OVERVIEW FISH AND FISH HABITAT INVENTORY

HALFWAY-GRAHAM RIVER WATERSHEDS

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PROJECT REFERENCE INFORMATION

FDIS Project Number	4100
MELP Region	07
MELP District	Fort St. John
FW Management Units	7-36, 7-43, 7-57
Forest Region	Prince George
Forest District	Fort St. John
First Nations Claim Area	Treaty 8

WATERSHED INFORMATION

Watershed Group	Lower Halfway and Upper Halfway
Watershed Name	Halfway River
Watershed Code	235-00000
NTS Maps	94B/6, 10, 11, 13-15, 94G/3
BEC Zone	BWBS, ESSF, AT
Access	Helicopter

CONTRACTOR INFORMATION

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This project was funded by the BC Ministry of Sustainable Resource Management (MSRM), as part of the upper Halfway/Graham River watershed pre-tenure planning process. The authors wish to thank Deborah Johnson, Pre-tenure Biologist (MSRM), Graeme McLaren, Manager of Mining, Oil & Gas, (MSRM), and Jeff Burrows, Fisheries Inventory Specialist (MSRM) for their cooperation and support. Special thanks to Allan Moore of Bailey Helicopters for his anti-gravitational talents and free cockpit entertainment.

1.0 INTRODUCTION

As a result of consensus reached at the Fort St. John Land and Resource Management planning table, the Muskwa-Kechika Management Area (M-KMA) was formally designated through the M-KMA Act. This legislation requires that the management and development of Crown lands and natural resources within the M-KMA be carried out in accordance with the Muskwa-Kechika Management Plan. The Muskwa-Kechika Management Plan calls for the completion of pre-tenure plans as a prerequisite to the allocation or authorization of any oil and gas development within the M-KMA.

A pre-tenure planning process is currently under way within the upper portions of the Halfway River watershed and several of its tributaries, including the Graham River, Chowade River and Cypress Creek (hereafter referred to as the Halfway-Graham). Existing fish distribution and habitat data within the Halfway-Graham study area was limited and largely restricted to the mainstems of the four major drainages. The paucity of information on aquatic habitats and fluvial fish populations was identified as a major limitation to effective planning of access and oil and gas development.

In August and September 2001, Diversified Environmental Services completed an *Overview Fish and Fish Habitat Inventory* (Overview Inventory) within the Halfway-Graham pre-tenure planning area.

2.0 PROJECT AREA

The project area lies to the west of the Alaska Highway, approximately 150 km northwest of Fort St. John, and includes all portions of the upper Halfway River, Cypress Creek, Chowade River and Graham River watersheds lying within the M-KMA. The study area is bounded by the M-KMA boundary to the east, by Graham-Laurier Provincial Park on the west and south, and by the height-of-land between the Halfway and Sikanni Chief watersheds to the north (Fig. 1). The study area lies within portions the Upper Halfway and Lower Halfway Watershed Groups, as defined by the British Columbia Watershed Atlas.

The Halfway River and its three major tributaries within the study area (the Cypress, Chowade and Graham), originate in the Rocky Mountains and flow eastward through the Muskwa Foothills and Peace Foothills ecosections of the Northern Boreal Mountains ecoprovince. Alpine Tundra (AT), Engelmann Spruce-Subalpine Fir (ESSF), Spruce-Willow-Birch (SWB), and Boreal White and Black Spruce (BWBS) biogeoclimatic zones are present within the project area.

Topography within the western portion of the project area is extremely mountainous, with the terrain becoming less severe to the east, where it is dominated by forested ridges and valleys, subalpine parkland and vegetated alpine tundra. Mainstem and tributary drainage systems are characterized by moderate gradients and low turbidity.

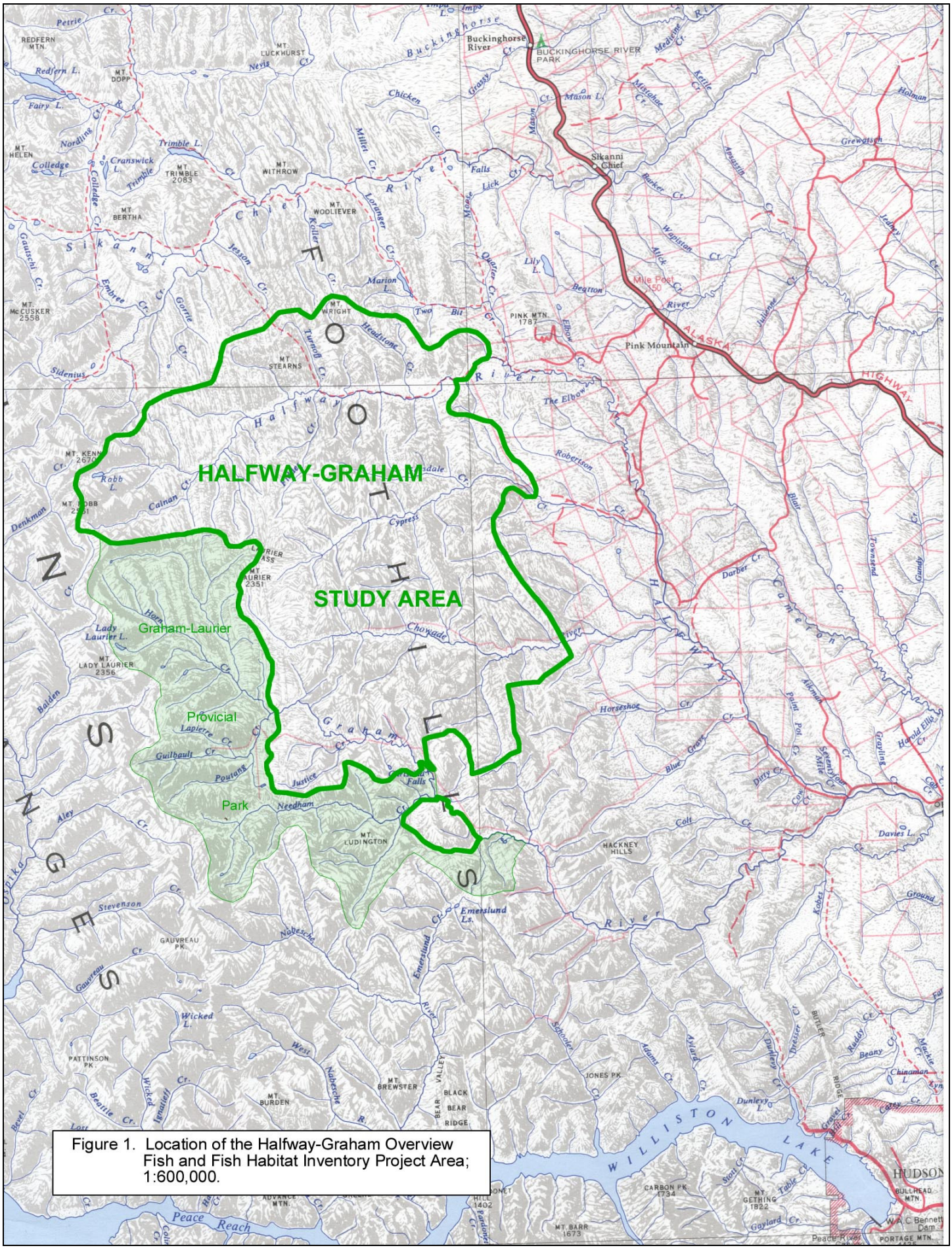

Figure 1. Location of the Halfway-Graham Overview Fish and Fish Habitat Inventory Project Area; 1:600,000.

Portions of the four main valleys are accessible by snowmobile and all-terrain-vehicle (ATV) via the Halfway River Trail, Cypress Creek Trail, Chowade River Trail, and Graham River Trail designated routes. The remainder of the project area is accessible only by foot, horseback or aircraft.

Recreation is currently the primary land use. Commercial activities are associated with recreational use by both residents and non-residents, and include guide-outfitting and packing. With the exception of a small amount of past seismic exploration, industrial land use within the project area is limited.

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 fisheries data was compiled and reviewed under a previous contract and included a proposed field sampling program consisting of 41 stream sample sites (De Gisi 2001).

Sample site placement outlined in the originally proposed sampling program (DeGisi 2001) was modified during the course of the fieldwork, as migration obstructions and habitat use patterns were identified and flow-dependent seasonal access limitations were noted. Final site selection was also dependent on the availability of suitable helicopter landing sites. Site locations were adjusted in the field to increase the amount of fish habitat and distribution data collected.

All field access was by Bell 206B helicopter. Flight paths were generally low-level along significant 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.

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 or Coffelt's CPS™ complex pulse setting. 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 typically 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 method 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*), rainbow trout (*Oncorhynchus mykiss*), and juvenile 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 mature bull trout, mounted, and analyzed by North-South Consulting Inc., Winnipeg, Manitoba.

No lakes were sampled, no water samples were collected for analysis 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 Halfway-Graham 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 41 stream sample sites were completed between August 20 and September 06, 2001.

4.1 Logistics

All site access was by helicopter and all sample site evaluations were conducted by the same two-person field crew. Field operations for the north half of the project area were staged from Mae's Kitchen at Mile Post 147 of the Alaska Highway and from Heyer's Camp, on the Graham River, for the south half of the project area. No logistical problems relating to access, weather, or timing were encountered during the course of the field program.

4.2 Habitat and Fish Distribution

Forty-one stream sample sites were established and evaluated in the field. These sites were distributed uniformly throughout the four major drainages comprising the project area, which included all portions of the upper Halfway, Graham, Chowade and Cypress watersheds lying upstream of the M-KMA boundary, with the exception of those portions of the Graham River watershed occurring within Graham-Laurier Provincial Park.

Fluvial aquatic habitats within the project area are generally characterized by moderate gradient, riffle/pool configurations, with coarse granular substrates. Suspended sediment levels are typically low, with correspondingly high water clarity. Boulder cover and occasional deep pools account for the majority of rearing cover in tributary habitats, with functional large woody debris (LWD) comprising a sub-dominant, but variable, component. On mainstem reaches, side channel habitats and cobble margins provide juvenile rearing habitat, while runs and deep pools associated with LWD and bedrock provide holding and feeding habitat for adult salmonids.

Bull trout, Arctic grayling, mountain whitefish, rainbow trout and slimy sculpin (*Cottus cognatus*) have been previously sampled within the project area. All stream reaches that are seasonally accessible from the Halfway River mainstem and contain suitable seasonal rearing habitat can generally be assumed to support one or more of these species. Bull trout and mountain whitefish appeared to be most abundant, while rainbow trout and Arctic grayling were found to occur at lower densities.

Bull trout exhibit the most "upstream" distribution pattern of the four sport-fish species and juveniles of this species are the most likely to be found in headwater and upper reach tributary habitats.

All four major drainages within the project area contain critical spawning habitat for sub-populations of fluvial migratory bull trout that make annual pre-spawning migrations from the Peace and lower Halfway Rivers. As a result, all four drainages also contain important year-round, rearing habitat for juvenile bull trout.

Migrational barriers occur on all four mainstem drainages within the project area. Portions of the Graham River and Halfway River lying above the lowermost impasses support geographically and genetically isolated bull trout populations, while portions of the Chowade River and Cypress Creek watersheds lying upstream of their respective barriers are non fish-bearing. A summary of all barriers to fish movement documented within the project area appears in Table 2.

Mountain whitefish are present in all four mainstem drainages within the project area but, unlike bull trout, their distribution is restricted to habitats downstream of the lowermost migrational barriers. Mountain whitefish appear to use seasonally accessible portions of the project area for adult summer habitat, spawning and juvenile rearing. Young-of-the-year (YOY) whitefish were captured at both mainstem sample sites on the Halfway River during the current survey, suggesting successful spawning activity. While juveniles are assumed to over-winter in mainstem habitats within the project area, adults typically undertake downstream movements to the lower Halfway mainstem during the late fall (RL&L 1995).

Arctic grayling have been recorded in all four major drainages comprising the project area, although none were sampled during the current survey. Arctic graying distribution appears to be largely associated with summer use by adult fish in mainstem and large tributary habitats. Although several YOY grayling were sampled on the Halfway River mainstem near Headstone Creek in 1995 (DES 1995), there is little other evidence of grayling spawning or juvenile rearing within the project area. Existing regional inventory and radio-telemetry data (MELP 1999a) suggests that most Arctic grayling spawning and juvenile rearing occurs lower in the Halfway system. Arctic grayling do not typically exist as upstream-resident populations above migrational barriers and have been historically

excluded from habitats upstream of the lowermost barriers within the project area. An unofficial transplant, however, appears to have resulted in the establishment of a resident population in Lady Laurier Lake, at the headwaters of Horn Creek (Woods 2001). Woods (2001) found anecdotal evidence of the presence of Arctic grayling at Red Falls on the Graham River. These fish are assumed to originate from the Lady Laurier Lake population.

Rainbow trout are native to all four main drainages within the project area and exhibit a distribution pattern similar to that of mountain whitefish, although at somewhat lower densities.

Slimy sculpin appear to exist as local populations in all accessible portions of mainstem and tributary drainages where suitable over-wintering capability exists. Although this species often occurs in association with isolated, upstream-resident bull trout populations, none have been recorded upstream of the lower barriers on the Graham (Christina Falls) or Halfway Rivers.

Additional non-sport species, including, longnose sucker (*Catostomus catostomus*), lake chub (*Couesius plumbeus*), and longnose dace (*Rhinichthys cataractae*) have been recorded in portions of the Halfway River system downstream of the project area, and may be seasonally present at low densities within lower portions of the project area.

A summary of fish sampling results for the 41 stream sample sites appears in Table 3. Site data cards, individual fish data, and site photographs appear in Appendices I through XLI. A complete index of all photodumentation recorded during the current survey is included in Appendix XLII. Interpretive maps (1:80,000 scale) summarizing sample site location, barriers, historical sampling data and fish distribution are included in Appendix XLIII. A brief description of fish distribution and general habitat values for each of the four major drainages sampled is presented below.

Table 2. Summary of barriers to fish movement within the Halfway-Graham Overview Inventory project area.

Stream Name	Watershed Code	NTS Map	Barrier Type	Height	UTM	Comments
Graham River	235-304300	94B/11	falls	60 m	10.493381.6267044	Christina Falls – lowermost impassable barrier on Graham mainstem; resident bull trout population and introduced Arctic grayling population upstream.
Graham River	235-304300	94B/11	falls	4 m	10.471638.6276696	Second impassable barrier on Graham mainstem; upstream of confluence with Poutang Creek.
Graham River	235-304300	94B/11	falls	9 m	10.471081.6276874	Red Falls - impassable barrier downstream of confluence with Horn Creek; presence or absence of bull trout upstream not confirmed; Arctic grayling introduced upstream (Lady Laurier lake).
Needham Creek	235-304300-51900	94B/6	falls	4 m	10.489016.6261018	Impassable barrier; upper limit of fish distribution on Needham Creek – non fish-bearing upstream.
Trib to Needham Creek	235-304300-51900-18800	94B/6	falls	8 m	10.489420.6261195	Impassable barrier at mouth of largest Needham sub-drainage; non fish-bearing upstream.
Chowade River	235-430800	94B/11	cascade	2 m	10.481289.6284794	Partial barrier on Chowade mainstem – may be passable to mature sport-fish.
Chowade River	235-430800	94B/11	dewatered zone	n/a	10.480135.6284384 to 10.475692.6283817	Extended dewatered section on Chowade mainstem; likely precludes upstream fish movement in conjunction with 2 m partial barrier immediately downstream; fish absence upstream assumed but not confirmed.
Cypress Creek	235-492500	94B/14	falls	5 m	10.485197.6299203	Impassable barrier; upper limit of fish distribution on Cypress Creek – non fish-bearing upstream.
Trib to Cypress Creek	235-492500-74500	94B/14	falls	3 m	10.484861.6300348	Lowermost impassable barrier 1.3 km upstream from mouth; non fish-bearing upstream.
Trib to Cypress Creek	235-492500-74500	94B/14	falls	5 m	10.484472.6300295	Impassable barrier on non fish-bearing reach.
Trib to Cypress Creek	235-492500-74500	94B/14	falls	3 m	10.482077.6301230	Impassable barrier on non fish-bearing reach.
Halfway River	235-000000	94B/14	falls	4 m	10.470926.6313425	Lowermost impassable barrier on Halfway mainstem; resident bull trout population upstream.

Table 2 Cont. Summary of barriers to fish movement within the Halfway-Graham Overview Inventory project area.

Stream Name	Watershed Code	NTS Map	Barrier Type	Height	UTM	Comments
Halfway River	235-000000	94B/14	falls	5 m	10.470397.6313234	Second impassable barrier on Halfway mainstem; resident bull trout population upstream.
Trib to Halfway River	235-879200	94B/14	falls	30 m	10.470556.6314166	Impassable barrier 930 m upstream from mouth; non fish-bearing upstream.
Calnan Creek	235-927700	94B/13	cascade	2 m	10.462480.6303166	Partial barrier on Calnan Creek mainstem; juvenile bull trout sampled upstream.
Calnan Creek	235-927700	94B/13	falls	10 m	10.457057.6301515	Lowermost in series of impassable mainstem barriers; limited habitat upstream assumed non fish-bearing.
Calnan Creek	235-927700	94B/13	falls	8 m	10.457014.6301467	2nd in series of impassable mainstem barriers; limited habitat upstream assumed non fish-bearing.
Calnan Creek	235-927700	94B/13	falls	5 m	10.456961.6301415	3rd in series of impassable mainstem barriers; limited habitat upstream assumed non fish-bearing.

Table 3. Summary of fish sampling results from 41stream sample sites in the Halfway-Graham Overview Inventory project area.

Stream Name	Site #	Fish Species	Comments
Graham River	1	BT	Isolated up-stream resident population
Trib to Graham River	2	BT CCG	
Needham Creek	3	BT RB MW CCG	
Needham Creek	4	NFC	Non fish-bearing; upstream of impassable barrier
Trib to Graham River	5	BT	Isolated up-stream resident population
Justice Creek	6	NFC	BT assumed seasonally present at low densities
Trib to Justice Creek	7	NFC	BT assumed seasonally present at low densities
Justice Creek	8	NFC	BT assumed seasonally present at low densities
Trib to Graham River	9	NFC	BT assumed seasonally present at low densities
Chowade River	10	BT	GR MW RB CCG also assumed present
Chowade River	11	NFC	Upstream of partial barrier, adjacent to de-watered zone
Trib to Chowade River	12	BT RB CCG	
Trib to Chowade River	13	BT RB CCG	
Trib to Chowade River	14	BT CCG	
Trib to Chowade River	15	CCG	Juvenile BT assumed seasonally present at low densities
Trib to Chowade River Trib	16	CCG	Juvenile BT assumed seasonally present at low densities
Trib to Chowade River	17	BT RB MW CCG	
Trib to trib to Chowade River	18	NFC	BT CCG MW also assumed seasonally present at low densities
Trib to Chowade River	19	BT	MW CCG also assumed seasonally present at low densities
Cypress Creek	20	BT RB MW CCG	
Cypress Creek	21	NFC	Non fish-bearing; upstream of impassable barrier
Geesdale Creek	22	NFC	BT CCG MW assumed seasonally present at low densities
Trib to Geesdale Creek	23	NFC	BT CCG MW assumed seasonally present at low densities
Trib to Geesdale Creek	24	BT	MW CCG also assumed seasonally present at low densities
Trib to Cypress Creek	25	NFC	BT MW RB CCG assumed seasonally present at low densities
Trib to Cypress Creek	26	NFC	BT CCG MW assumed seasonally present at low densities
Trib to Cypress Creek	27	CCG	BT MW RB also assumed seasonally present at low densities
Trib to Cypress Creek	28	BT	MW RB CCG also assumed seasonally present at low densities
Trib to Cypress Creek	29	NFC	Non fish-bearing; upstream of impassable barrier
Halfway River	30	RB MW CCG	BT GR also assumed seasonally present at low densities
Halfway River	31	MW CCG	BT RB GR also assumed seasonally present at low densities
Headstone Creek	32	BT RB	MW CCG also assumed seasonally present at low densities
Trib to Halfway River	33	NFC	BT MW CCG assumed seasonally present at low densities
Trib to Halfway River	34	NFC	BT GR MW CCG assumed seasonally present at low densities
Turnoff Creek	35	BT	
Fiddes Creek	36	BT	
Trib to Halfway River	37	BT MW	RB CCG also assumed seasonally present at low densities
Trib to Halfway River	38	NFC	Juvenile BT assumed seasonally present at low densities
Trib to Halfway River	39	BT RB MW	
Calnan Creek	40	BT	Upstream resident population above Halfway Falls
Calnan Creek	41	BT	Upstream resident population above Halfway Falls

BT=bull trout MW=mountain whitefish GR=Arctic grayling RB=rainbow trout CCG=slimy sculpin NFC=no fish caught

4.2.1 Graham River

The project area includes a relatively small portion of the Graham River watershed extending from near Christina Falls to the confluence with Poutang Creek. All portions of the Graham River drainage occurring upstream of the mouth of Poutang Creek lie within Graham-Laurier Provincial Park. Christina Falls is the largest and lowermost of three impassable barriers on the Graham River mainstem (Plate 1). Bull trout, mountain whitefish, Arctic grayling and rainbow trout are common downstream of Christina Falls while only bull trout are present upstream. The remaining two barriers are located 600 m apart, approximately 4.5 km upstream of the project area boundary near the mouth of Poutang Creek. There has been no sampling to confirm the presence or absence of resident bull trout upstream of the upper barrier (locally known as Red Falls), however, Woods (2001) found anecdotal evidence of the presence of resident bull trout in Horn Creek and at the confluence of the Graham River and Horn Creek.

Plate 1. Christina Falls – lower impassable barrier on the Graham River mainstem; aerial view upstream.

The southernmost extremity of the Halfway-Graham pre-tenure planning area includes portions of the Needham Creek drainage. Needham Creek is the largest tributary to the Graham River and enters the mainstem immediately downstream of Christian Falls. As a result of an impassable barrier located 8 km upstream of the mouth, only the lower reach of Needham Creek is fish-bearing. Although the lower mainstem itself lies within Graham-Laurier Provincial Park, tributary drainages entering from the south side of the stream lie within the pre-tenure planning area, and have potential to effect downstream fisheries values and water quality. A 4 km segment of the mainstem immediately downstream of the impasse provides critical spawning habitat for a sub-population of fluvial, migratory bull trout that over-winter in the lower Halfway and Peace Rivers.

Needham Creek is one of only four locations where the Peace-Halfway migratory bull trout population is known to spawn (MELP 1999b). A bull trout Wildlife Habitat Area (WHA) was established on the Needham Creek spawning zone in 2001, under the Identified Wildlife Strategy. Needham Creek also supports summer populations of adult mountain whitefish and rainbow trout.

Based on limited sampling, the geographically and genetically isolated bull trout population present upstream of Christina Falls appears to exist at low to moderate densities within the project area. No critical spawning habitat, as evidenced by concentrations of mature fish, redds, or high densities of YOY, were identified. No bull trout were captured in three sites sampled in the Justice Creek drainage, although suitable habitat for rearing juvenile bull trout is present. Seasonal access at the time of the survey was restricted by subsurface flow in the lower reach and bull trout were assumed to be seasonally present at low densities.

4.2.2 Chowade River

The east boundary of the M-KMA crosses the Chowade River mainstem approximately 22 km upstream from its confluence with the Halfway River. All of the Chowade watershed upstream of this point, including the remaining 50 km of mainstem, lies within the Halfway-Graham pre-tenure planning area. All four sport-fish species found within the project area are relatively common in the Chowade River. The Chowade River is believed to be the most important bull trout spawning stream in northeastern British Columbia. Regional inventory data and radio-telemetry (Baxter 1997, MELP 1999b) data suggests that the majority of the Peace-Halfway fluvial, migratory bull trout population spawns along a four kilometre section of the middle Chowade mainstem. As a result, the Chowade mainstem supports high densities of juvenile bull trout including over-wintering YOY and yearlings. In addition, almost all seasonally accessible tributary habitat is assumed to support rearing juvenile bull trout on a seasonal basis. A bull trout WHA was established on the Chowade River spawning zone in 2001, under the Identified Wildlife Strategy.

As in the project area as a whole, mountain whitefish, although not the most widely distributed, appear to be the most abundant sport-fish species in the Chowade River drainage. During an investigation of fish emigration from the Chowade system in the fall of 1994, 8,034 mountain whitefish were counted, compared to 529 rainbow trout, 301 bull trout and 118 Arctic grayling (RL&L 1995). The capture of relatively high densities of YOY mountain whitefish in August 1990 (ARL 1991) also suggests significant spawning activity.

While the Chowade River supports rainbow trout through a wide range of age classes, Arctic grayling use appears restricted to the adult age class, with an absence of rearing juveniles.

Although no impassable vertical barriers occur on the Chowade mainstem, the seasonal movement of fish to the upper drainage appears to be effectively precluded by the combination of a 5 km zone of sub-surface flow and a 2 m cascade, which likely forms a partial barrier immediately downstream. The cascade may limit the movement of juvenile fish during the spring when surface flow could potentially exists on the normally de-watered segment, while discharge is likely entirely sub-surface by the time adult fish large enough to ascend the cascade enter the system for the summer.

Sampling to confirm the absence of fish from headwaters habitat upstream of the de-watered zone has not been conducted.

4.2.3 Cypress Creek

The east boundary of the M-KMA crosses Cypress Creek approximately 18 km upstream from its confluence with the Halfway River. All portions of the Cypress drainage upstream of the M-KMA boundary lie within the Halfway-Graham pre-tenure planning area. This includes the remaining 45 km of mainstem and Geesdale Creek, the largest sub-drainage.

A 5-metre vertical impasse is located on the Cypress Creek mainstem approximately 46 km upstream of the confluence with the Halfway River. This impasse precludes all fish movement into the upper drainage and no upstream-resident fish were found above this barrier during sampling in 1996 (DES 1997). A second sample site was evaluated upstream of the impasse during the current survey to re-confirm non fish-bearing status. Three other migrational barriers occur within the Cypress drainage. All are located on a unnamed tributary entering from the north, immediately downstream of the mainstem barrier. The portion of the tributary drainage upstream of these impasses was found to be non fish-bearing.

Three of the four sport-fish species found within the project area were captured in the Cypress Creek drainage during the current survey, including bull trout, rainbow trout and mountain whitefish. Rainbow trout and mountain whitefish representing a range of age classes, including YOY, have been recorded in the Cypress Creek drainage, although at lower densities than in the Chowade or upper Halfway drainages (DES 1997, ARL 1991). Over-summering adult Arctic grayling appear to use the Cypress Creek drainage in relatively low densities. The only record within the Cypress portion of the project area is of two adult grayling in the Geesdale Creek mainstem in 1996 (DES 1997).

Two critical bull trout spawning locations used by Peace-Halfway fluvial, migratory bull trout have been identified on Cypress Creek. One is located immediately downstream of the confluence with Geesdale Creek and the second is located immediately downstream of the mainstem barrier (MELP 1999b). Bull trout WHA's were established at both sites in 2001, under the Identified Wildlife Strategy.

All seasonally accessible tributary habitats providing suitable rearing habitat can be assumed to support juvenile bull trout on a seasonal basis.

4.2.4 Upper Halfway River

Of the four sub-drainages comprising the Halfway-Graham pre-tenure planning area, the upper Halfway River accounts for the largest proportion. The downstream boundary of the project area (east M-KMA boundary) crosses the Halfway River between the confluences of Headstone Creek and Two Bit Creek, just west of Pink Mountain. The project area includes the upper 67 km of Halfway mainstem, the Headstone Creek, Turnoff Creek, Fiddes Creek and Calnan Creek sub-drainages, and Rob Lake.

Two impassible barriers occur on the Halfway River mainstem. Both are located within a 650-metre section of river, approximately halfway between the east M-KMA boundary

and the headwaters. The lower impasse (4 m) precludes all fish movement into the upper portion of the drainage (Plate 2).

Plate 2. Lower impassable barrier on the Halfway River mainstem; aerial view upstream.

Three of the four sport-fish species know to occur within the Halfway-Graham project area were captured downstream of the mainstem barrier during the current survey: bull trout, rainbow trout and mountain whitefish. Arctic grayling were not captured during the current survey but were recorded in the Halfway mainstem, within the project area, in 1995 (DES 1995). Over-summering, adult Arctic grayling appear more abundant in the Halfway mainstem downstream of the project area boundary. Rainbow trout and mountain whitefish appear to be relatively widespread at moderate densities through seasonally accessible portions of the Halfway mainstem and significant tributaries.

Two critical staging/spawning areas used by Peace-Halfway migratory bull trout, have been identified on the Halfway mainstem within the pre-tenure planning area (MELP 1999b). One is located near the mouth of Fiddes Creek and the other immediately downstream of the lower mainstem impasse. Both sites currently receive some level of protection from bull trout WHA's established in 2001, under the Identified Wildlife Strategy. Radio-telemetry data suggests that a proportion of these migratory fish may spawn in Fiddes Creek and Turnoff Creek. Relatively high densities of juvenile bull trout in both streams, recorded during the current inventory and by Baxter (1996) also suggest spawning activity.

Above the mainstem impasses, the upper watershed diverges into two sub-basins of comparable size: the Halfway River and Calnan Creek. This portion of the watershed supports geographically and genetically isolated bull trout. It is unclear if bull trout

populations in the Halfway River/Calnan Creek and in Robb Lake represent separate fluvial and adfluvial sub-populations. Baxter (1996) and BC Environment (J. Burrows pers. comm.) both sampled YOY bull trout immediately downstream of the outlet of Robb Lake, which suggests an outlet-spawning adfluvial population. During the current survey several bull trout approaching spawning condition were observed in lower Calnan Creek. These large-bodied fish appeared to have morphometric characteristics common to migratory populations. No other fish species have been recorded in fluvial habitats upstream of the mainstem barrier or in Robb Lake.

Only two other barriers potentially effecting fish passage were noted in the upper Halfway drainage. One is located on the lower reach of an unnamed tributary (WSC 235-879200) entering the Halfway mainstem from the north, immediately downstream of the mainstem barriers. Habitat upstream of this 30-metre barrier is assumed to be non fish-bearing due to limited potential to support an upstream-resident population. The second is the lowermost of a series of waterfalls located near the headwaters of Calnan Creek. Habitat upstream of this 10-metre barrier is also assumed to be non fish-bearing due to limited habitat availability and complexity.

4.3 Fish Age and Growth

Fork lengths and aging structures were collected from representatives of sport-fish species captured within the Halfway-Graham Overview Inventory project area between August 20 and September 6, 2001. These included bull trout, rainbow trout and mountain whitefish. Although Arctic grayling are present in the project area, none were captured or sampled in the course of this inventory.

A meaningful analysis of growth is precluded by small sample sizes, absence of representatives from numerous age classes and, in the case of bull trout, variability in the combined sample due to the existence of genetically isolated sub-populations within the project area. Limited information on the life history of each species can be gleaned from general age class distribution within the watershed. A brief discussion of each of the three species follows. Where possible, length-frequency and age-at-length plots are presented, however, the limitations of sample size and sampling bias should be acknowledged.

4.3.1 Rainbow Trout

Nine rainbow trout were captured within the Chowade River, Cypress Creek and Halfway River drainages; aging structures from all nine were analyzed. Sampled fish were distributed sparsely through the 1+ to 5+ age classes. Table 4 depicts the age-length relationship of sampled rainbow trout; the sample size is too limited to allow meaningful analysis.

Table 4. Age-length relationship of rainbow trout captured in the Halfway-Graham Overview Inventory project area between August 20 and September 5, 2001.

	Assigned Age						
	0+	1+	2+	3+	4+	5+	6+
Mean F.L. (mm)	-	108	120	196	254	350	-
Range (mm)	-	98-118	-	180-216	275-234	-	-
n = 9	-	2	1	3	2	1	-

F.L. = fork length

4.3.2 Mountain Whitefish

Thirty-five mountain whitefish were captured within the Chowade River, Cypress Creek and upper Halfway River drainages. Eighty percent of these were young-of-the-year juveniles sampled in the Halfway River mainstem downstream of the mainstem barrier. The remaining seven fish were scattered across the 3+ to 7+ age classes. Table 5 summarizes age-at-length; limited sample size precludes further analysis.

Table 5. Age-length relationship of mountain whitefish captured in the Halfway-Graham Overview Inventory project area between August 20 and September 5, 2001.

	Assigned Age							
	0+	1+	2+	3+	4+	5+	6+	7+
Mean F.L. (mm)	45	-	-	171	218	307	304	300
Range (mm)	38-52	-	-	-	-	305-310	295-313	-
N = 35	28	0	0	1	1	2	2	1

F.L. = fork length

4.3.3 Bull Trout

A total of ninety-eight bull trout were captured across all four drainages within the project area; most were in tributary habitats.

Rearing juveniles in the YOY, yearling and 2+ age classes accounted for the majority of the sample (75%). YOY juveniles were sampled in the upper Graham River mainstem below the mouth of Poutang Creek (Site 1), suggesting possible mainstem spawning by the upstream resident population, and in the Needham Creek WHA (Site 3).

The remainder of the sample consisted primarily of age 3+ and 4+ sub-adults, and six additional fish in the 6+ to 9+ age classes. Figure 2 represents the length-frequency relationship of the combined sample, while Table 6 summarizes age-at-length. Aging structures were analyzed for all bull trout except 18 representatives of the yearling length class. These were assigned ages of 1+ based on fork length and physical characteristics and are included in Table 6.

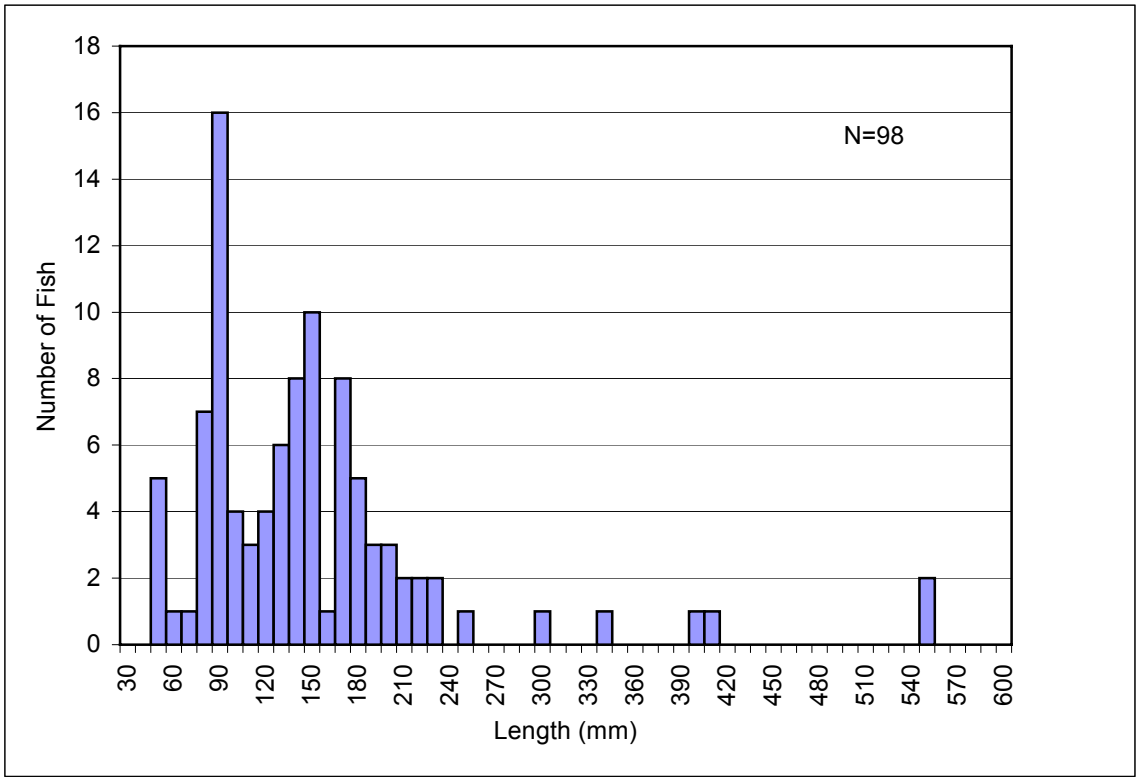

Figure 2. Length-frequency relationship of bull trout captured in the Halfway-Graham Overview Inventory project area between August 20 and September 5, 2001.

Table 6. Age-length relationship of bull trout captured in the Halfway-Graham Overview Inventory project area between August 20 and September 6, 2001.

	Assigned Age									
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+
Mean F.L. (mm)	55	96	152	198	236	335	451	440	-	552
Range (mm)	44-63	75-126	122-186	175-251	220-261	-	348-555	418-463-	-	-
n=98	6	33	35	13	5	1	2	2	-	1

F.L. = fork length

4.4 Significant Features and Fisheries Observations

Due to their blue-listed (i.e., vulnerable) status in British Columbia and large-scale declines over their North American range, bull trout are of special management concern in the Halfway River watershed. 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.

The Peace and Halfway Rivers support the largest population of large-bodied, fluvial, migratory bull trout so far identified in northeastern British Columbia. Existing regional fisheries data and radio-telemetry data collected by BC Environment between 1996 and 1998 suggest that these fish typically over-winter in the Peace River, between Hudson's Hope and the BC-Alberta border, and make summer movements up the Halfway River and its tributaries to one of four critical spawning grounds. All four of these critical spawning areas lie within the Halfway-Graham pre-tenure planning area. The Chowade River appears to support the largest spawning run, followed by the upper Halfway River, lower Needham Creek and Cypress Creek. Important core spawning zones within the project area are currently defined by bull trout WHA's, however, industrial disturbances outside WHA boundaries resulting in sediment transport or disruptions to ground water flow have high potential to negatively affect bull trout spawning habitat. In addition, improved human access in the vicinity of critical spawning and staging areas, where concentrations of large fish are at increased vulnerability, can have dramatic effects on spawning populations despite restrictive regulations.

Although there is little evidence of Arctic grayling spawning or juvenile rearing within the project area, existing data suggests mainstem and larger tributary habitats may provide post-spawning, summer refuge for adult grayling from the broader Halfway River watershed. Mature Arctic grayling (5+ to 8+ age class) are sensitive to over-harvest and can be significantly affected by increased human access to key summer holding/feeding habitats.

Mountain whitefish are widely distributed throughout the project area and appear to be the most abundant fish species present. This species is generally less affected by human development due to less stringent spawning habitat requirements, a general preference for larger streams, and a lower appeal to anglers.

Relatively few migrational barriers effect the fish-bearing status of significant portions of the project area. These include a 5-metre falls on the Cypress Creek mainstem which precludes fish use of the upper Cypress watershed, and the upper Chowade de-watered zone which is assumed to limited fish distribution in the upper Chowade drainage. Both the Graham River and upper Halfway River watersheds support upstream resident bull trout population above their respective impassable barriers.

4.5 Future Research Recommendations

Data on fluvial, migratory bull trout has been documented within the project area by radio-telemetry data collected by BC Environment (MELP 1999b). Although adequate information on migration timing and spawning habitat use is available for the Needham Creek, Cypress Creek and Chowade River sub-populations, further information may be required on the upper Halfway spawning run to allow for effective development planning. Specifically, the use of upper Halfway mainstem spawning zones by migratory bull trout should be further defined (below the mainstem barrier). As well, the suspected importance of Turnoff Creek and Fiddes Creek as critical spawning and rearing areas for migratory bull trout should also be investigated.

Further work is needed to define the reproductive characteristics of possible fluvial and adfluvial bull trout populations isolated above the Halfway mainstem barrier (i.e., possible critical spawning zone in Calnan Creek and the outlet of Robb Lake).

Baseline estimates of the Chowade River bull trout spawning run, derived from data collected by BC Environment between 1995-1998, should be periodically replicated as an index into long term population trends for the Peace-Halfway fluvial, migratory population.

PERSONAL COMMUNICATIONS

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APPENDIX I

GRAHAM RIVER
(235-304300)

Sample Site 1

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Graham River										FIELD COORDINATES	56° 37.76' 123° 23.20'			
LOCATION															
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-304300										
REACH #		SITE #	1	SITE UTM	10	476281	6276187		SITE LENGTH	300	METH	RF	ACCESS	H	
DATE	2001/09/06	TIME	0742	AGENCY	Diversified Environmental Services				CREW	BC/TE	FISH FORM	Y	X	N	

CHANNEL (m)	meth							avg	GRADIENT %		WATER	
CHANNEL WIDTH	RF	28.50	29.00	35.00	30.00	30.00	33.50	31.00	meth	AL	EMS		COND	
WETTED WIDTH	RF	28.50	28.20	35.00	18.20	21.00	19.50	25.07	1.0		TEMP (°C)	5.5	TURBIDITY	
RES POOL DEPTH	MS	0.70	0.80	0.85	1.20	1.50	0.75	0.97	1.0		Ph		Clear	
Wb DEPTH	0.85	0.70	0.80	STAGE	Moderate		No Vis Chan		Dry/Int	1	FLOOD SIGNS	1.3 m - RD		
							Dewater		Tribs		BED MATERIAL			
											Dominant	Gravel (2-64 mm)		
											Subdom.	Cobble (64-256 mm)		
											D95 (cm)	19	D (cm)	23
											Morph.	Riffle-pool		

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	T	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	Few	DIST	Clumped
LB SHAPE	Vertical	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	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 potential for rearing adult sportfish (BT, MW, GR).
Limited side channel and boulder cover for juvenile BT rearing.
Low to moderate potential for mainstem spawning for BT - sand-like fines abundant in interstices in gravel substrates.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC2	18	wd	u	view u/s from bottom of site
GC2	19	wd	u	view u/s from centre of site
GC2	20	wd	d	view d/s from top of site
GC2	21	wd	u	aerial view upstream
T1	12	50	object	female bull trout - 552 mm
T1	13	50	object	female bull trout - 552 mm

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 525 seconds @ 250 volts. Bull trout were captured.
C1	Occasional bedrock out-croppings in deep pools and LWD jams.
CX2	Site located u/s of Christina Falls. Upstream resident bull trout population present; no other species recorded except GR present upstream in Lady Laurier Lake.

FISH COLLECTION FORM

STREAM NAME	Graham River							[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION						WATERSHED CODE	235-304300				
WATERBODY ID		NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N			
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	1	FISH PERMIT #	SC2001-032				
DATE	2001/09/06	to	2001/09/06	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	
1			10.476281.6276187	EF	1	5.5		C	
1			10.476281.6276187	VO	1	5.5		C	

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	BT			9	57	552	Rearing	
1	VO/1	1	BT			3			Rearing	approx 400 mm ln

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	0747	0815	575	300	25.07	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	
	1	EF/1	1	BT	94							
	1	EF/1	1	BT	96							
	1	EF/1	1	BT	106							
	1	EF/1	1	BT	103							
	1	EF/1	1	BT	102							
	1	EF/1	1	BT	63							
	1	EF/1	1	BT	57							
	1	EF/1	1	BT	59							
	1	EF/1	1	BT	59							
	1	EF/1	1	BT	552		F		Fin ray	33-1	9+	
	1	VO/1	1	BT	400							approximate length

Graham River
Site 1: View upstream from bottom of site
(Roll GC2 - Exp 18; CD 1 - Im 1)

Graham River
Site 1: View upstream from centre of site
(Roll GC2 - Exp 19; CD 1 - Im 2)

Graham River
Site 1: Aerial view upstream
(Roll GC2 - Exp 21; CD 1 - Im 4)

552 mm female bull trout
Site 1: Graham River
(Roll T1 - Exp 12; CD 1 - Im 5)

APPENDIX II

UNNAMED TRIBUTARY TO GRAHAM RIVER
(235-304300-50700)

Sample Site 2

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Graham River										FIELD COORDINATES	56° 30.68' 123° 03.99'			
LOCATION															
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-304300-50700										
REACH #		SITE #	2	SITE UTM	10	496043	6262951		SITE LENGTH	200	METH	RF	ACCESS	H	
DATE	2001/09/06	TIME	1545	AGENCY	Diversified Environmental Services				CREW	BC/TE	FISH FORM	Y	X	N	

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	2.80	2.60	2.40	1.80	2.80	2.20	2.43	meth	AL
WETTED WIDTH	RF	2.80	2.60	2.90	1.70	2.60	2.20	2.47	2.5	
RES POOL DEPTH	MS	0.30	0.33	0.13	0.15	0.60	0.51	0.34	3.5	
Wb DEPTH	0.30	0.30	0.35	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	5.5	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	T	T	T	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		

INSTREAM VEGETATION	Algae

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

MORPHOLOGY

FLOOD SIGNS	0.3 m - RD		
BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	25	D (cm)	50
Morph.	Riffle-pool		

1 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 to good potential for seasonal rearing of BT juveniles.
Abundant deep pools and undercut cover.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC4	14A	wd	u	aerial view upstream from Graham River confluence
GC4	15A	wd	u	view u/s from bottom of site
GC4	16A	wd	u	view u/s from centre of site
GC4	17A	wd	d	view d/s from top of site

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose tracks		

COMMENTS

C
CX1 Electro-fishing effort: 279 seconds @ 300 volts.Bull trout and slimy sculpin were captured.
C1 Channel appears very stable with no evidence of disturbance.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Graham River						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	235-304300-50700			
WATERBODY ID		NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	2	FISH PERMIT #	SC2001-032		
DATE	2001/09/06 to 2001/09/06	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
2			10.496043.6262951	EF	1	5.5		C	

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	BT			4	83	141	Rearing	
2	EF/1	1	CCG			1	92	92	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
	2	EF/1	1	1550	1610	279	200	2.47	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
	2	EF/1	1	BT	132				Scale	41-1	2+	
	2	EF/1	1	BT	83				Scale	41-2	1+	
	2	EF/1	1	BT	141				Scale	41-3	2+	
	2	EF/1	1	BT	87							
	2	EF/1	1	CCG	92							

Unnamed tributary to Graham River
Site 2: View upstream from bottom of site
(Roll GC4 - Exp 15A; CD 1 - Im 6)

Unnamed tributary to Graham River
Site 2: Aerial view upstream from Graham River confluence
(Roll GC4 - Exp 14A; CD 1 - Im 9)

APPENDIX III

NEEDHAM CREEK

(235-304300-51900)

Sample Site 3

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Needham Creek											FIELD COORDINATES	56° 30.43' 123° 08.31'				
LOCATION	Downstream of barrier																
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-304300-51900												
REACH #		SITE #	3	SITE UTM	10	490963	6262524	SITE LENGTH	300	METH	RF	ACCESS	H				
DATE	2001/09/06	TIME	1400	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	22.00	30.00	21.00	28.00	31.00	25.00	26.17	meth	AL
WETTED WIDTH	RF	16.00	16.00	18.00	8.20	11.00	12.50	13.62	1.0	
RES POOL DEPTH	MS	0.90	0.80	0.76	0.44	0.80	1.20	0.82	1.5	
Wb DEPTH	1.10	1.30	1.20	STAGE	Low		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	7.0	TURBIDITY	
Ph		Clear	

FLOOD SIGNS 1.0 m - RD

COVER

COVER Total Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	S	S	S	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	Abundant	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Sloping
TEXTURE	Fines/Cobble	TEXTURE	Fines/Boulder
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: None

MORPHOLOGY

BED MATERIAL

Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	32	D (cm)	24
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 to high quality habitat for adult and juvenile salmonids.
Known spawning area for large fluvial migratory BT.
Large adult BT holding in deep pool at top of site.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC4	10A	wd	u	view u/s from bottom of site
GC4	11A	wd	u	view u/s from centre of site
GC4	12A	wd	d	view d/s from top of site
GC4	13A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 432 seconds @ 250 volts. Bull trout and slimy sculpin captured.
	Angling: adult bull trout captured.
	Adult mountian whitefish and Arctic grayling observed.

FISH COLLECTION FORM

STREAM NAME	Needham Creek							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION	Downstream of barrier					WATERSHED CODE	235-304300-51900			
WATERBODY ID		NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	3	FISH PERMIT #	SC2001-032			
DATE	2001/09/06 to 2001/09/06	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
3			10.490963.6262524	EF	1	7.0		C	
3			10.490963.6262524	VO	1	7.0		C	
3			10.490963.6262524	AG	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
3	EF/1	1	BT			12	50	187	Rearing	
3	EF/1	1	CCG			4	50	93	Rearing	
3	VO/1	1	RB							
3	VO/1	1	MW							
3	AG/1	1	BT	Adult		1	555	555		

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	1405	1425	432	300	13.62	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
	3	EF/1	1	BT	190				Scale	40-1	3+	
	3	EF/1	1	BT	136				Scale	40-2	2+	
	3	EF/1	1	BT	187				Scale	40-3	3+	
	3	AG/1	1	BT	555		F		Fin ray	40-4	6+	
	3	EF/1	1	BT	50							
	3	EF/1	1	BT	94							
	3	EF/1	1	BT	94							
	3	EF/1	1	BT	91							
	3	EF/1	1	BT	91							
	3	EF/1	1	BT	97							
	3	EF/1	1	BT	94							
	3	EF/1	1	BT	95							
	3	EF/1	1	CCG	93							
	3	EF/1	1	CCG	50							
	3	EF/1	1	CCG	81							
	3	EF/1	1	CCG	59							

Needham Creek
Site 3: View downstream from top of site
(Roll GC4 - Exp 12A; CD 1 - Im 16)

Needham Creek
Site 3: Aerial view upstream
(Roll GC4 - Exp 13A; CD 1 - Im 17)

APPENDIX IV

NEEDHAM CREEK
(235-304300-51900)

Sample Site 4

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Needham Creek											FIELD COORDINATES	56° 29.55' 123° 13.01'				
LOCATION	Upstream of barrier																
NTS MAP #	94B/6	NID NO		WATERSHED CODE	235-304300-51900												
REACH #		SITE #	4	SITE UTM	10	496637	6260908	SITE LENGTH	300	METH	RF	ACCESS	H				
DATE	2001/09/06	TIME	1320	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	13.20	14.20	10.20	11.20	13.20	14.80	12.80	meth	AL
WETTED WIDTH	RF	13.20	11.50	10.20	9.80	11.00	11.00	11.12	1.5	
RES POOL DEPTH	MS	0.20	0.20	0.45	0.30	0.20	0.15	0.25	1.5	
Wb DEPTH	0.30	0.45	0.30	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	6.5	TURBIDITY	
Ph		Clear	
FLOOD SIGNS	0.6 m - RD		

COVER

	COVER	Total	Abundant (>20%)					CROWN CLOSURE							
type	SWD	LWD	B	U	DP	OV	IV								
amt	T	T	D	T	S	N	N								
loc	P	P	P	P	P	P	P	0%	1-20%	21-40%	41-70%	71-90%	>90%		
LWD FNC	Few	DIST	Even												
LB SHAPE	Sloping	RB SHAPE	Vertical					0	1	2	3	4	5		
TEXTURE	Gravel/Cobble	TEXTURE	Fines/Gravel					INSTREAM	Algae						
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous					VEGETATION							
STAGE	Mature Forest	STAGE	Mature Forest												

MORPHOLOGY

BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	56
D (cm)	85
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	Coupled
CONFINED	Frequently Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS	UTM		
			F	4	AE	R	4	F	3A	4 m impassable barrier	10	488344	6261906
						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 and juvenile BT.
Access precluded by barrier downstream of site.
NFC after electro-fishing indicates that there is no headwater population of BT upstream of falls.
No fish captured or observed; apparntly non fish-bearing upstream of 4 m barrier downstream of site

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC4	6A	wd	u	view u/s from bottom of site
GC4	7A	wd	u	view u/s from centre of site
GC4	8A	wd	d	view d/s from top of site
GC4	9A	wd	u	aerial view upstream

WILDLIFE

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

COMMENTS

C	
CX1	Electro-fishing effort: 998 seconds @ 250 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Needham Creek			[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION	Upstream of barrier			WATERSHED CODE	235-304300-51900		
WATERBODY ID		NTS MAP	94B/6	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	4	FISH PERMIT #	SC2001-032
DATE	2001/09/06 to 2001/09/06	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
4			10.496637.6260908	EF	1	6.5		C	

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	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
	4	EF/1	1	1320	1345	998	300	11.12	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

Needham Creek
Site 4: View upstream from centre of site
(Roll GC4 - Exp 7A; CD 1 - Im 11)

Needham Creek
Site 4: Aerial view upstream
(Roll GC4 - Exp 9A; CD 1 - Im 13)

APPENDIX V

UNNAMED TRIBUTARY TO GRAHAM RIVER
(235-304300-59800)

Sample Site 5

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Graham River											FIELD COORDINATES	56° 34.92' 123° 09.37'				
LOCATION																	
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-304300-59800												
REACH #	1	SITE #	5	SITE UTM	10	490376	6270887	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/09/06	TIME	1157	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	5.20	4.80	4.60	3.20	2.90	4.30	4.17	meth	AL
WETTED WIDTH	RF	3.50	2.10	3.50	2.00	2.00	2.70	2.63	1.0	
RES POOL DEPTH	MS	0.20	0.38	0.26	0.36	0.26	0.44	0.32	1.5	
Wb DEPTH	0.32	0.48	0.36	STAGE	Low		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	4.5	TURBIDITY	
Ph		Clear	

COVER

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

LWD FNC	Abundant	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines/Cobble
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
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: Algae

MORPHOLOGY

FLOOD SIGNS	1.0 m - RD
BED MATERIAL	
Dominant	Gravel (2-64 mm)
Subdom.	Cobble (64-256 mm)
D95 (cm)	24 D (cm) 26
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
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 quality seasonal rearing habitat for juvenile salmonids.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC3	21A	wd	u	view u/s from bottom of site
GC3	22A	wd	u	view u/s from centre of site
GC3	23A	wd	d	view d/s from top of site
GC3	24A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
AMP	Boreal toad		

COMMENTS

C	
CX1	Electro-fishing effort: 273 seconds @ 300 volts. Bull trout captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Graham River								[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION						WATERSHED CODE	235-304300-59800				
WATERBODY ID		NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N			
PROJECT ID	Halfway-Graham Overview	REACH #	1	SITE #	5	FISH PERMIT #	SC2001-032				
DATE	2001/09/06	to	2001/09/06	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	
5			10.490376.6270887	EF	1	4.5		C	

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	BT			4	143	163	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
	5	EF/1	1	1205	1220	273	200	2.63	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	
	5	EF/1	1	BT	163				Scale	38-1	2+	
	5	EF/1	1	BT	153				Scale	38-2	2+	
	5	EF/1	1	BT	147				Scale	38-3	2+	
	5	EF/1	1	BT	143				Scale	38-4	2+	

Unnamed tributary to Graham River
Site 5: View upstream from centre of site
(Roll GC3 - Exp 22A; CD 1 - Im 19)

Unnamed tributary to Graham River
Site 5: Aerial view upstream
(Roll GC3 - Exp 24A; CD 1 - Im 21)

APPENDIX VI

JUSTICE CREEK
(235-304300-66400)

Sample Site 6

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Justice Creek										FIELD COORDINATES	56° 34.35' 123° 18.20'			
LOCATION															
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-304300-66400										
REACH #		SITE #	6	SITE UTM	10	481363	6269829	SITE LENGTH	200	METH	rf	ACCESS	H		
DATE	2001/09/06	TIME	1030	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N		

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	6.60	7.00	6.50	5.50	5.00	8.00	2.90	meth	AL
WETTED WIDTH	RF	2.20	5.10	2.30	1.90	2.20	8.00	2.90	1.5	
RES POOL DEPTH	MS	0.69	0.16	0.57	0.27	0.46	0.28	0.41	1.5	
Wb DEPTH	0.60	0.42	0.62	STAGE	Low		No Vis Chan		Dry/Int	
					Moderate (5-20%)		Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	4.5	TURBIDITY	
Ph		Clear	

MORPHOLOGY

FLOOD SIGNS	1.10 m - RD
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	28
D (cm)	18
Morph.	Riffle-pool

COVER

COVER	Total	type	amt	loc
SWD		type	S	P
LWD		amt	S	P
B		loc	S	P
U			S	P
DP			D	P
OV			T	P
IV			N	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	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: None

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/Diagonal
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 but seasonal access currently restricted by de-watered section downstream and poorly defined channel through back channels and oxbows at Graham confluence.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC3	10A	wd	u	view u/s from bottom of site
GC3	11A	wd	u	view u/s from centre of site
GC3	12A	wd	d	view d/s from top of site
GC3	13A	wd	u	aerial view upstream
GC3	14A	wd	u	upstream aerial view of basin

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 263 seconds @ 300 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Justice Creek			[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION				WATERSHED CODE	235-304300-66400		
WATERBODY ID		NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	6	FISH PERMIT #	SC2001-032
DATE	2001/09/06 to 2001/09/06	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
6			10.481363.6269828	EF	1	4.5		C	

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	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
	6	EF/1	1	1035	1055	263	200	2.90	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

Justice Creek
Site 6: View upstream from bottom of site
(Roll GC3 - Exp 10A; CD 1 - Im 26)

Justice Creek
Site 6: View downstream from top of site
(Roll GC3 - Exp 12A; CD 1 - Im 28)

APPENDIX VII

UNNAMED TRIBUTARY TO JUSTICE CREEK
(235-304300-66400-16500)

Sample Site 7

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Justice Creek									FIELD COORDINATES	56° 34.02' 123° 17.64'				
LOCATION															
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-304300-66400-16500										
REACH #	1	SITE #	7	SITE UTM	10	489881	6269227			SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/09/06	TIME	1117	AGENCY	Diversified Environmental Services					CREW	BC/TE	FISH FORM	Y	X	N

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	12.40	9.20	8.10	7.60	6.80	6.40	8.42	meth	AL
WETTED WIDTH	RF	4.60	9.20	3.60	6.20	5.60	5.20	5.73	2.5	
RES POOL DEPTH	MS	0.10	0.10	0.20	0.31	0.15	0.20	0.18	3.0	
Wb DEPTH	0.25	0.30	0.30	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	4.0	TURBIDITY	
Ph		Clear	

FLOOD SIGNS 0.25 m - RD

BED MATERIAL

Dominant	Gravel (2-64 mm)		
Subdom.	Cobble (64-256 mm)		
D95 (cm)	22	D (cm)	28
Morph.	Riffle-pool		

COVER

COVER	Total	Abundant (>20%)					
type	SWD	LWD	B	U	DP	OV	IV
amt	T	T	S	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	Few	DIST	Clumped
LB SHAPE	Sloping	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fine/Cob/Grav
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: Algae

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/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 juvenile BT.
Access currently limited by de-watered channel downstream and poorly defined channel through back channels and oxbows at confluence with Graham River.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC3	15A	wd	u	view u/s from bottom of site
GC3	16A	wd	u	view u/s from centre of site
GC3	17A	wd	d	view d/s from top of site
GC3	18A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 361 seconds @ 250 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Justice Creek		[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION		WATERSHED CODE	235-304300-66400-16500		
WATERBODY ID		NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Halfway-Graham Overview	REACH #	1	SITE #	7	FISH PERMIT #	SC2001-032
DATE	2001/09/06 to 2001/09/06	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
7			10.489881.6269227	EF	1	4.0		C	

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	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
	7	EF/1	1	1122	1140	361	200	5.73	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 Justice Creek
Site 7: View upstream from centre of site
(Roll GC3 - Exp 16A; CD 1 - Im 23)

Unnamed tributary to Justice Creek
Site 7: Aerial view upstream
(Roll GC3 - Exp 18A; CD 1 - Im 25)

APPENDIX VIII

UNNAMED TRIBUTARY TO JUSTICE CREEK
(235-304300-66400-16500)

Sample Site 8

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Justice Creek											FIELD COORDINATES	56° 34.93' 123° 20.87'				
LOCATION																	
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-304300-66400-16500												
REACH #		SITE #	8	SITE UTM	10	477241	6270933	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/09/06	TIME	0955	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	MS	3.10	2.65	3.50	4.00	3.30	4.20	3.46	meth	AL
WETTED WIDTH	MS	2.90	2.65	2.90	3.70	1.50	3.00	2.78	2.5	
RES POOL DEPTH	MS	0.13	0.46	0.20	0.20	0.15	0.25	0.23	2.0	

Wb DEPTH	0.35	0.35	0.35	STAGE	Low	No Vis Chan		Dry/Int		1
						Dewater		Tribs		

COVER

	COVER	Total			Moderate (5-20%)				CROWN CLOSURE							
type	SWD	LWD	B	U	DP	OV	IV									
amt	T	T	S	T	D	T	N									
loc	P	P	P	P	P	P	P		0%	1-20%	21-40%	41-70%	71-90%	>90%		
LWD FNC	Few	DIST	Clumped													
LB SHAPE	Vertical	RB SHAPE	Vertical						0	1	2	3	4	5		
TEXTURE	Fines	TEXTURE	Fines/Bedrock						INSTREAM		Algae					
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous						VEGETATION							
STAGE	Mature Forest	STAGE	Mature Forest													

WATER

EMS		COND	
TEMP (°C)	4.0	TURBIDITY	
Ph		Clear	

MORPHOLOGY

FLOOD SIGNS	0.3 m - RD
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	46 D (cm) 23
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	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

Limited seasonal rearing potential for juvenile BT.

Seasonal access currently limited by de-watered and poorly defined segments of channel downstream.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC3	5A	wd	u	view u/s from bottom of site
GC3	6A	wd	u	view u/s from centre of site
GC3	7A	wd	d	view d/s from top of site
GC3	8A	wd	u	aerial view upstream
GC3	9A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose		

COMMENTS

C	
CX1	Electro-fishing effort: 325 seconds @ 300 volts. No fish captured.
C1	Also significant proportion of boulder present.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Justice Creek		[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION		WATERSHED CODE	235-304300-66400-16500		
WATERBODY ID		NTS MAP	94B/11	NID NO	
SITE/LAKE CARD ATTACHED	[X] Y	[ ] N			
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	8
FISH PERMIT #	SC2001-032				
DATE	2001/09/06 to 2001/09/06	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
8			10.477241.6270933	EF	1	4.0		C	

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	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
	8	EF/1	1	1000	1020	325	200	2.78	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

Unnamed tributary to Justice Creek
Site 8: View upstream from centre of site
(Roll GC3 - Exp 6A; CD 1 - Im 32)

Unnamed tributary to Justice Creek
Site 8: View downstream from top of site
(Roll GC3 - Exp 7A; CD 1 - Im 33)

APPENDIX IX

UNNAMED TRIBUTARY TO GRAHAM RIVER
(235-304300-74200)

Sample Site 9

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Graham River											FIELD COORDINATES	56° 38.03' 123° 22.37'				
LOCATION																	
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-304300-74200												
REACH #		SITE #	9	SITE UTM	10	477265	6276781	SITE LENGTH	160	METH	RF	ACCESS	H				
DATE	2001/09/06	TIME	0840	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	4.70	5.20	3.40	3.10	3.20	2.40	3.67	meth	AL
WETTED WIDTH	RF	3.20	2.50	2.90	2.90	1.50	3.40	2.73	1.5	
RES POOL DEPTH	MS	0.32	0.17	0.12	0.19	0.53	0.24	0.26	1.0	
Wb DEPTH	0.40	0.42	0.38	STAGE	Low		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	3.5	TURBIDITY	
Ph		Clear	

FLOOD SIGNS: 0.6 m - RD

BED MATERIAL

Dominant	Cobble (64-256 mm)		
Subdom.	Boulder (> 256 mm)		
D95 (cm)	42	D (cm)	28
Morph.	Riffle-pool		

COVER

COVER	Total	Trace (5%)

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

LWD FNC	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Coniferous	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

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 to moderate seasonal rearing potential for juvenile BT.

Seasonal access currently restricted by 100 m de-watered section immediately upstream of mouth.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC2	22	wd	u	view u/s from bottom of site
GC2	23	wd	u	view u/s from centre of site
GC2	24	wd	d	view d/s from top of site
GC2	25	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 268 seconds @ 250 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Graham River				[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION				WATERSHED CODE	235-304300-74200		
WATERBODY ID		NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	9	FISH PERMIT #	SC2001-032
DATE	2001/09/06 to 2001/09/06	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
9			10.477265.6276781	EF	1	3.5		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	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
	9	EF/1	1	0845	0900	268	160	2.73	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

Unnamed tributary to Graham River
Site 9: View upstream from bottom of site
(Roll GC2 - Exp 22; CD 1 - Im 35)

Unnamed tributary to Graham River
Site 9: Aerial view upstream from Graham River confluence
(Roll GC2 - Exp 25; CD 1 - Im 38)

APPENDIX X

CHOWADE RIVER
(235-430800)

Sample Site 10

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Chowade River											FIELD COORDINATES	56° 42.38' 123° 12.03'				
LOCATION																	
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-430800												
REACH #		SITE #	10	SITE UTM	10	487715	6284735					SITE LENGTH	300	METH	RF	ACCESS	H
DATE	2001/09/05	TIME	1020	AGENCY	Diversified Environmental Services							CREW	BC/TE	FISH FORM	Y	X	N

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	17.00	17.50	30.00	25.80	32.00	24.00	29.00	meth	AL
WETTED WIDTH	RF	9.90	9.00	14.00	7.80	21.00	12.00	7.10	1.0	
RES POOL DEPTH	MS	0.75	0.60	0.75	0.70	0.40	1.00	0.72	1.5	
Wb DEPTH	1.35	1.00	1.20	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	4.0	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	S	S	S	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	Abundant	DIST	Clumped
LB SHAPE	Sloping	RB SHAPE	Vertical
TEXTURE	Fines/Cobble	TEXTURE	Fines/Cobble
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: Algae

MORPHOLOGY

FLOOD SIGNS	1.0 m - RD
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	40
D (cm)	24
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	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 to good potential for seasonal use by adult RB, GR and MW and juvenile rearing for BT and MW.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
CF8	21	wd	u	view u/s from bottom of site
CF8	22	wd	u	view u/s from centre of site
CF8	23	wd	d	view d/s from top of site
CF8	24	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose, elk		

COMMENTS

C	
CX1	Electro-fishing effort: 497 seconds @ 250 volts. Bull trout were captured.
C1	Also some boulder present.

FISH COLLECTION FORM

STREAM NAME	Chowade River						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	235-430800			
WATERBODY ID		NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	10	FISH PERMIT #	SC2001-032		
DATE	2001/09/05 to 2001/09/05	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
10			10.478715.6284735	EF	1	4.0		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	BT			2	84	87	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
	10	EF/1	1	1025	1050	497	300	7.1	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
	10	EF/1	1	BT	84				Scale	24-1	1+	
	10	EF/1	1	BT	87				Scale	24-2	1+	

Chowade River
Site 10: View upstream from centre of site
(Roll GF8 - Exp 22; CD 1 - Im 40)

Chowade River
Site 10: Aerial view upstream
(Roll GF8 - Exp 24; CD 1 - Im 42)

APPENDIX XI

CHOWADE RIVER
(235-430800)

Sample Site 11

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Chowade River											FIELD COORDINATES	56° 42.34' 123° 18.74'				
LOCATION																	
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-430800												
REACH #		SITE #	11	SITE UTM	10	480856	6284678	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/09/05	TIME	0935	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	15.00	14.00	13.00	11.20	11.90	11.00	12.68	meth	AL
WETTED WIDTH	RF	10.50	7.20	8.00	8.50	11.20	10.20	9.27	1.5	
RES POOL DEPTH	MS	0.65	0.06	0.20	0.15	1.30	0.20	0.43	2.0	
Wb DEPTH	0.85	0.60	0.50	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	3.5	TURBIDITY	
Ph		Clear	

FLOOD SIGNS 0.5 m - RD

BED MATERIAL

Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	24	D (cm)	27

Morph. Riffle-pool

COVER

COVER	Total	Abundant (>20%)					
type	SWD	LWD	B	U	DP	OV	IV
amt	T	N	T	T	D	S	S
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	Fines	TEXTURE	Fines
RIP. VEG.	Shrubs	RIP. VEG.	Shrubs
STAGE	Shrub/Herb	STAGE	Shrub/Herb

INSTREAM VEGETATION: Algae

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	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 habitat potential for adult MW, GR and juvenile BT and MW, however seasonal access may be partially restricted by 2 m falls/cascade immediately downstream.
No spawning potential due to large nature of substrates.
Extended de-watered zone begins immediately upstream.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
CF8	14	wd	u	view u/s from bottom of site
CF8	15	wd	u	view u/s from centre of site
CF8	16	wd	d	view d/s from top of site
CF8	17	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 402 seconds @ 250 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Chowade River			[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION				WATERSHED CODE	235-430800		
WATERBODY ID		NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	11	FISH PERMIT #	SC2001-032
DATE	2001/09/05 to 2001/09/05	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
11			10.480856.6284678	EF	1	3.5		C	

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	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
	11	EF/1	1	0940	1000	402	200	9.27	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

Chowade River
Site 11: View upstream from bottom of site
(Roll GF8 - Exp 14; CD 1 - Im 43)

Chowade River
Site 11: Aerial view upstream
(Roll GF8 - Exp 17; CD 1 - Im 46)

APPENDIX XII

UNNAMED TRIBUTARY TO CHOWADE RIVER
(235-430800-32300)

Sample Site 12

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Chowade River									FIELD COORDINATES	56° 43.37' 122° 52.25'				
LOCATION															
NTS MAP #	94B/10	NID NO		WATERSHED CODE	235-430800-32300										
REACH #		SITE #	12	SITE UTM	10	507904	6286541			SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/09/05	TIME	1420	AGENCY	Diversified Environmental Services					CREW	BC/TE	FISH FORM	Y	X	N

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	12.10	18.50	19.00	16.00	20.40	16.50	17.08	meth	AL
WETTED WIDTH	RF	6.00	3.60	6.60	4.80	4.40	8.10	5.58	2.0	
RES POOL DEPTH	MS	0.24	0.19	0.22	0.37	0.32	0.24	0.26	2.0	
Wb DEPTH	0.55	0.70	0.60	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	7.0	TURBIDITY	
Ph		Clear	

COVER

COVER Total: Moderate (5-20%)

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

LWD FNC	Abundant	DIST	Clumped
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines/Cobble	TEXTURE	Fines/Cobble
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: Algae

MORPHOLOGY

FLOOD SIGNS	0.7 m - RD
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	42
D (cm)	42
Morph.	Riffle-pool

DISTURBANCE INDICATORS

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

C3	C4	C5	S1	S2	S3	S4
X						X

PATTERN	Irregular Wandering
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 quality seasonal rearing habitat for juvenile and sub-adult sport-fish.
Seasonal access currently restricted by 500 m de-watered section at mouth.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC1	15	wd	u	view u/s from bottom of site
GC1	16	wd	u	view u/s from centre of site
GC1	17	wd	d	view d/s from top of site
GC1	18	wd	u	aerial view upstream
GC1	19	wd	u	aerial view upstream from Chowade River confluence
T1	5	50	object	BT (225 mm) and RB (191 mm)
T1	7	50	object	BT (225 mm) and RB (191 mm)
T1	8	50	object	CCG (121 mm)

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 466 seconds @ 250 volts. Bull trout, rainbow trout and slimy sculpin were captured.
C1	Also significant boulder component.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Chowade River						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION				WATERSHED CODE	235-430800-32300				
WATERBODY ID		NTS MAP	94B/10	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	12	FISH PERMIT #	SC2001-032		
DATE	2001/09/05 to 2001/09/05	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
12			10.507904.6285541	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
12	EF/1	1	BT			3	143	225	Rearing	
12	EF/1	1	RB			1	191	191	Rearing	
12	EF/1	1	CCG			3	57	121	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
	12	EF/1	1	1425	1445	466	200	5.58	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
	12	EF/1	1	BT	225				Scale	28-1	4+	
	12	EF/1	1	BT	152				Scale	28-2	2+	
	12	EF/1	1	BT	143				Scale	28-3	2+	
	12	EF/1	1	RB	191				Scale	28-4	3+	
	12	EF/1	1	CCG	57							
	12	EF/1	1	CCG	121							
	12	EF/1	1	CCG	98							

Unnamed tributary to Chowade River
Site 12: View upstream from centre of site
(Roll GC1 - Exp 16; CD 1 - Im 48)

Unnamed tributary to Chowade River
Site 12: Upstream aerial view of site
(Roll GC1 - Exp 18; CD 1 - Im 50)

Unnamed tributary to Chowade River
Site 12: Upstream aerial view from confluence with Chowade River
(Roll GC1 - Exp 19; CD 1 - Im 51)

Unnamed tributary to Chowade River
Site 12: 225 mm bull trout and 191 mm rainbow trout
(Roll T1 - Exp 7; CD 1 - Im 52)

APPENDIX XIII

UNNAMED TRIBUTARY TO CHOWADE RIVER
(235-430800-45100)

Sample Site 13

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Chowade River											FIELD COORDINATES	56° 40.63' 122° 58.03'				
LOCATION																	
NTS MAP #	94B/10	NID NO		WATERSHED CODE	235-430800-45100												
REACH #		SITE #	13	SITE UTM	10	501997	6281512	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/09/05	TIME	1530	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	21.00	15.00	11.20	16.30	33.40	32.00	21.48	meth	AL
WETTED WIDTH	RF	7.20	6.20	8.30	10.10	5.40	7.00	7.37	1.5	
RES POOL DEPTH	MS	1.30	1.20	0.75	0.30	0.73	0.59	0.81	1.5	
Wb DEPTH	0.35	0.35	0.30	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	7.5	TURBIDITY	
Ph		Clear	

FLOOD SIGNS 1.5 m - RD

COVER

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

LWD FNC	Abundant	DIST	Even
LB SHAPE	Sloping	RB SHAPE	Sloping
TEXTURE	Fines	TEXTURE	Gravels
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: Algae

MORPHOLOGY

BED MATERIAL

Dominant	Gravel (2-64 mm)		
Subdom.	Fines (<2 mm)		
D95 (cm)	18	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	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

High potential for seasonal rearing of sport and non-sport juveniles and adults.

Moderate potential for BT, RB, GR and MW spawning.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC1	21	wd	u	view u/s from bottom of site
GC1	22	wd	u	view u/s from centre of site
GC1	23	wd	d	aerial view upstream
T1	9	50	object	BT 418 mm
T1	10	50	object	juvenile BT and RB
T1	11	50	object	juvenile BT and RB

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Wolf, grizzly bear, moose, elk and deer tracks		

COMMENTS

C	
CX1	Electro-fishing effort: 488 seconds @ 250 volts. Bull trout, rainbow trout and slimy sculpin were captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Chowade River							[ ] LAKE [X] STREAM [ ] WETLAND	
LOCATION						WATERSHED CODE	235-430800-45100		
WATERBODY ID		NTS MAP	94B/10	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N		
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	13	FISH PERMIT #	SC2001-032		
DATE	2001/09/05 to 2001/09/05	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			10.501997.6281512	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
13	EF/1	1	BT			4	122	418	Rearing	
13	EF/1	1	RB			2	98	118	Rearing	
13	EF/1	1	CCG			8	46	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
	13	EF/1	1	1535	1600	488	200	7.37	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	
	13	EF/1	1	BT	418				Fin ray	29-1	7+	
	13	EF/1	1	BT	218				Scale	29-2	3+	
	13	EF/1	1	BT	145				Scale	29-3	2+	
	13	EF/1	1	BT	122				Scale	29-4	2+	
	13	EF/1	1	RB	118				Scale	29-5	1+	
	13	EF/1	1	RB	98				Scale	29-6	1+	
	13	EF/1	1	CCG	70							
	13	EF/1	1	CCG	63							
	13	EF/1	1	CCG	53							
	13	EF/1	1	CCG	48							
	13	EF/1	1	CCG	52							
	13	EF/1	1	CCG	60							
	13	EF/1	1	CCG	54							
	13	EF/1	1	CCG	46							

Unnamed tributary to Chowade River
Site 13: View upstream from centre of site
(Roll GC1 - Exp 22; CD 1 - Im 55)

Unnamed tributary to Chowade River
Site 13: Aerial view upstream
(Roll GC1 - Exp 23; CD 1 - Im 56)

APPENDIX XIV

UNNAMED TRIBUTARY TO CHOWADE RIVER
(235-430800-45100)

Sample Site 14

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Chowade River											FIELD COORDINATES	56° 38.51' 123° 59.62'				
LOCATION																	
NTS MAP #	94B/10	NID NO		WATERSHED CODE	235-430800-45100												
REACH #		SITE #	14	SITE UTM	10	500489	6277906	SITE LENGTH	300	METH	RF	ACCESS	H				
DATE	2001/09/05	TIME	1630	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	12.00	11.90	12.00	11.50	14.50	14.00	12.65	meth	AL
WETTED WIDTH	RF	7.80	8.10	10.00	7.90	6.90	8.60	8.22	1.0	
RES POOL DEPTH	MS	0.68	0.41	0.18	0.12	0.40	0.25	0.34	1.0	
Wb DEPTH	0.40	0.45	0.55	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

COVER

COVER Total: Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type	SWD	LWD	B	U	DP	OV	IV
amt	S	S	S	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	Clumped
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines/Cobble	TEXTURE	Fines/Cobble
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION: None

WATER

EMS		COND	
TEMP (°C)	8.5	TURBIDITY	
Ph		Clear	

MORPHOLOGY

FLOOD SIGNS: 0.9 m - RD

BED MATERIAL

Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	32	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	Irregular Wandering
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 quality seasonal rearing habitat for juvenile BT.

Access currently restricted by de-watered section d/s of site and poorly defined channel through wetland area d/s of site.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC1	25	wd	u	view u/s from bottom of site
GC2	1	wd	u	view u/s from centre of site
GC2	2	wd	d	view d/s from top of site
GC2	3	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Wolf, deer and moose		

COMMENTS

C	
CX1	Electro-fishing effort: 552 seconds @ 250 volts. Bull trout and slimy sculpin were captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Chowade River						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	235-430800-45100			
WATERBODY ID		NTS MAP	94B/10	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	14	FISH PERMIT #	SC2001-032		
DATE	2001/09/05 to 2001/09/05	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
14			10.500489.6277906	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
14	EF/1	1	BT			2	138	188	Rearing	
14	EF/1	1	CCG			11	64	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
	14	EF/1	1	1635	1705	552	300	8.22	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 30-2	AGE AGE	COMMENTS
	14	EF/1	1	BT	188				Scale	30-1	3+	
	14	EF/1	1	BT	138				Scale	14-2	2+	
	14	EF/1	1	CCG	79							
	14	EF/1	1	CCG	72							
	14	EF/1	1	CCG	78							
	14	EF/1	1	CCG	101							
	14	EF/1	1	CCG	90							
	14	EF/1	1	CCG	71							
	14	EF/1	1	CCG	67							
	14	EF/1	1	CCG	68							
	14	EF/1	1	CCG	79							
	14	EF/1	1	CCG	64							
	14	EF/1	1	CCG	73							

Unnamed tributary to Chowade River
Site 14: View upstream from bottom of site
(Roll GC1 - Exp 25; CD 1 - Im 59)

Unnamed tributary to Chowade River
Site 14: Aerial view upstream
(Roll GC2 - Exp 3; CD 1 - Im 62)

APPENDIX XV

UNNAMED TRIBUTARY TO CHOWADE RIVER
(235-430800-45100)

Sample Site 15

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Chowade River											FIELD COORDINATES	56° 36.04' 122° 57.63'				
LOCATION																	
NTS MAP #	94B/10	NID NO		WATERSHED CODE	235-430800-45100												
REACH #		SITE #	15	SITE UTM	10	502344	6272789					SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/09/05	TIME	1830	AGENCY	Diversified Environmental Services							CREW	BC/TE	FISH FORM	Y	X	N

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	15.00	21.00	8.70	11.10	10.90	7.80	12.42	meth	AL
WETTED WIDTH	RF	3.00	3.60	6.20	4.90	10.90	4.60	5.53	1.5	
RES POOL DEPTH	MS	0.26	0.32	0.26	0.14	0.98	0.24	0.37	2.5	
Wb DEPTH	0.60	0.50	0.62	STAGE	Low		No Vis Chan		Dry/Int	
							Dewater		Tribs	

COVER

	COVER	Total			Moderate (5-20%)				CROWN CLOSURE							
type	SWD	LWD	B	U	DP	OV	IV		0%	1-20%	21-40%	41-70%	71-90%	>90%		
amt	S	S	D	N	S	T	N									
loc	P	P	P	P	P	P	P									

LWD FNC	Few	DIST	Even	0	1	2	3	4	5			
LB SHAPE	Vertical	RB SHAPE	Vertical									
TEXTURE	Fines/Cobble	TEXTURE	Fines/Boulder	INSTREAM VEGETATION	Algae							
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D									
STAGE	Young Forest	STAGE	Young Forest									

WATER

EMS		COND	
TEMP (°C)	7.0	TURBIDITY	
Ph		Clear	

MORPHOLOGY

FLOOD SIGNS	0.8 m - RD
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	44
D (cm)	28
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

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.

Seasonal access currently restricted by de-watered section and poorly defined channel downstream.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC2	7	wd	u	view u/s from bottom of site
GC2	8	wd	u	view u/s from centre of site
GC2	9	wd	d	view d/s from top of site
GC2	10	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 286 seconds @ 250 volts. Slimy sculpin were captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Chowade River						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	235-430800-45100			
WATERBODY ID		NTS MAP	94B/10	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	15	FISH PERMIT #	SC2001-032		
DATE	2001/09/05 to 2001/09/05	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			10.502344.6272789	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
15	EF/1	1	CCG			4	73	113	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	1835	1850	286	200	5.53	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
	15	EF/1	1	CCG	76							
	15	EF/1	1	CCG	73							
	15	EF/1	1	CCG	113							
	15	EF/1	1	CCG	97							

Unnamed tributary to Chowade River
Site 15: View upstream from bottom of site
(Roll GC1 - Exp 7; CD 1 - Im 63)

Unnamed tributary to Chowade River
Site 15: Aerial view upstream
(Roll GC1 - Exp 10; CD 1 - Im 66)

APPENDIX XVI

TRIBUTARY TO UNNAMED CHOWADE RIVER TRIBUTARY
(235-430800-45100-29500)

Sample Site 16

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Tributary to unnamed Chowade River tributary											FIELD COORDINATES	56° 37.91' 123° 04.30'				
LOCATION																	
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-430800-45100-29500												
REACH #		SITE #	16	SITE UTM	10	495580	6276430	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/09/05	TIME	1741	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	16.00	12.00	10.50	9.40	20.00	14.50	13.73	meth	AL
WETTED WIDTH	RF	3.90	2.00	2.20	4.50	2.00	3.70	3.05	2.5	
RES POOL DEPTH	MS	0.54	0.13	0.15	0.24	0.42	0.61	0.35	3.0	
Wb DEPTH	0.55	0.50	0.50	STAGE	Low		No Vis Chan		Dry/Int	
							Dewater		Tribs	

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	T	T	T	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	Even
LB SHAPE	Sloping	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: Algae

WATER

EMS		COND	
TEMP (°C)	6.2	TURBIDITY	
Ph		Clear	

MORPHOLOGY

FLOOD SIGNS: 0.85 m - RD

BED MATERIAL

Dominant	Gravel (2-64 mm)		
Subdom.	Cobble (64-256 mm)		
D95 (cm)	27	D (cm)	27
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	Irregular
BARS	Side/Mid-stream
COUPLING	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 potential for seasonal rearing of juvenile BT, MW and non-sport species.

Access limited by extensive braiding, and new channel cutting through forest downstream for several km to mainstem.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC2	4	wd	u	view u/s from bottom of site
GC2	5	wd	u	view u/s from centre of site
GC2	6	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Caribou, moose		

COMMENTS

C	
CX1	Electro-fishing effort: 457 seconds @ 250 volts. Slimy sculpin were captured.

FISH COLLECTION FORM

STREAM NAME	Tributary to unnamed Chowade River tributary								[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION						WATERSHED CODE	235-430800-45100-29500				
WATERBODY ID			NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Halfway-Graham Overview		REACH #		SITE #	16	FISH PERMIT #	SC2001-032			
DATE	2001/09/05	to 2001/09/05	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	
16			10.495580.6276430	EF	1	6.2		C	

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	CCG			2	95	102	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	1741	1800	457	200	3.05	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	
	16	EF/1	1	CCG	95							
	16	EF/1	1	CCG	102							

Tributary to unnamed Chowade River tributary
Site 16: View upstream from bottom of site
(Roll GC2 - Exp 4; CD 1 - Im 67)

Tributary to unnamed Chowade River tributary
Site 16: Aerial view upstream
(Roll GC2 - Exp 6; CD 1 - Im 69)

APPENDIX XVII

UNNAMED TRIBUTARY TO CHOWADE RIVER
(235-430800-56400)

Sample Site 17

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Chowade River													FIELD COORDINATES	56° 46.25' 123° 05.74'				
LOCATION																			
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-430800-56400														
REACH #		SITE #	17	SITE UTM	10	494133	6291863	SITE LENGTH	200	METH	RF	ACCESS	H						
DATE	2001/09/05	TIME	1235	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N						

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	27.50	32.00	23.50	33.00	35.00	22.50	28.92	meth	AL	TEMP (°C)	6.0	TURBIDITY	
WETTED WIDTH	RF	13.50	15.00	9.50	4.20	7.20	4.60	9.00	1.0		Ph		Clear	
RES POOL DEPTH	MS	0.08	0.12	0.20	0.14	0.32	0.18	0.17	1.5					
Wb DEPTH	1.00	1.20	1.10	STAGE	Moderate		No Vis Chan		Dry/Int	1				
							Dewater		Tribs					

COVER

COVER	Total	Moderate (5-20%)												
type	SWD	LWD	B	U	DP	OV	IV	CROWN CLOSURE						
amt	N	T	D	N	S	S	S							
loc	P	P	P	P	P	P	P							
								0%	1-20%	21-40%	41-70%	71-90%	>90%	
LWD FNC	Few	DIST	Clumped					0	1	2	3	4	5	
LB SHAPE	Vertical	RB SHAPE	Vertical											
TEXTURE	Cobbles	TEXTURE	Cobbles					INSTREAM VEGETATION	None					
RIP. VEG.	Mixed C & D	RIP. VEG.	Mixed C & D											
STAGE	Young Forest	STAGE	Young Forest											

MORPHOLOGY

FLOOD SIGNS	1.0 m - RD		
BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	38	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/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

Moderate rearing potential for adult and juvenile sport-fish.

Seasonal access currently restricted by 1 km de-watered section immediately u/s of Chowade confluence.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC1	3	wd	d	view d/s from top of site
GC1	4	wd	u	view u/s from centre of site
GC1	5	wd	u	view u/s from bottom of site
GC1	6	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 488 seconds @ 250 volts. Bull trout, rainbow trout, mountain whitefish and slimy sculpin were captured.
C1	Also significant boulder component.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Chowade River							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION						WATERSHED CODE	235-430800-56400			
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	17	FISH PERMIT #	SC2001-032			
DATE	2001/09/05 to 2001/09/05	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			10.494133.6291863	EF	1	6.0		C	

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	MW			1	313	313	Rearing	
17	EF/1	1	BT			2	135	220	Rearing	
17	EF/1	1	RB			1	234	234	Rearing	
17	EF/1	1	CCG			5	71	116	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	1240	1300	488	200	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	
	17	EF/1	1	MW	313				Scale	26-1	6+	
	17	EF/1	1	BT	220				Scale	26-2	4+	
	17	EF/1	1	BT	135				Scale	26-3	2+	
	17	EF/1	1	RB	234				Scale	26-4	4+	
	17	EF/1	1	CCG	116							
	17	EF/1	1	CCG	111							
	17	EF/1	1	CCG	73							
	17	EF/1	1	CCG	71							
	17	EF/1	1	CCG	87							

Unnamed tributary to Chowade River
Site 17: View upstream from bottom of site
(Roll GC1 - Exp 5; CD 1 - Im 72)

Unnamed tributary to Chowade River
Site 17: Aerial view upstream
(Roll GC1 - Exp 6; CD 1 - Im 73)

APPENDIX XVIII

TRIBUTARY TO UNNAMED CHOWADE RIVER TRIBUTARY

(235-430800-56400-54100)

Sample Site 18

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Tributary to unnamed Chowade River tributary									FIELD COORDINATES	56° 47.13' 123° 10.21'				
LOCATION															
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-430800-56400-54100										
REACH #		SITE #	18	SITE UTM	10	489543	6293476			SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/09/05	TIME	1335	AGENCY	Diversified Environmental Services					CREW	BC/TE	FISH FORM	Y	X	N

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	6.20	9.00	11.85	6.50	5.50	8.00	7.84	meth	AL
WETTED WIDTH	RF	4.90	5.10	4.35	4.80	5.50	5.90	5.09	1.0	
RES POOL DEPTH	MS	0.11	0.05	0.20	0.31	0.55	0.51	0.29	1.0	
Wb DEPTH	0.35	0.30	0.35	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	5.5	TURBIDITY	
Ph		Clear	

FLOOD SIGNS: 0.78 m - RD

COVER

COVER Total: Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	S	T	S	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	Sloping
TEXTURE	Cobbles	TEXTURE	Cobbles
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: None

MORPHOLOGY

BED MATERIAL

Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	30	D (cm)	30
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/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

Moderate potential for seasonal rearing for sport and non-sport species.
Seasonal access currently restricted by de-watered reach at mouth.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
GC1	7	wd	u	view u/s from bottom of site
GC1	8	wd	u	view u/s from centre of site
GC1	9	wd	d	view d/s from top of site
GC1	10	wd	u	aerial view upstream
GC1	11	wd	u	upstream aerial view of basin

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose tracks		

COMMENTS

C	
CX1	Electro-fishing effort: 401 seconds @ 250 volts. No fish captured.
C1	Also boulder present.

FISH COLLECTION FORM

STREAM NAME	Tributary to unnamed Chowade River tributary			[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION		WATERSHED CODE	235-430800-56400-54100				
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	18	FISH PERMIT #	SC2001-032
DATE	2001/09/05 to 2001/09/05	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
18			10.489543.6293476	EF	1	5.5		C	

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	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
	18	EF/1	1	1340	1400	401	250	5.09	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	SAMPLE #	AGE	COMMENTS

Tributary to unnamed Chowade River tributary
Site 18: View downstream from top of site
(Roll GC1 - Exp 9; CD 1 - Im 76)

Tributary to unnamed Chowade River tributary
Site 18: Aerial view upstream
(Roll GC1 - Exp 10; CD 1 - Im 77)

APPENDIX XIX

UNNAMED TRIBUTARY TO CHOWADE RIVER
(235-430800-62600)

Sample Site 19

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Chowade River									FIELD COORDINATES	56° 40.23' 123° 10.23'						
LOCATION																	
NTS MAP #	94B/11	NID NO		WATERSHED CODE	235-430800-62600												
REACH #		SITE #	19	SITE UTM	10	489612	6280855	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	23001/09/05	TIME	1155	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	5.20	4.20	5.10	5.90	5.10	4.60	5.02	meth	AL
WETTED WIDTH	RF	4.90	4.20	3.25	5.90	2.40	4.60	4.21	2.5	
RES POOL DEPTH	MS	0.05	0.15	0.14	0.15	0.20	0.50	0.20	2.5	
Wb DEPTH	0.55	0.60	0.55	STAGE	Low		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	3.8	TURBIDITY	
Ph		Clear	

FLOOD SIGNS: 0.8 m - RD

COVER

COVER Total: Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	T	N	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	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: Moss

MORPHOLOGY

BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	45
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 potential for BT and MW.
Absence of YOY or yearling BT suggest low suitability for BT spawning.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
CF8	25	wd	u	view u/s from bottom of site
GC1	1	wd	u	view u/s from centre of site
GC1	2	wd	d	view d/s from top of site

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Grizzly tracks, caribou tracks.		

COMMENTS

C	
CX1	Electro-fishing effort: 374 seconds @ 250 volts. Bull trout were captured.
CX2	Reach break at top of site - impounded area and seepage channels.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Chowade River							[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION						WATERSHED CODE	235-430800-62600				
WATERBODY ID		NTS MAP	94B/11	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N			
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	19	FISH PERMIT #	SC2001-032				
DATE	2001/09/05	to	2001/09/05	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			10.489612.6280855	EF	1	3.8		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	BT			2	149	210	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	1200	1215	374	200	4.21	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			COMMENTS
									STR	SAMPLE #	AGE	
	19	EF/1	1	BT	210				Scale	25-1	3+	
	19	EF/1	1	BT	149				Scale	25-2	2+	

Unnamed tributary to Chowade River
Site 19: View upstream from centre of site
(Roll GC1 - Exp 1; CD 1 - Im 79)

Unnamed tributary to Chowade River
Site 19: View downstream from top of site
(Roll GC1 - Exp 2; CD 1 - Im 80)

APPENDIX XX

CYPRESS CREEK
(235-492500)

Sample Site 20

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Cypress Creek											FIELD COORDINATES	56° 53.73' 123° 58.58'				
LOCATION																	
NTS MAP #	94B/15	NID NO		WATERSHED CODE	235-492500												
REACH #		SITE #	20	SITE UTM	10	500959	6305303	SITE LENGTH	300	METH	RF	ACCESS	H				
DATE	2001/08/21	TIME	1655	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	42.00	59.00	72.00	55.00	90.00	68.00	64.33	meth	AL
WETTED WIDTH	RF	17.00	16.00	24.00	32.00	28.00	21.00	23.00	1.0	
RES POOL DEPTH	MS	0.60	0.70	0.85	0.65	0.90	0.83	0.76	1.5	
Wb DEPTH	1.60	1.80	1.40	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	6.5	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	N	S	S	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	Even
LB SHAPE	Vertical	RB SHAPE	Sloping
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	1.60 m - RD		
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/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

Moderate quality year round habitat for sport and non-sport species.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG4	18	wd	d	view d/s from centre of site
HG4	19	wd	u	view u/s from centre of site
HG4	20	wd	d	view d/s from top of site
HG4	21	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 604 seconds @ 250 volts. Rainbow trout, bull trout, mountain whitefish and slimy sculpin captured.
CX2	Large volumes of non-functional LWD within channel width.

FISH COLLECTION FORM

STREAM NAME	Cypress Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	235-492500			
WATERBODY ID		NTS MAP	94B/15	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	20	FISH PERMIT #	SC2001-032		
DATE	2001/08/21 to 2001/08/21	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
20			10.500959.6305303	EF	1	6.5		C	

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	RB			2	216	275	Rearing	
20	EF/1	1	BT			10	44	348	Rearing	
20	EF/1	1	MW			2	218	305	Rearing	
20	EF/1	1	CCG			3	76	105	Rearing	

GEAR SPECS

C	SITE #	MD/NO	H/P	DATE IN	TIME IN	DATE OUT	TIME OUT	NET / TRAP SPECIFICATIONS 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	1700	1725	604	300	23.0	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
	20	EF/1	1	RB	216				Scale	19-1	3+	
	20	EF/1	1	MW	305				Scale	19-2	5+	
	20	EF/1	1	BT	348		M		Fin ray	19-3	6+	
	20	EF/1	1	RB	275				Scale	19-4	4+	
	20	EF/1	1	MW	218				Scale	19-5	4+	
	20	EF/1	1	BT	144				Scale	19-6	2+	
	20	EF/1	1	BT	82				Scale	19-7	1+	
	20	EF/1	1	BT	95				Scale	19-8	1+	
	20	EF/1	1	BT	110							
	20	EF/1	1	BT	83							
	20	EF/1	1	BT	93							
	20	EF/1	1	BT	44							
	20	EF/1	1	BT	81							
	20	EF/1	1	BT	91							
	20	EF/1	1	CCG	105							
	20	EF/1	1	CCG	76							
	20	EF/1	1	CCG	83							

Cypress Creek
Site 20: View upstream from centre of site
(Roll HG4 - Exp 19; CD 1 - Im 83)

Cypress Creek
Site 20: View downstream from top of site
(Roll HG4 - Exp 20; CD 1 - Im 84)

APPENDIX XXI

CYPRESS CREEK
(235-492500)

Sample Site 21

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Cypress Creek										FIELD COORDINATES	56° 49.91' 123° 15.32'			
LOCATION															
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-492500										
REACH #		SITE #	21	SITE UTM	10	484506	6298787		SITE LENGTH	200	METH	RF	ACCESS	H	
DATE	2001/08/21	TIME	1255	AGENCY	Diversified Environmental Services				CREW	BC/TE	FISH FORM	Y	X	N	

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	13.00	10.00	7.00	8.50	6.80	7.50	8.80	meth	AL
WETTED WIDTH	RF	10.50	10.00	7.00	8.00	6.80	7.50	8.30	1.5	
RES POOL DEPTH	MS	0.30	0.25	0.30	0.25	0.13	0.20	0.24	1.5	
Wb DEPTH	0.70	0.70	0.65	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	4.0	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	N	N	S	T	D	N	T
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	Undercut
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION	Algae

MORPHOLOGY

FLOOD SIGNS	1.2 m - RD		
BED MATERIAL			
Dominant	Boulder (> 256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	45	D (cm)	6
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	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 to high quality rearing habitat for BT, MW, RB and GR.

No seasonal access due to falls downstream - non fish-bearing.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG4	1	wd	u	view u/s from bottom of site
HG4	2	wd	u	view u/s from centre of site
HG4	3	wd	d	view d/s from top of site
HG4	4	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose		

COMMENTS

C	
CX1	Electro-fishing effort: 404 seconds @ 250 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Cypress Creek			[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION				WATERSHED CODE	235-492500		
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	21	FISH PERMIT #	SC2001-032
DATE	2001/08/21 to 2001/08/21	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			10.484506.6298787	EF	1	4.0		C	

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	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
	21	EF/1	1	1300	1320	404	200	8.30	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

Cypress Creek
Site 21: View upstream from bottom of site
(Roll HG4 - Exp 1; CD 1 - Im 86)

Cypress Creek
Site 21: View downstream from top of site
(Roll HG4 - Exp 3; CD 1 - Im 88)

APPENDIX XXII

GEESDALE CREEK
(235-492500-43800)

Sample Site 22

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Geesdale Creek											FIELD COORDINATES	56° 53.76' 123° 12.76'				
LOCATION																	
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-492500-43800												
REACH #		SITE #	22	SITE UTM	10	497058	6306614	SITE LENGTH	210	METH	RF	ACCESS	H				
DATE	2001/08/23	TIME	1218	AGENCY	Diversified Environmental Services			CREW	BC/DC	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	6.00	6.90	6.00	15.00	9.00	6.00	8.15	meth	AL
WETTED WIDTH	RF	4.40	6.00	5.70	3.60	3.90	2.50	4.35	2.7	
RES POOL DEPTH	MS	0.15	0.24	0.18	0.11	0.11	0.32	0.19	3.0	
Wb DEPTH	0.84	0.75	0.80	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	5.0	TURBIDITY	
Ph		Clear	

FLOOD SIGNS 0.93 m - RD

BED MATERIAL

Dominant	Cobble (64-256 mm)		
Subdom.	Boulder (> 256 mm)		
D95 (cm)	42	D (cm)	29
Morph.	Riffle-pool		

COVER

COVER Total: Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	T	S	D	S	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	Abundant	DIST	Even
LB SHAPE	Sloping	RB SHAPE	Sloping
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	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 seasonal rearing potential for juvenile BT.

Suitable sport-fish spawning habitat on next reach downstream.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG5	9	wd	u	view u/s from bottom of site
HG5	10	wd	u	view u/s from centre of site
HG5	11	wd	d	view d/s from top of site
HG5	12	wd	u	aerial view upstream
HG5	13	wd	u	upstream aerial basin view

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 357 seconds @ 250 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Geesdale Creek				LAKE	X STREAM	WETLAND
LOCATION				WATERSHED CODE	235-492500-43800		
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	X Y / N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	22	FISH PERMIT #	SC2001-032
DATE	2001/08/23 to 2001/08/23	AGENCY	Diversified Environmental Services			CREW	BC/DC / RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	CON	TURB	COMMENTS
22			10.497056.6306614	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
22	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
	22	EF/1	1	1222	1240	357	210	4.35	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

Geesdale Creek
Site 22: View upstream from centre of site
(Roll HG5 - Exp 10; CD 1 - Im 91)

Geesdale Creek
Site 22: Aerial view upstream of creek basin
(Roll HG5 - Exp 12; CD 1 - Im 93)

APPENDIX XXIII

UNNAMED TRIBUTARY TO GEESDALE CREEK
(235-492500-43800-13500)

Sample Site 23

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Geesdale Creek											FIELD COORDINATES	56° 54.08' 123° 02.90'				
LOCATION																	
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-492500-43800-13500												
REACH #		SITE #	23	SITE UTM	10	487000	6305851	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/08/23	TIME	1025	AGENCY	Diversified Environmental Services			CREW	BC/DC	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	MS	3.70	1.90	2.70	2.90	2.70	2.80	2.78	meth	AL
WETTED WIDTH	MS	3.60	2.50	2.90	2.90	2.70	1.70	2.72	2.0	
RES POOL DEPTH	MS	0.16	0.15	0.11	0.10	0.27	0.18	0.16	3.0	
Wb DEPTH	0.45	0.36	0.43	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	4.0	TURBIDITY	
Ph		Clear	

COVER

COVER Total: Trace (5%)

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

LWD FNC	Few
LB SHAPE	Vertical
TEXTURE	Fines
RIP. VEG.	Coniferous
STAGE	Young Forest

DIST	Even
RB SHAPE	Vertical
TEXTURE	Fines
RIP. VEG.	Coniferous
STAGE	Young Forest

CROWN CLOSURE

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

INSTREAM VEGETATION	Algae
	Moss

MORPHOLOGY

FLOOD SIGNS	0.7 m - RD
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	46
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	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

Limited seasonal rearing for juvenile BT.
No spawning potential.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG5	1	wd	u	view u/s from bottom of site
HG5	2	wd	u	view u/s from centre of site
HG5	3	wd	d	view d/s from top of site
HG5	4	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose		

COMMENTS

C	
CX1	Electro-fishing effort: 324 seconds @ 250 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Geesdale Creek			[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION				WATERSHED CODE	235-492500-43800-13500		
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	23	FISH PERMIT #	SC2001-032
DATE	2001/08/23 to 2001/08/23	AGENCY	Diversified Environmental Services			CREW	BC/DC [ ] RE-SAMPLE

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION TEMP	CON	TURB	COMMENTS
23			10.487000.6305851	EF	1	4.0		C	

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	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
	23	EF/1	1	1030	1050	324	200	2.72	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 Geesdale Creek
Site 23: View upstream from bottom of site
(Roll HG5 - Exp 1; CD 1 - Im 95)

Unnamed tributary to Geesdale Creek
Site 23: Aerial view upstream
(Roll HG5 - Exp 4; CD 1 - Im 98)

APPENDIX XXIV

UNNAMED TRIBUTARY TO GEESDALE CREEK
(235-492500-43800-50500)

Sample Site 24

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Geesdale Creek											FIELD COORDINATES	56° 54.59' 123° 10.58'				
LOCATION																	
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-492500-43800-50500												
REACH #		SITE #	24	SITE UTM	10	489186	6307193	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/08/23	TIME	1121	AGENCY	Diversified Environmental Services			CREW	BC/DC	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	MS	4.90	4.50	5.90	4.10	3.90	5.90	4.87	meth	AL
WETTED WIDTH	MS	3.50	3.60	6.40	4.00	3.90	4.40	4.30	2.5	
RES POOL DEPTH	MS	0.19	0.10	0.11	0.09	0.16	0.18	0.14	2.0	
Wb DEPTH	0.30	0.42	0.38	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	6.0	TURBIDITY	
Ph		Clear	
FLOOD SIGNS	0.7 m - RD		

COVER

	COVER	Total	Trace (5%)					CROWN CLOSURE						
type	SWD	LWD	B	U	DP	OV	IV	0%	1-20%	21-40%	41-70%	71-90%	>90%	
amt	T	T	D	N	S	T	N	0	1	2	3	4	5	
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	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: None

MORPHOLOGY

BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	28
D (cm)	23
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
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 BT juveniles.

Low potential for BT spawning.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG5	5	wd	u	view u/s from bottom of site
HG5	6	wd	u	view u/s from centre of site
HG5	7	wd	d	view d/s from top of site
HG5	8	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Caribou		

COMMENTS

C	
CX1	Electro-fishing effort: 288 seconds @ 250 volts. Bull trout captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Geesdale Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	235-492500-43800-50500			
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	24	FISH PERMIT #	SC2001-032		
DATE	2001/08/23 to 2001/08/23	AGENCY	Diversified Environmental Services			CREW	BC/DC [ ]	RE-SAMPLE	

SITE / METHOD

SITE #	NID MAP #	NID #	SITE UTM	METHOD/NO.		STREAM CONDITION			COMMENTS
						TEMP	CON	TURB	
24			10.489186.6307193	EF	1	6.0		C	

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	BT			4	172	177	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	1125	1140	288	200	4.3	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			COMMENTS
									STR	SAMPLE #	AGE	
	24	EF/1	1	BT	177				Scale	21-1	2+	
	24	EF/1	1	BT	173				Scale	21-2	2+	
	24	EF/1	1	BT	172				Scale	21-3	2+	
	24	EF/1	1	BT	175				Scale	21-4	2+	

Unnamed tributary to Geesdale Creek
Site 24: View upstream from bottom of site
(Roll HG5 - Exp 5; CD 1 - Im 99)

Unnamed tributary to Geesdale Creek
Site 24: Aerial view upstream
(Roll HG5 - Exp 8; CD 1 - Im 102)

APPENDIX XXV

UNNAMED TRIBUTARY TO CYPRESS CREEK
(235-492500-53800)

Sample Site 25

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Cypress Creek										FIELD COORDINATES	56° 56.20' 123° 05.04'			
LOCATION															
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-492500-53800										
REACH #		SITE #	25	SITE UTM	10	494910	6301061				SITE LENGTH	200	METH	RF	ACCESS H
DATE	2001/08/21	TIME	1608	AGENCY	Diversified Environmental Services						CREW	BC/TE	FISH FORM	Y X	N

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	MS	4.50	5.70	5.30	4.70	5.20	5.50	5.15	meth	AL
WETTED WIDTH	MS	4.00	4.00	3.90	4.60	4.50	3.10	4.02	2.0	
RES POOL DEPTH	MS	0.11	0.11	0.20	0.21	0.20	0.21	0.17	2.5	
Wb DEPTH	0.45	0.40	0.49	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	4.2	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	T	T	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	Gravel/Cobble	TEXTURE	Gravel/Cobble
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	Algae

MORPHOLOGY

FLOOD SIGNS	0.8 m - RD		
BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	57	D (cm)	7
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 BT, MW and RB; limited cover - boulders and shallow pools.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG4	14	wd	u	view u/s from bottom of site
HG4	15	wd	u	view u/s from centre of site
HG4	16	wd	d	view d/s from top of site
HG4	17	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose		

COMMENTS

C	
CX1	Electro-fishing effort: 350 seconds @ 250 volts. No fish captured.
C1	Boulders also present in high proportion.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Cypress Creek			[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION				WATERSHED CODE	235-492500-53800		
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y [ ] N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	25	FISH PERMIT #	SC2001-032
DATE	2001/08/21 to 2001/08/21	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
25			10.494910.6301061	EF	1	4.2		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	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
	25	EF/1	1	1610	1630	350	200	4.02	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 Cypress Creek
Site 25: View downstream from top of site
(Roll HG4 - Exp 16; CD 1 - Im 105)

Unnamed tributary to Cypress Creek
Site 25: Aerial view upstream
(Roll HG4 - Exp 17; CD 1 - Im 106)

APPENDIX XXVI

UNNAMED TRIBUTARY TO CYPRESS CREEK
(235-492500-53800)

Sample Site 26

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Cypress Creek											FIELD COORDINATES	56° 50.22' 123° 03.51'				
LOCATION																	
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-492500-53800												
REACH #		SITE #	26	SITE UTM	10	496386	6299240	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/08/21	TIME	1530	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	MS	2.80	2.60	3.40	3.50	3.50	3.10	3.15	meth	AL
WETTED WIDTH	MS	2.80	2.60	3.40	2.80	2.20	2.00	2.63	4.0	
RES POOL DEPTH	MS	0.13	0.15	0.13	0.14	0.12	0.14	0.14	3.0	
Wb DEPTH	0.42	0.50	0.45	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	3.0	TURBIDITY	
Ph		Clear	

COVER

	COVER	Total	Trace (5%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	T	T	D	S	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	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: Algae

MORPHOLOGY

FLOOD SIGNS	0.9 m - RD
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	38
D (cm)	26
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

Low to moderate potential for seasonal rearing by juvenile BT.
No spawning habitat.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG4	11	wd	u	view u/s from bottom of site
HG4	12	wd	u	view u/s from centre of site
HG4	13	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 311 seconds @ 250 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Cypress Creek			LAKE	X STREAM		WETLAND
LOCATION				WATERSHED CODE	235-492500-53800		
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	X Y / N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	26	FISH PERMIT #	SC2001-032
DATE	2001/08/21 to 2001/08/21	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
26			10.496386.6299240	EF	1	3.0		C	

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	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
	26	EF/1	1	1535	1552	311	200	2.63	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 Cypress Creek
Site 26: View upstream from centre of site
(Roll HG4 - Exp 12; CD 2 - Im 108)

Unnamed tributary to Cypress Creek
Site 26: Aerial view upstream
(Roll HG4 - Exp 13; CD 2 - Im 109)

APPENDIX XXVII

UNNAMED TRIBUTARY TO CYPRESS CREEK
(235-492500-60800)

Sample Site 27

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Cypress Creek											FIELD COORDINATES	56° 50.54' 123° 07.70'				
LOCATION																	
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-492500-60800												
REACH #		SITE #	27	SITE UTM	10	492147	6299854	SITE LENGTH	150	METH	RF	ACCESS	H				
DATE	2001/08/21	TIME	1442	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	MS	4.30	3.50	3.80	7.10	6.40	4.00	4.85	meth	AL	TEMP (°C)	5.0	TURBIDITY	
WETTED WIDTH	MS	3.00	3.50	3.10	2.50	2.70	4.00	3.13	1.0		Ph		Clear	
RES POOL DEPTH	MS	0.20	0.70	0.20	0.39	0.41	0.56	0.41	1.5		FLOOD SIGNS	0.65 m - RD		
Wb DEPTH	0.45	0.40	0.40	STAGE	Moderate		No Vis Chan		Dry/Int	1	BED MATERIAL			
							Dewater		Tribs		Dominant	Gravel (2-64 mm)		
											Subdom.	Cobble (64-256 mm)		
											D95 (cm)	33	D (cm)	9
											Morph.	Riffle-pool		

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	N	T	T	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	Even
LB SHAPE	Undercut	RB SHAPE	Undercut
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
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 sport-fish (BT, RB, MW).
Limited potential for spawning within the site due to high fines in substrate.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG4	8	wd	u	view u/s from bottom of site
HG4	9	wd	d	view d/s from top of site
HG4	10	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose, wolf		

COMMENTS

C
CX1 Electro-fishing effort: 427 seconds @ 250 volts. Slimy sculpin were captured.
C1 Fines also in significant proportion.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Cypress Creek								
LOCATION						WATERSHED CODE	235-492500-60800		
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	X Y		N
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	27	FISH PERMIT #	SC2001-032		
DATE	2001/08/21 to 2001/08/21	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 TEMP	STREAM CONDITION CON	STREAM CONDITION TURB	COMMENTS
27			10.492147.6299854	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
27	EF/1	1	CCG			9	46	92	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	1446	1505	427	150	3.13	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
	27	EF/1	1	CCG	92							
	27	EF/1	1	CCG	72							
	27	EF/1	1	CCG	46							
	27	EF/1	1	CCG	54							
	27	EF/1	1	CCG	59							
	27	EF/1	1	CCG	75							
	27	EF/1	1	CCG	73							
	27	EF/1	1	CCG	76							
	27	EF/1	1	CCG	48							

Unnamed tributary to Cypress Creek
Site 27: View upstream from bottom of site
(Roll HG4 - Exp 8; CD 2 - Im 110)

Unnamed tributary to Cypress Creek
Site 27: Aerial view upstream
(Roll HG4 - Exp 10; CD 2 - Im 112)

APPENDIX XXVIII

UNNAMED TRIBUTARY TO CYPRESS CREEK
(235-492500-74500)

Sample Site 28

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Cypress Creek											FIELD COORDINATES	56° 50.49' 123° 14.15'				
LOCATION																	
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-492500-74500												
REACH #		SITE #	28	SITE UTM	10	485617	6299739	SITE LENGTH	220	METH	RF	ACCESS	H				
DATE	2001/08/21	TIME	1336	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	3.90	4.00	5.20	4.70	3.70	4.20	4.28	meth	AL
WETTED WIDTH	RF	3.60	2.80	4.00	4.00	3.70	4.20	3.72	3.0	
RES POOL DEPTH	MS	0.13	0.24	0.34	0.16	0.12	0.21	0.20	2.0	
Wb DEPTH	0.60	0.70	0.60	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	4.5	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	T	T	D	S	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	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	1.30 m - RD
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	32
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
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 quality seasonal rearing habitat for sport-fish species.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG4	5	wd	u	view u/s from bottom of site
HG4	6	wd	u	view u/s from centre of site
HG4	7	wd	d	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 563 seconds @ 250 volts. Bull trout were captured.
C1	Site is on lower reach of tributary within Cypress Creek valley; becomes confined upstream.
CX2	Impassable barriers approximately 1 km u/s of site.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Cypress Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	235-492500-74500			
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	28	FISH PERMIT #	SC2001-032		
DATE	2001/08/21 to 2001/08/21	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			10.485617.6299739	EF	1	4.5		C	

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	BT			4	95	156	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	1340	1410	563	220	3.72	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	BT	156				Scale	15-1	2+	
	28	EF/1	1	BT	127				Scale	15-2	2+	
	28	EF/1	1	BT	151				Scale	15-3	2+	
	28	EF/1	1	BT	95				Scale	15-4	1+	

Unnamed tributary to Cypress Creek
Site 28: View upstream from bottom of site
(Roll HG4 - Exp 5; CD 2 - Im 113)

Unnamed tributary to Cypress Creek
Site 28: Aerial view upstream
(Roll HG4 - Exp 7; CD 2 - Im 115)

APPENDIX XXIX

UNNAMED TRIBUTARY TO CYPRESS CREEK
(235-492500-74500)

Sample Site 29

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Cypress Creek											FIELD COORDINATES	56° 51.46' 123° 18.03'				
LOCATION	Upstream of impassable barriers																
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-492500-74500												
REACH #		SITE #	29	SITE UTM	10	481662	6301579					SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/08/21	TIME	1205	AGENCY	Diversified Environmental Services							CREW	BC/TE	FISH FORM	Y	X	N

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	MS	3.30	3.00	4.70	3.50	4.20	2.80	3.58	meth	AL
WETTED WIDTH	RF	3.30	3.00	4.70	3.50	3.40	2.80	3.45	1.0	
RES POOL DEPTH	MS	0.34	0.32	0.34	0.12	0.36	0.26	0.29	2.0	
Wb DEPTH	0.40	0.40	0.50	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	4.5	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	T	N	D	S	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	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Shrubs	RIP. VEG.	Shrubs
STAGE	Shrub/Herb	STAGE	Shrub/Herb

INSTREAM VEGETATION: Algae

MORPHOLOGY

FLOOD SIGNS	0.9 m - RD		
BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	26	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	None
BARS	Side
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 quality seasonal rearing habitat for BT juveniles. No seasonal access due to barriers downstream.

No seasonal access due to barriers downstream - non fish-bearing.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG3	20A	wd	u	view u/s from bottom of site
HG3	21A	wd	u	view u/s from centre of site
HG3	22A	wd	d	view d/s from top of site
HG3	23A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 253 seconds @ 250 volts. No fish captured.
C1	Also significant fines and boulder component.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Cypress Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	235-492500-74500			
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	29	FISH PERMIT #	SC2001-032		
DATE	2001/08/21 to 2001/08/21	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			10.481662.6301579	EF	1	4.5		C	

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	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
	29	EF/1	1	1210	1230	253	200	3.45	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 Cypress Creek
Site 29: View upstream from bottom of site
(Roll HG3 - Exp 20A; CD 2 - Im 116)

Unnamed tributary to Cypress Creek
Site 29: Aerial view upstream
(Roll HG3 - Exp 23A; CD 2 - Im 119)

APPENDIX XXX

HALFWAY RIVER
(235)

Sample Site 30

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Halfway River											FIELD COORDINATES	56° 59.29' 123° 04.16'				
LOCATION																	
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-000000												
REACH #		SITE #	30	SITE UTM	10	495587	6316128	SITE LENGTH	300	METH	RF	ACCESS	H				
DATE	2001/08/20	TIME	1826	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %		EMS		COND	
CHANNEL WIDTH	RF	52.00	38.00	60.00	78.00	88.00	65.00	63.50	meth	AL	TEMP (°C)	9.0	TURBIDITY	
WETTED WIDTH	RF	24.00	28.00	32.00	36.00	29.00	32.00	30.17	1.0		Ph		Clear	
RES POOL DEPTH	MS	0.80	0.65	0.90	0.72	0.80	0.85	0.79	1.0					
Wb DEPTH	1.50	1.60	1.70	STAGE	Moderate		No Vis Chan		Dry/Int					
							Dewater		Tribs					

COVER

COVER	Total	Moderate (5-20%)															
type	SWD	LWD	B	U	DP	OV	IV	CROWN CLOSURE									
amt	S	S	S	S	D	N	N	0%	1-20%	21-40%	41-70%	71-90%	>90%				
loc	P	P	P	P	P	P	P	0	1	2	3	4	5				

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

MORPHOLOGY

FLOOD SIGNS	1.2 m - RD		
BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	36	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	Irregular Wandering
ISLANDS	None
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

Moderate to high quality summer/fall habitat for adult sport-fish.
Suitable salmonid spawning habitat present.
Suitable year-round rearing habitat for juvenile sport-fish.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG3	3A	wd	u	aerial view upstream
HG3	4A	wd	u	view u/s from bottom of site
HG3	5A	wd	u	view u/s from centre of secondary channel
HG3	6A	wd	d	view d/s from top of site

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose, bison, elk		

COMMENTS

C	
CX1	Electro-fishing effort: 603 seconds @ 250 volts. Rainbow trout, mountain whitefish and slimy sculpin were captured.

FISH COLLECTION FORM

STREAM NAME	Halfway River							[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION						WATERSHED CODE	235-000000				
WATERBODY ID			NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Halfway-Graham Overview		REACH #		SITE #	30	FISH PERMIT #	SC2001-032			
DATE	2001/08/20	to	2001/08/20	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	
30			10.495587.6316128	EF	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	RB			1	120	120	Rearing	
30	EF/1	1	MW			7	40	45	Rearing	
30	EF/1	1	CCG			21	35	115	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
	30	EF/1	1	1830	1900	603	300	30.17	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	
	30	EF/1	1	RB	120				Scale	9-1	2+	
	30	EF/1	1	MW	40						YOY	
	30	EF/1	1	MW	42						YOY	
	30	EF/1	1	MW	40						YOY	
	30	EF/1	1	MW	40						YOY	
	30	EF/1	1	MW	45						YOY	
	30	EF/1	1	MW	43						YOY	
	30	EF/1	1	MW	42						YOY	
	30	EF/1	1	CCG	115							
	30	EF/1	1	CCG	92							
	30	EF/1	1	CCG	72							
	30	EF/1	1	CCG	52							
	30	EF/1	1	CCG	59							
	30	EF/1	1	CCG	73							
	30	EF/1	1	CCG	90							
	30	EF/1	1	CCG	61							
	30	EF/1	1	CCG	26							
	30	EF/1	1	CCG	75							
	30	EF/1	1	CCG	73							
	30	EF/1	1	CCG	81							
	30	EF/1	1	CCG	58							
	30	EF/1	1	CCG	56							

INDIVIDUAL FISH DATA												
C	SITE #	MD/NO	H/P	SPECIES	LENGTH (mm)	WEIGHT (gms)	SEX	MATUR	AGE			COMMENTS
									STR	SAMPLE #	AGE	
	30	EF/1	1	CCG	72							
	30	EF/1	1	CCG	73							
	30	EF/1	1	CCG	63							
	30	EF/1	1	CCG	56							
	30	EF/1	1	CCG	55							
	30	EF/1	1	CCG	56							
	30	EF/1	1	CCG	35							

Halfway River
Site 30: View upstream from bottom of site
(Roll HG3 - Exp 4A; CD 2 - Im 120)

Halfway River
Site 30: Aerial view upstream
(Roll HG3 - Exp 3A; CD 2 - Im 123)

APPENDIX XXXI

HALFWAY RIVER
(235)

Sample Site 31

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Halfway River											FIELD COORDINATES	56° 58.08' 123° 25.82'				
LOCATION																	
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-000000												
REACH #		SITE #	31	SITE UTM	10	473796	6313923					SITE LENGTH	300	METH	RF	ACCESS	H
DATE	2001/08/20	TIME	1400	AGENCY	Diversified Environmental Services							CREW	BC/TE	FISH FORM	Y	X	N

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	25.00	27.00	26.50	46.20	28.50	32.00	30.87	meth	AL
WETTED WIDTH	RF	18.50	25.00	16.00	18.20	18.00	23.00	19.78	1.0	
RES POOL DEPTH	MS	1.00	0.60	0.42	0.30	0.50	0.60	0.57	1.5	
Wb DEPTH	1.20	1.30	1.20	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	9.5	TURBIDITY	
Ph		Clear	

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	Few	DIST	Even
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION	None

MORPHOLOGY

FLOOD SIGNS	1.5 m - RD
BED MATERIAL	
Dominant	Gravel (2-64 mm)
Subdom.	Fines (<2 mm)
D95 (cm)	6
D (cm)	3
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	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

Good seasonal rearing for adult BT, GR, MW and RB.
Moderate potential for rearing juvenile MW and BT in side channels with LWD.
Abundant YOY MW suggests successful spawning.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG2	1	wd	u	view u/s from bottom of site
HG2	2	wd	u	view u/s from centre of site
HG2	3	wd	d	view d/s from top of site
HG2	4	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose, bison, deer, wolf, grizzly.		

COMMENTS

C	
C1	Some cobble also present.
CX1	Quad tracks at site.
CX2	Electro-fishing effort: 463 seconds @ 250 volts. Mountain whitefish and slimy sculpin were captured.

FISH COLLECTION FORM

STREAM NAME	Halfway River							[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION						WATERSHED CODE	235-000000				
WATERBODY ID			NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Halfway-Graham Overview		REACH #		SITE #	31	FISH PERMIT #	SC2001-032			
DATE	2001/08/20	to 2001/08/20	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
31			10.473796.6313926	EF	1	9.5		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	MW			19	38	52	Rearing	
31	EF/1	1	CCG			3	31	49	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	1405	1420	463	300	19.78	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
	31	EF/1	1	MW	50						YOY	
	31	EF/1	1	MW	46						YOY	
	31	EF/1	1	MW	38						YOY	
	31	EF/1	1	MW	50						YOY	
	31	EF/1	1	MW	49						YOY	
	31	EF/1	1	MW	46						YOY	
	31	EF/1	1	MW	47						YOY	
	31	EF/1	1	MW	49						YOY	
	31	EF/1	1	MW	44						YOY	
	31	EF/1	1	MW	45						YOY	
	31	EF/1	1	MW	48						YOY	
	31	EF/1	1	MW	45						YOY	
	31	EF/1	1	MW	48						YOY	
	31	EF/1	1	MW	52						YOY	
	31	EF/1	1	MW	49						YOY	
	31	EF/1	1	MW	47						YOY	
	31	EF/1	1	MW	39						YOY	
	31	EF/1	1	MW	45						YOY	
	31	EF/1	1	MW	41						YOY	
	31	EF/1	1	MW	42						YOY	
	31	EF/1	1	MW	50						YOY	
	31	EF/1	1	CCG	32							
	31	EF/1	1	CCG	31							
	31	EF/1	1	CCG	49							

Halfway River
Site 31: View upstream from bottom of site
(Roll HG2 - Exp 1; CD 2 - Im 124)

Halfway River
Site 31: Aerial view upstream
(Roll HG2 - Exp 4; CD 2 - Im 127)

APPENDIX XXXII

HEADSTONE CREEK
(235-754400)

Sample Site 32

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Headstone Creek											FIELD COORDINATES	57° 02.75' 123° 11.26'				
LOCATION																	
NTS MAP #	94G/3	NID NO		WATERSHED CODE	235-754400												
REACH #		SITE #	32	SITE UTM	10	488677	6322541	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/08/20	TIME	1742	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	15.20	9.20	12.00	13.20	11.00	10.80	11.90	meth	AL
WETTED WIDTH	RF	9.80	4.80	9.90	8.70	4.80	6.80	7.47	3.5	
RES POOL DEPTH	MS	0.12	0.12	0.25	0.30	0.24	0.25	0.21	3.0	
Wb DEPTH	1.03	1.10	1.20	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	7.0	TURBIDITY	
Ph		Clear	

COVER

	COVER	Total	Moderate (5-20%)						
type	SWD	LWD	B	U	DP	OV	IV	CROWN CLOSURE	
amt	N	T	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	Vertical	INSTREAM VEGETATION	Algae	
TEXTURE	Fines/Cobble	TEXTURE	Cobbles			
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous			
STAGE	Mature Forest	STAGE	Mature Forest			

MORPHOLOGY

FLOOD SIGNS	1.5 m - RD
BED MATERIAL	
Dominant	Gravel (2-64 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	52 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	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

Moderate seasonal rearing for BT, MW and RB - cover somewhat limited, mostly boulder pockets.
Spawning potential limited by large substrates and subsurface flow at mouth.
Limited juvenile rearing habitat present.
Seasonal access currently restricted by sub-surface flow at lower 1 km.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG2	23	wd	u	view u/s from bottom of site
HG2	24	wd	u	view u/s from centre of site
HG2	25	wd	d	view d/s from top of site
HG3	1A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Bison, elk		

COMMENTS

C	
CX1	Electro-fishing effort: 428 seconds @ 250 volts. Bull trout and rainbow trout were captured.
CX2	Lower 1000 m of stream de-watered (subsurface at confluence).

FISH COLLECTION FORM

STREAM NAME	Headstone Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION				WATERSHED CODE	235-754400				
WATERBODY ID		NTS MAP	94G/3	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	32	FISH PERMIT #	SC2001-032		
DATE	2001/08/20 to 2001/08/20	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			10.488677.6322541	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	BT			2	186	335	Rearing	
32	EF/1	1	RB			1	180	180	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	1745	1800	428	200	7.47	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	RB	180				Scale	6-1	3+	
	32	EF/1	1	BT	335				Scale	6-2	5+	
	32	EF/1	1	BT	186				Scale	6-3	2+	

Headstone Creek
Site 32: View upstream from bottom of site
(Roll HG2 - Exp 23; CD 2 - Im 128)

Headstone Creek
Site 32: Aerial view upstream
(Roll HG3 - Exp 1A; CD 2 - Im 131)

APPENDIX XXXIII

UNNAMED TRIBUTARY TO HALFWAY RIVER
(235-793900)

Sample Site 33

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Halfway River									FIELD COORDINATES	56° 59.07' 123° 14.04'				
LOCATION															
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-793900										
REACH #		SITE #	33	SITE UTM	10	485801	6315660			SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/08/21	TIME	0826	AGENCY	Diversified Environmental Services					CREW	BC/TE	FISH FORM	Y	X	N

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	18.00	19.50	25.00	28.00	16.00	18.00	20.75	meth	AL
WETTED WIDTH	RF	3.00	3.50	4.00	2.50	4.80	4.30	3.68	2.5	
RES POOL DEPTH	MS	0.10	0.15	0.20	0.15	0.30	0.20	0.18	2.5	
Wb DEPTH	0.50	0.60	0.50	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	5.5	TURBIDITY	
Ph		Clear	

COVER

	COVER	Total	Trace (5%)						CROWN CLOSURE						
type	SWD	LWD	B	U	DP	OV	IV		0%	1-20%	21-40%	41-70%	71-90%	>90%	
amt	T	N	D	N	T	N	N		0	1	2	3	4	5	
loc	P	P	P	P	P	P	P								

LWD FNC	Few	DIST	Clumped
LB SHAPE	Vertical	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	0.4 m - RD
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	29
D (cm)	10
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	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

Limited potential for seasonal use by rearing juvenile sport-fish but access precluded by sub-surface flow and undefined channel on alluvial fan.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG3	7A	wd	u	view u/s from bottom of site
HG3	8A	wd	u	view u/s from centre of site
HG3	9A	wd	d	view d/s from top of site
HG3	10A	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
C1	Also some boulders present.
CX1	Electro-fishing effort: 258 seconds @ 250 volts. No fish present.
CX2	No surface connectivity with Halfway River; flows sub-surface, with no stable channel, through large alluvial fan downstream of site.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Halfway River		[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION		WATERSHED CODE	235-793900		
WATERBODY ID		NTS MAP	94B/14	NID NO	
SITE/LAKE CARD ATTACHED	[X] Y	[ ] N			
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	33
FISH PERMIT #	SC2001-032				
DATE	2001/08/21 to 2001/08/21	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
33			10.485801.6315660	EF	1	5.5		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	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
	33	EF/1	1	0830	0847	258	200	3.68	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 Halfway River
Site 33: View upstream from centre of site
(Roll HG3 - Exp 8A; CD 2 - Im 133)

Unnamed tributary to Halfway River
Site 33: Aerial view upstream
(Roll HG3 - Exp 10A; CD 2 - Im 135)

APPENDIX XXXIV

UNNAMED TRIBUTARY TO HALFWAY RIVER
(235-804800)

Sample Site 34

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Halfway River													FIELD COORDINATES	56° 58.99' 123° 16.21'				
LOCATION																			
NTS MAP #	94B/14		NID NO		WATERSHED CODE	235-804800													
REACH #			SITE #	34	SITE UTM	10	483606	6315503						SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/08/21		TIME	0915	AGENCY	Diversified Environmental Services								CREW	BC/TE	FISH FORM	Y	X	N

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	MS	2.50	2.60	2.80	2.30	3.50	2.20	2.65	meth	AL
WETTED WIDTH	MS	2.50	2.60	2.80	2.30	3.50	2.20	2.65	5.0	
RES POOL DEPTH	MS	0.14	0.09	0.38	0.21	0.12	0.48	0.24	6.0	
Wb DEPTH	0.60	0.70	0.60	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	3.0	TURBIDITY	
Ph		Clear	

FLOOD SIGNS 0.5 m - RD

BED MATERIAL

Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	42
D (cm)	22
Morph.	Riffle-pool

COVER

COVER Total: Trace (5%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	T	T	D	S	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	Even
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: Algae

MORPHOLOGY

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

Low to moderate seasonal rearing potential; low cover due to relatively high gradient, low summer temperature may be limiting.

No fish captured or observed.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG3	11A	wd	u	view u/s from bottom of site
HG3	12A	wd	u	view u/s from centre of site
HG3	13A	wd	d	view d/s from top of site
HG3	14A	wd	u	view of confluence with Halfway river

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 307 seconds @ 250 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Halfway River		LAKE	X STREAM	WETLAND
LOCATION		WATERSHED CODE	235-804800		
WATERBODY ID		NTS MAP	94B/14	NID NO	
SITE/LAKE CARD ATTACHED	X Y	N			
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	34
FISH PERMIT #	SC2001-032				
DATE	2001/08/21 to 2001/08/21	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
34			10.483606.6315503	EF	1	3.0		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	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
	34	EF/1	1	0920	0940	307	200	2.65	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	SAMPLE #	AGE	COMMENTS

Unnamed tributary to Halfway River
Site 34: View upstream from bottom of site
(Roll HG3 - Exp 11A; CD 2 - Im 136)

Unnamed tributary to Halfway River
Site 34: View of confluence with Halfway River
(Roll HG3 - Exp 14A; CD 2 - Im 139)

APPENDIX XXXV

TURNOFF CREEK
(235-821300)

Sample Site 35

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Turnoff Creek											FIELD COORDINATES	57° 04.41' 123° 22.97'				
LOCATION																	
NTS MAP #	94G/3	NID NO		WATERSHED CODE	235-821300												
REACH #		SITE #	35	SITE UTM	10	476792	6325633	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/08/20	TIME	1636	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	MS	2.80	2.90	2.50	3.20	2.80	3.90	3.02	meth	AL
WETTED WIDTH	MS	2.80	2.90	2.50	2.30	2.20	3.90	2.77	1.0	
RES POOL DEPTH	MS	0.26	0.08	0.12	0.22	0.16	0.20	0.17	1.5	
Wb DEPTH	0.60	0.55	0.55	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	9.0	TURBIDITY	
Ph		Clear	

FLOOD SIGNS: 0.8 m - RD

COVER

COVER Total: Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	T	N	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	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

MORPHOLOGY

BED MATERIAL

Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	36	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	None
BARS	Side
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 potential for seasonal use by rearing juvenile BT.
Possible juvenile over-wintering potential.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG2	17	wd	u	view u/s from bottom of site
HG2	18	wd	u	view u/s from centre of site
HG2	19	wd	d	view d/s from top of site
HG2	20	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Bison tracks		

COMMENTS

C	
CX1	Electro-fishing effort: 409 seconds @ 250 volts. Bull trout were captured.
C1	Also high proportion of fines and some boulders.

FISH COLLECTION FORM

STREAM NAME	Turnoff Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION				WATERSHED CODE	235-821300				
WATERBODY ID		NTS MAP	94G/3	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	35	FISH PERMIT #	SC2001-032		
DATE	2001/08/20 to 2001/08/20	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	
35			10.476792.6325633	EF	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
35	EF/1	1	BT			5	87	235	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
	35	EF/1	1	1640	1655	409	200	2.77	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	
	35	EF/1	1	BT	94				Scale	5-1	1+	
	35	EF/1	1	BT	87				Scale	5-2	1+	
	35	EF/1	1	BT	200				Scale	5-3	3+	
	35	EF/1	1	BT	185				Scale	5-4	3+	
	35	EF/1	1	BT	235				Scale	5-5	4+	

Turnoff Creek
Site 35: View upstream from bottom of site
(Roll HG2 - Exp 17; CD 2 - Im 140)

Turnoff Creek
Site 35: Aerial view upstream
(Roll HG2 - Exp 20; CD 2 - Im 143)

APPENDIX XXXVI

FIDDES CREEK
(235-821600)

Sample Site 36

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Fiddes Creek										FIELD COORDINATES	56° 52.53' 123° 23.90'			
LOCATION															
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-821600										
REACH #		SITE #	36	SITE UTM	10	475683	6303600		SITE LENGTH	200	METH	RF	ACCESS	H	
DATE	2001/08/21	TIME	1030	AGENCY	Diversified Environmental Services				CREW	BC/TE	FISH FORM	Y	X	N	

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	MS	5.80	2.50	5.20	4.00	5.60	4.50	4.60	meth	AL
WETTED WIDTH	MS	3.70	2.50	3.20	3.60	3.20	4.00	3.37	3.5	
RES POOL DEPTH	MS	0.30	0.28	0.20	0.40	0.35	0.20	0.29	3.5	
Wb DEPTH	0.32	0.38	0.35	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	6.0	TURBIDITY	
Ph		Clear	

MORPHOLOGY

FLOOD SIGNS: 0.95 m - RD

BED MATERIAL

Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 mm)
D95 (cm)	65
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	Partially Coupled
CONFINED	Frequently Confined

COVER

COVER	Total	Abundant (>20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	N	N	S	T	D	T	T
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	Undercut
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Shrubs	RIP. VEG.	Shrubs
STAGE	Shrub/Herb	STAGE	Shrub/Herb

INSTREAM VEGETATION: Algae

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 juvenile BT- abundant deep pool and boulder cover.
Limited spawning within this reach - gravels not abundant and fines are prevalent.
Suitable spawning habitat on next reach downstream.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG3	15A	wd	u	view u/s from bottom of site
HG3	16A	wd	u	view u/s from centre of site
HG3	17A	wd	d	view d/s from top of site
HG3	19A	wd	u	aerial view upstream
HG3	18A	wd	object	yearling and 2+ BT captured at site 36

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose		

COMMENTS

C
CX1 Electro-fishing effort: 255 seconds @ 250 volts. Bull trout captured.
C1 Also a small proportion of gravels.

FISH COLLECTION FORM

STREAM NAME	Fiddes Creek							[ ] LAKE	[X] STREAM	[ ] WETLAND	
LOCATION						WATERSHED CODE	235-821600				
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N			
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	36	FISH PERMIT #	SC2001-032				
DATE	2001/08/21	to	2001/08/21	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			10.475683.6303600	EF	1	6.0		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	BT			7	123	202	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	1035	1057	255	200	3.37	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	BT	202				Fin ray	12-1	3+	
	36	EF/1	1	BT	177				Fin ray	12-2	2+	
	36	EF/1	1	BT	171				Fin ray	12-3	2+	
	36	EF/1	1	BT	170				Fin ray	12-4	2+	
	36	EF/1	1	BT	153				Fin ray	12-5	2+	
	36	EF/1	1	BT	123				Fin ray	12-6	1+	
	36	EF/1	1	BT	126				Fin ray	12-7	1+	

Fiddes Creek
Site 36: View upstream from bottom of site
(Roll HG3 - Exp 15A; CD 2 - Im 144)

Fiddes Creek
Site 36: View downstream from top of site
(Roll HG3 - Exp 17A; CD 2 - Im 146)

Fiddes Creek
Site 36: Aerial view upstream
(Roll HG3 - Exp 19A; CD 2 - Im 147)

Fiddes Creek
Site 36: Yearling and age 2+ juvenile bull trout
(Roll HG3 - Exp 18A; CD 2 - Im 148)

APPENDIX XXXVII

UNNAMED TRIBUTARY TO HALFWAY RIVER
(235-841200)

Sample Site 37

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Halfway River									FIELD COORDINATES	56° 59.18' 123° 23.21'				
LOCATION															
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-841200										
REACH #		SITE #	37	SITE UTM	10	476226	6316212			SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/08/20	TIME	1545	AGENCY	Diversified Environmental Services					CREW	BC/TE	FISH FORM	Y	X	N

CHANNEL (m)

	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	39.60	19.50	16.00	15.00	40.00	12.50	23.77	meth	AL
WETTED WIDTH	RF	4.60	8.90	7.00	8.50	8.00	3.40	6.73	2.5	
RES POOL DEPTH	MS	0.37	0.20	0.45	0.35	0.15	0.19	0.29	3.0	
Wb DEPTH	0.60	1.00	1.00	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

WATER

EMS		COND	
TEMP (°C)	8.0	TURBIDITY	
Ph		Clear	

FLOOD SIGNS 0.8 m - RD

COVER

COVER Total Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	N	T	S	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	Vertical	RB SHAPE	Sloping
TEXTURE	Fines/Cobble	TEXTURE	Cobbles
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Mature Forest	STAGE	Mature Forest

INSTREAM VEGETATION: Algae

MORPHOLOGY

BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Boulder (> 256 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		

PATTERN	Sinuous
ISLANDS	None
BARS	Side/Mid-stream
COUPLING	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 BT, RB and MW - limited cover.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG2	10	wd	u	view u/s from bottom of site
HG2	11	wd	u	view u/s from centre of site
HG2	12	wd	d	view d/s from top of site
HG2	13	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 347 seconds @ 250 volts. Bull trout and mountain whitefish were captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Halfway River		LAKE / X STREAM / WETLAND
LOCATION		WATERSHED CODE	235-841200
WATERBODY ID		NTS MAP	94B/14
NID NO		SITE/LAKE CARD ATTACHED	X Y / N
PROJECT ID	Halfway-Graham Overview	REACH #	
SITE #	37	FISH PERMIT #	SC2001-032
DATE	2001/08/20 to 2001/08/20	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
37			10.476226.6316212	EF	1	8.0		C	

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			1	310	310	Rearing	
37	EF/1	1	BT			1	251	251	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	1550	1605	347	200	6.73	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
	37	EF/1	1	MW	310				Scale	6-1	5+	
	37	EF/1	1	BT	251		M		Scale	6-2	3+	

Unnamed tributary to Halfway River
Site 37: View upstream from bottom of site
(Roll HG2 - Exp 10; CD 2 - Im 149)

Unnamed tributary to Halfway River
Site 37: Aerial view upstream
(Roll HG2 - Exp 13; CD 2 - Im 152)

APPENDIX XXXVIII

UNNAMED TRIBUTARY TO HALFWAY RIVER
(235-841200)

Sample Site 38

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Halfway River											FIELD COORDINATES	56° 01.16' 123° 26.34'				
LOCATION																	
NTS MAP #	94G/3	NID NO		WATERSHED CODE	235-841200												
REACH #		SITE #	38	SITE UTM	10	473198	6319588					SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/08/20	TIME	1500	AGENCY	Diversified Environmental Services							CREW	BC/TE	FISH FORM	Y	X	N

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	5.70	5.40	4.00	3.70	5.40	3.30	4.58	meth	AL
WETTED WIDTH	RF	5.70	4.90	4.00	3.70	5.40	3.30	4.50	2.0	
RES POOL DEPTH	MS	0.12	0.26	0.19	0.09	0.14	0.28	0.18	2.0	
Wb DEPTH	0.40	0.40	0.50	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	6.0	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Moderate (5-20%)

type	SWD	LWD	B	U	DP	OV	IV
amt	T	S	D	S	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	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: Algae

MORPHOLOGY

FLOOD SIGNS	0.9 m - RD		
BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Gravel (2-64 mm)		
D95 (cm)	38	D (cm)	28
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	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. Distance from mainstem may be limiting.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG2	6	wd	u	view u/s from bottom of site
HG2	7	wd	u	view u/s from centre of site
HG2	8	wd	d	view d/s from top of site
HG2	9	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose		

COMMENTS

C	
CX1	Electro-fishing effort: 460 seconds @ 250 volts. No fish captured.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Halfway River		[ ] LAKE [X] STREAM [ ] WETLAND
LOCATION		WATERSHED CODE	235-841200
WATERBODY ID		NTS MAP 94G/3	NID NO	SITE/LAKE CARD ATTACHED [X] Y [ ] N
PROJECT ID	Halfway-Graham Overview	REACH #	SITE # 38	FISH PERMIT # SC2001-032
DATE	2001/08/20 to 2001/08/20	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			10.473198.6319588	EF	1	6		C	

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	1505	1525	460	200	4.5	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	SAMPLE #	AGE	COMMENTS

Unnamed tributary to Halfway River
Site 38: View upstream from centre of site
(Roll HG2 - Exp 7; CD 2 - Im 154)

Unnamed tributary to Halfway River
Site 38: Aerial view upstream
(Roll HG2 - Exp 9; CD 2 - Im 156)

APPENDIX XXXIX

UNNAMED TRIBUTARY TO HALFWAY RIVER
(235-879200)

Sample Site 39

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Unnamed tributary to Halfway River											FIELD COORDINATES	56° 57.82' 123° 28.56'				
LOCATION																	
NTS MAP #	94B/14	NID NO		WATERSHED CODE	235-879200												
REACH #		SITE #	39	SITE UTM	10	470884	6313802					SITE LENGTH	200	METH	RF	ACCESS	H
DATE	2001/08/20	TIME	1300	AGENCY	Diversified Environmental Services							CREW	BC/TE	FISH FORM	Y	X	N

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	5.90	5.00	4.80	4.60	3.90	5.40	4.93	meth	AL
WETTED WIDTH	RF	5.90	5.00	4.80	4.60	3.90	5.40	4.93	2.0	
RES POOL DEPTH	MS	0.22	0.12	0.17	0.13	0.12	0.19	0.16	2.5	
Wb DEPTH	0.45	0.50		STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	7.5	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Moderate (5-20%)

	SWD	LWD	B	U	DP	OV	IV
type							
amt	T	T	D	S	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	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: Algae

MORPHOLOGY

FLOOD SIGNS	0.9 m - RD		
BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Boulder (> 256 mm)		
D95 (cm)	90	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	None
BARS	None
COUPLING	Partially Coupled
CONFINED	Frequently Confined

FEATURES

C	NID MAP #	NID #	TYPE	HT/LG (m)	mthd	PHOTO				COMMENTS	UTM		
			F	30	AE	R	H1	F	23	impassable falls 500 m u/s	10	470557	6314160
						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 sport-fish species (BT, GR, MW, RB).

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG1	19	wd	u	view u/s from bottom of site
HG1	20	wd	u	view u/s from centre of site
HG1	21	wd	d	view d/s from top of site
HG1	22	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Moose, deer, bison tracks		

COMMENTS

C	
CX1	Electro-fishing effort: 499 seconds @ 250 volts. Bull trout, mountain whitefish and rainbow trout were captured.
CX2	30 m impassable falls 500 m upstream of site.

FISH COLLECTION FORM

STREAM NAME	Unnamed tributary to Halfway River						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	235-879200			
WATERBODY ID		NTS MAP	94B/14	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	39	FISH PERMIT #	SC2001-032		
DATE	2001/08/20 to 2001/08/20	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
39			10.470884.6313802	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
39	EF/1	1	RB			1	350	350	Rearing	
39	EF/1	1	MW			3	171	300	Rearing	
39	EF/1	1	BT			2	114	463	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
	39	EF/1	1	1305	1325	499	200	4.93	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 STR	AGE SAMPLE #	AGE AGE	COMMENTS
	39	EF/1	1	RB	350				Scale	3-1	5+	
	39	EF/1	1	BT	463		M		Fin ray	3-2	7+	
	39	EF/1	1	MW	171				Scale	3-3	3+	
	39	EF/1	1	MW	300				Scale	3-4	7+	
	39	EF/1	1	MW	295				Scale	3-5	6+	
	39	EF/1	1	BT	114				Scale	3-6	1+	

Unnamed tributary to Halfway River
Site 39: View upstream from bottom of site
(Roll HG1 - Exp 19; CD 2 - Im 157)

Unnamed tributary to Halfway River
Site 39: Aerial view upstream
(Roll HG1 - Exp 22; CD 2 - Im 160)

APPENDIX XL

CALNAN CREEK
(235-927700)

Sample Site 40

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Calnan Creek											FIELD COORDINATES	56° 53.11' 123° 35.71'		
LOCATION															
NTS MAP #	94B/13	NID NO		WATERSHED CODE	235-927700										
REACH #		SITE #	40	SITE UTM	10	463546	6304551			SITE LENGTH	250	METH	RF	ACCESS	H
DATE	2001/08/20	TIME	1030	AGENCY	Diversified Environmental Services					CREW	BC/TE	FISH FORM	Y	X	N

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	14.00	21.00	13.50	17.00	17.50	13.00	16.00	meth	AL
WETTED WIDTH	RF	14.00	15.00	6.50	15.50	10.50	13.00	12.42	1.0	
RES POOL DEPTH	MS	0.60	0.53	0.32	0.80	1.00	0.72	0.66	1.0	
Wb DEPTH	0.60	0.90	0.80	STAGE	Moderate		No Vis Chan		Dry/Int	
							Dewater		Tribs	

EMS	
COND	
TEMP (°C)	6.0
TURBIDITY	
Ph	
	Clear

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	Abundant	DIST	Clumped
LB SHAPE	Vertical	RB SHAPE	Vertical
TEXTURE	Fines	TEXTURE	Fines
RIP. VEG.	Coniferous	RIP. VEG.	Coniferous
STAGE	Young Forest	STAGE	Young Forest

INSTREAM VEGETATION

MORPHOLOGY

FLOOD SIGNS	0.8 m - RD
BED MATERIAL	
Dominant	Cobble (64-256 mm)
Subdom.	Gravel (2-64 mm)
D95 (cm)	30
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	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 resident BT.
Potential BT spawning although fines appear high.

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG1	6	wd	u	view u/s from bottom of site
HG1	7	wd	u	view u/s from centre of site
HG1	8	wd	d	view d/s from top of site
HG1	9	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C	
CX1	Electro-fishing effort: 663 seconds @ 250 volts. Bull trout were captured.
CX2	Upstream resident BT population isolated above Halfway River falls.
CX3	Several 50+ cm mature BT approaching spawning condition observed but not sampled; assumed to be migrating to upstream spawning habitat.

FISH COLLECTION FORM

STREAM NAME	Calnan Creek						[ ] LAKE	[X] STREAM	[ ] WETLAND
LOCATION					WATERSHED CODE	235-927700			
WATERBODY ID		NTS MAP	94B/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N	
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	40	FISH PERMIT #	SC2001-032		
DATE	2001/08/20 to 2001/08/20	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
40			10.463546.6304551	EF	1	6.0		C	

FISH SUMMARY

SITE #	MTD/NO	H/P	SPECIES	STAGE	AGE	TOTAL NO	MIN LN (mm)	MAX LN (mm)	FISH ACT	COMMENTS
40	EF/1	1	BT			9	75	192	Rearing	
40	VO/1	1	BT	Adult		4	500	600		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
	40	EF/1	1	1035	1100	663	250	12.42	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 STR	AGE SAMPLE #	AGE	COMMENTS
	40	EF/1	1	BT	175				Scale	1-1	3+	
	40	EF/1	1	BT	192				Scale	1-2	3+	
	40	EF/1	1	BT	136				Scale	1-3	2+	
	40	EF/1	1	BT	146				Scale	1-4	2+	
	40	EF/1	1	BT	138				Scale	1-5	2+	
	40	EF/1	1	BT	116				Scale	1-6	1+	
	40	EF/1	1	BT	75				Scale	1-7	1+	
	40	EF/1	1	BT	91				Scale	1-8	1+	
	40	EF/1	1	BT	100				Scale	1-9	1+	

Calnan Creek
Site 40: View downstream from top of site
(Roll HG1 - Exp 8; CD 2 - Im 163)

Calnan Creek
Site 40: Aerial view upstream
(Roll HG1 - Exp 9; CD 2 - Im 164)

APPENDIX XLI

CALNAN CREEK
(235-927700)

Sample Site 41

Site Data Card, Fish Collection Form and Site Photographs

SITE CARD

STREAM NAME	Calnan Creek											FIELD COORDINATES	56° 51.86' 123° 37.62'				
LOCATION																	
NTS MAP #	94B/13	NID NO		WATERSHED CODE	235-927700												
REACH #		SITE #	41	SITE UTM	10	461165	6302466	SITE LENGTH	200	METH	RF	ACCESS	H				
DATE	2001/08/20	TIME	1137	AGENCY	Diversified Environmental Services			CREW	BC/TE	FISH FORM	Y	X	N				

WATER

CHANNEL (m)	meth							avg	GRADIENT %	
CHANNEL WIDTH	RF	28.00	26.00	26.00	32.00	25.50	23.00	26.75	meth	AL
WETTED WIDTH	RF	28.00	26.00	25.00	32.00	25.00	21.00	26.17	2.5	
RES POOL DEPTH	MS	0.32	0.20	0.12	0.35	0.30	0.25	0.26	2.5	
Wb DEPTH	0.60	0.50	0.60	STAGE	Moderate		No Vis Chan		Dry/Int	1
							Dewater		Tribs	

EMS		COND	
TEMP (°C)	8.5	TURBIDITY	
Ph		Clear	

COVER

COVER	Total	Abundant (>20%)						CROWN CLOSURE							
type	SWD	LWD	B	U	DP	OV	IV								
amt	N	N	D	N	S	N	N	0%	1-20%	21-40%	41-70%	71-90%	>90%		
loc	P	P	P	P	P	P	P								

LWD FNC	None	DIST		0	1	2	3	4	5		
LB SHAPE	Sloping	RB SHAPE	Sloping								
TEXTURE	Fines	TEXTURE	Fines	INSTREAM	None						
RIP. VEG.	Shrubs	RIP. VEG.	Shrubs	VEGETATION							
STAGE	Shrub/Herb	STAGE	Shrub/Herb								

MORPHOLOGY

FLOOD SIGNS	0.66 m - RD		
BED MATERIAL			
Dominant	Cobble (64-256 mm)		
Subdom.	Boulder (> 256 mm)		
D95 (cm)	105	D (cm)	45
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	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

Good seasonal rearing habitat for resident BT and juvenile BT (boulder cover and side channels).

FSZ

PHOTO DOCUMENTATION

ROLL	FRAME	FOCAL LN	DIRECTION	COMMENTS
HG1	10	wd	u	view u/s from bottom of site
HG1	11	wd	u	view u/s from centre of site
HG1	12	wd	d	view d/s from top of site
HG1	13	wd	u	aerial view upstream

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
MAM	Bison tracks		

COMMENTS

C	
CX1	Electro-fishing effort: 648 seconds @ 250 volts. Bull trout were captured.
CX2	One adult BT observed in deep pool.
C1	Also a significant pockets of gravel.

FISH COLLECTION FORM

STREAM NAME	Calnan Creek							LAKE [ ]	STREAM [X]	WETLAND [ ]
LOCATION					WATERSHED CODE	235-927700				
WATERBODY ID		NTS MAP	94B/13	NID NO		SITE/LAKE CARD ATTACHED	[X] Y	[ ] N		
PROJECT ID	Halfway-Graham Overview	REACH #		SITE #	41	FISH PERMIT #	SC2001-032			
DATE	2001/08/20 to 2001/08/20	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	
41			10.461165.6302466	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
41	EF/1	1	BT			8	151	261	Rearing	
41	VO/1	1	BT			1	500	600		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
	41	EF/1	1	1145	1210	648	200	26.17	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	
	41	EF/1	1	BT	261				Fin ray	2-1	4+	
	41	EF/1	1	BT	237				Fin ray	2-2	4+	
	41	EF/1	1	BT	154				Scale	2-3	2+	
	41	EF/1	1	BT	190				Scale	2-4	3+	
	41	EF/1	1	BT	157				Scale	2-5	2+	
	41	EF/1	1	BT	155				Scale	2-6	2+	
	41	EF/1	1	BT	151				Scale	2-7	2+	
	41	EF/1	1	BT	152				Scale	2-8	2+	

Calnan Creek
Site 41: View upstream from bottom of site
(Roll HG1 - Exp 10; CD 2 - Im 165)

Calnan Creek
Site 41: Aerial view upstream
(Roll HG1 - Exp 13; CD 2 - Im 168)

APPENDIX XLII

PHOTODOCUMENTATION INDEX

Site Photos
Features Photos
Basin-view photos

SITE	CD	IMAGE	ROLL	FRAME	VIEW	WATERSHED
1	1	1	GC2	18	view u/s from bottom of site	Graham
1	1	2	GC2	19	view u/s from centre of site	Graham
1	1	3	GC2	20	view d/s from top of site	Graham
1	1	4	GC2	21	aerial view upstream	Graham
1	1	5	T1	12	female bull trout - 552 mm	Graham
2	1	9	GC4	14A	aerial view upstream from Graham River confluence	Graham
2	1	6	GC4	15A	view u/s from bottom of site	Graham
2	1	7	GC4	16A	view u/s from centre of site	Graham
2	1	8	GC4	17A	view d/s from top of site	Graham
3	1	14	GC4	10A	view u/s from bottom of site	Graham
3	1	15	GC4	11A	view u/s from centre of site	Graham
3	1	16	GC4	12A	view d/s from top of site	Graham
3	1	17	GC4	13A	aerial view upstream	Graham
4	1	10	GC4	6A	view u/s from bottom of site	Graham
4	1	11	GC4	7A	view u/s from centre of site	Graham
4	1	12	GC4	8A	view d/s from top of site	Graham
4	1	13	GC4	9A	aerial view upstream	Graham
6	1	26	GC3	10A	view u/s from bottom of site	Graham
6	1	27	GC3	11A	view u/s from centre of site	Graham
6	1	28	GC3	12A	view d/s from top of site	Graham
6	1	29	GC3	13A	aerial view upstream	Graham
6	1	30	GC3	14A	aerial view upstream of basin	Graham
7	1	22	GC3	15A	view u/s from bottom of site	Graham
7	1	23	GC3	16A	view u/s from centre of site	Graham
7	1	24	GC3	17A	view d/s from top of site	Graham
7	1	25	GC3	18A	aerial view upstream	Graham
8	1	31	GC3	5A	view u/s from bottom of site	Graham
8	1	32	GC3	6A	view u/s from centre of site	Graham
8	1	33	GC3	7A	view d/s from top of site	Graham
8	1	34	GC3	8A	aerial view upstream	Graham
9	1	35	GC2	22	view u/s from bottom of site	Graham
9	1	36	GC2	23	view u/s from centre of site	Graham
9	1	37	GC2	24	view d/s from top of site	Graham
9	1	38	GC2	25	aerial view upstream	Graham
10	1	39	CF8	21	view u/s from bottom of site	Chowade
10	1	40	CF8	22	view u/s from centre of site	Chowade
10	1	41	CF8	23	view d/s from top of site	Chowade
10	1	42	CF8	24	aerial view upstream	Chowade
11	1	43	CF8	14	view u/s from bottom of site	Chowade
11	1	44	CF8	15	view u/s from centre of site	Chowade
11	1	45	CF8	16	view d/s from top of site	Chowade
11	1	46	CF8	17	aerial view upstream	Chowade
12	1	47	GC1	15	view u/s from bottom of site	Chowade
12	1	48	GC1	16	view u/s from centre of site	Chowade
12	1	49	GC1	17	view d/s from top of site	Chowade
12	1	50	GC1	18	aerial view upstream	Chowade
12	1	51	GC1	19	aerial view upstream from Chowade River confluence	Chowade
12	1	52	T1	7	BT (225 mm) and RB (191 mm)	Chowade

SITE	CD	IMAGE	ROLL	FRAME	VIEW	WATERSHED
12	1	53	T1	8	CCG (121 mm)	Chowade
13	1	54	GC1	21	view u/s from bottom of site	Chowade
13	1	55	GC1	22	view u/s from centre of site	Chowade
13	1	56	GC1	23	aerial view upstream	Chowade
13	1	57	T1	9	BT 418 mm	Chowade
13	1	58	T1	11	juvenile BT and RB	Chowade
14	1	59	GC1	25	view u/s from bottom of site	Chowade
14	1	60	GC2	1	view u/s from centre of site	Chowade
14	1	61	GC2	2	view d/s from top of site	Chowade
14	1	62	GC2	3	aerial view upstream	Chowade
15	1	63	GC2	7	view u/s from bottom of site	Chowade
15	1	64	GC2	8	view u/s from centre of site	Chowade
15	1	65	GC2	9	view d/s from top of site	Chowade
15	1	66	GC2	10	aerial view upstream	Chowade
16	1	67	GC2	4	view u/s from bottom of site	Chowade
16	1	68	GC2	5	view u/s from centre of site	Chowade
16	1	69	GC2	6	aerial view upstream	Chowade
17	1	70	GC1	3	view d/s from top of site	Chowade
17	1	71	GC1	4	view u/s from centre of site	Chowade
17	1	72	GC1	5	view u/s from bottom of site	Chowade
17	1	73	GC1	6	aerial view upstream	Chowade
18	1	74	GC1	7	view u/s from bottom of site	Chowade
18	1	75	GC1	8	view u/s from centre of site	Chowade
18	1	76	GC1	9	view d/s from top of site	Chowade
18	1	77	GC1	10	aerial view upstream	Chowade
18	1	78	GC1	11	aerial basin view upstream	Chowade
19	1	81	CF8	25	view u/s from bottom of site	Chowade
19	1	79	GC1	1	view u/s from centre of site	Chowade
19	1	80	GC1	2	view d/s from top of site	Cypress
20	1	82	HG4	18	view d/s from centre of site	Cypress
20	1	83	HG4	19	view u/s from centre of site	Cypress
20	1	84	HG4	20	view d/s from top of site	Cypress
20	1	85	HG4	21	aerial view upstream	Cypress
21	1	86	HG4	1	view u/s from bottom of site	Cypress
21	1	87	HG4	2	view u/s from centre of site	Cypress
21	1	88	HG4	3	view d/s from top of site	Cypress
21	1	89	HG4	4	aerial view upstream	Cypress
22	1	90	HG5	9	view u/s from bottom of site	Cypress
22	1	91	HG5	10	view u/s from centre of site	Cypress
22	1	92	HG5	11	view d/s from top of site	Cypress
22	1	93	HG5	12	aerial view upstream	Cypress
22	1	94	HG5	13	aerial basin view upstream	Cypress
23	1	95	HG5	1	view u/s from bottom of site	Cypress
23	1	96	HG5	2	view u/s from centre of site	Cypress
23	1	97	HG5	3	view d/s from top of site	Cypress
23	1	98	HG5	4	aerial view upstream	Cypress
24	1	99	HG5	5	view u/s from bottom of site	Cypress
24	1	100	HG5	6	view u/s from centre of site	Cypress

SITE	CD	IMAGE	ROLL	FRAME	VIEW	WATERSHED
24	1	101	HG5	7	view d/s from top of site	Cypress
24	1	102	HG5	8	aerial view upstream	Cypress
25	1	103	HG4	14	view u/s from bottom of site	Cypress
25	1	104	HG4	15	view u/s from centre of site	Cypress
25	1	105	HG4	16	view d/s from top of site	Cypress
25	1	106	HG4	17	aerial view upstream	Cypress
26	2	107	HG4	11	view u/s from bottom of site	Cypress
26	2	108	HG4	12	view u/s from centre of site	Cypress
26	2	109	HG4	13	aerial view upstream	Cypress
27	2	110	HG4	8	view u/s from bottom of site	Cypress
27	2	111	HG4	9	view d/s from top of site	Cypress
27	2	112	HG4	10	aerial view upstream	Cypress
28	2	113	HG4	5	view u/s from bottom of site	Cypress
28	2	114	HG4	6	view u/s from centre of site	Cypress
28	2	115	HG4	7	aerial view upstream	Cypress
29	2	116	HG3	20A	view u/s from bottom of site	Cypress
29	2	117	HG3	21A	view u/s from centre of site	Cypress
29	2	118	HG3	22A	view d/s from top of site	Cypress
29	2	119	HG3	23A	aerial view upstream	Cypress
30	2	123	HG3	3A	aerial view upstream	Halfway
30	2	120	HG3	4A	view u/s from bottom of site	Halfway
30	2	121	HG3	5A	view u/s from centre of secondary channel	Halfway
30	2	122	HG3	6A	view d/s from top of site	Halfway
31	2	124	HG2	1	view u/s from bottom of site	Halfway
31	2	125	HG2	2	view u/s from centre of site	Halfway
31	2	126	HG2	3	view d/s from top of site	Halfway
31	2	127	HG2	4	aerial view upstream	Halfway
32	2	128	HG2	23	view u/s from bottom of site	Halfway
32	2	129	HG2	24	view u/s from centre of site	Halfway
32	2	130	HG2	25	view d/s from top of site	Halfway
32	2	131	HG3	1A	aerial view upstream	Halfway
33	2	132	HG3	7A	view u/s from bottom of site	Halfway
33	2	133	HG3	8A	view u/s from centre of site	Halfway
33	2	134	HG3	9A	view d/s from top of site	Halfway
33	2	135	HG3	10A	aerial view upstream	Halfway
34	2	136	HG3	11A	view u/s from bottom of site	Halfway
34	2	137	HG3	12A	view u/s from centre of site	Halfway
34	2	138	HG3	13A	view d/s from top of site	Halfway
34	2	139	HG3	14A	view of confluence with Halfway river	Halfway
35	2	140	HG2	17	view u/s from bottom of site	Halfway
35	2	141	HG2	18	view u/s from centre of site	Halfway
35	2	142	HG2	19	view d/s from top of site	Halfway
35	2	143	HG2	20	aerial view upstream	Halfway
36	2	144	HG3	15A	view u/s from bottom of site	Halfway
36	2	145	HG3	16A	view u/s from centre of site	Halfway
36	2	146	HG3	17A	view d/s from top of site	Halfway
36	2	147	HG3	19A	aerial view upstream	Halfway
36	2	148	HG3	18A	yearling and 2+ BT captured at site 36	Halfway

SITE	CD	IMAGE	ROLL	FRAME	VIEW	WATERSHED
37	2	149	HG2	10	view u/s from bottom of site	Halfway
37	2	150	HG2	11	view u/s from centre of site	Halfway
37	2	151	HG2	12	view d/s from top of site	Halfway
37	2	152	HG2	13	aerial view upstream	Halfway
38	2	153	HG2	6	view u/s from bottom of site	Halfway
38	2	154	HG2	7	view u/s from centre of site	Halfway
38	2	155	HG2	8	view d/s from top of site	Halfway
38	2	156	HG2	9	aerial view upstream	Halfway
39	2	157	HG1	19	view u/s from bottom of site	Halfway
39	2	158	HG1	20	view u/s from centre of site	Halfway
39	2	159	HG1	21	view d/s from top of site	Halfway
39	2	160	HG1	22	aerial view upstream	Halfway
40	2	161	HG1	6	view u/s from bottom of site	Halfway
40	2	162	HG1	7	view u/s from centre of site	Halfway
40	2	163	HG1	8	view d/s from top of site	Halfway
40	2	164	HG1	9	aerial view upstream	Halfway
41	2	165	HG1	10	view u/s from bottom of site	Halfway
41	2	166	HG1	11	view u/s from centre of site	Halfway
41	2	167	HG1	12	view d/s from top of site	Halfway
41	2	168	HG1	13	aerial view upstream	Halfway

STREAM	CD	IMAGE	ROLL	FRAME	VIEW	WSC	EAST	NORTH
Graham River	2	187	GC4	18A	aerial view u/s from trib 45400	235-304300	498475	6260465
Graham River	2	183	GC4	0A	u/s aerial view of Christina Falls	235-304300	493461	6267093
Graham River	2	182	GC3	25A	aerial view u/s from near Christina Falls	235-304300	491662	6268972
Graham River	2	178	GC3	3A	aerial view u/s from near Justice Cr	235-304300	482825	6271697
Graham River	2	177	GC3	2A	aerial view u/s from near Justice Cr	235-304300	480946	6271816
Graham River	2	175	GC2	15	Red Falls	235-304300	471725	6276737
Graham River	2	174	GC2	14	u/s aerial basin view (upper)	235-304300	468789	6282545
trib to Graham R	2	188	GC4	21A	aerial view u/s from mouth	235-304300-45400	498978	6259566
Needham Creek	2	184	GC4	2A	aerial view u/s from mouth	235-304300-51900	494374	6263773
Needham Creek	2	185	GC4	3A	u/s aerial view of barrier	235-304300-51900	489154	6261039
Needham Creek	2	186	GC4	5A	u/s aerial basin view (upper)	235-304300-51900	484399	6262423
trib to Graham R	2	181	GC3	20A	aerial view u/s from mouth	235-304300-60600	489532	6270784
trib to Graham R	2	180	GC3	19A	aerial view u/s from mouth	235-304300-64500	485484	6271942
Justice Creek	2	179	GC3	4A	aerial view u/s from mouth	235-304300-66400	483883	6271274
Poutang Creek	2	176	GC2	16	aerial view u/s from mouth	235-304300-78200	473789	6275348
Horn Creek	2	172	GC2	12	u/s aerial basin view	235-304300-81100	466910	6280971
Chowade River	2	170	GC1	13	aerial view u/s from trib 56400	235-430800	496543	6283630
Chowade River	2	190	CF8	14	u/s aerial view of cascade	235-430800	481303	6284913
Chowade River	2	189	CF8	12	u/s aerial basin view (upper)	235-430800	475205	6284410
trib to Chowade R	2	171	GC1	14	aerial basin view u/s from mouth	235-430800-47100	501690	6282889
trib to Chowade R	2	169	GC1	12	aerial view u/s from mouth	235-430800-56400	496411	6283669
trib to Chowade R	2	192	CF8	20	u/s aerial basin view	235-430800-72800	486211	6285826
trib to Chowade R	2	191	CF8	19	u/s aerial basin view	235-430800-79500	480192	6286553
trib to Cypress Cr	2	213	HG3	25A	u/s aerial view of falls (lower)	235-492500-74500	485008	6300312
trib to Cypress Cr	2	212	HG3	24A	u/s aerial view of falls	235-492500-74500	484545	6300312
Halfway River	2	201	HG1	18	u/s aerial view of falls (lower)	235	471051	6313448
Halfway River	2	200	HG1	17	u/s aerial view of falls	235	470455	6313329
Halfway River	2	197	HG1	14	u/s aerial basin view (upper)	235	459436	6307826
trib to Headstone Cr	2	211	HG3	2A	aerial view u/s from mouth	235-754400-42300	489135	6322021
trib to Halfway R	2	210	HG2	22	aerial view u/s from mouth	235-78000	488579	6316544
trib to Halfway R	2	209	HG2	21	aerial view u/s from mouth	235-801600	485365	6316240
Turnoff Creek	2	206	HG2	14	aerial view u/s from mouth	235-821300	480523	6316412
Turnoff Creek	2	207	HG2	15	u/s aerial basin view (mid)	235-821300	479438	6322034
Turnoff Creek	2	208	HG2	16	u/s aerial basin view (upper)	235-821300	476342	6325513

STREAM	CD	IMAGE	ROLL	FRAME	VIEW	WSC	EAST	NORTH
trib to Halfway R	2	205	HG2	5	u/s aerial basin view (upper)	235-841200	472136	6319785
trib to Halfway R	2	202	HG1	23	u/s aerial view of falls	235-879200	470667	6314096
trib to Halfway R	2	203	HG1	24	u/s aerial basin view above falls	235-879200	469106	6314268
trib to Halfway trib	2	204	HG1	25	aerial view u/s from mouth	235-879200-14400	469887	6314387
trib to Halfway R	2	199	HG1	16	aerial view u/s from mouth	235-906000	467955	6309228
Calnan Creek	2	193	HG1	1	u/s aerial view of falls	235-927700	457094	6301595
Calnan Creek	2	194	HG1	3	u/s aerial basin view above falls	235-927700	455903	6300722
Calnan Creek	2	195	HG1	4	u/s aerial view of cascades	235-927700	462584	6303235
trib to Calnan Cr	2	196	HG1	5	aerial view u/s from mouth	235-927700-24800	463391	6303248
trib to Halfway R	2	198	HG1	15	aerial view u/s from mouth	235-939500	462253	6307032

APPENDIX XLIII

INTERPRETIVE MAPS

1:80,000 SCALE