT #	SC2001-002		
DATE	2001/07/25 to 2001/07/25	AGENCY	Diversified Environmental Services	CREW	BC/TE	[ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	STREAM CONDITION CON	STREAM CONDITION TURB	COMMENTS
6			10.462528.6450427	EF	1	5		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
6	EF/1	1	MW			6	164	200	Rearing	
6	EF/1	1	GR		2+	1	132	132	Rearing	
6	EF/1	1	CCG			1	81	81	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	6	EF/1	1	850	905	466	200	13.9	O	200	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE AGE	COMMENTS
	6	EF/1	1	GR	132				Scale	6-1	2+	
	6	EF/1	1	MW	191				Scale	6-2	3+	
	6	EF/1	1	MW	184				Scale	6-3	3+	
	6	EF/1	1	MW	200				Scale	6-4	4+	
	6	EF/1	1	MW	166				Scale	6-5	3+	
	6	EF/1	1	MW	189				Scale	6-6	3+	
	6	EF/1	1	MW	164				Scale	6-7	regen	
	6	EF/1	1	CCG	81							

Beckman Creek
Site 6: View upstream from centre of site
(Roll UM7 - Exp 2; CD 1 - Im 22)

Beckman Creek
Site 6: View downstream from top of site
(Roll UM7 - Exp 3; CD 1 - Im 23)

APPENDIX VII

BECKMAN CREEK
(212-580800-44400-05700)

Sample Site 7

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Beckman Creek											FIELD COORDINATES	58° 10.68' 123° 47.49'				
LOCATION	Upper Beckman Creek																
NTS MAP #	94J/4	NID NO		WATERSHED CODE	212-580800-44400-05700												
REACH #		SITE #	7	SITE UTM	10	453427	6448804	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/07/25	TIME	1030	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	12.50	11.50	13.00	10.60	11.60	13.00	12.03	meth	AL	TEMP (°C)	4.5	TURBIDITY	
WETTED WIDTH	RF	12.50	11.50	13.00	7.50	11.30	12.20	11.33	1.5		Ph		Lightly Turbid	
RES POOL DEPTH	MS	0.40	0.35	0.20	0.35	0.30	0.42	0.34	2.0		FLOOD SIGNS	0.6 m		
Wb DEPTH	0.60	0.55	0.60	STAGE	Moderate		No Vis Chan		Dry/Int	2	BED MATERIAL			
							Dewater		Tribs		Dominant	Gravel (2-64 mm)		
											Subdom.	Cobble (64-256 mm)		
											D95 (cm)	25	D (cm)	12
											Morph.	Riffle-pool		

COVER

	COVER	Total	Trace (5%)
type	SWD	LWD	B	U	DP	OV	IV
amt	T	T	T	T	D	T	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%
	0	1	2	3	4	5

LWD FNC	Few	DIST	Clumped
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Fines	TEXTURE	Fines
1 RIP. VEG.	Shrubs	RIP. VEG.	Shrubs
STAGE	Shrub/Herb	STAGE	Shrub/Herb

INSTREAM VEGETATION: None

MORPHOLOGY

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering	
4 ISLANDS	Occasional	
3 BARS	Side	
COUPLING	Partially Coupled	
CONFINED	Frequently Confined	

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing potential for MW and GR.
Low temperature may be limiting.
Fines in substrate high.
Limited deep pool habitat present at current flows.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM7	5	wd	u	view u/s from bottom of site
UM7	6	wd	u	view u/s from centre of site
UM7	7	wd	d	view d/s from top of site
UM7	8	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk		

COMMENTS

C	
C1	Formerly coniferous stand - now burnt off.
C2	Abundant colluvial substrates.
C3	Bars and islands uncommon in reach.
C4	Electro-fishing effort: 333 seconds @ 250 volts. MW were captured.
CX1	

FISH COLLECTION FORM

STREAM NAME	Beckman Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Upper Beckman Creek				WATERSHED CODE	212-580800-44400-05700			
WATERBODY ID		NTS MAP	94J/4	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	7	FISH PERMIT #	SC2001-002		
DATE	2001/07/25 to 2001/07/25	AGENCY	Diversified Environmental Services			CREW	BC/TE	[ ]	RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
7			10.453427.6448804	EF	1	4.5		L	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
7	EF/1	1	MW			7	185	280	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	7	EF/1	1	1035	1050	333	200	11.3	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	7	EF/1	1	MW	241				Scale	7-1	6+	
	7	EF/1	1	MW	270				Scale	7-2	regen	
	7	EF/1	1	MW	280				Scale	7-3	regen	
	7	EF/1	1	MW	239				Scale	7-4	7+	
	7	EF/1	1	MW	200				Scale	7-5	4+	
	7	EF/1	1	MW	186				Scale	7-6	3+	
	7	EF/1	1	MW	185				Scale	7-7	4+	

Beckman Creek
Site 7: View upstream from bottom of site
(Roll UM7 - Exp 5; CD 1 - Im 24)

Beckman Creek
Site 7: Aerial view upstream
(Roll UM7 - Exp 8; CD 1 - Im 27)

APPENDIX VIII

ARNELL CREEK

(212-580800-44400-31200)

Sample Site 8

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Arnell Creek										FIELD COORDINATES	58° 05.64' 123° 49.81'			
LOCATION	Immediately downstream of lower impasse														
NTS MAP #	94J/4	NID NO		WATERSHED CODE	212-580800-44400-31200										
REACH #		SITE #	8	SITE UTM	10	451131	6439504				SITE LENGTH	100	METH	RF	ACCESS H
DATE	2001/07/24	TIME	1700	AGENCY	Diversified Environmental Services						CREW	BC/TE	FISH FORM Y	X	N

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	10.50	9.10	8.00	9.00	7.20	5.40	8.20	meth	AL
WETTED WIDTH	RF	10.50	9.10	8.00	9.00	7.20	5.40	8.20	2.0	
RES POOL DEPTH	MS	0.14	0.18	0.12	0.21	0.16	0.28	0.18	3.0	
Wb DEPTH	0.70	0.60		STAGE	High		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	6.5	TURBIDITY	
Ph		Lightly Turbid	
FLOOD SIGNS	0.6 m - debris		

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	D	T	S	T	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Clumped
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines/Boulder	TEXTURE	Fines/Boulder
RIP. VEG.	Deciduous	RIP. VEG.	Deciduous
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

MORPHOLOGY

BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Boulder (> 256 mm)		
D95 (cm)	70	D (cm)	18
Morph.	Riffle-pool		

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	None
COUPLING	Coupled
CONFINED	Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS	UTM		
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Seasonal rearing for GR and MW.
Adult over-summering for GR and MW.
1.5m barrier at top of site; higher impasse upstream.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM6	13	wd	u	view u/s from bottom of site
UM6	14	wd	u	view u/s from centre of site
UM6	16	wd	u	falls 1.5 m
UM6	17	wd	d	view d/s from top of site
UM6	12	wd	u	upstream aerial view of lower barrier
UM6	18	wd	u	upstream aerial view of site
UM6	15	wd	obj	2 male GR

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C
CX1 Electro-fishing effort: 134 seconds @ 200 volts. Arctic grayling and mountain whitefish captured.

FISH COLLECTION FORM

STREAM NAME	Arnell Creek							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION	Immediately downstream of lower impasse					WATERSHED CODE	212-580800-44400-31200			
WATERBODY ID		NTS MAP	94J/4	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	8	FISH PERMIT #	SC2001-002			
DATE	2001/07/24 to 2001/07/24	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
8			10.451131.6439504	EF	1	6.5		L	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
8	EF/1	1	GR			7	206	332	Rearing	
8	EF/1	1	MW			2	208	280	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	8	EF/1	1	1700	1715	134	100	8.2	O	200	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	8	EF/1	1	GR	206				Scale	8-1	3+	
	8	EF/1	1	MW	280				Scale	8-2	regen	
	8	EF/1	1	GR	312		M		Scale	8-3	5+	
	8	EF/1	1	GR	332		M		Scale	8-4	5+	
	8	EF/1	1	GR	302				Scale	8-5	4+	
	8	EF/1	1	GR	275		F		Scale	8-6	regen	
	8	EF/1	1	MW	208				Scale	8-7	4+	
	8	EF/1	1	GR	261		F		Scale	8-8	3+	
	8	EF/1	1	GR	220		F		Scale	8-9	3+	

Arnell Creek
Site 8: View downstream from top of site
(Roll UM6 - Exp 17; CD 1 - Im 30)

Arnell Creek
Site 8: 1.5 m barrier at top of site
(Roll UM6 - Exp 16; CD 1 - Im 31)

Arnell Creek
Site 8: 312mm and 332mm adult male Arctic grayling captured at base of 1.5 m falls
(Roll UM6 - Exp 15; CD 1 - Im 33)

Arnell Creek
Site 8: Upstream aerial view of site
(Roll UM6 - Exp 18; CD 1 - Im 32)

APPENDIX IX

UNNAMED TRIBUTARY TO GATHTO CREEK
(212-580800-44400-45200)

Sample Site 9

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Gathto Creek											FIELD COORDINATES	58° 01.96' 124° 01.69'				
LOCATION	Lower																
NTS MAP #	94K/1	NID NO		WATERSHED CODE	212-580800-44400-45200												
REACH #		SITE #	9	SITE UTM	10	439250	6432828	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/07/24	TIME	1545	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	17.00	19.00	16.00	16.00	20.00	22.00	18.33	meth	AL
WETTED WIDTH	RF	14.50	12.80	13.50	13.20	12.50	15.00	13.58	2.5	
RES POOL DEPTH	MS	1.20	0.90	0.80	0.95	0.75	0.70	0.88	3.0	
Wb DEPTH	1.80	1.60	1.40	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	7.5	TURBIDITY	
Ph		Clear	

COVER

	COVER	Total		Moderate (5-20%)				
type	SWD	LWD	B	U	DP	OV	IV	
amt	N	N	D	N	S	N	N	
loc	P	P	P	P	P	P	P	

LWD FNC	None	DIST	
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Cobble/Boulder	TEXTURE	Bedrock
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Young Forest	STAGE	Mature Forest

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%	
0	1	2	3	4	5	

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	1.0 m
BED MATERIAL	
Dominant	Boulder (> 256 mm)
Subdom.	Cobble (64-256 mm)
D95 (cm)	130
D (cm)	80
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	Side
COUPLING	Partially Coupled
CONFINED	Frequently Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate quality rearing for juvenile BT and MW.

Good deep pool habitat available for adult BT, GR and MW.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM6	4	wd	u	view u/s from bottom of site
UM6	5	wd	u	view u/s from centre of site
UM6	6	wd	d	view d/s from top of site
UM6	8	wd	obj	3 BT from site
UM6	9	wd	u	upstream aerial view of site

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose and elk		

COMMENTS

C

CX1 Electro-fishing effort: 570 seconds @ 300 volts. 3 BT and 1 GR captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Gathto Creek							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION	Lower					WATERSHED CODE	212-580800-44400-45200			
WATERBODY ID		NTS MAP	94K/1	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	9	FISH PERMIT #	SC2001-002			
DATE	2001/07/24 to 2001/07/24	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
9			10.439250.6432828	EF	1	7.5		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
9	EF/1	1	BT			3	99	351	Rearing	
9	AG/1	1	GR			1	328	328		

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	9	EF/1	1	1545	1600	570	200	13.6	O	300	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	9	EF/1	1	BT	351		M		Fin ray	9-1	7+	
	9	EF/1	1	BT	112				Scale	9-2	1+	
	9	EF/1	1	BT	99				Scale	9-3	1+	
	9	AG	1	GR	328		M		Scale	9-4	4+	

Unnamed tributary to Gathto Creek
Site 9: View upstream from bottom of site
(Roll UM6 - Exp 4; CD 1 - Im 34)

Unnamed tributary to Gathto Creek
Site 9: View downstream from top of site
(Roll UM6 - Exp 6; CD 1 - Im 36)

Unnamed tributary to Gathto Creek
Site 9: Age 7+ and yearling bull trout
Roll UM6 - Exp 8; CD 1 - Im 37)

Unnamed tributary to Gathto Creek
Site 9: Upstream aerial view of site
(Roll UM6 - Exp 9; CD 1 - Im 38)

APPENDIX X

UNNAMED TRIBUTARY TO GATHTO CREEK
(212-580800-44400-45200)

Sample Site 10

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed trib to Gathto Creek											FIELD COORDINATES	57° 59.70' 124° 02.79'				
LOCATION	Upper site below forks																
NTS MAP #	94F/16	NID NO		WATERSHED CODE	212-580800-44400-45200												
REACH #		SITE #	10	SITE UTM	10	438206	6428745	SITE LENGTH	250	METH	RF	ACCESS	H				
DATE	2001/07/24	TIME	1440	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	24.00	29.00	26.00	22.00	36.00	24.00	26.83	meth	AL	TEMP (°C)	7.5	TURBIDITY	
WETTED WIDTH	RF	15.50	16.00	16.00	14.00	26.00	16.00	17.25	3.0		Ph		Clear	
RES POOL DEPTH	MS	0.32	0.24	0.18	0.36	0.25	0.16	0.25	3.0		FLOOD SIGNS	1.0 m - debris		
Wb DEPTH	1.80	1.60	2.00	STAGE	Moderate		No Vis Chan		Dry/Int		BED MATERIAL			
							Dewater		Tribs		Dominant	Boulder (> 256 mm)		
											Subdom.	Cobble (64-256 mm)		
											D95 (cm)	200	D (cm)	70
											Morph.	Riffle-pool		

WATER

MORPHOLOGY

COVER

COVER	Total	Moderate (5-20%)
type	SWD	LWD	B	U	DP	OV	IV
amt	N	N	D	N	S	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%
	0	1	2	3	4	5

LWD FNC	None	DIST	
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Cobble/Boulder	TEXTURE	Cobble/Boulder
RIP. VEG.	Coniferous	RIP. VEG.	Mixed C & D
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	Occasional
BARS	Side
COUPLING	Partially Coupled
CONFINED	Frequently Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate quality rearing for juvenile BT - assumed seasonally present

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM5	25	wd	u	view u/s from bottom of site
UM6	1	wd	u	view u/s from centre of site
UM6	2	wd	d	view d/s from top of site
UM6	3	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 472 seconds @ 300 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Gathto Creek								
LOCATION	Upper site below forks					WATERSHED CODE	212-580800-44400-45200		
WATERBODY ID		NTS MAP	94F/16	NID NO		SITE/LAKE CARD ATTACHED	X	Y	N
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	10	FISH PERMIT #	SC2001-002		
DATE	2001/07/24	to	2001/07/24	AGENCY	Diversified Environmental Services	CREW	BC/TE		RE-SAMPLE

LAKE [ ] STREAM [X] WETLAND [ ]

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
10			10.438206.6428745	EF	1	7.5		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
10	EF/1	1	NFC			0				

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

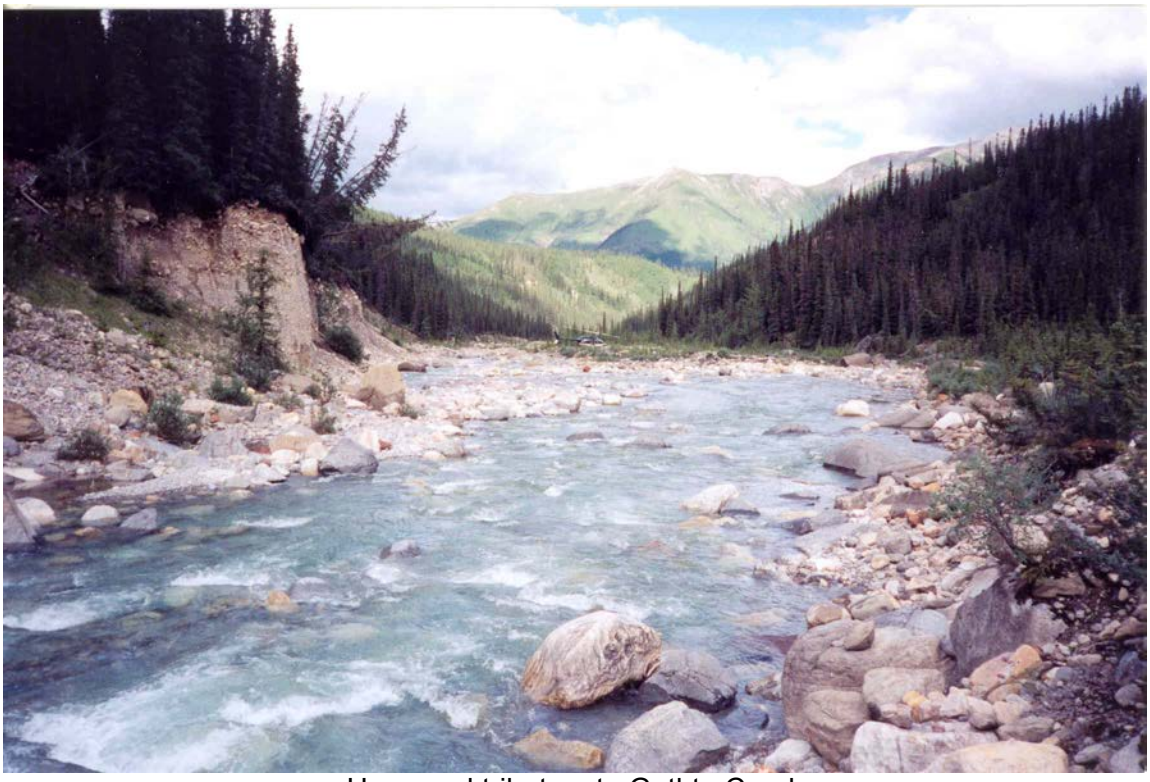
C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	10	EF/1	1	1445	1450	472	250	17.2	O	300	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	



Unnamed tributary to Gathto Creek
Site 10: View downstream from top of site
(Roll UM6 - Exp 2; CD 1 - Im 41)

Unnamed tributary to Gathto Creek
Site 10: Aerial view upstream
(Roll UM6 - Exp 3; CD 1 - Im 42)

APPENDIX XI

UNNAMED TRIBUTARY TO GATHTO CREEK
(212-580800-44400-60500)

Sample Site 11

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Gathto Creek										FIELD COORDINATES	58 02.50	124 16.06		
LOCATION															
NTS MAP #	94K/1	NID NO		WATERSHED CODE	212-580800-44400-60500										
REACH #		SITE #	11	SITE UTM	10	425189	6434148	SITE LENGTH	200	METH	RF	ACCESS	H		
DATE	2001/07/24	TIME	1130	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N		

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	19.00	18.00	28.00	35.00	21.00	22.00	23.83	meth	AL
WETTED WIDTH	RF	13.50	14.50	17.50	22.00	13.00	17.00	16.25	1.0	
RES POOL DEPTH	MS	0.18	0.24	0.16	0.28	14.00	0.18	2.51	2.0	
Wb DEPTH	1.20	1.40	1.20	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	1

WATER

EMS		COND	
TEMP (°C)	7.0	TURBIDITY	
Ph		Lightly Turbid	

COVER

	COVER	Total	Moderate (5-20%)						
type	SWD	LWD	B	U	DP	OV	IV	CROWN CLOSURE	
amt	N	N	D	N	S	N	N		
loc	P	P	P	P	P	P	P		

	0%	1-20%	21-40%	41-70%	71-90%	>90%	
	0	1	2	3	4	5	

LWD FNC	None	DIST				
LB SHAPE	Vertical	RB SHAPE	Sloping	INSTREAM VEGETATION	None	
TEXTURE	Cobbles	TEXTURE	Cobbles			
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous			
STAGE	Young Forest	STAGE	Young Forest			

MORPHOLOGY

FLOOD SIGNS	1.2 m - debris
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	120
D (cm)	40
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	Occasional
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing for BT, MW and GR.
Primarily boulder pocket cover.
Limited pockets of gravel.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM5	9	wd	u	view u/s from bottom of site
UM5	10	wd	u	view u/s in side channel (centre)
UM5	11	wd	d	view d/s from top of site
UM5	12	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose and elk		

COMMENTS

C
C1 Significant boulder component also.
CX1 Electro-fishing effort: 630 seconds @ 300 volts. BT captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Gathto Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	212-580800-44400-60500			
WATERBODY ID		NTS MAP	94K/1	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	11	FISH PERMIT #	SC2001-002		
DATE	2001/07/24 to 2001/07/24	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE	

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
11			10.425189.6434148	EF	1	7.0		L	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
11	EF/1	1	BT			8	81	150	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	11	EF/1	1	1130	1150	630	200	16.2	O	300	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	11	EF/1	1	BT	150				Scale	12-1	2+	
	11	EF/1	1	BT	138				Scale	12-2	2+	
	11	EF/1	1	BT	110				Scale	12-3	1+	
	11	EF/1	1	BT	111				Scale	12-4	1+	
	11	EF/1	1	BT	111				Scale	12-5	1+	
	11	EF/1	1	BT	105				Scale	12-6	1+	
	11	EF/1	1	BT	104				Scale	12-7	1+	
	11	EF/1	1	BT	81				Scale	12-8	1+	

Unnamed tributary to Gathto Creek
Site 11: View downstream from top of site
(Roll UM5 - Exp 11; CD 1 - Im 45)

Unnamed tributary to Gathto Creek
Site 11: Aerial view upstream
(Roll UM5 - Exp 12; CD 1 - Im 46)

APPENDIX XII

UNNAMED TRIBUTARY TO GATHTO CREEK
(212-580800-44400-66700)

Sample Site 12

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Gathto Creek											FIELD COORDINATES	58 01.45 124 20.0				
LOCATION	Upstream of Gathto mainstem impasse																
NTS MAP #	94K/1	NID NO		WATERSHED CODE	212-580800-44400-66700												
REACH #		SITE #	12	SITE UTM	10	421278	6432195	SITE LENGTH	400	METH	RF	ACCESS	H				
DATE	2001/07/24	TIME	1045	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	35.00	36.00	32.50	29.50	30.00	29.00	32.00	meth	AL
WETTED WIDTH	RF	35.00	36.00	30.00	28.50	28.00	28.00	30.92	2.5	
RES POOL DEPTH	MS	0.60	0.80	0.75	0.60	0.50	0.65	0.65	2.5	
Wb DEPTH	1.50	1.20	1.10	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	6.5	TURBIDITY	
Ph		Mod turbid	

COVER

COVER Total: Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	N	N	D	N	T	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	None	DIST	
LB SHAPE	Vertical	RB SHAPE	Sloping
1 TEXTURE	Fines/Cobble	TEXTURE	Fines/Boulder
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	0.4 m
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	80
D (cm)	60
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	Mid-stream
COUPLING	Decoupled
CONFINED	Unconfined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate rearing potential for BT and MW.
Deep boulder pockets behind large boulders.
No seasonal access; impassable barrier dowsntream on Gathto Creek mainstem.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM5	4	wd	u	view u/s from bottom of site
UM5	5	wd	u	view u/s from centre of site
UM5	6	wd	d	view d/s from top of site
UM5	7	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C
C1 Fines dominant bank substrate.
CX1 Electro-fishing effort: 351 seconds @ 300 volts. No fish captured.
CX2 Non fish-bearing; barrier downstream on Gathto Creek.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Gathto Creek			[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION	Upstream of Gathto mainstem impasse			WATERSHED CODE	212-580800-44400-66700		
WATERBODY ID		NTS MAP	94K/1	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	12	FISH PERMIT #	SC2001-002
DATE	2001/07/24 to 2001/07/24	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ] RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION: TEMP	CON	TURB	COMMENTS
12			10.421278.6432195	EF	1	6.5		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
12	EF/1	1	NFC			0				

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	12	EF/1	1	1045	1100	351	400	30.9	O	300	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE: STR	SAMPLE #	AGE	COMMENTS

Unnamed tributary to Gathto Creek
Site 12: View upstream from bottom of site
(Roll UM5 - Exp 4; CD 1 - Im 47)

Unnamed tributary to Gathto Creek
Site 12: Aerial view upstream
(Roll UM5 - Exp 7; CD 1 - Im 50)

APPENDIX XIII

UNNAMED TRIBUTARY TO GATHTO CREEK
(212-580800-44400-75800)

Sample Site 13

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Gathto Creek											FIELD COORDINATES	57° 56.26' 124° 23.23'				
LOCATION	Upstream of Gathto mainstem impasse																
NTS MAP #	94F/16	NID NO		WATERSHED CODE	212-580800-44400-75800												
REACH #		SITE #	13	SITE UTM	10	417838	6422598	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/01/24	TIME	915	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	11.60	12.00	13.50	10.90	25.00	13.00	14.33	meth	AL
WETTED WIDTH	RF	8.10	10.20	13.00	8.90	25.00	11.00	12.70	3.5	
RES POOL DEPTH	MS	0.25	0.12	0.30	0.65	0.16	0.12	0.27	3.5	
Wb DEPTH	1.10	1.20	1.10	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	5.5	TURBIDITY	
Ph		Mod turbid	

COVER

	COVER	Total	Moderate (5-20%)						
type	SWD	LWD	B	U	DP	OV	IV	CROWN CLOSURE	
amt	N	N	D	N	S	N	N		
loc	P	P	P	P	P	P	P		

0%	1-20%	21-40%	41-70%	71-90%	>90%		
0	1	2	3	4	5		

LWD FNC	None	DIST		INSTREAM VEGETATION	None		
LB SHAPE	Vertical	RB SHAPE	Sloping				
TEXTURE	Cobble/Boulder	TEXTURE	Cobble/Boulder				
RIP. VEG.	Mixed C & D	RIP. VEG.	Shrubs				
STAGE	Young Forest	STAGE	Initial				

MORPHOLOGY

FLOOD SIGNS	1.2 m
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	55
D (cm)	40
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

1	PATTERN	Sinuous
	ISLANDS	Occasional
	BARS	Side/Mid-stream
	COUPLING	Decoupled
	CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing for BT.
Somewhat turbid from glacial melt waters.
Barrier less than 1 km upstream of site; barrier downstream on Gathto Creek.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM4	14	wd	u	aerial view upstream from confluence with Gathto Creek
UM4	16	wd	u	view u/s from bottom of site
UM4	17	wd	u	view u/s from centre of site
UM4	18	wd	d	view d/s from top of site

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
C1	Islands not well vegetated - shifting channel in alluvial fan.
CX1	Electro-fishing effort: 260 seconds @ 300 volts. No fish captured.
CX2	Non fish-bearing; impasse downstream on Gathto Creek.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Gathto Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Upstream of Gathto mainstem impasse				WATERSHED CODE	212-580800-44400-75800			
WATERBODY ID		NTS MAP	94F/16	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	13	FISH PERMIT #	SC2001-002		
DATE	2001/07/24 to 2001/07/24	AGENCY	Diversified Environmental Services			CREW	BC/TE	[ ]	RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
13			10.417838.6422598	EF	1	5.5		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
13	EF/1	1	NFC			0				

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	13	EF/1	1	915	930	260	200	12.7	O	300	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	

Unnamed tributary to Gathto Creek
Site 13: View upstream from bottom of site
(Roll UM4 - Exp 16; CD 1 - Im 51)

Unnamed tributary to Gathto Creek
Site 13: Aerial view upstream from Gathto Creek
(Roll UM4 - Exp 14; CD 1 - Im 54)

APPENDIX XIV

UNNAMED TRIBUTARY TO GATHTO CREEK
(212-580800-44400-86400)

Sample Site 14

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Gathto Creek					FIELD COORDINATES	57° 55.40' 124° 23.39'
LOCATION	Upstream of Gathto mainstem impasses						
NTS MAP #	94F/16	NID NO		WATERSHED CODE	212-580800-44400-86400		
REACH #		SITE #	14	SITE UTM	10 417726 6421025	SITE LENGTH	200 METH RF ACCESS H
DATE	2001/07/24	TIME	830	AGENCY	Diversified Environmental Services	CREW	BC/TE FISH FORM Y X N

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	17.00	20.00	24.00	30.00	26.90	34.00	25.32	meth	AL
WETTED WIDTH	RF	7.60	10.10	5.40	12.00	8.90	11.00	9.17	6.0	
RES POOL DEPTH	MS	0.16	0.12	0.18	0.14	0.15	0.12	0.15	8.0	
Wb DEPTH	1.40	1.20	1.60	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	5.0	TURBIDITY	
Ph			Clear

COVER

COVER	Total	Trace (5%)				
type	SWD	LWD	B	U	DP	OV	IV
amt	N	T	D	N	T	N	N
loc	P	P	P	P	P	P	P

LWD FNC	Few	DIST	Even
LB SHAPE	Sloping	RB SHAPE	Sloping
TEXTURE	Cobbles	TEXTURE	Cobbles
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Young Forest	STAGE	Young Forest

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
[0]	1	2	3	4	5

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	2.0 m debris line
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	80 D (cm) 80
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	**[B1]**	**[B2]**	B3	D1	D2	D3	**[C1]**	C2
[C3]	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	Side/Mid-stream
COUPLING	Decoupled
1 CONFINED	Unconfined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO		COMMENTS	UTM		
						R	F				
						R	F				
						R	F				

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing for BT.

Upstream of impasse on Gathto Creek mainstem; non fish-bearing.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM4	10	wd	u	view u/s from bottom of site
UM4	11	wd	u	view u/s from centre of site
UM4	12	wd	d	view d/s from top of site
UM4	13	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk		

COMMENTS

C	
C1	Shifting channel on alluvial fan.
CX1	Electro-fishing effort: 308 seconds @ 250 volts. No fish captured.
CX2	Enters non fish-bearing reach of Gathto Creek upstream of mainstem impasse.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Gathto Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Upstream of Gathto mainstem impasses				WATERSHED CODE	212-580800-44400-86400			
WATERBODY ID		NTS MAP	94F/16	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	14	FISH PERMIT #	SC2001-002		
DATE	2001/07/24 to 2001/07/24	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE	

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
14			10.417726.6421025	EF	1	5.0		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
14	EF/1	1	NFC			0				

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	14	EF/1	1	835	850	308	200	9.2	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	

Unnamed tributary to Gathto Creek
Site 14: View downstream from top of site
(Roll UM4 - Exp 12; CD 1 - Im 57)

Unnamed tributary to Gathto Creek
Site 14: Aerial view upstream
(Roll UM4 - Exp 13; CD 1 - Im 58)

APPENDIX XV

KLUACHESI CREEK
(212-580800-48300)

Sample Site 15

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Kluachesi Creek													FIELD COORDINATES	58° 08.05' 123° 35.38'				
LOCATION	Lower Kluachesi Creek																		
NTS MAP #	94J/4	NID NO		WATERSHED CODE	212-580800-48300														
REACH #		SITE #	15	SITE UTM	10	465391	6443699	SITE LENGTH	250	METH	RF	ACCESS	H						
DATE	2001/07/25	TIME	1120	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N						

CHANNEL (m)

	meth							avg	GRADIENT %		
CHANNEL WIDTH	RF	26.00	30.00	36.00	35.50	22.00	15.00	27.42	meth	AL	
WETTED WIDTH	RF	26.00	30.00	24.00	23.50	22.00	15.00	23.42	0.5		2
RES POOL DEPTH	MS	0.24	0.42	0.36	0.18	0.28	0.20	0.28	1.0		
Wb DEPTH	0.70	0.60	0.60	STAGE	Moderate		No Vis Chan		Dry/Int		1
							Dewater		Tribs		

WATER

EMS		COND	
TEMP (°C)	9.5	TURBIDITY	
Ph		Turbid	

MORPHOLOGY

FLOOD SIGNS: 0.6 m - debris

BED MATERIAL

Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	40	D (cm)	36
Morph.	Riffle-pool		

DISTURBANCE INDICATORS

O1	B1	**B2**	B3	**D1**	**D2**	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering		
ISLANDS	None		
BARS	Side/Mid-stream		
COUPLING	Partially Coupled		
CONFINED	Frequently Confined		

COVER

COVER Total: Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	S	S	D	T	S	S	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Clumped
LB SHAPE	Sloping	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Deciduous	RIP. VEG.	Deciduous
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate potential for over-summering GR and MW.
Moderate rearing potential for juvenile GR, MW and BT.
Spawning potential moderate for GR and MW; low for BT.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM7	9	wd	u	view u/s from bottom of site
UM7	10	wd	u	view u/s from centre of site
UM7	11	wd	d	view d/s from top of site
UM7	12	wd	u	aerial view upstream
UM7	13	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose and elk		

COMMENTS

C	
C1	Also significant proportion of fines.
C2	Suspended sediment due to recent rain.
CX1	Electro-fishing effort: 380 seconds @ 350 volts. GR, MW and CCG captured.

FISH COLLECTION FORM

STREAM NAME	Kluachesi Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Lower Kluachesi Creek				WATERSHED CODE	212-580800-48300			
WATERBODY ID		NTS MAP	94J/4	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	15	FISH PERMIT #	SC2001-002		
DATE	2001/07/25 to 2001/07/25	AGENCY	Diversified Environmental Services	CREW	BC/TE	[ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	STREAM CONDITION CON	STREAM CONDITION TURB	COMMENTS
15			10.465391.6443699	EF	1	9.5		T	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
15	EF/1	1	GR			11	75	200	Rearing	
15	EF/1	1	MW			12	96	178	Rearing	
15	EF/1	1	CCG			10	38	90	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	15	EF/1	1	1120	1135	380	250	23.4	O	350	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE AGE	COMMENTS
	15	EF/1	1	GR	200				Scale	15-1	3+	
	15	EF/1	1	MW	150				Scale	15-2	3+	
	15	EF/1	1	MW	160				Scale	15-3	3+	
	15	EF/1	1	GR	100				Scale	15-4	1+	
	15	EF/1	1	GR	77				Scale	15-5	0+	
	15	EF/1	1	MW	178				Scale	15-6	3+	
	15	EF/1	1	MW	105				Scale	15-7	2+	
	15	EF/1	1	MW	130				Scale	15-8	2+	
	15	EF/1	1	MW	119				Scale	15-9	2+	
	15	EF/1	1	MW	130				Scale	15-10	2+	
	15	EF/1	1	MW	135				Scale	15-11	2+	
	15	EF/1	1	MW	112				Scale	15-12	2+	
	15	EF/1	1	GR	122				Scale	15-13	2+	
	15	EF/1	1	GR	150				Scale	15-14	2+	
	15	EF/1	1	GR	106				Scale	15-15	1+	
	15	EF/1	1	MW	110				Scale	15-16	2+	
	15	EF/1	1	MW	96				Scale	15-17	1+	
	15	EF/1	1	GR	126				Scale	15-18	1+	
	15	EF/1	1	GR	101				Scale	15-19	1+	
	15	EF/1	1	GR	104				Scale	15-20	1+	
	15	EF/1	1	GR	75				Scale	15-21	0+	
	15	EF/1	1	GR	78				Scale	15-22	0+	
	15	EF/1	1	MW	121				Scale	15-23	2+	

INDIVIDUAL FISH DATA												
C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	15	EF/1	1	CCG	48							
	15	EF/1	1	CCG	72							
	15	EF/1	1	CCG	52							
	15	EF/1	1	CCG	85							
	15	EF/1	1	CCG	50							
	15	EF/1	1	CCG	47							
	15	EF/1	1	CCG	90							
	15	EF/1	1	CCG	83							
	15	EF/1	1	CCG	50							
	15	EF/1	1	CCG	38							

Kluachesi Creek
Site 15: View upstream from bottom of site
(Roll UM7 - Exp 9; CD 1 - Im 61)

Kluachesi Creek
Site 15: Aerial view of Kluachesi Creek – lower watershed
(Roll UM7 - Exp 13; CD 1 - Im 63)

APPENDIX XVI

KLUACHESI CREEK
(212-580800-48300)

Sample Site 16

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Kluachesi Creek											FIELD COORDINATES	57° 59.91' 123° 51.00'		
LOCATION	Upper Kluachesi Creek														
NTS MAP #	94G/13	NID NO		WATERSHED CODE	212-580800-48300										
REACH #		SITE #	16	SITE UTM	10	449763	6428755	SITE LENGTH	200	METH	RF	ACCESS	H		
DATE	2001/07/25	TIME	1532	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N		

CHANNEL (m)

	meth							avg	GRADIENT %		
CHANNEL WIDTH	RF	16.30	13.00	17.50	14.00	9.00	8.40	13.03	meth	AL	
WETTED WIDTH	RF	16.30	10.00	16.00	14.00	9.00	7.20	12.08	2.0		2
RES POOL DEPTH	MS	0.50	0.32	0.45	0.28	0.30	0.24	0.35	1.5		
Wb DEPTH	0.60	0.50	0.70	STAGE	High		No Vis Chan		Dry/Int		1
							Dewater		Tribs		

WATER

EMS		COND	
TEMP (°C)	12.0	TURBIDITY	
Ph		Lightly Turbid	

FLOOD SIGNS: 0.5 m - debris

COVER

COVER Total: Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	S	S	S	N	D	T	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Fines/Cobble	TEXTURE	Fines/Cobble
RIP. VEG.	Shrubs	RIP. VEG.	Shrubs
STAGE	Shrub/Herb	STAGE	Shrub/Herb

INSTREAM VEGETATION: None

MORPHOLOGY

BED MATERIAL

Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	28	D (cm)	20
Morph.	Riffle-pool		

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	Occasional
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate rearing potential for GR and MW.

Low suitability for BT - high proportion of fines and moderated temperature.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM8	1	wd	u	view u/s from bottom of site
UM8	2	wd	u	view u/s from centre of site
UM8	3	wd	d	view d/s from top of site
UM8	4	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
C1	Also high proportion of fines.
C2	Water slightly turbid due to recent precipitation.
CX1	Electro-fishing effort: 393 seconds @ 250 volts. BT, GR, MW and CCG captured.

FISH COLLECTION FORM

STREAM NAME	Kluachesi Creek							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION	Upper Kluachesi Creek					WATERSHED CODE	212-580800-48300			
WATERBODY ID		NTS MAP	94G/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	16	FISH PERMIT #	SC2001-002			
DATE	2001/07/25 to 2001/07/25	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	CON	TURB	COMMENTS
16			10.449763.6428755	EF	1	12.0		L	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
16	EF/1	1	BT		3+	1	192	192	Rearing	
16	EF/1	1	GR			9	96	325	Rearing	
16	EF/1	1	MW			9	196	204	Rearing	
16	EF/1	1	CCG			2	38	101	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	16	EF/1	1	1540	1555	393	200	12.1	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE AGE	COMMENTS
	16	EF/1	1	GR	325				Scale	16-1	5+	
	16	EF/1	1	GR	325				Scale	16-2	4+	
	16	EF/1	1	GR	208				Scale	16-3	3+	
	16	EF/1	1	GR	156				Scale	16-4	2+	
	16	EF/1	1	MW	204				Scale	16-5	3+	
	16	EF/1	1	GR	100				Scale	16-6	1+	
	16	EF/1	1	GR	96				Scale	16-7	1+	
	16	EF/1	1	GR	228				Scale	16-8	3+	
	16	EF/1	1	MW	229				Scale	16-9	4+	
	16	EF/1	1	MW	289				Scale	16-10	5+	
	16	EF/1	1	MW	305				Scale	16-11	5+	
	16	EF/1	1	GR	110				Scale	16-12	1+	
	16	EF/1	1	GR	109				Scale	16-13	1+	
	16	EF/1	1	MW	181				Scale	16-14	3+	
	16	EF/1	1	BT	192				Scale	16-15	3+	
	16	EF/1	1	MW	205				Scale	16-16	4+	
	16	EF/1	1	MW	200							
	16	EF/1	1	MW	204							
	16	EF/1	1	MW	196							
	16	EF/1	1	CCG	101							
	16	EF/1	1	CCG	38							

Kluachesi Creek
Site 16: View downstream from top of site
(Roll UM8 - Exp 3; CD 1 - Im 66)

Kluachesi Creek
Site 16: Aerial view upstream
(Roll UM8 - Exp 4; CD 1 - Im 67)

APPENDIX XVII

UNNAMED TRIBUTARY TO KLUACHESI CREEK

(212-580800-48300-19500)

Sample Site 17

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Kluachesi Creek	FIELD COORDINATES	58° 05.00' 123° 37.00'
LOCATION			

NTS MAP #	94J/4	NID NO		WATERSHED CODE	212-580800-48300-19500								
REACH #		SITE #	17	SITE UTM	10	463634	6438192	SITE LENGTH	150	METH	RF	ACCESS	H
DATE	2001/07/25	TIME	1240	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM Y	X	N	

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	13.50	11.60	13.20	11.40	12.80	16.00	13.08	meth	AL
WETTED WIDTH	RF	13.50	6.80	7.10	6.20	8.80	8.90	8.55	1.5	
RES POOL DEPTH	MS	0.25	0.10	0.25	0.30	0.25	0.10	0.21	1.5	
Wb DEPTH	1.10	0.85	0.90	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER	
EMS	
COND	
TEMP (°C)	11.5
TURBIDITY	Mod turbid
Ph	

COVER

COVER	Total	Moderate (5-20%)				
type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	S	T	D	N	N
loc	P	P	P	P	P	P	P

LWD FNC	Few	DIST	Clumped
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Fn/Grvl/Bdrck	TEXTURE	Fines/Gravel
RIP. VEG. STAGE	Mixed C & D Mature Forest	RIP. VEG. STAGE	Mixed C & D Mature Forest

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%
	0	**1** (selected)	2	3	4	5

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	0.46 m - flat grass
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	46
D (cm)	12
Morph.	Riffle-pool

DISTURBANCE INDICATORS: O1 B1 **B2** B3 **D1** **D2** **D3** C1 C2 C3 C4 C5 S1 S2 S3 S4 (B2, D1, D2, D3 selected)

PATTERN	Irregular Wandering
ISLANDS	None
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Confined

Gradient scale marks: 2, 1, 3

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO		COMMENTS	UTM
						R	F		
						R	F		
						R	F		

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Good seasonal rearing for GR and MW - adult and juvenile.
Abundant deep pool/run habitat.
Granulars abundant however fines are a significant component.
High shale-like banks coupled and introducing fines.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM7	14	wd	u	view u/s from bottom of site
UM7	15	wd	u	view u/s from centre of site
UM7	16	wd	d	view d/s from top of site
UM7	17	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk		

COMMENTS

C	
Ci	Also significant proportion of boulders.
C2	Water brown/tannic.
C3	Bars infrequent.
CX1	Electro-fishing effort: 444 seconds @ 400 volts. GR captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Kluachesi Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION				WATERSHED CODE	212-580800-48300-19500				
WATERBODY ID		NTS MAP	94J/4	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	17	FISH PERMIT #	SC2001-002		
DATE	2001/07/25 to 2001/07/25	AGENCY	Diversified Environmental Services	CREW	BC/TE	[ ] RE-SAMPLE			

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
17			10.463634.6438192	EF	1	11.5		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
17	EF/1	1	GR			9	66	149	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	17	EF/1	1	1245	1300	444	150	8.6	O	400	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	17	EF/1	1	GR	138				Scale	17-1	2+	
	17	EF/1	1	GR	146				Scale	17-2	2+	
	17	EF/1	1	GR	145				Scale	17-3	2+	
	17	EF/1	1	GR	90				Scale	17-4	1+	
	17	EF/1	1	GR	66				Scale	17-5	0+	
	17	EF/1	1	GR	122				Scale	17-6	1+	
	17	EF/1	1	GR	149				Scale	17-7	2+	
	17	EF/1	1	GR	110							
	17	EF/1	1	GR	144							

Unnamed tributary to Kluachesi Creek
Site 17: View upstream from centre of site
(Roll UM7 - Exp 15; CD 1 - Im 69)

Unnamed tributary to Kluachesi Creek
Site 17: Aerial view upstream
(Roll UM7 - Exp 17; CD 1 - Im 71)

APPENDIX XVIII

TIERNEY CREEK

(212-580800-48300-62200)

Sample Site 18

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Tierney Creek											FIELD COORDINATES	57° 59.89' 123° 46.82'				
LOCATION	Lower Tierny Creek																
NTS MAP #	94J/4	NID NO		WATERSHED CODE	212-580800-48300-62200												
REACH #		SITE #	18	SITE UTM	10	453890	6429364	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/07/25	TIME	1440	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	7.20	7.50	7.00	8.20	7.50	8.10	7.58	meth	AL	TEMP (°C)	8.0	TURBIDITY	
WETTED WIDTH	RF	7.20	7.50	7.00	8.00	7.50	8.00	7.53	0.5		Ph		Lightly Turbid	
RES POOL DEPTH	MS	0.40	0.60	0.30	0.35	0.70	0.35	0.45	1.0		FLOOD SIGNS	0.4 m		
Wb DEPTH	0.20	0.10	0.40	STAGE	Moderate		No Vis Chan		Dry/Int		BED MATERIAL			
							Dewater		Tribs		Dominant	Gravel (2-64 mm)		
											Subdom.	Fines (<2 mm)		
											D95 (cm)	16	D (cm)	10
											Morph.	Riffle-pool		

COVER

COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	T	T	N	S	D	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%
	0	1	2	3	4	5

LWD FNC	Few	DIST	Clumped
LB SHAPE	Sloping	RB SHAPE	Sloping
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: None

MORPHOLOGY

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2	
C3	C4	C5	S1	S2	S3	S4			

1	PATTERN	Irregular Wandering
	ISLANDS	None
2	BARS	Side/Mid-stream
	COUPLING	Decoupled
	CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Good seasonal rearing for GR and MW adults and juveniles.
Deep pool cover abundant.
Limited spawning potential due to high fines.
Low suitability for BT.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM7	22	wd	u	view u/s from bottom of site
UM7	23	wd	u	view u/s from centre of site
UM7	24	wd	d	view d/s from top of site
UM7	25	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose and elk		

COMMENTS

C
C1 Irregular wandering through extensive meadow.
C2 Bars infrequent through reach.
CX1 Electro-fishing effort: 310 seconds @ 250 volts. MW and CCG captured and 1 adult GR missed.

FISH COLLECTION FORM

STREAM NAME	Tierney Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Lower Tierny Creek				WATERSHED CODE	212-580800-48300-62200			
WATERBODY ID		NTS MAP	94J/4	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	18	FISH PERMIT #	SC2001-002		
DATE	2001/07/25 to 2001/07/25	AGENCY	Diversified Environmental Services			CREW	BC/TE	[ ]	RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	STREAM CONDITION CON	STREAM CONDITION TURB	COMMENTS
18			10.453890.6429364	EF	1	8.0		L	
18			10.453890.6429364	VO	1	8.0		L	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
18	EF/1	1	MW			2	285	320	Rearing	
18	EF/1	1	CCG			2	58	84	Rearing	
18	VO/1	1	GR			1	300	300	Rearing	approximate length

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	18	EF/1	1	1440	1455	310	200	7.5	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE AGE	COMMENTS
	18	EF/1	1	MW	285				Scale	18-1	5+	
	18	EF/1	1	MW	320				Scale	18-2	6+	
	18	EF/1	1	CCG	84							
	18	EF/1	1	CCG	58							

Tierney Creek
Site 18: View downstream from top of site
(Roll UM7 - Exp 24; CD 1 - Im 74)

Tierney Creek
Site 18: Aerial view upstream
(Roll UM7 - Exp 25; CD 1 - Im 75)

APPENDIX XIX

TIERNEY CREEK
(212-580800-48300-62200)

Sample Site 19

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Tierney Creek											FIELD COORDINATES	57° 57.79' 123° 46.38'				
LOCATION	Upper Tierny Creek																
NTS MAP #	94G/13	NID NO		WATERSHED CODE	212-580800-48300-62200												
REACH #		SITE #	19	SITE UTM	10	454289	6424833	SITE LENGTH	250	METH	RF	ACCESS	H				
DATE	2001/07/25	TIME	1350	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	11.00	6.00	9.50	8.50	5.40	9.20	8.27	meth	AL	TEMP (°C)	7.0	TURBIDITY	
WETTED WIDTH	RF	11.00	6.00	9.50	8.50	5.40	8.00	8.07	1.0		Ph		Clear	
RES POOL DEPTH	MS	0.35	0.55	0.70	0.42	0.36	0.22	0.43	1.0		FLOOD SIGNS	0.5 m - debris		
Wb DEPTH	0.35	0.40	0.60	STAGE	Moderate	No Vis Chan			Dry/Int	1	BED MATERIAL			
						Dewater			Tribs		Dominant	Gravel (2-64 mm)		
											Subdom.	Fines (<2 mm)		
											D95 (cm)	18	D (cm)	16
											Morph.	Riffle-pool		

COVER

COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	N	T	D	T	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%		
	0	1	2	3	4	5		

LWD FNC	Abundant	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

MORPHOLOGY

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	None
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing habitat for MW and GR.
Good deep pools and LWD cover.
Poor BT spawning potential due to colluvial substrates and fines.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM7	18	wd	u	view u/s from bottom of site
UM7	19	wd	u	view u/s from centre of site
UM7	20	wd	d	view d/s from top of site
UM7	21	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose and elk		

COMMENTS

C
C1 Colluvial substrates with high proportion of fines.
CX1 Electro-fishing effort: 425 seconds @ 250 volts. GR and MW captured.

FISH COLLECTION FORM

STREAM NAME	Tierney Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Upper Tierny Creek				WATERSHED CODE	212-580800-48300-62200			
WATERBODY ID		NTS MAP	94G/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	19	FISH PERMIT #	SC2001-002		
DATE	2001/07/25 to 2001/07/25	AGENCY	Diversified Environmental Services			CREW	BC/TE	[ ]	RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
19			10.454289.6424833	EF	1	7.0		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
19	EF/1	1	GR			1	252	252	Rearing	
19	EF/1	1	MW			2	278	310	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	19	EF/1	1	1355	1410	425	250	8.1	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	19	EF/1	1	MW	310				Scale	19-1	regen	
	19	EF/1	1	MW	278				Scale	19-2	6+	
	19	EF/1	1	GR	252				Scale	19-3	4+	

Tierney Creek
Site 19: View upstream from centre of site
(Roll UM7 - Exp 19; CD 1 - Im 77)

Tierney Creek
Site 19: Aerial view upstream
(Roll UM7 - Exp 21; CD 1 - Im 79)

APPENDIX XX

VARRICK CREEK
(212-580800-54700)

Sample Site 20

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Varrick Creek													FIELD COORDINATES	58° 01.73' 123° 22.87'				
LOCATION	Lower Varick Creek																		
NTS MAP #	94J/3		NID NO		WATERSHED CODE	212-580800-54700													
REACH #			SITE #	20	SITE UTM	10	477504	6431897		SITE LENGTH	250	METH	RF	ACCESS	H				
DATE	2001/07/26		TIME	1118	AGENCY	Diversified Environmental Services				CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	30.00	21.00	25.00	21.00	19.00	21.00	22.83	meth	AL	TEMP (°C)	12.0	TURBIDITY	
WETTED WIDTH	RF	14.50	19.00	19.00	17.50	19.00	21.00	18.33	1.0		Ph		Mod turbid	
RES POOL DEPTH	MS	0.60	0.30	0.18	0.22	0.16	0.24	0.28	2.0		FLOOD SIGNS	1.0 m - debris		
Wb DEPTH	1.10	0.90	1.00	STAGE	Moderate		No Vis Chan		Dry/Int	1	BED MATERIAL			
							Dewater		Tribs		Dominant	Cobble (64-256 mm)		
											Subdom.	Gravel (2-64 mm)		
											D95 (cm)	50	D (cm)	16
											Morph.	Riffle-pool		

COVER

2	COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	S	T	D	S	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%		
0	1	2	3	4	5		

LWD FNC	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: None

MORPHOLOGY

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	Occasional
BARS	Side
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing potential for GR and MW

Low suitability for BT.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM9	2A	wd	u	view u/s from bottom of site
UM9	3A	wd	u	view u/s from centre of site
UM9	4A	wd	d	view d/s from top of site
UM9	5A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
C1	Also significant boulder and fines component.
C2	Turbidity offers abundant cover.
CX1	Electro-fishing effort: 454 seconds @ 250 volts. GR, LSU and CCG captured.

FISH COLLECTION FORM

STREAM NAME	Varrick Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Lower Varick Creek				WATERSHED CODE	212-580800-54700			
WATERBODY ID		NTS MAP	94J/3	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	20	FISH PERMIT #	SC2001-002		
DATE	3001/07/26 to 2001/07/26	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE	

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
20			10.477504.6431897	EF	1	12.0		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
20	EF/1	1	GR			1	84	84	Rearing	
20	EF/1	1	LSU			1	287	287	Rearing	
20	EF/1	1	CCG			2	40	54	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	20	EF/1	1	1125	1140	454	250	18.3	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	20	EF/1	1	LSU	287							
	20	EF/1	1	GR	84							
	20	EF/1	1	CCG	54							
	20	EF/1	1	CCG	40							

Varrick Creek
Site 20: View upstream from bottom of site
(Roll UM9 - Exp 3A; CD 1 - Im 81)

Varrick Creek
Site 20: Aerial view upstream
(Roll UM9 - Exp 5A; CD 1 - Im 83)

APPENDIX XXI

VARRICK CREEK
(212-580800-54700)

Sample Site 21

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Varrick Creek											FIELD COORDINATES	58° 00.04' 123° 33.54'				
LOCATION	Upper Varrick Creek																
NTS MAP #	94J/4	NID NO		WATERSHED CODE	212-580800-54700												
REACH #		SITE #	21	SITE UTM	10	466959	6428921	SITE LENGTH	100	METH	RF	ACCESS	H				
DATE	2001/07/26	TIME	1230	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	MS	4.40	4.80	4.30	5.10	2.30	4.50	4.23	meth	AL	TEMP (°C)	10.0	TURBIDITY	
WETTED WIDTH	MS	4.40	4.50	4.30	4.60	2.30	4.50	4.10	1.5		Ph		Mod turbid	
RES POOL DEPTH	MS	1.20	1.30	0.40	0.60	0.20	0.30	0.67	1.0		FLOOD SIGNS	2.1 m		
Wb DEPTH	0.40	0.50	0.40	STAGE	Moderate		No Vis Chan		Dry/Int		2	BED MATERIAL		
							Dewater		Tribs			Dominant	Cobble (64-256 mm)	
												Subdom.	Gravel (2-64 mm)	
												D95 (cm)	12	D (cm) 7
												Morph.	Riffle-pool	

COVER

COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	N	N	N	S	D	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	None	DIST	
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Shrubs	RIP. VEG.	Shrubs
STAGE	Shrub/Herb	STAGE	Shrub/Herb

INSTREAM VEGETATION: None

MORPHOLOGY

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	None
1 BARS	Side/Mid-stream
COUPLING	Decoupled
CONFINED	Frequently Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Good seasonal rearing potential for juvenile GR and MW - abundant cover.

Potential spawning for GR - granular substrate although somewhat large and high proportion of fines.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM9	6A	wd	u	aerial view upstream
UM9	7A	wd	u	view u/s from bottom of site
UM9	8A	wd	d	view u/s from centre of site
UM9	9A	wd	u	view d/s from top of site

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
C1	Side and mid-channel bars infrequent.
C2	High proportion of fines in substrates.
CX1	Electro-fishing effort: 392 seconds @ 250 volts. GR, MW, LNC and CCG captured.

FISH COLLECTION FORM

STREAM NAME	Varrick Creek							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION	Upper Varrick Creek					WATERSHED CODE	212-580800-54700			
WATERBODY ID		NTS MAP	94J/4	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	21	FISH PERMIT #	SC2001-002			
DATE	2001/07/26 to 2001/07/26	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	CON	TURB	COMMENTS
21			10.466959.6428921	EF	1	10.0		M	
21			10.466959.6428921	VO	1	10.0		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
21	EF/1	1	MW			5	189	258	Rearing	
21	EF/1	1	LNC			1	110	110	Rearing	
21	EF/1	1	CCG			4	73	82	Rearing	
21	VO/1	1	GR			1				Missed during EF

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	21	EF/1	1	1235	1250	392	250	4.1	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE AGE	COMMENTS
	21	EF/1	1	MW	254							
	21	EF/1	1	MW	258							
	21	EF/1	1	MW	240							
	21	EF/1	1	MW	192							
	21	EF/1	1	MW	189							
	21	EF/1	1	LNC	110							
	21	EF/1	1	CCG	73							
	21	EF/1	1	CCG	82							
	21	EF/1	1	CCG	77							
	21	EF/1	1	CCG	76							

Varrick Creek
Site 21: View upstream from bottom of site
(Roll UM9 - Exp 7A; CD 1 - Im 84)

Varrick Creek
Site 21: Aerial view upstream
(Roll UM9 - Exp 6A; CD 1 - Im 87)

APPENDIX XXII

UNNAMED TRIBUTARY TO VARRICK CREEK
(212-580800-54700-74200)

Sample Site 22

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Varrick Creek											FIELD COORDINATES	57° 58.06' 123° 34.72'				
LOCATION																	
NTS MAP #	94G/13	NID NO		WATERSHED CODE	212-580800-54700-74200												
REACH #		SITE #	22	SITE UTM	10	465784	6425239	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/07/26	TIME	1335	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	2.60	3.80	4.40	2.30	3.00	5.10	3.53	meth	AL	TEMP (°C)	8.0	TURBIDITY	
WETTED WIDTH	RF	2.60	3.80	4.40	2.30	3.00	5.10	3.53	1.5		Ph		Lightly Turbid	
RES POOL DEPTH	MS	0.60	0.36	0.48	0.50	0.55	0.42	0.49	1.0		FLOOD SIGNS	0.9 m - debris		
Wb DEPTH	0.40	0.70	0.50	STAGE	Moderate		No Vis Chan		Dry/Int	1	BED MATERIAL			
							Dewater		Tribs		Dominant	Cobble (64-256 mm)		
											Subdom.	Gravel (2-64 mm)		
											D95 (cm)	36	D (cm)	16
											Morph.	Riffle-pool		

COVER

COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	S	T	S	S	D	S	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Shrubs	RIP. VEG.	Shrubs
STAGE	Shrub/Herb	STAGE	Shrub/Herb

INSTREAM VEGETATION: None

MORPHOLOGY

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	None
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Good quality seasonal rearing for GR, MW.
Abundant cover (deep pool, boulder, undercut).
Spawning potential limited.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM9	10A	wd	u	view u/s from centre of site
UM9	11A	wd	u	view d/s from top of site
UM9	12A	wd	d	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk, moose, wolf		

COMMENTS

C
C1 Also significant boulder and fines component in substrate.
CX1 Electro-fishing effort: 270 seconds @ 250 volts.GR and MW captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Varrick Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	212-580800-54700-74200			
WATERBODY ID		NTS MAP	94G/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	22	FISH PERMIT #	SC2001-002		
DATE	2001/07/26 to 2001/07/26	AGENCY	Diversified Environmental Services			CREW	BC/TE	[ ]	RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
22			10.465784.6425239	EF	1	8.0		L	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
22	EF/1	1	GR			1	168	168	Rearing	
22	EF/1	1	MW			3	235	275	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	22	EF/1	1	1340	1355	270	200	3.5	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	22	EF/1	1	GR	168							
	22	EF/1	1	MW	225							
	22	EF/1	1	MW	235							
	22	EF/1	1	MW	275							

Unnamed tributary to Varrick Creek
Site 22: View upstream from centre of site
(Roll UM9 - Exp 10A; CD 1 - Im 88)

Unnamed tributary to Varrick Creek
Site 22: Aerial view upstream
(Roll UM9 - Exp 12A; CD 1 - Im 90)

APPENDIX XXIII

UNNAMED TRIBUTARY TO MUSKWA RIVER
(212-580800-55600)

Sample Site 23

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Muskwa River											FIELD COORDINATES	58° 01.05' 123° 20.31'				
LOCATION																	
NTS MAP #	94J/3	NID NO		WATERSHED CODE	212-580800-55600												
REACH #		SITE #	23	SITE UTM	10	480250	6430736	SITE LENGTH	150	METH	RF	ACCESS	H				
DATE	2001/07/25	TIME	1720	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	13.80	14.30	9.50	13.80	9.00	13.00	12.23	meth	AL
WETTED WIDTH	RF	13.30	8.20	9.50	13.80	8.00	8.50	10.22	1.5	
RES POOL DEPTH	MS	0.70	0.85	0.65	0.71	0.43	0.80	0.69	1.0	
Wb DEPTH	0.60	0.50	0.65	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	12.0	TURBIDITY	
Ph		Mod turbid	

COVER

COVER	Total	Abundant (>20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	S	S	N	T	D	T	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%
	0	1	2	3	4	5

LWD FNC	Abundant	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Fines/Gravel	TEXTURE	Fines/Gravel
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	0.5 m - flat grass
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	23
D (cm)	11
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	None
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing for GR and MW, although turbid.

High fines in substrates.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM8	5	wd	u	view u/s from bottom of site
UM8	6	wd	u	view u/s from centre of site
UM8	7	wd	d	view d/s from top of site
UM8	8	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C

C1 Also significant proportion of fines.

CX1 Electro-fishing effort:393 seconds @ 250 volts. GR, MW and CCG captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Muskwa River						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	212-580800-55600			
WATERBODY ID		NTS MAP	94J/3	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	23	FISH PERMIT #	SC2001-002		
DATE	2001/07/25 to 2001/07/25	AGENCY	Diversified Environmental Services	CREW	BC/TE	[ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
23			10.480250.6430736	EF	1	12.0		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
23	EF/1	1	GR			8	85	244	Rearing	
23	EF/1	1	MW			11	75	254	Rearing	
23	EF/1	1	CCG			3	67	76	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	23	EF/1	1	1725	1740	393	150	10.2	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	23	EF/1	1	GR	244				Scale	23-1	4+	
	23	EF/1	1	MW	254				Scale	23-2	6+	
	23	EF/1	1	GR	209				Scale	23-3	2+	
	23	EF/1	1	MW	166				Scale	23-4	2+	
	23	EF/1	1	MW	82				Scale	23-5	1+	
	23	EF/1	1	GR	158				Scale	23-6	2+	
	23	EF/1	1	GR	150				Scale	23-7	2+	
	23	EF/1	1	GR	91				Scale	23-8	1+	
	23	EF/1	1	MW	75				Scale	23-9	1+	
	23	EF/1	1	MW	142							
	23	EF/1	1	MW	134							
	23	EF/1	1	MW	122							
	23	EF/1	1	MW	134							
	23	EF/1	1	MW	79							
	23	EF/1	1	MW	95							
	23	EF/1	1	MW	80							
	23	EF/1	1	CCG	76							
	23	EF/1	1	CCG	71							
	23	EF/1	1	CCG	67							
	23	EF/1	1	GR	91							
	23	EF/1	1	GR	85							
	23	EF/1	1	GR	94							

Unnamed tributary to Muskwa River
Site 23: View downstream from top of site
(Roll UM8 - Exp 7; CD 1 - Im 92)

Unnamed tributary to Muskwa River
Site 23: Aerial view upstream
(Roll UM8 - Exp 8; CD 1 - Im 93)

APPENDIX XXIV

WENGER CREEK
(212-580800-60500)

Sample Site 24

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Wenger Creek											FIELD COORDINATES	57° 55.15'	123° 19.78'	
LOCATION	Lower Wenger Creek														
NTS MAP #	94G/14	NID NO		WATERSHED CODE	212-580800-60500										
REACH #		SITE #	24	SITE UTM	10	480417	6419841	SITE LENGTH	200	METH	RF	ACCESS	H		
DATE	2001/07/26	TIME	1700	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N		

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	9.00	8.20	6.40	9.60	12.00	10.20	9.23	meth	AL
WETTED WIDTH	RF	9.00	8.20	6.40	9.60	8.90	10.20	8.72	1.0	
RES POOL DEPTH	MS	0.40	0.18	0.12	0.58	0.24	0.36	0.31	0.5	
Wb DEPTH	0.70	0.65	0.70	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	14.0	TURBIDITY	
Ph		Mod turbid	

FLOOD SIGNS: 0.7 m - debris

COVER

COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	T	S	D	T	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

MORPHOLOGY

BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Fines (<2 mm)		
D95 (cm)	36	D (cm)	12
Morph.	Riffle-pool		

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	Occasional
BARS	Side
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing potential for GR and MW.
Suitability for spawning limited due to high proportion of fines in substrate.
Seasonal access for GR and MW may be restricted by tortuously meandering, large channel, deadwater reach downstream (immediately upstream of Muskwa River).

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM10	1A	wd	u	view u/s from bottom of site
UM10	2A	wd	u	view u/s from centre of site
UM10	3A	wd	d	view d/s from top of site
UM10	7A	wd	u	aerial view upstream
UM10	8A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 552 seconds @ 400 volts. GR, LNC, LKC and CCG captured.

FISH COLLECTION FORM

STREAM NAME	Wenger Creek								
LOCATION	Lower Wenger Creek					WATERSHED CODE	212-580800-60500		
WATERBODY ID		NTS MAP	94G/14	NID NO		SITE/LAKE CARD ATTACHED	X Y		N
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	24	FISH PERMIT #	SC2001-002		
DATE	2001/07/26	to	2001/07/26	AGENCY	Diversified Environmental Services	CREW	BC/TE		RE-SAMPLE

LAKE [ ] STREAM [X] WETLAND [ ]

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
24			10.480417.6419841	EF	1	14.0		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
24	EF/1	1	GR			2	81	139	Rearing	
24	EF/1	1	LNC			3	49	120	Rearing	
24	EF/1	1	LKC			2	64	106	Rearing	
24	EF/1	1	CCG			5	44	70	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	24	EF/1	1	1700	1725	552	400	8.7	O	400	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	24	EF/1	1	GR	139				Scale	24-1	2+	
	24	EF/1	1	GR	81				Scale	24-2	1+	
	24	EF/1	1	LNC	120							
	24	EF/1	1	LNC	89							
	24	EF/1	1	LNC	49							
	24	EF/1	1	LKC	106							
	24	EF/1	1	LKC	64							
	24	EF/1	1	CCG	70							
	24	EF/1	1	CCG	44							
	24	EF/1	1	CCG	69							
	24	EF/1	1	CCG	65							
	24	EF/1	1	CCG	48							

Wenger Creek
Site 24: View downstream from top of site
(Roll UM10 - Exp 3A; CD 1 - Im 96)

Wenger Creek
Site 24: Aerial view upstream
(Roll UM10 - Exp 7A; CD 1 - Im 97)

APPENDIX XXV

WENGER CREEK
(212-580800-60500)

Sample Site 25

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Wenger Creek											FIELD COORDINATES	57° 51.39' 123° 22.90'				
LOCATION																	
NTS MAP #	94G/14	NID NO		WATERSHED CODE	212-580800-60500												
REACH #		SITE #	25	SITE UTM	10	477348	6412798	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/07/26	TIME	1622	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		
CHANNEL WIDTH	MS	3.10	1.84	2.63	3.20	2.90	3.20	2.81	meth	AL	
WETTED WIDTH	MS	3.10	1.84	2.63	3.10	2.80	3.20	2.78	1.0		1
RES POOL DEPTH	MS	0.40	0.30	1.40	0.90	1.30	0.60	0.82	1.0		
Wb DEPTH	0.60	0.50	0.60	STAGE	Moderate		No Vis Chan		Dry/Int		2
							Dewater		Tribs		

EMS		COND	
TEMP (°C)	11.0	TURBIDITY	
Ph		Clear	

COVER

	COVER	Total	Abundant (>20%)					CROWN CLOSURE							
type	SWD	LWD	B	U	DP	OV	IV								
amt	T	N	T	T	D	T	N								
loc	P	P	P	P	P	P	P	0%	1-20%	21-40%	41-70%	71-90%	>90%		
LWD FNC	None	DIST													
LB SHAPE	Vertical	RB SHAPE	Vertical					0	1	2	3	4	5		
TEXTURE	Fines	TEXTURE	Fines					INSTREAM	Moss						
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous					VEGETATION							
STAGE	Mature Forest	STAGE	Mature Forest												

MORPHOLOGY

FLOOD SIGNS	1.0 m		
BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	25	D (cm)	14
Morph.	Riffle-pool		

DISTURBANCE INDICATORS									
O1	B1	B2	B3	D1	D2	D3	C1	C2	
C3	C4	C5	S1	S2	S3	S4			

PATTERN	Sinuous
ISLANDS	None
BARS	Side
COUPLING	Decoupled
CONFINED	Frequently Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Excellent seasonal rearing for GR and MW - deep pools, abundant cover.
High fines in substrate may limit spawning.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM9	22A	wd	u	view u/s from bottom of site
UM9	23A	wd	u	view u/s from centre of site
UM9	24A	wd	d	view d/s from top of site
UM9	25A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk, moose		

COMMENTS

C	
C1	Water dark tannic but clear.
C2	Trace boulders present.
CX1	Electro-fishing effort: 317 seconds @ 400 volts. CCG captured.

FISH COLLECTION FORM

STREAM NAME	Wenger Creek							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION						WATERSHED CODE	212-580800-60500			
WATERBODY ID		NTS MAP	94G/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	25	FISH PERMIT #	SC2001-002			
DATE	2001/07/26 to 2001/07/26	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
25			10.477348.6412798	EF	1	11.0		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
25	EF/1	1	CCG			2	66	73	Rearing	

GEAR SPECS

								NET / TRAP SPECIFICATIONS					
C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	25	EF/1	1	1630	1645	317	200	2.8	O	400	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	25	EF/1	1	CCG	73							
	25	EF/1	1	CCG	66							

Wenger Creek
Site 25: View upstream from bottom of site
(Roll UM9 - Exp 22A; CD 1 - Im 98)

Wenger Creek
Site 25: Aerial view upstream
(Roll UM9 - Exp 25A; CD 2 - Im 101)

APPENDIX XXVI

UNNAMED TRIBUTARY TO MUSKWA RIVER
(212-580800-62000)

Sample Site 26

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Muskwa River											FIELD COORDINATES	57° 55.65' 123° 23.84'				
LOCATION																	
NTS MAP #	94G/14	NID NO		WATERSHED CODE	212-580800-62000												
REACH #	1	SITE #	26	SITE UTM	10	476416	6420776	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/07/25	TIME	1810	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	2.40	2.00	2.20	3.40	2.90	2.20	2.52	meth	AL
WETTED WIDTH	RF	2.40	2.00	2.20	2.80	2.20	2.20	2.30	1.0	
RES POOL DEPTH	MS	0.30	0.14	0.28	0.70	0.52	0.24	0.36	1.0	
Wb DEPTH	0.36	0.42	0.34	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	13.5	TURBIDITY	
Ph		Mod turbid	

COVER

COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	S	N	T	S	D	S	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%
	0	1	2	3	4	5

LWD FNC	None	DIST	
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Grass	RIP. VEG.	Grass
STAGE	Initial	STAGE	Initial

INSTREAM VEGETATION	None

MORPHOLOGY

FLOOD SIGNS	0.8 m - debris		
BED MATERIAL			
Dominant	Fines (<2 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	15	D (cm)	15
Morph.	Riffle-pool		

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	Side
COUPLING	Partially Coupled
CONFINED	Frequently Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing for juvenile GR and MW.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM8	9	wd	u	view u/s from bottom of site
UM8	10	wd	u	view u/s from centre of site
UM8	11	wd	d	view d/s from top of site
UM8	12	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk		

COMMENTS

C	
CX1	Electro-fishing effort: 414 seconds @ 250 volts. GR, MW and CCG captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Muskwa River							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION						WATERSHED CODE	212-580800-62000			
WATERBODY ID		NTS MAP	94G/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	26	FISH PERMIT #	SC2001-002			
DATE	2001/07/25 to 2001/07/25	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
26			10.476416.6420776	EF	1	13.5		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
26	EF/1	1	GR			1	145	145	Rearing	
26	EF/1	1	MW			4	62	101	Rearing	
26	EF/1	1	CCG			1	60	60	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	26	EF/1	1	1815	1830	414	200	2.3	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	26	EF/1	1	GR	145				Scale	26-1	2+	
	26	EF/1	1	MW	101				Scale	26-2	2+	
	26	EF/1	1	MW	71				Scale	26-3	1+	
	26	EF/1	1	MW	70							
	26	EF/1	1	MW	62							
	26	EF/1	1	CCG	60							

Unnamed tributary to Muskwa River
Site 26: View upstream from centre of site
(Roll UM8 - Exp 10; CD 2 - Im 103)

Unnamed tributary to Muskwa River
Site 26: Aerial view upstream
(Roll UM8 - Exp 12; CD 2 - Im 105)

APPENDIX XXVII

REIMER CREEK
(212-580800-64400)

Sample Site 27

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Reimer Creek											FIELD COORDINATES	57° 54.82' 123° 30.84'				
LOCATION																	
NTS MAP #	94G/13	NID NO		WATERSHED CODE	212-580800-64400												
REACH #		SITE #	27	SITE UTM	10	469560	6419279	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/07/26	TIME	1430	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	9.50	8.80	9.60	10.20	12.10	10.90	10.18	meth	AL
WETTED WIDTH	RF	8.10	5.20	7.50	8.60	8.60	10.90	8.15	1.0	
RES POOL DEPTH	MS	0.14	0.25	0.26	0.35	0.52	0.36	0.31	1.5	
Wb DEPTH	0.70			STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	8.5	TURBIDITY	
Ph		Mod turbid	

FLOOD SIGNS 0.75 m

BED MATERIAL

Dominant	Gravel (2-64 mm)		
Subdom.	Fines (<2 mm)		
D95 (cm)	4	D (cm)	4
Morph.	Riffle-pool		

COVER

COVER	Total	Abundant (>20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	S	S	N	T	D	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Abundant	DIST	Even
LB SHAPE	Sloping	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: None

MORPHOLOGY

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	None
BARS	Side/Mid-stream
COUPLING	Decoupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Good seasonal rearing for GR and MW - abundant cover.

Spawning potential limited by very high proportions of fines in substrate.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM9	13A	wd	u	view u/s from bottom of site
UM9	14A	wd	u	view u/s from centre of site
UM9	15A	wd	d	view d/s from top of site
UM9	16A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk		

COMMENTS

C	
CX1	Electro-fishing effort: 239 seconds @ 250 volts. GR, CCG and MW captured.

FISH COLLECTION FORM

STREAM NAME	Reimer Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	212-580800-64400			
WATERBODY ID		NTS MAP	94G/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	27	FISH PERMIT #	SC2001-002		
DATE	2001/07/26 to 2001/07/26	AGENCY	Diversified Environmental Services	CREW	BC/TE	[ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
27			10.469560.6419279	EF	1	8.5		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
27	EF/1	1	GR			2	80	95	Rearing	
27	EF/1	1	MW			7	118	248	Rearing	
27	EF/1	1	CCG			1	72	72	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	27	EF/1	1	1435	1450	239	200	8.2	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	27	EF/1	1	MW	205				Scale	27-1	3+	
	27	EF/1	1	MW	248				Scale	27-2	6+	
	27	EF/1	1	MW	228				Scale	27-3	5+	
	27	EF/1	1	MW	200				Scale	27-4	4+	
	27	EF/1	1	MW	178				Scale	27-5	3+	
	27	EF/1	1	MW	192				Scale	27-6	4+	
	27	EF/1	1	MW	118				Scale	27-7	2+	
	27	EF/1	1	GR	95				Scale	27-8	1+	
	27	EF/1	1	GR	80				Scale	27-9	1+	
	27	EF/1	1	CCG	72							

Reimer Creek
Site 27: View upstream from bottom of site
(Roll UM9 - Exp 13A; CD 2 - Im 106)

Reimer Creek
Site 27: Aerial view upstream
(Roll UM9 - Exp 16A; CD 2 - Im 109)

APPENDIX XXVIII

PUDER CREEK
(212-580800-64700)

Sample Site 28

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Puder Creek aka "Wildhorse Creek"										FIELD COORDINATES	57° 49.53' 123° 28.96'			
LOCATION															
NTS MAP #	94G/14	NID NO		WATERSHED CODE	212-580800-64700										
REACH #		SITE #	28	SITE UTM	10	471317	6409385		SITE LENGTH	200	METH	RF	ACCESS	H	
DATE	2001/07/26	TIME	1530	AGENCY	Diversified Environmental Services				CREW	BC/TE	FISH FORM	Y	X	N	

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	5.40	8.90	9.10	9.00	8.90	6.50	7.97	meth	AL	TEMP (°C)	9.0	TURBIDITY	
WETTED WIDTH	RF	5.40	8.90	5.00	7.00	8.90	6.50	6.95	1.0		Ph		Lightly Turbid	
RES POOL DEPTH	MS	0.18	0.40	0.30	0.12	0.16	0.24	0.23	1.0		FLOOD SIGNS	0.6 m - debris		
Wb DEPTH	0.70	0.40	0.55	STAGE	Moderate		No Vis Chan		Dry/Int	1	BED MATERIAL			
							Dewater		Tribs		Dominant	Cobble (64-256 mm)		
											Subdom.	Boulder (> 256 mm)		
											D95 (cm)	50	D (cm)	18
											Morph.	Riffle-pool		

COVER

COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	S	S	D	S	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

MORPHOLOGY

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	Side
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

High quality seasonal rearing for GR and MW.
Spawning potential limited due to lack of gravels.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM9	17A	wd	u	view u/s from bottom of site
UM9	18A	wd	u	view u/s from centre of site
UM9	19A	wd	d	view d/s from top of site
UM9	20A	wd	u	upstream aerial view of site
UM9	21A	wd	u	upstream aerial basin view

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose		

COMMENTS

C
C1 Also significant proportion of fines.
CX1 Electro-fishing effort: 462 seconds @ 250 volts. GR and MW captured.

FISH COLLECTION FORM

STREAM NAME	Puder Creek "Wildhorse Creek"							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION						WATERSHED CODE	212-580800-64700			
WATERBODY ID		NTS MAP	94G/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	28	FISH PERMIT #	SC2001-002			
DATE	2001/07/26 to 2001/07/26	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
28			10.471317.6409385	EF	1	9.0		L	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
28	EF/1	1	GR			4	190	254	Rearing	
28	EF/1	1	MW			1	199	199	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	28	EF/1	1	1535	1550	462	200	6.9	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	28	EF/1	1	GR	210		F		Scale	28-1	2+	
	28	EF/1	1	GR	254		F		Scale	28-2	3+	
	28	EF/1	1	GR	202		F		Scale	28-3	2+	
	28	EF/1	1	GR	190		F		Scale	28-4	2+	
	28	EF/1	1	MW	199				Scale	28-5	3+	

Puder Creek
Site 28: View upstream from bottom of site
(Roll UM9 - Exp 17A; CD 2 - Im 110)

Puder Creek
Site 28: Upstream aerial view of site
(Roll UM9 - Exp 20A; CD 2 - Im 113)

APPENDIX XXIX

CREHAN CREEK
(212-580800-71000)

Sample Site 29

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Crehan Creek aka "Beaver Creek"	FIELD COORDINATES	57° 49.52' 123° 42.83'
LOCATION	Lower Crehan Creek		

NTS MAP #	94G/13	NID NO		WATERSHED CODE	212-580800-71000						
REACH #		SITE #	29	SITE UTM	10	457683	6409519	SITE LENGTH	200	METH RF	ACCESS H
DATE	2001/07/26	TIME	945	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM Y X N	

CHANNEL (m)	meth						avg	GRADIENT %	
CHANNEL WIDTH	RF	100.00	110.00	125.00	95.00	65.00	65.00	93.33	meth AL
WETTED WIDTH	RF	27.00	35.00	33.00	31.00	31.00	40.00	32.83	1.5
RES POOL DEPTH	MS	1.50	1.20	0.40	0.25	0.21	0.37	0.66	1.0
Wb DEPTH	1.30	1.40	1.30	STAGE	Moderate		No Vis Chan		Dry/Int
							Dewater		Tribs

WATER

EMS		COND	
TEMP (°C)	6.0	TURBIDITY	
Ph			Lightly Turbid

COVER

COVER	Total	Moderate (5-20%)					
type	SWD	LWD	B	U	DP	OV	IV
amt	T	T	D	N	S	N	N
loc	P	P	P	P	P	P	P

LWD FNC	Few	DIST	Clumped
LB SHAPE	Sloping	RB SHAPE	Sloping
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Mature Forest	STAGE	Mature Forest

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
[0]	1	2	3	4	5

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	0.5 m debris
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	59
D (cm)	18
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	**[B2]**	B3	**[D1]**	**[D2]**	D3	C1	C2
[C3]	**[C4]**	C5	S1	S2	S3	**[S4]**		

PATTERN	Sinuous
ISLANDS	Irregular
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO		COMMENTS	UTM
						R	F		
						R	F		
						R	F		

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Good seasonal rearing for adult MW - ample boulder cover.
Moderate seasonal rearing for adult GR - pools infrequent, turbid.
Limited LWD cover for adult BT.
Moderate seasonal rearing for juvenile GR, MW and BT.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM8	23	wd	u	view u/s from bottom of site
UM8	24	wd	u	view u/s from centre of site
UM8	25	wd	d	view d/s from top of site
UM9	1A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk, wolf tracks		

COMMENTS

C	
CX1	Site is situated in wide, braided reach of Crehan Creek.
CX2	Electro-fishing effort: 604 seconds @ 250 volts. BT, MW and CCG captured.

FISH COLLECTION FORM

STREAM NAME	Crehan Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Lower Crehan Creek				WATERSHED CODE	212-580800-71000			
WATERBODY ID		NTS MAP	94G/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	29	FISH PERMIT #	SC2001-002		
DATE	2001/07/26 to 2001/07/26	AGENCY	Diversified Environmental Services			CREW	BC/TE	[ ]	RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
29			10.457683.6409519	EF	1	6.0		L	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
29	EF/1	1	BT			2	60	550	Rearing	
29	EF/1	1	MW			4	106	187	Rearing	
29	EF/1	1	CCG			6	64	78	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	29	EF/1	1	950	1005	604	200	32.8	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	29	EF/1	1	BT	60				Scale	29-1	0+	
	29	EF/1	1	BT	550		F		Fin ray	29-2	11+	
	29	EF/1	1	MW	187							
	29	EF/1	1	MW	110							
	29	EF/1	1	MW	146							
	29	EF/1	1	MW	106							
	29	EF/1	1	CCG	78							
	29	EF/1	1	CCG	70							
	29	EF/1	1	CCG	69							
	29	EF/1	1	CCG	79							
	29	EF/1	1	CCG	74							
	29	EF/1	1	CCG	64							

Crehan Creek
Site 29: View upstream from bottom of site
(Roll UM8 - Exp 23; CD 2 - Im 115)

Crehan Creek
Site 29: Aerial view upstream
(Roll UM9 - Exp 1A; CD 2 - Im 118)

APPENDIX XXX

UNNAMED TRIBUTARY TO CREHAN CREEK

(212-580800-71000-47800)

Sample Site 30

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Crehan Creek													FIELD COORDINATES	57° 45.20' 123° 46.41'				
LOCATION	Bull trout spawning zone																		
NTS MAP #	94G/13		NID NO		WATERSHED CODE	212-580800-71000-47800													
REACH #			SITE #	30	SITE UTM	10	453806	6401571		SITE LENGTH	300	METH	RF	ACCESS	H				
DATE	2001/08/27		TIME	1520	AGENCY	Diversified Environmental Services				CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	60.00	29.00	29.50	27.00	20.50	9.00	29.17	meth	AL
WETTED WIDTH	RF	7.20	8.60	8.20	7.50	6.50	5.25	7.21	4.0	
RES POOL DEPTH	MS	0.41	0.40	0.06	0.15	0.20	0.18	0.23	3.5	
Wb DEPTH	0.65	0.55	0.65	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	X 2

WATER

EMS		COND	
TEMP (°C)	9.0	TURBIDITY	
Ph		Clear	

FLOOD SIGNS 0.46 m - RD

COVER

	COVER	Total	Abundant (>20%)					
type	SWD	LWD	B	U	DP	OV	IV	CROWN CLOSURE
amt	T	N	D	T	S	S	N	
loc	P	P	P	P	P	P	P	

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%		
	0	1	2	3	4	5		

LWD FNC	None	DIST	
LB SHAPE	Sloping	RB SHAPE	Sloping
TEXTURE	Gravel/Cobble	TEXTURE	Gravel/Cobble
RIP. VEG.	Shrubs	RIP. VEG.	Shrubs
STAGE	Shrub/Herb	STAGE	Shrub/Herb

INSTREAM VEGETATION: Algae

MORPHOLOGY

BED MATERIAL	
Dominant	Gravel (2-64 mm)
Subdom.	Cobble (64-256 mm)
D95 (cm)	46 D (cm) 28
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4	S5	

PATTERN	Sinuous
ISLANDS	Occasional
BARS	Side/Mid-stream
COUPLING	Decoupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Suitable habitat available for BT spawning.
Moderate potential for BT juvenile rearing but side channel habitat somewhat limited in abundance - no YOY captured.
High flows in July 2001 may have flushed YOY lower downstream.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
CR1	4	wd	u	view u/s from bottom of site
CR1	5	wd	u	view u/s from centre of site
CR1	6	wd	d	view d/s from top of site
CR1	7	wd	u	upstream aerial view of site
CR1	8	wd	u	upstream aerial basin view
T2	10	std	obj	700 mm male BT
T2	12	std	obj	700 mm male BT
T2	13	std	obj	605 mm female BT

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose, elk, wolf, grizzly		

COMMENTS

C	
C1	Also significant boulder component.
C2	Wide channel; braided.
CX1	Mature adult bull trout observed on redds.
CX2	Electro-fishing effort: 594 seconds @ 250 volts: juvenile bull trout captured; adult bull trout angled.
CX3	Adult mountain whitefish and Arctic grayling also observed.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Crehan Creek							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION	Bull trout spawning zone					WATERSHED CODE	212-580800-71000-47800			
WATERBODY ID		NTS MAP	94G/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	30	FISH PERMIT #	SC2001-002			
DATE	2001/08/27 to 2001/08/27	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	CON	TURB	COMMENTS
30			10.453806.6401571	EF	1	9.0		C	
30			10.453806.6401571	VO	1	9.0		C	
30			10.453806.6401571	AG	1	9.0		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
30	EF/1	1	BT			9	82	122	Rearing	
30	VO/1	1	GR							
30	VO/1	1	MW							
30	AG/1	1	BT			3	466	700	Spawning	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	30	EF/1	1	1525	1600	594	300	7.21	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE AGE	COMMENTS
	30	EF/1	1	BT	90				Scale	30-4	1+	
	30	EF/1	1	BT	84				Scale	30-5	1+	
	30	EF/1	1	BT	122				Scale	30-6	1+	
	30	EF/1	1	BT	120				Scale	30-7	1+	
	30	EF/1	1	BT	92							
	30	EF/1	1	BT	88							
	30	EF/1	1	BT	84							
	30	EF/1	1	BT	84							
	30	EF/1	1	BT	87							
	30	AG/1	1	BT	466		M	Spawning	Fin ray	30-1	9+	
	30	AG/1	1	BT	700		M	Spawning	Fin ray	30-2	13+	
	30	AG/1	1	BT	605		F	Spawning	Fin ray	30-3	12+	

Unnamed tributary to Crehan Creek
Site 30: View upstream from bottom of site
(Roll CR1 - Exp 4; CD 2 - Im 119)

Unnamed tributary to Crehan Creek
Site 30: Upstream aerial view of site
(Roll CR1 - Exp 7; CD 2 - Im 122)

APPENDIX XXXI

UNNAMED TRIBUTARY TO CREHAN CREEK
(212-580800-71000-47800)

Sample Site 31

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Crehan Creek											FIELD COORDINATES	57° 44.21' 123° 47.91'				
LOCATION																	
NTS MAP #	94G/12	NID NO		WATERSHED CODE	212-580800-71000-47800												
REACH #		SITE #	31	SITE UTM	10	452457	6399678	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/08/27	TIME	1145	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	meth	AL
CHANNEL WIDTH	RF	9.40	6.40	7.60	5.50	9.00	6.80	7.45		
WETTED WIDTH	RF	7.40	4.70	5.90	4.90	8.50	4.20	5.93	4.0	
RES POOL DEPTH	MS	0.18	0.10	0.12	0.16	0.18	0.13	0.15	4.0	
Wb DEPTH	0.60	0.50	0.55	STAGE	Moderate				Dry/Int	
						No Vis Chan			Tribs	
						Dewater				

GRADIENT %

WATER

EMS		COND	
TEMP (°C)	7.0	TURBIDITY	
Ph		Clear	

COVER

	Total	Moderate (5-20%)					
type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	D	T	S	N	N
loc	P	P	P	P	P	P	P

LWD FNC	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Young Forest	STAGE	Young Forest

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

INSTREAM VEGETATION	None

MORPHOLOGY

FLOOD SIGNS	0.9 m - RD
BED MATERIAL	
Dominant	Gravel (2-64 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	75
D (cm)	38
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	Occasional
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing potential for juvenile BT.

Poor spawning. High quality spawning habitat on d/s reach.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
CR1	1	wd	u	view u/s from bottom of site
CR1	2	wd	u	view u/s from centre of site
CR1	3	wd	d	view d/s from top of site

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 414 seconds @ 250 volts. Bull trout and Arctic grayling captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Crehan Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	212-580800-71000-47800			
WATERBODY ID		NTS MAP	94G/12	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	31	FISH PERMIT #	SC2001-002		
DATE	2001/08/27 to 2001/08/27	AGENCY	Diversified Environmental Services			CREW	BC/TE	[ ]	RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
31			10.452457.6399678	EF	1	7.0		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
31	EF/1	1	BT			4	123	175	Rearing	
31	EF/1	1	GR			1	220	220	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	31	EF/1	1	1150	1210	414	200	5.93	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	31	EF/1	1	BT	175				Scale	31-1	2+	
	31	EF/1	1	BT	169				Scale	31-2	2+	
	31	EF/1	1	BT	171				Scale	31-3	2+	
	31	EF/1	1	BT	123				Scale	31-4	1+	
	31	EF/1	1	GR	220				Scale	31-5	3+	

Unnamed tributary to Crehan Creek
Site 31: View upstream from bottom of site
(Roll CR1 - Exp 1; CD 2 - Im 124)

Unnamed tributary to Crehan Creek
Site 31: View downstream from top of site
(Roll CR1 - Exp 3; CD 2 - Im 126)

APPENDIX XXXII

UNNAMED TRIBUTARY TO CREHAN CREEK
(212-580800-71000-77600)

Sample Site 32

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Crehan Creek											FIELD COORDINATES	57° 45.03' 123° 54.50'				
LOCATION																	
NTS MAP #	94G/13	NID NO		WATERSHED CODE	212-580800-71000-77600												
REACH #		SITE #	32	SITE UTM	10	445690	6401401	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/08/27	TIME	1020	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	10.20	8.00	9.50	10.50	15.00	11.20	10.73	meth	AL
WETTED WIDTH	RF	5.50	6.00	9.50	10.20	6.80	6.50	7.42	2.5	
RES POOL DEPTH	MS	0.54	0.50	0.14	0.20	0.15	0.40	0.32	2.5	
Wb DEPTH	0.75	0.60	0.65	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	7.0	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	N	T	T	T	D	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%		
	0	1	2	3	4	5		

LWD FNC	None	DIST	
LB SHAPE	Sloping	RB SHAPE	Sloping
TEXTURE	Gravel/Cobble	TEXTURE	Gravel/Cobble
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION	Algae

MORPHOLOGY

FLOOD SIGNS	0.0 m - RD		
BED MATERIAL			
Dominant	Gravel (2-64 mm)		
Subdom.	Cobble (64-256 mm)		
D95 (cm)	45	D (cm)	18
Morph.	Riffle-pool		

DISTURBANCE INDICATORS									
O1	B1	B2	B3	D1	D2	D3	C1	C2	
C3	C4	C5	S1	S2	S3	S4			

PATTERN	Sinuous
ISLANDS	Occasional
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Frequently Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing potential for MW, GR and BT although LWD cover is absent and deep pool habitat is limited.

Low gradient, meandering reach downstream on Crehan mainstem may limit BT use.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
CF1	20A	wd	u	view u/s from bottom of site
CF1	21A	wd	u	view u/s from centre of site
CF1	22A	wd	d	view d/s from top of site
CF1	23A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose. Elk		

COMMENTS

C	
CX1	Electrofishing effort: 621 seconds @ 250 volts. Arctic grayling and mountain whitefish captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Crehan Creek								[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION						WATERSHED CODE	212-580800-71000-77600				
WATERBODY ID		NTS MAP	94G/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N			
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	32	FISH PERMIT #	SC2001-002				
DATE	2001/08/27	to	2001/08/27	AGENCY	Diversified Environmental Services	CREW	BC/TE	[ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
32			10.445690.6401401	EF	1	7.0		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
32	EF/1	1	MW		5+	1	215	215	Rearing	
32	EF/1	1	GR		5+	1	317	317	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	32	EF/1	1	1025	1055	621	200	7.42	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	32	EF/1	1	MW	215				Scale	32-1	5+	
	32	EF/1	1	GR	317				Scale	32-2	5+	

Unnamed tributary to Crehan Creek
Site 32: View upstream from bottom of site
(Roll CF1 - Exp 20A; CD 2 - Im 129)

Unnamed tributary to Crehan Creek
Site 32: Aerial view upstream
(Roll CF1 - Exp 23A; CD 2 - Im 132)

APPENDIX XXXIII

UNNAMED TRIBUTARY TO MUSKWA RIVER
(212-580800-77600)

Sample Site 33

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Muskwa River											FIELD COORDINATES	57° 51.99' 123° 59.24'				
LOCATION	100 m u/s of Muskwa River confluence																
NTS MAP #	94G/13	NID NO		WATERSHED CODE	212-580800-77600												
REACH #		SITE #	33	SITE UTM	10	441362	6414191	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/07/26	TIME	850	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	22.00	11.00	15.00	17.00	12.50	19.00	16.08	meth	AL
WETTED WIDTH	RF	17.00	10.00	9.10	12.50	7.50	13.00	11.52	2.0	
RES POOL DEPTH	MS	0.24	0.16	0.12	0.30	0.18	0.24	0.21	2.0	
Wb DEPTH	0.90	0.75	0.80	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	7.5	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Trace (5%)

type	SWD	LWD	B	U	DP	OV	IV
amt	T	T	D	N	S	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%
	0	1	2	3	4	5

LWD FNC	Few	DIST	Clumped
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines/Cobble	TEXTURE	Fines/Cobble
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION

MORPHOLOGY

FLOOD SIGNS	0.7 m - debris
BED MATERIAL	
Dominant	Gravel (2-64 mm)
Subdom.	Cobble (64-256 mm)
D95 (cm)	30 D (cm) 32
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	Side/Mid-stream
COUPLING	Decoupled
CONFINED	Unconfined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS	UTM		
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate seasonal rearing for MW and GR.
Boulder cover and some small pools.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM8	17	wd	u	view u/s from bottom of site
UM8	18	wd	u	view u/s from centre of site
UM8	19	wd	d	view d/s from top of site
UM8	20	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk		

COMMENTS

C	
CX1	Shifting channel on alluvial fan.
CX2	Electro-fishing effort: 402 seconds @ 250 volts. MW yearlings captured.
CX3	Angled for GR at mouth (clear water entering glacial water): no bites; adult GR angled at base of impassable falls upstream of site.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Muskwa River								[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	100 m u/s of Muskwa River confluence					WATERSHED CODE	212-580800-77600				
WATERBODY ID		NTS MAP	94G/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N			
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	33	FISH PERMIT #	SC2001-002				
DATE	2001/07/26	to	2001/07/26	AGENCY	Diversified Environmental Services	CREW	BC/TE	[ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
33			10.441362.6414191	EF	1	7.5		C	
33			10.441362.6414191	AG	1	7.5		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
33	EF/1	1	MW			3	67	70	Rearing	
33	AG/1	1	NFC			0				Angled for GR at mouth
33	AG/2	1	GR			1	355	355		Base of falls u/s of site

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	33	EF/1	1	855	910	402	200	11.5	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	33	EF/1	1	MW	67							
	33	EF/1	1	MW	69							
	33	EF/1	1	MW	70							
	33	AG/2	1	GR	355							Base of falls u/s of site

Unnamed tributary to Muskwa River
Site 33: View upstream from bottom of site
(Roll UM8 - Exp 17; CD 2 - Im 133)

Unnamed tributary to Muskwa River
Site 33: View downstream from top of site
(Roll UM8 - Exp 19; CD 2 - Im 135)

APPENDIX XXXIV

UNNAMED TRIBUTARY TO MUSKWA RIVER
(212-580800-83500)

Sample Site 34

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Muskwa River aka "Windy Point Creek"	FIELD COORDINATES	57° 47.41' 124° 11.60'
LOCATION	Lower reach		

NTS MAP #	94F/16	NID NO		WATERSHED CODE	212-580800-83500						
REACH #	1	SITE #	34	SITE UTM	10	428981	6406002	SITE LENGTH	200	METH RF	ACCESS H
DATE	2001/07/23	TIME	1700	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM Y X N	

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	50.00	28.00	16.50	16.00	26.00	22.00	26.42	meth	AL
WETTED WIDTH	RF	16.00	16.50	13.50	14.00	25.00	16.50	16.92	2.0	
RES POOL DEPTH	MS	0.45	0.32	0.24	0.14	0.22	0.18	0.26	2.5	
Wb DEPTH	1.20	1.10	1.20	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

WATER			
EMS		COND	
TEMP (°C)	8.5	TURBIDITY	
Ph			Clear

COVER

COVER	Total	Moderate (5-20%)					
type	SWD	LWD	B	U	DP	OV	IV
amt	T	S	D	N	S	N	N
loc	P	P	P	P	P	P	P

LWD FNC	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Cobble/Boulder	TEXTURE	Cobble/Boulder
RIP. VEG. STAGE	Mixed C & D Young Forest	RIP. VEG. STAGE	Mixed C & D Young Forest

CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%
	0	1	2	3	4	5

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	1.0 m - debris line
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	80
D (cm)	60
Morph.	Riffle-pool

DISTURBANCE INDICATORS: O1 B1 **B2** B3 **D1** **D2** D3 **C1** C2 C3 C4 C5 S1 S2 S3 S4

PATTERN	Sinuous
ISLANDS	None
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Frequently Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO		COMMENTS	UTM
						R	F		
						R	F		
						R	F		

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate rearing for MW and BT.
Limited spawning potential.
Primarily boulder pocket habitat.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM3	8	wd	u	view u/s from bottom of site
UM3	9	wd	u	view u/s from centre of site
UM3	10	wd	d	view d/s from top of site
UM3	11	wd	d	view downstream from centre of side channel
UM3	12	wd	u	aerial view upstream
UM3	13	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk		

COMMENTS

C	
C1	Significant boulder component.
CX1	Electro-fishing effort: 407 seconds @ 350 volts. BT and MW captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Muskwa River aka "Windy Point Creek"									LAKE [ ]	STREAM [X] WETLAND [ ]
LOCATION	Lower reach						WATERSHED CODE	212-580800-83500			
WATERBODY ID		NTS MAP	94F/16	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N				
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	34	FISH PERMIT #	SC2001-002				
DATE	2001/07/23 to 2001/07/23	AGENCY	Diversified Environmental Services	CREW	BC/TE [ ] RE-SAMPLE						

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
34			10.428981.6406002	EF	1	8.5		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
34	EF/1	1	BT			2	138	174	Rearing	
34	EF/1	1	MW			3	176	214	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	34	EF/1	1	1705	1720	407	200	16.9	O	350	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	34	EF/1	1	MW	177				Scale	34-1	3+	
	34	EF/1	1	MW	214				Scale	34-2	5+	
	34	EF/1	1	MW	176				Scale	34-3	4+	
	34	EF/1	1	BT	174				Scale	34-4	3+	
	34	EF/1	1	BT	138				Scale	34-5	2+	

Unnamed tributary to Muskwa River
Site 34: View downstream from top of site
(Roll UM3 - Exp 10; CD 2 - Im 139)

Unnamed tributary to Muskwa River
Site 34: Aerial view upstream
(Roll UM3 - Exp 13; CD 2 - Im 141)

APPENDIX XXXV

UNNAMED TRIBUTARY TO MUSKWA RIVER
(212-580800-83500)

Sample Site 35

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Muskwa River											FIELD COORDINATES	57° 48.99' 124° 13.23'				
LOCATION																	
NTS MAP #	94F/16	NID NO		WATERSHED CODE	212-580800-83500												
REACH #		SITE #	35	SITE UTM	10	427429	6409174	SITE LENGTH	300	METH	RF	ACCESS	H				
DATE	2001/07/23	TIME	1605	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	22.00	19.00	15.10	13.80	19.00	18.00	17.82	meth	AL
WETTED WIDTH	RF	13.00	19.00	9.20	9.50	13.50	12.20	12.73	4.0	
RES POOL DEPTH	MS	0.10	0.10	0.25	0.28	0.14	0.23	0.18	3.5	
Wb DEPTH	1.20	1.10	1.20	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	7.5	TURBIDITY	
Ph		Clear	

COVER

	COVER	Total			Moderate (5-20%)			
type	SWD	LWD	B	U	DP	OV	IV	
amt	N	T	D	N	S	N	N	
loc	P	P	P	P	P	P	P	

LWD FNC	None	DIST	
LB SHAPE	Sloping	RB SHAPE	Sloping
TEXTURE	Cobble/Boulder	TEXTURE	Cobble/Boulder
RIP. VEG.	None	RIP. VEG.	None
STAGE	NA	STAGE	NA

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

INSTREAM VEGETATION: None

MORPHOLOGY

FLOOD SIGNS	1.0 m
BED MATERIAL	
Dominant	Gravel (2-64 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	80
D (cm)	55
Morph.	Riffle-pool

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	Side/Mid-stream
COUPLING	Partially Coupled
CONFINED	Occasionally Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate rearing for BT and MW.
High gradient, cover mostly limited to boulder pockets.
Not suitable for spawning.
Boulder chutes downstream may restrict seasonal access.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM3	17	wd	u	view u/s from bottom of site
UM3	18	wd	u	view u/s from centre of site
UM3	19	wd	d	view d/s from top of site
UM3	20	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk tracks		

COMMENTS

C	
CX1	Electro-fishing effort: 332 seconds @ 250 volts. No fish captured.
CX2	Boulder chutes downstream likely limit access for GR, MW and juvenile BT but may be passable by larger BT.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Muskwa River			[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION				WATERSHED CODE	212-580800-83500		
WATERBODY ID		NTS MAP	94F/16	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	35	FISH PERMIT #	SC2001-002
DATE	2001/07/23 to 2001/07/23	AGENCY	Diversified Environmental Services	CREW	BC/TE	[ ] RE-SAMPLE	

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD	NO.	TEMP	CON	TURB	COMMENTS
35			10.427429.6409174	EF	1	7.5		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
35	EF/1	1	NFC			0				

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	35	EF/1	1	1610	1625	332	300	12.7	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE	COMMENTS

Unnamed tributary to Muskwa River
Site 35: View downstream from top of site
(Roll UM3 - Exp 19; CD 2 - Im 144)

Unnamed tributary to Muskwa River
Site 35: Aerial view upstream
(Roll UM3 - Exp 20; CD 2 - Im 145)

APPENDIX XXXVI

UNNAMED TRIBUTARY TO MUSKWA RIVER
(212-580800-86300)

Sample Site 36

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Muskwa River											FIELD COORDINATES	57° 45.88' 124° 18.48'				
LOCATION	Lower reach - below falls																
NTS MAP #	94F/16	NID NO		WATERSHED CODE	212-580800-86300												
REACH #		SITE #	36	SITE UTM	10	422180	6403242	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/07/23	TIME	1350	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	10.00	10.00	11.00	7.80	8.20	8.00	9.17	meth	AL
WETTED WIDTH	RF	10.00	10.00	10.50	7.80	8.20	7.50	9.00	3.0	
RES POOL DEPTH	MS	0.60	0.50	1.50	1.20	0.40	0.32	0.75	3.5	
Wb DEPTH	0.65	0.55		STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	8.5	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Abundant (>20%)						CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%
type	SWD	LWD	B	U	DP	OV	IV							
amt	S	S	S	N	D	N	N							
loc	P	P	P	P	P	P	P							
LWD FNC	Abundant		DIST	Even										
LB SHAPE	Sloping		RB SHAPE	Vertical					0	1	2	3	4	5
TEXTURE	Grvl/Cbl/Bdrck		TEXTURE	Grvl/Cbl/Bdrck				INSTREAM	None					
1 RIP. VEG.	Shrubs		RIP. VEG.	Shrubs				VEGETATION						
STAGE	Shrub/Herb		STAGE	Shrub/Herb										

MORPHOLOGY

FLOOD SIGNS	1.2 m		
BED MATERIAL			
Dominant	Boulder (> 256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	65	D (cm)	8
Morph.	Riffle-pool		

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	None
COUPLING	Partially Coupled
CONFINED	Frequently Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Good holding water for adult GR and MW - deep pools.
Granular substrates for spawning.
Impassable falls immediately upstream.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM2	23	wd	u	view u/s from bottom of site
UM2	24	wd	u	view u/s from centre of site
UM2	25	wd	d	view d/s from top of site
UM3	1	wd	u	barrier at top of site - 4m + 4m
UM3	2	wd	u	barrier at top of site - 4m + 4m
UM3	3	wd	u	aerial view upstream including falls
UM3	4	wd	u	aerial view upstream including falls

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
C1	Coniferous cover removed by fire.
CX1	Electro-fishing effort: 288 seconds @ 250 volts. MW and CCG captured.
CX2	Impassable barrier immediately upstream of site.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Muskwa River							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION	Lower reach - below falls					WATERSHED CODE	212-580800-86300			
WATERBODY ID		NTS MAP	94F/16	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	36	FISH PERMIT #	SC2001-002			
DATE	2001/07/23 to 2001/07/23	AGENCY	Diversified Environmental Services			CREW	BC/TE [ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
36			10.422180.6403242	EF	1	8.5		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
36	EF/1	1	MW			2	188	190	Rearing	
36	EF/1	1	CCG			1	95	95	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	36	EF/1	1	1355	1410	288	200	9.0	O	250	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	36	EF/1	1	MW	190				Scale	36-1	4+	
	36	EF/1	1	MW	188				Scale	36-2	regen	
	36	EF/1	1	CCG	95							

Unnamed tributary to Muskwa River
Site 36: View upstream from bottom of site
(Roll UM2 - Exp 23; CD 2 - Im 146)

Unnamed tributary to Muskwa River
Site 36: View downstream from top of site
(Roll UM2 - Exp 25; CD 2 - Im 148)

Unnamed tributary to Muskwa River
Site 36: View upstream; barrier at top of site – 4m x 4m
(Roll UM3 - Exp 2; CD 2 - Im 149)

Unnamed tributary to Muskwa River
Site 36: Aerial view upstream; barrier at top of site – 4m x 4m
(Roll UM3 - Exp 3; CD 2 - Im 150)

APPENDIX XXXVII

UNNAMED TRIBUTARY TO MUSKWA RIVER
(212-580800-86800)

Sample Site 37

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Muskwa River aka "Southfork Creek"											FIELD COORDINATES	57° 45.34' 124° 20.51'				
LOCATION	Lower reach - below falls																
NTS MAP #	94F/16	NID NO		WATERSHED CODE	212-580800-86800												
REACH #		SITE #	37	SITE UTM	10	420165	6402294	SITE LENGTH	250	METH	RF	ACCESS	H				
DATE	2001/07/23	TIME	1426	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	15.50	22.00	29.00	15.80	17.00	28.00	21.22	meth	AL	TEMP (°C)	8.0	TURBIDITY	
WETTED WIDTH	RF	15.50	22.00	29.00	15.80	17.00	28.00	21.22	1.0		Ph		Mod turbid	
RES POOL DEPTH	MS	0.32	0.26	0.36	0.18	0.30	0.24	0.28	2.0		FLOOD SIGNS	1.8 m - debris line		
Wb DEPTH	1.20	1.00	1.40	STAGE	Moderate		No Vis Chan		Dry/Int		BED MATERIAL			
							Dewater		Tribs		Dominant	Cobble (64-256 mm)		
											Subdom.	Gravel (2-64 mm)		
											D95 (cm)	80	D (cm)	60
											Morph.	Riffle-pool		

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	D	N	S	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Clumped
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Gravel/Cobble	TEXTURE	Gravel/Cobble
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

MORPHOLOGY

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Irregular Wandering
ISLANDS	Occasional
BARS	Side/Mid-stream
COUPLING	Decoupled
1 CONFINED	Unconfined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Moderate rearing potential for GR, MW and BT. Primarily boulder cover.

Impasse immediately upstream of site.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM2	15	wd	u	view u/s from bottom of site
UM2	16	wd	u	view u/s from centre of site
UM2	17	wd	d	view d/s from top of site
UM2	18	wd	u	upstream aerial view of site
UM2	19	wd	u	upstream aerial view of lower falls (3 m and 10 m)

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
C1	Site is within Muskwa valley flat.
CX1	Electro-fishing effort: 468 seconds @ 350 volts. MW, GR and CCG captured.
CX2	Impassable barrier immediately upstream.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Muskwa River "Southfork Creek"						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Lower reach - below falls				WATERSHED CODE				
WATERBODY ID		NTS MAP	94F/16	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	37	FISH PERMIT #	SC2001-002		
DATE	2001/07/23 to 2001/07/23	AGENCY	Diversified Environmental Services	CREW	BC/TE	[ ]	RE-SAMPLE		

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
37				EF	1	8.0		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
37	EF/1	1	MW			9	130	265	Rearing	
37	EF/1	1	GR			1	270	270	Rearing	
37	EF/1	1	CCG			6	56	97	Rearing	

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	37	EF/1	1	1430	1445	468	250	21.22	O	350	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	37	EF	1	MW	260				Scale	37-1	5+	
	37	EF	1	MW	265				Scale	37-2	regen	
	37	EF	1	MW	215				Scale	37-3	4+	
	37	EF	1	MW	205				Scale	37-5	4+	
	37	EF	1	MW	202				Scale	37-6	4+	
	37	EF	1	MW	198				Scale	37-7	4+	
	37	EF	1	MW	160				Scale	37-8	regen	
	37	EF	1	MW	181				Scale	37-9	4+	
	37	EF	1	MW	130				Scale	37-10	2+	
	37	EF	1	GR	270		M		Scale	37-4	4+	
	37	EF	1	CCG	93							
	37	EF	1	CCG	97							
	37	EF	1	CCG	69							
	37	EF	1	CCG	76							
	37	EF	1	CCG	56							
	37	EF	1	CCG	66							

Unnamed tributary to Muskwa River
Site 37: View upstream from bottom of site
(Roll UM2 - Exp 15; CD 2 - Im 151)

Unnamed tributary to Muskwa River
Site 37: Aerial view upstream
(Roll UM2 - Exp 18; CD 2 - Im 154)

APPENDIX XXXVIII

UNNAMED TRIBUTARY TO MUSKWA RIVER
(212-580800-91600)

Sample Site 38

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Muskwa River											FIELD COORDINATES	57° 46.61' 124° 34.53'				
LOCATION	100 m upstream of Muskwa River confluence																
NTS MAP #	94F/15	NID NO		WATERSHED CODE	212-580800-91600												
REACH #		SITE #	38	SITE UTM	10	406229	6405067					SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/07/23	TIME	1245	AGENCY	Diversified Environmental Services							CREW	BC/TE	FISH FORM	Y	X	N

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	8.90	12.60	10.50	12.10	5.80	8.80	9.78	meth	AL
WETTED WIDTH	RF	6.60	11.00	10.00	7.60	5.80	8.80	8.30	1.0	
RES POOL DEPTH	MS	0.30	0.45	0.38	0.32	0.24	0.36	0.34	1.5	
Wb DEPTH	0.50	0.48	0.55	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	7.5	TURBIDITY	
Ph		Mod turbid	

MORPHOLOGY

FLOOD SIGNS: 50 cm - debris line

BED MATERIAL

Dominant	Gravel (2-64 mm)		
Subdom.	Cobble (64-256 mm)		
D95 (cm)	10	D (cm)	16
Morph.	Riffle-pool		

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	Side
COUPLING	Decoupled
1 CONFINED	Unconfined

COVER

	COVER Total	Abundant (>20%)						CROWN CLOSURE	0%	1-20%	21-40%	41-70%	71-90%	>90%
type	SWD	LWD	B	U	DP	OV	IV							
amt	S	S	N	T	D	T	N							
loc	P	P	P	P	P	P	P							

				INSTREAM VEGETATION	None
LWD FNC	Few	DIST	Even		
LB SHAPE	Vertical	RB SHAPE	Vertical	0	1 2 3 4 5
TEXTURE	Fines	TEXTURE	Fines		
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D		
STAGE	Young Forest	STAGE	Young Forest		

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS		UTM	
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Low to moderate suitability for salmonid spawning and rearing.
No seasonal access for native species due to mainstem barriers downstream.
Naturalized RB from Fern Lake potentially present.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM1	21A	wd	U	view u/s from bottom of site
UM1	22A	wd	U	view u/s from centre of site
UM1	23A	wd	D	view d/s from top of site
UM1	24A	wd	U	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
C1	Site located on Muskwa valley flat.
CX1	Electro-fishing effort: 320 seconds @ 350 volts over 200 m. No fish captured.
CX2	Barrier immediately upstream of site; inaccessible from downstream due to impasses on Muskwa mainstem.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Muskwa River				[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	100 m upstream of Muskwa River confluence				WATERSHED CODE	212-580800-91600	
WATERBODY ID		NTS MAP	94F/15	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	38	FISH PERMIT #	SC2001-002
DATE	2001/07/23 to 2001/07/23	AGENCY	Diversified Environmental Services		CREW	BC/TE	[ ] RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	CON	TURB	COMMENTS
38			10.406229.6405067	EF	1	7.5		M	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
38	EF/1	1	NFC			0				

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	38	EF/1	1	1250	1310	320	200	8.3	O	350	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE STR	AGE SAMPLE #	AGE AGE	COMMENTS

Unnamed tributary to Muskwa River
Site 38: View downstream from top of site
(Roll UM1 - Exp 23A; CD 2 - Im 158)

Unnamed tributary to Muskwa River
Site 38: Aerial view southwest
(Roll UM1 - Exp 24A; CD 2 - Im 159)

APPENDIX XXXIX

UNNAMED TRIBUTARY TO MUSKWA RIVER
(212-580800-94200)

Sample Site 39

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Muskwa River											FIELD COORDINATES	57° 46.21' 124° 42.53'				
LOCATION	Lower reach - below falls																
NTS MAP #	94F/14	NID NO		WATERSHED CODE	212-580800-94200												
REACH #		SITE #	39	SITE UTM	10	398567	6404359	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	20001/07/23	TIME	1145	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	8.20	9.80	12.50	15.00	12.00	11.50	11.50	meth	AL	TEMP (°C)	6.0	TURBIDITY	
WETTED WIDTH	RF	8.20	9.80	11.00	13.50	12.00	11.00	10.92	2.5		Ph		Turbid	
RES POOL DEPTH	MS	C1							4.0		FLOOD SIGNS	0.5 m - rafted LWD		
Wb DEPTH	0.32	0.40	0.35	STAGE	High		No Vis Chan		Dry/Int		BED MATERIAL			
							Dewater		Tribs		Dominant	Boulder (> 256 mm)		
											Subdom.	Cobble (64-256 mm)		
											D95 (cm)	46	D (cm)	20
											Morph.	Riffle-pool		

COVER

COVER	Total	Trace (5%)

type	SWD	LWD	B	U	DP	OV	IV
amt	N	T	D	N	N	N	N
loc	P	P	P	P	P	P	P

CROWN CLOSURE

0%	1-20%	21-40%	41-70%	71-90%	>90%
0	1	2	3	4	5

LWD FNC	Few	DIST	Clumped
LB SHAPE	Sloping	RB SHAPE	Vertical
TEXTURE	Gravel/Cobble	TEXTURE	Gravel/Cobble
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: Moss

MORPHOLOGY

DISTURBANCE INDICATORS

O1	B1	B2	B3	D1	D2	D3	C1	C2
C3	C4	C5	S1	S2	S3	S4		

PATTERN	Sinuous
ISLANDS	None
BARS	Side
COUPLING	Decoupled
CONFINED	Unconfined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS	UTM		
						R		F					
						R		F					
						R		F					

DISTURBANCE INDICATOR LEGEND

O1	Beaver Dam	B3	Avulsion	D3	Recent LWD jam	C3	Elevated Bar	S1	Homogenous Bed	S4	Extensive Bars
B1	Abandoned Channel	D1	Small Woody Debris	C1	Extensive Riffles	C4	Multiple Channel	S2	Sediment Fingers	S5	Extensive Scours
B2	Eroding Bank	D2	Large Woody Debris	C2	Limited Pools	C5	Disturbed Lines	S3	Sediment Wedges		

HABITAT QUALITY

Low sportfish potential, high turbidity and gradient, low cover except boulder pockets, few granular substrates for spawning.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
UM1	12A	wd	u	view u/s from bottom of main channel
UM1	13A	wd	u	view u/s from centre of site
UM1	14A	wd	d	view d/s from top of site
UM1	16A	wd	u	aerial view upstream
UM1	17A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Elk and moose tracks		

COMMENTS

C1	Boulder dominant cover - no pools.
C2	Side channel enters at top of site and at bottom of site (into Muskwa River).
CX1	Electro-fishing effort: 397 seconds @ 350 volts over 200 m. No fish captured.
CX2	3 m and 5 m falls upstream of site.
CX3	No seasonal access for native species due to barriers downstream on Muskwa mainstem.
CX4	Naturalized RB from Fern Lake potentially present.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Muskwa River						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION	Lower reach - below falls				WATERSHED CODE	212-580800-94200			
WATERBODY ID		NTS MAP	94F/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Upper Muskwa Overview	REACH #		SITE #	39	FISH PERMIT #	SC2001-002		
DATE	2001/07/23 to 2001/07/23	AGENCY	Diversified Environmental Services			CREW	BC/TE	[ ]	RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
39			10.398567.6404359	EF	1	6.0		T	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
39	EF/1	1	NFC			0				

GEAR SPECS

NET / TRAP SPECIFICATIONS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET TYPE	LENGTH	DEPTH	MESH SIZE	SET	HAB

ELECTROFISHER SPECIFICATIONS

C	SITE #	MD/NO	H/P	TIME IN	TIME OUT	EF SEC	LENGTH	WIDTH	ENCL	VOLT	FREQ	PLSE	MAKE	MDL
	39	EF/1	1	1150	1210	397	200	10.9	O	350	60	Fixed	Coffelt	Mk X

COMMENTS

C	

INDIVIDUAL FISH DATA

C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	

Unnamed tributary to Muskwa River
Site 39: View upstream from bottom of site
(Roll UM1 - Exp 12A; CD 2 - Im 160)

Unnamed tributary to Muskwa River
Site 39: Aerial view upstream
(Roll UM1 - Exp 16A; CD 2 - Im 163)

APPENDIX XL

PHOTODOCUMENTATION INDEX

Site Photos
Feature Photos
Basin-view Photos

SITE	CD	IMAGE	ROLL	FRAME	VIEW	WATERSHED
1	1	1	UM8	13	view u/s from bottom of site	Muskwa
1	1	2	UM8	14	view u/s from centre of site	Muskwa
1	1	3	UM8	15	view d/s from top of site	Muskwa
1	1	4	UM8	16	aerial view upstream	Muskwa
2	1	5	UM2	7	view u/s from bottom of site	Muskwa
2	1	6	UM2	8	view u/s from centre of site	Muskwa
2	1	7	UM2	9	view d/s from top of site	Muskwa
2	1	8	UM2	11	aerial view upstream	Muskwa
3	1	9	UM6	22	view u/s from bottom of site	Muskwa
3	1	10	UM6	23	view u/s from centre of site	Muskwa
3	1	11	UM6	24	view d/s from top of site	Muskwa
3	1	12	UM6	25	aerial view upstream	Muskwa
4	1	13	UM5	13	view u/s from bottom of site	Muskwa
4	1	14	UM5	14	view u/s from centre of site	Muskwa
4	1	15	UM5	15	view d/s from top of site	Muskwa
4	1	16	UM5	17	aerial view upstream	Muskwa
5	1	17	UM4	21	view u/s from bottom of site	Muskwa
5	1	18	UM4	22	view u/s from centre of site	Muskwa
5	1	19	UM4	23	view d/s from top of site	Muskwa
5	1	20	UM4	24	aerial view upstream	Muskwa
6	1	21	UM7	1	view u/s from bottom of site	Muskwa
6	1	22	UM7	2	view u/s from centre of site	Muskwa
6	1	23	UM7	3	view d/s from top of site	Muskwa
7	1	24	UM7	5	view u/s from bottom of site	Muskwa
7	1	25	UM7	6	view u/s from centre of site	Muskwa
7	1	26	UM7	7	view d/s from top of site	Muskwa
7	1	27	UM7	8	aerial view upstream	Muskwa
8	1	28	UM6	13	view u/s from bottom of site	Muskwa
8	1	29	UM6	14	view u/s from centre of site	Muskwa
8	1	31	UM6	16	falls 1.5 m	Muskwa
8	1	30	UM6	17	view d/s from top of site	Muskwa
8	1	32	UM6	12	aerial view upstream of falls	Muskwa
8	1	33	UM6	15	2 male GR	Muskwa
9	1	34	UM6	4	view u/s from bottom of site	Muskwa
9	1	35	UM6	5	view u/s from centre of site	Muskwa
9	1	36	UM6	6	view d/s from top of site	Muskwa
9	1	37	UM6	8	3 BT from site	Muskwa
9	1	38	UM6	9	aerial view upstream	Muskwa
10	1	39	UM5	25	view u/s from bottom of site	Muskwa
10	1	40	UM6	1	view u/s from centre of site	Muskwa
10	1	41	UM6	2	view d/s from top of site	Muskwa
10	1	42	UM6	3	aerial view upstream	Muskwa
11	1	43	UM5	9	view u/s from bottom of site	Muskwa

SITE	CD	IMAGE	ROLL	FRAME	VIEW	WATERSHED
11	1	44	UM5	10	view u/s in side channel (centre)	Muskwa
11	1	45	UM5	11	view d/s from top of site	Muskwa
11	1	46	UM5	12	aerial view upstream	Muskwa
12	1	47	UM5	4	view u/s from bottom of site	Muskwa
12	1	48	UM5	5	view u/s from centre of site	Muskwa
12	1	49	UM5	6	view d/s from top of site	Muskwa
12	1	50	UM5	7	aerial view upstream	Muskwa
13	1	54	UM4	14	aerial view u/s from confluence with Gathto Creek	Muskwa
13	1	51	UM4	16	view u/s from bottom of site	Muskwa
13	1	52	UM4	17	view u/s from centre of site	Muskwa
13	1	53	UM4	18	view d/s from top of site	Muskwa
14	1	55	UM4	10	view u/s from bottom of site	Muskwa
14	1	56	UM4	11	view u/s from centre of site	Muskwa
14	1	57	UM4	12	view d/s from top of site	Muskwa
14	1	58	UM4	13	aerial view upstream	Muskwa
15	1	59	UM7	9	view u/s from bottom of site	Muskwa
15	1	60	UM7	10	view u/s from centre of site	Muskwa
15	1	61	UM7	11	view d/s from top of site	Muskwa
15	1	62	UM7	12	aerial view upstream	Muskwa
15	1	63	UM7	13	aerial view upstream	Muskwa
16	1	64	UM8	1	view u/s from bottom of site	Muskwa
16	1	65	UM8	2	view u/s from centre of site	Muskwa
16	1	66	UM8	3	view d/s from top of site	Muskwa
16	1	67	UM8	4	aerial view upstream	Muskwa
17	1	68	UM7	14	view u/s from bottom of site	Muskwa
17	1	69	UM7	15	view u/s from centre of site	Muskwa
17	1	70	UM7	16	view d/s from top of site	Muskwa
17	1	71	UM7	17	aerial view upstream	Muskwa
18	1	72	UM7	22	view u/s from bottom of site	Muskwa
18	1	73	UM7	23	view u/s from centre of site	Muskwa
18	1	74	UM7	24	view d/s from top of site	Muskwa
18	1	75	UM7	25	aerial view upstream	Muskwa
19	1	76	UM7	18	view u/s from bottom of site	Muskwa
19	1	77	UM7	19	view u/s from centre of site	Muskwa
19	1	78	UM7	20	view d/s from top of site	Muskwa
19	1	79	UM7	21	aerial view upstream	Muskwa
20	1	80	UM9	2A	view u/s from bottom of site	Muskwa
20	1	81	UM9	3A	view u/s from centre of site	Muskwa
20	1	82	UM9	4A	view d/s from top of site	Muskwa
20	1	83	UM9	5A	aerial view upstream	Muskwa
21	1	87	UM9	6A	aerial view upstream	Muskwa
21	1	84	UM9	7A	view u/s from bottom of site	Muskwa

SITE	CD	IMAGE	ROLL	FRAME	VIEW	WATERSHED
21	1	85	UM9	8A	view u/s from centre of site	Muskwa
21	1	98	UM9	9A	view d/s from top of site	Muskwa
22	1	88	UM9	10A	view u/s from centre of site	Muskwa
22	1	89	UM9	11A	view d/s from top of site	Muskwa
22	1	90	UM9	12A	aerial view upstream	Muskwa
23	1	91	UM8	6	view u/s from centre of site	Muskwa
23	1	92	UM8	7	view d/s from top of site	Muskwa
23	1	93	UM8	8	aerial view upstream	Muskwa
24	1	94	UM10	1A	view u/s from bottom of site	Muskwa
24	1	95	UM10	2A	view u/s from centre of site	Muskwa
24	1	96	UM10	3A	view d/s from top of site	Muskwa
24	1	97	UM10	7A	aerial view upstream	Muskwa
25	1	98	UM9	22A	view u/s from bottom of site	Muskwa
25	1	99	UM9	23A	view u/s from centre of site	Muskwa
25	1	100	UM9	24A	view d/s from top of site	Muskwa
25	2	101	UM9	25A	aerial view upstream	Muskwa
26	2	102	UM8	9	view u/s from bottom of site	Muskwa
26	2	103	UM8	10	view u/s from centre of site	Muskwa
26	2	104	UM8	11	view d/s from top of site	Muskwa
26	2	105	UM8	12	aerial view upstream	Muskwa
27	2	106	UM9	13A	view u/s from bottom of site	Muskwa
27	2	107	UM9	14A	view u/s from centre of site	Muskwa
27	2	108	UM9	15A	view d/s from top of site	Muskwa
27	2	109	UM9	16A	aerial view upstream	Muskwa
28	2	110	UM9	17A	view u/s from bottom of site	Muskwa
28	2	111	UM9	18A	view u/s from centre of site	Muskwa
28	2	112	UM9	19A	view d/s from top of site	Muskwa
28	2	113	UM9	20A	upstream aerial view of site	Muskwa
28	2	114	UM9	21A	upstream aerial basin view	Muskwa
29	2	115	UM8	23	view u/s from bottom of site	Muskwa
29	2	116	UM8	24	view u/s from centre of site	Muskwa
29	2	117	UM8	25	view d/s from top of site	Muskwa
29	2	118	UM9	1A	aerial view upstream	Muskwa
30	2	119	CR1	4	view u/s from bottom of site	Muskwa
30	2	120	CR1	5	view u/s from centre of site	Muskwa
30	2	121	CR1	6	view d/s from top of site	Muskwa
30	2	122	CR1	7	upstream aerial view of site	Muskwa
30	2	123	CR1	8	upstream aerial basin view	Muskwa
30	3	216	T2	10	700 mm male BT	Muskwa
30	3	217	T2	11	700 mm male BT	Muskwa
30	3	218	T2	13	605 mm female BT	Muskwa
31	2	124	CR1	1	view u/s from bottom of site	Muskwa

SITE	CD	IMAGE	ROLL	FRAME	VIEW	WATERSHED
31	2	125	CR1	2	view u/s from centre of site	Muskwa
31	2	126	CR1	3	view d/s from top of site	Muskwa
32	2	129	CF1	20A	view u/s from bottom of site	Muskwa
32	2	130	CF1	21A	view u/s from centre of site	Muskwa
32	2	131	CF1	22A	view d/s from top of site	Muskwa
32	2	132	CF1	23A	aerial view upstream	Muskwa
33	2	133	UM8	17	view u/s from bottom of site	Muskwa
33	2	134	UM8	18	view u/s from centre of site	Muskwa
33	2	135	UM8	19	view d/s from top of site	Muskwa
33	2	136	UM8	20	aerial view upstream	Muskwa
34	2	137	UM3	8	view u/s from bottom of site	Muskwa
34	2	138	UM3	9	view u/s from centre of site	Muskwa
34	2	139	UM3	10	view d/s from top of site	Muskwa
34	2	140	UM3	11	view downstream from centre of side channel	Muskwa
34	2	141	UM3	13	aerial view upstream	Muskwa
35	2	142	UM3	17	view u/s from bottom of site	Muskwa
35	2	143	UM3	18	view u/s from centre of site	Muskwa
35	2	144	UM3	19	view d/s from top of site	Muskwa
35	2	145	UM3	20	aerial view upstream	Muskwa
36	2	146	UM2	23	view u/s from bottom of site	Muskwa
36	2	147	UM2	24	view u/s from centre of site	Muskwa
36	2	148	UM2	25	view d/s from top of site	Muskwa
36	2	149	UM3	2	barrier at top of site - 4m + 4m	Muskwa
36	2	150	UM3	3	aerial view upstream including falls	Muskwa
37	2	151	UM2	15	view u/s from bottom of site	Muskwa
37	2	152	UM2	16	view u/s from centre of site	Muskwa
37	2	153	UM2	17	view d/s from top of site	Muskwa
37	2	154	UM2	18	upstream aerial view of site	Muskwa
37	2	155	UM2	19	upstream aerial view of lower falls (3 m and 10 m)	Muskwa
38	2	156	UM1	21A	view u/s from bottom of site	Muskwa
38	2	157	UM1	22A	view u/s from centre of site	Muskwa
38	2	158	UM1	23A	view d/s from top of site	Muskwa
38	2	159	UM1	24A	aerial view upstream	Muskwa
39	2	160	UM1	12A	view u/s from bottom of main channel	Muskwa
39	2	161	UM1	13A	view u/s from centre of site	Muskwa
39	2	162	UM1	14A	view d/s from top of site	Muskwa
39	2	163	UM1	16A	aerial view upstream	Muskwa

STREAM	CD	IMAGE	ROLL	FRAME	VIEW	WSC	EAST	NORTH
Muskwa River		219	UM1	7A	20m falls on upper mainstem	212-580800	397345	6404123
Muskwa River		167	UM1	2A	upstream basin view	212-580800	393738	6404347
Muskwa River		168	UM1	8A	20m falls on upper mainstem	212-580800	397345	6404123
Muskwa River		172	UM1	18A	2m falls	212-580800	401717	6403962
Muskwa River		173	UM1	20A	10m falls on Muskwa mainstem	212-580800	402342	6404638
Muskwa River		176	UM2	13	2m falls	212-580800	411094	6403212
Muskwa River		178	UM2	20	bedrock confinement on upper Muskwa mainstem	212-580800	418728	6401992
Muskwa River		179	UM2	21	3m falls (lower impasse on Muskwa mainstem)	212-580800	418172	6402120
Muskwa River		181	UM3	6	upstream basin view	212-580800	429496	6404717
Gathto Creek		189	UM3	25	upstream basin view	-580800-44400	428124	6435806
Gathto Creek		190	UM4	2	4m chute at top of impassable canyon	-580800-44400	423784	6433892
Gathto Creek		191	UM4	3	4m chute at top of impassable canyon	-580800-44400	423784	6433892
Gathto Creek		196	UM4	9	2 x 2m falls on upper mainstem	-580800-44400	417663	6421783
Gathto Creek		193	UM4	5	downstream basin view of upper drainage	-580800-44400	412421	6415799
Gathto Creek		194	UM4	7	upstream basin view of upper drainage	-580800-44400	412197	6415667
Gathto Creek		195	UM4	8	2 x 2m falls on upper mainstem	-580800-44400	417663	6421783
Gathto Creek		197	UM4	15	upstream basin view of upper drainage	-580800-44400	418388	6422678
Gathto Creek		198	UM4	20	2 x 4m falls on upper mainstem	-580800-44400	419786	6428789
Gathto Creek		211	UM6	20	lower bedrock constriction on mainstem	-580800-44400	446060	6437571
Beakman Creek		212	UM7	4	upstream basin view of upper Beckman Creek	-44400-05700	448495	6448136
Trib to Gathto Creek		210	UM6	19	20m impassable falls	-580800-44400-30900	451343	6433898
Trib to Gathto Creek		209	UM6	11	4m impassable falls	-580800-44400-37500	446006	6438696
Trib to Gathto Creek		208	UM6	10	2 x 2.5m impassable falls	-580800-44400-39400	444813	6435149
Trib to Gathto Creek		206	UM5	22	35m impassable falls	-580800-44400-45200	434855	6423989
Trib to Gathto Creek		205	UM5	21	upstream basin view from mouth of trib 5210	-580800-44400-45200	436801	6427015
Trib to Gathto Creek		207	UM5	24	upstream basin view below falls	-580800-44400-45200	435829	6425249
Trib to Gathto Cr trib		203	UM5	19	3m impassable falls	-44400-45200-5210	435391	6426886
Trib to Gathto Cr trib		204	UM5	20	upstream basin view from mouth of trib 5210	-44400-45200-5210	438801	6427015
Trib to Gathto Creek		202	UM5	18	4m impassable falls	-580800-44400-47200	436749	6435633
Trib to Gathto Creek		201	UM5	8	35m impassable falls	-580800-44400-60500	425337	6433096
Trib to Gathto Creek		199	UM5	1	5m falls	-580800-44400-66700	419423	6432062
Trib to Gathto Creek		200	UM5	3	4m, 4m and 10m falls in series of impasses	-580800-44400-66700	419065	6431827
Trib to Gathto Creek		192	UM4	4	4m falls	-580800-44400-75800	417459	6422970

STREAM	CD	IMAGE	ROLL	FRAME	VIEW	WSC	EAST	NORTH
Crehan Creek		127	CF1	24A	upstream basin view	-580800-71000	448518	6402366
Crehan Creek		128	CF1	18A	upstream basin view	212-580800-71000	445422	6402564
Trib to Crehan Cr trib		215	CF1	19A	upstream basin view below falls	-580800-71000-77600	445051	6397440
Trib to Muskwa River		214	UM8	22	2x20m falls in series of impasses on "Grizzly" Cr	212-580800-73100	451414	6415319
Trib to Muskwa River		222	UM10	4A	20m impassable falls	212-580800-77600	440595	6413670
Trib to Muskwa River		223	UM10	5A	20m impassable falls	212-580800-77600	440595	6413670
Trib to Muskwa River		223	UM10	6A	Arctic grayling at base of 20m falls	212-580800-77600	440595	6413670
Trib to Muskwa River		213	UM8	21	20m impassable falls	212-580800-77600	440595	6413670
Trib to Muskwa River		188	UM3	24	100m impassable falls/cascade	212-580800-80100	439634	6408983
Trib to Muskwa River		187	UM3	23	70m falls	212-580800-82100	434594	6405269
Trib to Muskwa River		185	UM3	21	10m falls	212-580800-83400	430074	6403922
Trib to Muskwa River		183	UM3	15	2m chutes	212-580800-83500	428340	6407315
Trib to Muskwa River		182	UM3	14	2m chutes	212-580800-83500	428484	6406981
Trib to Muskwa River		184	UM3	16	4m falls	212-580800-83500	427107	6409768
Trib to Muskwa River		186	UM3	22	aerial view u/s from confluence with Muskwa R	212-580800-83500	429761	6404927
Trib to Muskwa River		180	UM3	5	upstream aerial from Muskwa River (20m falls)	212-580800-86500	421890	6403689
Trib to Muskwa River		155	UM2	19	3m and 10m impassable falls	212-580800-86800	420127	6401972
Trib to Muskwa River		177	UM2	14	15m falls in series of impasses	212-580800-88500	415694	6402124
Trib to Muskwa River		220	UM2	5	50m and 30m	212-580800-90400	409757	6402514
Trib to Muskwa River		225	UM2	6	upstream basin view of upper drainage	212-580800-90400	409035	6401107
Trib to Muskwa River		174	UM2	2	80m falls in series of impasses	212-580800-91600	405612	6406600
Trib to Muskwa River		175	UM2	3	80m falls in series of impasses	212-580800-91600	405612	6406600
Trib to Muskwa River		170	UM1	11A	3m and 5m falls in series of impasses	212-580800-94200	398712	6403728
Bilou Creek		164	UM1	4A	upstream basin view from below falls	212-580800-94500	397138	6404783
Bilou Creek		165	UM1	6A	u/s basin view from confluence with Muskwa R.	212-580800-94500	397442	6404373
Bilou Creek		169	UM1	9A	3m falls on lower reach	212-580800-94500	397410	6404564
Bilou Creek		171	UM1	15A	upstream basin view of upper drainage	212-580800-94500	396899	6408157
Outlet of Fern lake		166	UM1	0A	falls at outlet of Fern Lake	212-580800-95500	393498	6402596

APPENDIX XLI

PROJECT MAPS

1:95,000 SCALE