

2022 Fish Habitat Assessment in the BCTS Babine Business Area

Smithers Field Unit

Blocks BU_CHAP_1, 2, 3, 4, 11, 12 and BU_DEEP_9A, 34, 39, 40, 43, 44

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1 Introduction

In April 2022, FINS Consulting Ltd. (FINS) was retained by Silvicon Services Inc. (Silvicon) to confirm stream classification of the selected streams in proposed blocks located within BC Timbers Sales (BCTS) – Babine Business Area. All proposed blocks are within and Smithers Field Unit Operating Area. The overall purpose of the assessment was to assign the stream’s riparian classification and alleviate forest management activities.

Fieldwork took place on September 26 – October 19, 2022.

2 Location of the Proposed Blocks

The proposed blocks are located between 29 km ENE and 40 km SE of Smithers, BC (Figure 1).

The areas were reached by a 4X4 vehicle, while specific stream reaches for assessment were accessed on foot.

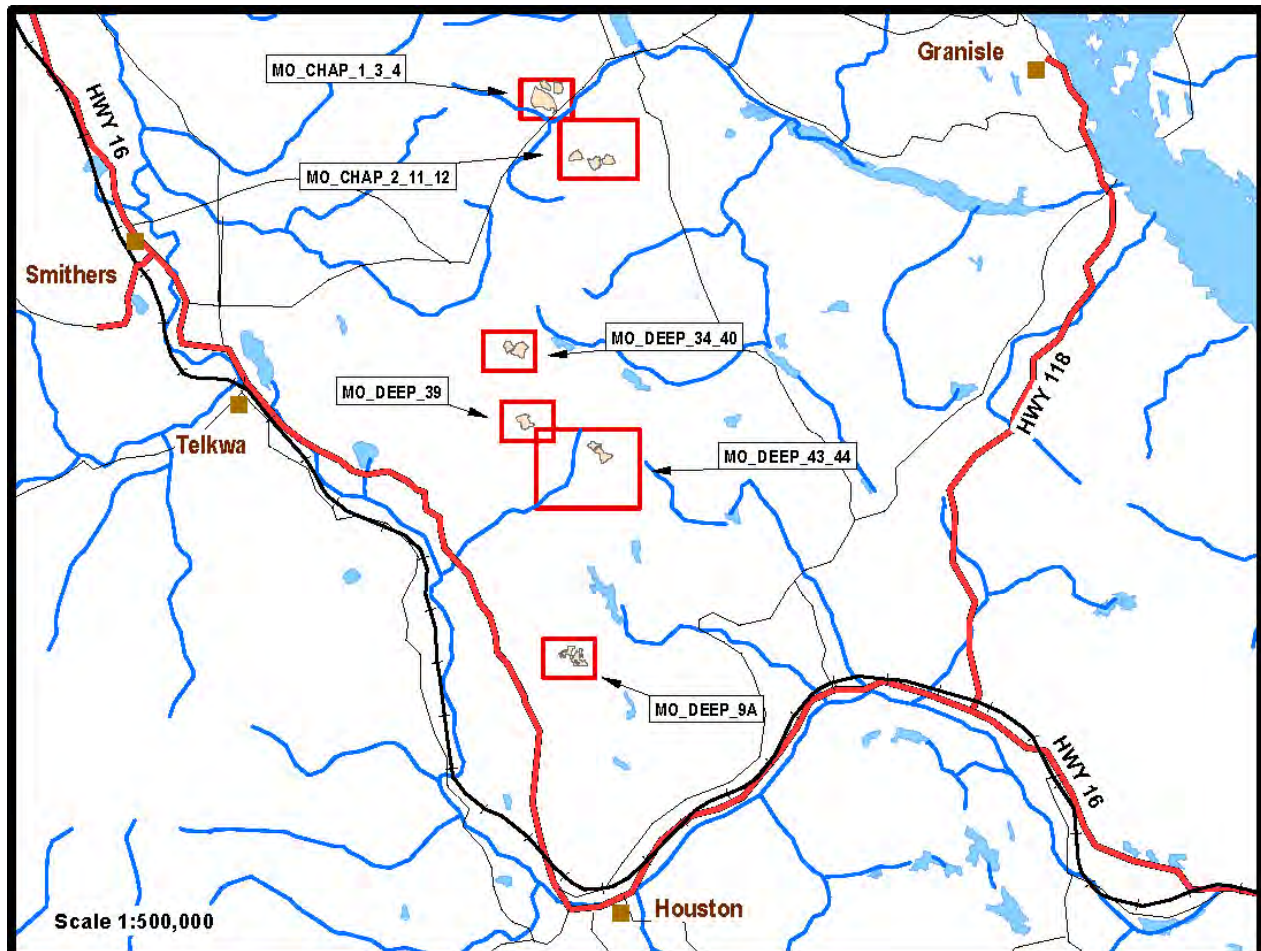


Figure 1: Location of the Project Areas.

3 Methods

The methodology used throughout this project was consistent with the standards and methods outlined in the following publications:

- Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures. Version 2.0. (RIC, 2001)
- Fish-stream Identification Guidebook, Second Edition (FSID) (FPC, 1998)
- Riparian Management Area Guidebook (FPC, 1995)
- Modernized Fisheries Act (FA, 2019)

Silvicon personnel identified all streams requiring assessments before the field trip.

3.1 Review of Existing Fisheries Information

All existing and relevant historical fisheries data are incorporated into the report and maps.

3.1.1 Proposed Blocks BU_CHAP_1, 3, and 4

All streams within the area are direct or indirect tributaries to McKendrick C. (480-697200-42700) within the Fulton River watershed (BABL watershed group).

McKendrick C. has documented the presence of cutthroat trout (CT) (*Oncorhynchus clarki*) and Dolly Varden char (DV) (*Salvelinus malma*).

Streams -42700-49000 (Stream D), -49000-4014, -42700-52200 (Stream A), and -42700-54100-3244 were visited in the years 1996 and 1997 by Triton Environmental Consultants Ltd. (Triton) during reconnaissance inventories. Throughout these projects, no fish were captured in these streams. Stream -42700-54100-3244 was determined non-fish bearing, while the others were designated for re-sampling in the future.

3.1.2 Proposed Blocks BU_CHAP_2, 11, and 12

All streams within the area are direct or indirect tributaries to Bristow C. (480-697200-34100) within the Fulton River watershed (BABL watershed group).

Bristow C. and Fink C. (-34100-26700) were inventoried by Triton in 1996 and 1997 during reconnaissance inventories. DV was captured near the Chapman FSR in Bristow C. during these projects, and its presence was assumed up to the 15m waterfall located 1.77km from the road. In Fink C. while Triton established that DV could easily access the stream up to the impassable 2m high cascade located approximately 0.82km upstream of the road. All sampling above these barriers yielded no fish, and both barriers defined upper distribution limits for game fish in both streams and marked the boundary between fish and non-fish-bearing waters.

3.1.3 Proposed Block BU_DEEP_9A

No fisheries evaluations were conducted in stream 460-517700-58200. It drains the southern portion of the block and flows to Thompson C. within the Bulkley River watershed (BULK watershed group).

In 1997 Triton visited a stream indirectly draining to McQuarry C. (460-744900). However, no fish were captured during the assessment.

3.1.4 Proposed Blocks BU_DEEP_34 and 40

Burbridge C. 460-325400-62400 (Stream A) flows to Canyon C. within the Bulkley River watershed (BULK watershed group).

Headwater reaches of Burbridge C. were part of fisheries inventories led by Triton in 1997 and FINS in 2008. No fish were captured by Triton in Reach 5, while CT presence was confirmed by FINS in Reach 4.

3.1.5 Proposed Block BU_DEEP_39

Stream 460-487900-11100-77624 (Stream D) dissecting and then adjacent to the block is a left bank tributary to Lemieux C. within the Robin C. watershed (BULK watershed group).

In 1997 Triton, during a Reconnaissance Fish Inventory, assessed sections of Lemieux C. in Reach 6 and Stream D in Reach 1. No fish were captured in both sections. In 2011 FINS established that DV could access Lemieux C. to the Triton's site from downstream reaches.

3.1.6 Proposed Block BU_DEEP_43 and 44

All streams within the area are direct tributaries to Deep C. (460-496100) within the Bulkley River watershed (BULK watershed group).

Deep C. has documented the presence of CT, DV, and rainbow trout (RB) (*Oncorhynchus mykiss*).

Streams -496100-69000 and -496100-81500 were inventoried by Triton in 1997, while FINS visited both streams in 2010 and 2016 respectively. During these projects, no fish were captured at any site. In stream -496100-69000, FINS recorded an impassable 1.5m waterfall located approximately 400m from the confluence with Deep C., while an 18m high by 90m long cascade barrier was located around 420m from the mouth in stream -496100-81500. Both barriers define upper distribution limits for game fish in respective streams and mark the boundaries between fish and non-fish-bearing waters.

3.2 Stream Data Collection

Stream data were collected on Site Cards and Fish Collection Forms. These field cards are the currently accepted method of collecting data for stream evaluation. Printout of all field data collected is provided in Appendices. Abbreviations used in the Site Data Form are provided in the List of Abbreviations on page 14.

3.3 Fish Sampling

During the assessment, electrofishing and minnow trapping supplemented by visual observation of fish movement was employed as the methods used for fish sampling.

3.4 Measurements, Calculations, and In-Field Markings

Stream channel and wetted widths were determined using a meter tape. Generally, a minimum of six-channel width (CW) measurements were made within the site vicinity at a distance of approximately 15-20 m apart and were rounded to two decimal places. In cases where the channel was close to riparian class boundaries (i.e., 1.5m, 3m, 5m), more measurements at equal spacing were taken to determine a precise transition location between riparian classes. Stream depth measurements were determined using a meter stick or were estimated if the channel was inaccessible due to treacherous conditions. Stream gradient measurements were determined using the Abney level along several site sections and were rounded to a whole number. In some instances, where the stream slope was close to 0%, the level readings were rounded to 0.5% to indicate flowing water. Site lengths were determined using a professional GPS unit or GIS software. Stream water temperatures, conductivity, and pH were determined using a portable Hanna water chemistry multi-meter, calibrated using standardized solutions. Water velocities for the velocity barrier were calculated using a modified Manning formula. Roughness factors were derived from Manning's and Cowan's coefficients (McCuen, R. H., 1989) and adjusted by analyzing stream morphology data collected by FINS during the past 27 years. Heights and lengths of linear obstructions (cascades, velocity barriers) were determined using a meter tape and clinometer and then applying slope/distance tables to verify the vertical height.

Riparian class transitions (i.e., from S4 to S6) were marked in-field by a yellow flagging tape tied to the opposite banks and above the transition point. From the center of the created "gate," another yellow ribbon was hung down and was labelled using a permanent marker with the stream ID, class transition, date, and the consultant's name (FINS).

3.5 GPS Recording

Existing drainages, survey sites, and critical features affecting fish habitat and fish distribution were recorded using professional GPS. All point coordinates were averaged from 30 to 100 GPS fixes.

Collected raw data were not post-processed.

3.6 Stream and Site Referencing

All watercourses without a gazetted name or watershed code were assigned a Temporary Watershed Code (or adopted existing one) consisting of five unique digits (known as Interim Location Points (ILP)) - as recommended in the FSID.

If available, parent streams were identified by a combination of a gazetted name with a WSC or just by a WSC.

Existing and non-existing drainages were then referenced using gazetted names with TWC or a reduced WSC. A reduced WSC contains the parent stream's last digit group and the stream's in question last digit group.

Site numbers for this project have been assigned in ascending order based on the survey sequence.

3.7 Photographs

Representative site photographs and any significant site or relevant features are presented in the Appendices. A standard field book (20x15cm) or a person (175cm tall) was employed for scale to reference the channel's size or features in pictures.

Photos have been reduced in size to present multiple images on one page. Each picture is labelled with a site number and the direction in which the photo was taken.

3.8 Fish Habitat Value

Fish habitat values represent the importance of existing habitat in sustaining a fish population in a specific watershed, as suggested by the Fish-stream Crossing Guidebook (Revised Edition, 2012). The abbreviation "CR" indicates critical habitat value, "IM" – important, "MG" – marginal, and "NA" - not applicable, was added to show that there is no fish habitat in a specific stream.

The applicable values for the assessed stream reaches were presented in the "Stream Assessment Summaries" table in the "Results" section to indicate that additional steps in preserving and protecting fish habitat may be warranted during forest management activities.

3.9 Mapping

The mapping convention for this project generally follows the standards as recommended in the FSID Guidebook. GIS software was used to produce four 1:10,000, one 1:15,000, and one 1:20,000 scale maps from shapefiles obtained from the BC Land and Resource Data Warehouse, GPS unit, the client, or created in the office from imagery interpretation. The maps are included in the Appendices at the end of this report.

Project maps depict current and any pertinent earlier site information, barriers to fish migration, evaluated streams with an indication of their fish status and classification, sections of assessed streams during the present and past visits, TRIM2 stream network, existing fish observation points, road network, and basic topographic features. This information is presented using unique symbols explained in the map's legend.

3.10 Field Equipment

All field equipment used is listed below:

- Trimble R1 GNSS Receiver
- Tablet iPad mini
- 1 Hanna water chemistry multi-meter
- 1 Pentax Optio W80 digital camera
- 1 Smith-Root model 12B POW Backpack Electrofisher
- assorted fish sampling equipment (measuring trough, fish anesthetic, collapsible bucket, fish bait, dip net, safety equipment)
- various other equipment, including meter tape, meter stick, clinometer, and compass
- Two personal First Aid kits, as per WorkSafe BC requirements
- Satellite telephone

4 Results

The following "Stream Assessment Summaries" table summarizes all surveyed reaches.

It provides pertinent physical site-specific data, sampling method and effort, relevant historical information, and comments that provide a rationale to support derived riparian classifications for assessed watercourses.

In the table, the symbol "*" in all columns indicates that no data were collected. In the column "Habitat Value Rating," the abbreviation "NA" means that a riparian classification does not apply to non-fish bearing reaches, "MG" – marginal habitat, and "IM" – important habitat. In the column "Flow Stage," the abbreviation "L" means that the flow was at low levels (< 30% of bankfull), and "INT" means that flow was intermittent. In the column "Turbidity," the abbreviation "C" indicates that water was clear during assessments. In the column "Sampling Method," the "EF" suggests the use of an electrofisher to capture fish, "MT" – the use of minnow traps, and "VO" that the visual observation of fish movement was applied. In the column "Sampling Results," "CT" shows that cutthroat trout was caught, "DV" – indicates the capture of Dolly Varden char, and "NFC" - indicates that no fish were captured during sampling; added asterisk indicates spawning fish while species in parenthesis indicate inferred fish presence.

Site details can be found in the field form in Appendices.

Table 1: Stream Assessment Summary.

Area	Stream ID (Name, TWC or WSC)	Reach #	Site #	Date	Riparian Class	Habitat Value	Channel Slope (%)	Channel Width (m)	Channel Depth (m)	Flow Stage	Water Temperature (°C)	Conductivity (µS/cm)	Turbidity	Sampling Method	Sampling Results	Effort (EF - sec/ dist.(m)); (MT #Hrs); (VO - min/m)	EF Specs (W Hz/ µs)	Comments
BU_CHAP _1	Stream D/ 480- 697200- 42700- 49000	1.1	1	26- Sep- 22	S2	IM	9	6.02	0.53	L	7.3	49	C	EF1/ EF2/ VO	DV DV*	(23/15) (153/85) (120/ 1000)	600/ 70/5	Excellent rearing habitat for DV was observed among boulders and shallow pools. Spawning habitat is poor due to only a few small (0.1-0.25 sq.m) pockets of 1-2cm gravels noted in pool areas. Nevertheless, several redds and spawning DV pairs were observed within the 450m section in these pockets. Overwintering habitat is fair due to good flow and the presence of larges despite the limited distribution of pools >0.5m. Overall DV population upstream of Babine L. Rd crossing (UTM 9. 645618. 6081736) is sparse, caused by the undersized wooden culvert hanging 1.5m above the pool (~20m long 1200mm pipe). 1.5m high waterfall over large boulders and no jump pool at UTM 9. 645222. 6082674 is impassable to all fish and marks the upper fish distribution limit. All watershed upstream of this barrier is non-fish bearing. (See comments below for site 2).
BU_CHAP _1, _3, & _4	Stream D/ 480- 697200- 42700- 49000	1.2	2	27- Sep- 22	S5	NA	15	5.08	0.43	L	7.8	44	C	EF	NFC	519/175	600/ 70/5	No fish habitat above the 1.5m high waterfall barrier - no isolated fish population is present. No fish were captured during the current assessment and in the past by Triton during the 1997 inventory upstream in Reach 2 and the tributary -49000-4014 despite the existence of fair overall perennial habitat.
BU_CHAP _1	Stream A/ 480- 697200- 42700- 49000	2	3	27- Sep- 22	S6	NA	21	2.94	0.37	L	8.7	40	C	EF	NFC	69/100	600/ 80/6	No fish habitat - stream has no useful habitat, pools are shallow, no complex cover was observed in the channel, and no suitable instream cover exists for fish at high flows. Eroded banks indicate volatile flows, and sections of the channel alternate between steep (>20%) and moderate gradients (10-20%). No spawning or overwintering habitat was observed, and the rearing habitat is poor at best during low flows. The stream is inaccessible to fish due to the 28% gradient immediately upstream of Babine Lake Road. No fish were captured during the present evaluation and in the past by Triton during the 1996 inventory just upstream of the site.
BU_CHAP _1	480- 697200- 54100- 3244	1	hist. data	17- Apr- 22	S6	NA	21	1.90	*	*	*	*	*	*	NFC	*	*	No fish habitat - the stream was documented as non-fish bearing by Triton in 1997. Signed off by RPBio.
BU_CHAP _2 & _11	Bristow C./ 480- 697200- 34100	4	hist. data	17- Apr- 22	S6	NA	8	1.62	*	*	*	*	*	*	NFC	*	*	No fish habitat - Triton documented the watershed as non-fish bearing in 1997. No fish were captured in three sites upstream of a 15m high waterfall located at UTM 9. 649715. 6078419. The waterfall marks the upper limit of fish distribution and the transition between fish and non-fish-bearing waters. It was signed off by RPBio.

Table 1: Stream Assessment Summary.

Area	Stream ID (Name, TWC or WSC)	Reach #	Site #	Date	Riparian Class	Habitat Value	Channel Slope (%)	Channel Width (m)	Channel Depth (m)	Flow Stage	Water Temperature (°C)	Conductivity (µS/cm)	Turbidity	Sampling Method	Sampling Results	Effort (EF - sec/ dist.(m)); (MT #Hrs); (VO - min/m)	EF Specs (W Hz µs)	Comments
BU_CHAP _12	Fink C./ 480- 697200- 34100- 26700	4	hist. data	17- Apr- 22	S5	NA	8	3.70	*	*	*	*	*	*	NFC	*	*	No fish habitat - Triton documented the watershed as non-fish bearing in 1997. No fish were captured in two sites upstream of a 2m high cascade at UTM 9. 648556. 6080527. The cascade marks the upper limit of fish distribution and the transition between fish and non-fish-bearing waters. It was signed off by RPBio.
BU_DEEP _9A	460- 517700- 58200	2 & 3	4	28- Sep- 22	S6	NA	9	1.24	0.23	L	6.3	197	C	EF	NFC	206/420	400/ 80/4	No fish habitat - inaccessible small stream from downstream reaches d/t 1800m long and steep gully containing the number of cascades visible on available imagery. The last impassable to fish cascade (1.3m high by 5m long) was marked at UTM 9. 648353. 6044819 at the start of the site. No perennial fish habitat was observed upstream of the site in Reach 2 and Reach 3. No isolated fish population exists in the watershed upstream of the barrier.
BU_DEEP _34 & _40	Burbridge L./ 00624BU LK/ 460- 325400- 62400	8	5	28- Sep- 22	*	NA	*	*	*	*	*	*	C	MT	NFC	5/17	*	No fish habitat. Fish sampling in Burbridge Lake. Lake is shallow - it appears that the depth is approximately 1m. The bottom is covered with ~0.5m organic matter. A distinct smell of H2S was recognized when the substrate was disturbed. The lake bottom also releases suspected CH4; frequent gas bubbles were observed with no scent attached. Suspect O2 deficiency year-round and freezing to the bottom during winter. No suitable habitat for fish exists. The lake is inaccessible to CT from downstream reaches (see comments below for sites 6, 7, and 8).
BU_DEEP _34 & _40	Stream A/ Burbridge C./ 460- 325400- 62400	6	6	28- Sep- 22	*	NA	*	*	*	*	*	*	C	MT	NFC	5/16.8	*	No fish habitat. Fish sampling in a small pond. The pond depth is ~1.5m. The bottom is covered with ~0.5m organic matter, similar to the lake upstream. The distinct smell of H2S was present when the bottom was disturbed. Suspect O2 deficiency during summer and winter. Only seasonal rearing habitat is available for game fish, but the pond is inaccessible to CT from downstream reaches (see comments below for sites 7 and 8).
BU_DEEP _34 & _40	Stream A/ Burbridge C./ 460- 325400- 62400	5.2	7	19- Oct- 22	S6	NA	6	1.18	0.33	L	6.5	330	C	EF	NFC	111/110	300/ 80/4	No fish habitat upstream of several barriers located downstream. No fish were captured during the current assessment and in the past by Triton in the 1997 inventory upstream of the site. No isolated fish population is present due to the lack of perennial habitat in the creek, pond, and lake upstream. Only seasonal rearing habitat is available for game fish, but the stream is inaccessible to CT from downstream reaches (see comments below for site 8).

Table 1: Stream Assessment Summary.

Area	Stream ID (Name, TWC or WSC)	Reach #	Site #	Date	Riparian Class	Habitat Value	Channel Slope (%)	Channel Width (m)	Channel Depth (m)	Flow Stage	Water Temperature (°C)	Conductivity (µS/cm)	Turbidity	Sampling Method	Sampling Results	Effort (EF - sec/ dist.(m)); (MT #Hrs); (VO - min/m)	EF Specs (W Hz/ µs)	Comments
BU_DEEP _34 & _40	Stream A/ Burbridge C./ 460- 325400- 62400	5.1	8	19- Oct- 22	S4/ S6	MG/ NA	14	1.46	0.27	L	6.5	330	C	EF	NFC (CT)	277/530	300/ 80/4	Moderately steep and shallow creek with poor rearing habitat due to a general lack of deep pools and minimal instream cover for high flows. No spawning habitat is present due to angular substrate with ~40-50% fines. The stream is too shallow for overwintering. However, the stream can be used by CT from the lower reach on rare occasions up to the velocity barrier (VB) located at UTM 9. 643109. 6065811 (1.7m high by 9m long; calculated water velocity 1.32 - 1.62m/s is impassable to juvenile fish). Upstream of the barrier stream habitat is fragmented by several small cascades and falls, which further makes the stream inconducive to be populated by adult fish. Fish absence is also indicated by the abundance of scuds, mayflies, and stoneflies. The combination of negative sampling results, habitat constraints, swimming abilities, and habitat preferences of CT indicates that the barrier marks the upper distribution limits for game fish and marks the riparian class transition from S4 to S6. The collapsed old wooden box culvert is located ~220m downstream of VB at UTM 9. 642897. 6065753 is a temporary barrier to fish passage.
BU_DEEP _39	460- 487900- 11100- 77624	1	9	19- Oct- 22	S6	NA	7	1.15	0.26	L INT	7.0	155	C	EF	NFC	62/110	400/ 80/4	No fish habitat. Stream is inaccessible to fish from Lemieux C. due to the cascade barrier at the mouth (0.8m high by 3.5m long) followed by another cascade (0.8m high by 4m long) approximately 30m upstream. Stream has no perennial habitat, and no isolated fish population is present above the barriers. No fish were captured during the current evaluation and in the past by Triton during the 1997 inventory upstream of the site.
BU_DEEP _43	460- 496100- 81500	7 & 8	hist. data	17- Apr- 22	*	NA	*	*	*	*	*	*	*	*	*	*	*	No fish habitat - the watershed was documented as non-fish bearing by FINS in 2016. No fish were captured in three sites upstream of an 18m high by 90m long cascade at UTM 9. 648689. 6056599. The cascade marks the upper limit of fish distribution and the transition between fish and non-fish-bearing waters. It was signed off by RPBio.
BU_DEEP _44	460- 496100- 69000	5	hist. data	17- Apr- 22	*	NA	*	*	*	*	*	*	*	*	*	*	*	No fish habitat - the watershed was documented as non-fish bearing by FINS in 2010. No fish were captured in three sites upstream of a 1.5m high waterfall located at UTM 9. 647159. 6057128. The waterfall marks the upper limit of fish distribution and the transition between fish and non-fish-bearing waters. It was signed off by RPBio.

5 List of Abbreviations

REPORT

C	Clear (turbidity)	MG	Marginal Fish Habitat Value Rating
dist.	Distance	MT	Minnow trap
EF	Electrofishing	NA	Not applicable
FPC	Forest Practices Code	NCD	Not Classified Drainage
FRPA	Forest and Range Practices Act	RIC	Resource Inventory Committee
FSID	Fish-stream Identification Guidebook	S1 - S6	Riparian classes (streams)
GIS	Geographic Information System	sec	seconds
GPS	Global Positioning System	TRIM	Terrain Resource Information Management
Hz	Hertz	TWC	Temporary Watershed Code
ID	Identifier	UTM	Universal Transverse Mercator
IM	Important Fish Habitat Value Rating	V	Volts
LiDAR	Light Detection and Ranging	WBID	Waterbody Identifier
m	meter	WSC	Watershed Code
M	Moderately turbid	°C	Degree Celsius
		µS	micro-Siemens

SITE DATA FORM

SITE REFERENCE	FT - foot, GIS - Geographic Information System, GP2 - GPS unit with differential correction, Lg - length, TWC - Temporary Watershed Code, UTM - Universal Transverse Mercator, V4 - 4x4 vehicle, WSC - Watershed Code, ZEN - Zone, Easting, Northing
CHANNEL	Avg - average, Chan. - channel, Dp - depth, DW - dewatered (water under alluvium), DRY - dry channel, H - high flow (>80% bankfull), INT - intermittent flow, L - low flow (<30% bankfull), m - meter, M - moderate flow (30-80% bankfull), ND - no watercourse exists, NVC - no visible channel, Res. - residual
WATER	C - clear water, Cond - conductivity in micro-Siemens, L - low turbidity, M - moderately turbid, pH - acidity (<7) or alkalinity (>7), T - turbid water, Temp - temperature in °Celsius
COVER	Cover Total: A - abundant, B - boulder cover, CB - cutbanks, D - dominant, DP - deep pools, IV - instream vegetation, LWD - large woody debris, M - moderate, N - none, OV - overstream vegetation, S - sub-dominant, SWD - small woody debris, T - trace Banks: LB - left bank, O - overhanging, RB - right bank, S - sloping, U - undercut, V - v-shaped Bank texture: A - anthropomorphic, B - boulders, C - cobbles, F - fines, G - gravels, R - bedrock Riparian vegetation: C - coniferous, D - deciduous, G - grasses, M - mixed C and D, N - none, S - shrubs, W - wetland Riparian Vegetation Stage: INIT - initial, MF - mature forest, NA - not applicable, PS - pole sapling, SHR - shrub, YF - young forest LWD Function & Distr (Distribution): A/C - abundant and clumped, A/E - abundant and even, F/C - few and clumped, F/E - few and even, N - none IV Type: A - algae, M - mosses, N - none, V - vascular.
MORPHOLOGY	Stream Bed Substrate: B - boulders, C - cobbles, D - largest movable particle, Dom - dominant, D95 - largest 5% of particles, F - fines, G - gravels, NA - not applicable, R - bedrock, Subdom - sub-dominant, Substr - substrate Channel Morphology: CP - cascade-pool, CPb - cascade-pool with boulders, CPcw - cascade-pool with cobbles and functioning LWD, LC - large channel (≥100 particles per channel width), RP - riffle-pool, RPPcw - riffle-pool with cobbles and functioning LWD, RPPgw - riffle-pool with gravels and functioning LWD, SP - step-pool, SPb - step-pool with boulders, SPbw - step-pool with boulders and functioning LWD, SPPr - step-pool through bedrock StrmPatt (Stream pattern): IM - irregular meandering, IR - irregular wandering, ME - regular meandering, SI - sinuous, ST - straight, TM - tortuous meandering Confinment (Confinement): CO - confined, EN - entrenched, FC - frequently confined, NA - not applicable, OC - occasionally confined, UN - unconfined Coupling: CO - coupled, DC - decoupled, PC - partially coupled Islands: AN - anastomosing, F - frequent, I - irregular, N - none, O - occasional, S - split Bars: BR - braided, DIAG - diagonal, MID - mid-stream, N - none, SIDE - intermittent along the channel, SPAN - continuous along the channel Disturbance Indicators (most common): B2 - eroded banks, C1 - extensive riffles, C2 - no pools, C3 - elevated mid-channel bars, C4 - multi-channels, D2 - parallel logs, O1 - beaver dams, S3 - frequent sediment wedges
FEATURES (most common)	BD - beaver dam, C - cascades/chute, CN - canyon, CV - culvert, F - waterfall, FLD - dewatering, FSB - subsurface flow/ dissipation/ dispersion, H - height, L - length, SP - spring, U - undefined obstruction, UC - underground channel (conduit), VB - velocity barrier, X - log jam, XW - sediment wedge
SAMPLING (most common)	BB - burbot, BMC - brassy minnow, BT - bull trout or bottom habitat, CSU - largescale (coarsescale) sucker, CT - cutthroat trout, CO - coho, d - days, DN - dip netting, DV - Dolly Varden, EB - eastern brook trout, EF - electrofishing, freq - frequency, h - hours, Hab - habitat, KO - kokanee, LKC - lake chub, LNC - longnose dace, LSU - longnose sucker, Max L - maximum length, MD - midwater, min - minutes, Min L - minimum length, MT - minnow trap, MW - mountain whitefish, NFC - no fish capture, NFP - no fish present, NS - not sampled, NSC - northern pike minnow, O - other, PCC - peamouth chub, PS - pole seining, R - rearing, RB - rainbow trout, RSC - reddsider shiner, S - spawning, Samp L - sampling length, sec - seconds, SK - sockeye, SP - species unidentified, ST - steelhead, SU - suckers or surface habitat, TR - trout unknown, VO - visual observation, VR - variable, WSU - white sucker

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List of Appendices

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**Appendix I: Block BU_CHAP_1, 3, 4 - Site Data Forms, Photos,
and Map**

SITE DATA

2022 Fish Habitat Assessment in the BCTS Babine Business Area - Smithers Field Unit - Block BU_CHAP_1, _3, & _4

Site: 1

SITE REFERENCE													
Gazetted Name:		WSC: 480-697200-42700-49000				Map: 093L.087		Access: FT		Riparian Class: S2			
Local Name: Stream D		TWC:		Reach: 1.1		Assessed Lg: 1200		Crew: MJ/HR					
UTM Z.E.N: 9 645639 6081676		Method: GP2		Survey Date: 2022-09-26		Time: 9:45		Agency: C016					
CHANNEL													
Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	4.4	7.8	5.5	5.2	8.1	5.1							6.02
Wetted Width (m):	2.1	2.3	4.7	4	6.3	3.6							3.83
Res. Pool Dp (m):	0.44	0.48	0.35	0.27	0.37	0.48							0.4
Bankfull Depth (m):	0.5	0.5	0.6										0.53
Chan. Gradient (%):	8	6	11	10									8.75
Flow Stage: L		Channel Conditions:				Flood Signs: None							
COVER													
CoverTotal:	SWD	LWD	B	CB	DP	OV	IV	Canopy: 21-40%		LWD Function & Distr: F/C		IV Type: M	
A	T	S	D	N	T	T	N						
LB Shape: V		LB Texture: B		LB Riparian Vegetation: C		LB Riparian Vegetation Stage: MF							
RB Shape: V		RB Texture: B		RB Riparian Vegetation: C		RB Riparian Vegetation Stage: MF							
CHANNEL MORPHOLOGY													
Dom Substrate: B		D95 (cm): 70		Morphology: CPb		Strm Patt: SI		Confmnt: CO		Coupling: CO		Islands: O	
Subdom Substr: C		D (cm): 45		Bars: DIAG		Disturbance Indicators: D2D3S3							
FEATURES													
Feature	H (m)	L (m)	Comment									UTM Z.E.N	
CV	1.5	20	1200mm wooden pipe, length estimated. Definite barrier to fish.									9 645618 6081736	
C	1.5	6	6m @26%, DV u/s									9 645448 6082231	
SAMPLING													
Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab			
EF1	23	15	600	70	5								
EF2	153	85	600	70	5								
Species	Stage	Total #	Min L	Max L	Act	Sampling Comments							
DV	J	1	98	98	R	EF1 d/s of CV, EF2 u/s of CV, VO for ~1000m after spawner caught - several spawners observed.							
DV	A	9	152	180	S								
COMMENTS													
Comm 1	Rhab - excellent habitat for DV among boulders and shallow pools.												
Comm 2	Shab - poor - only a few small (0.1-0.25 sq.m) pockets of 1-2cm gravels observed in pool areas utilized by spawning pairs; several redds observed within 400-500m section.												
Comm 3	Ohab - poor - very few suitable pools present; good flow and larges away from plunging water likely sufficient for DV to rest and not being washed out despite pools <0.5m deep.												
Comm 4	Sparse fish population u/s of CV at Babine L. Rd.												
Comm 5	Additional obstructions: 1.2m high by 5m long debris jam (X) @ UTM 9. 645419. 6082292 - temporary barrier; no fish obsrved u/s; 1.5m high waterfall (F) over large boulders, no jump pool @ UTM 9. 645222. 6082674 - impassable to all fish.												
Comm 6													
Comm 7													
Comm 8													

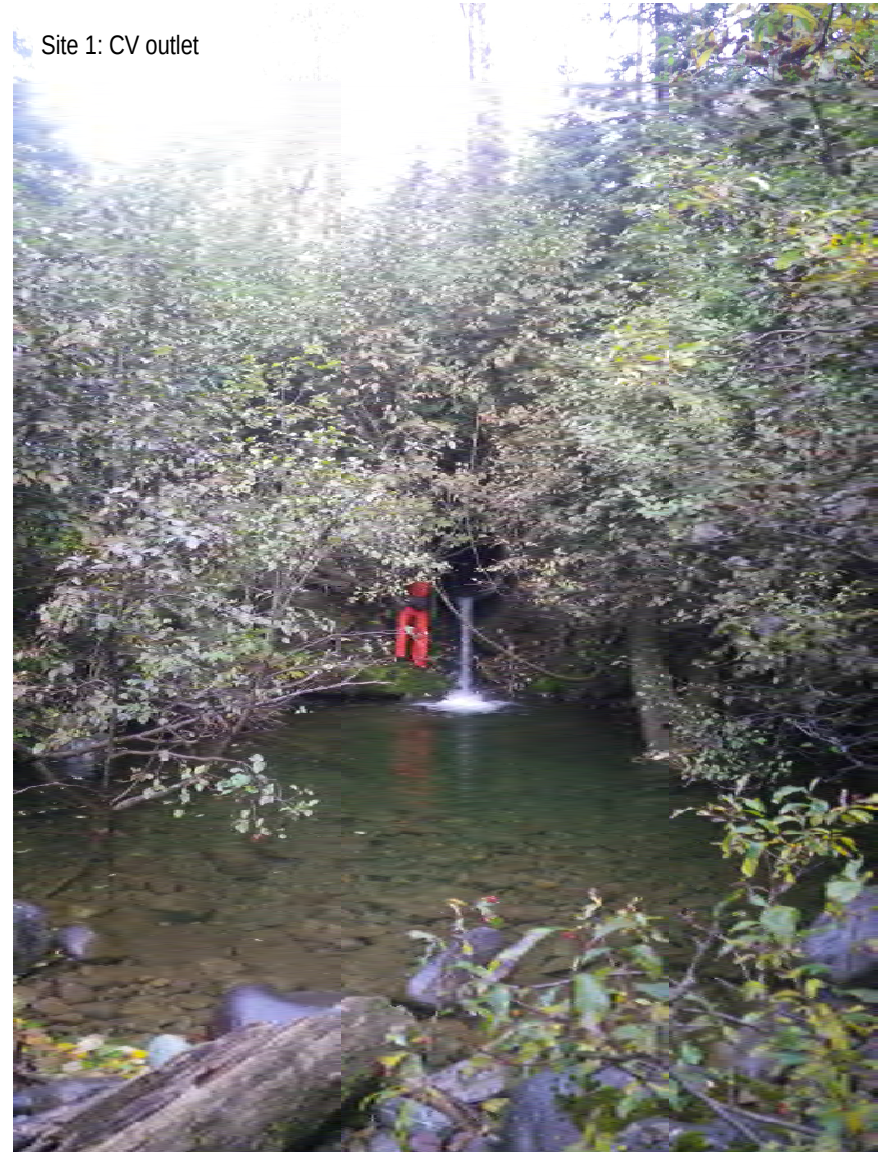
Site 1: view across - Dolly Varden



Site 1: CV inlet



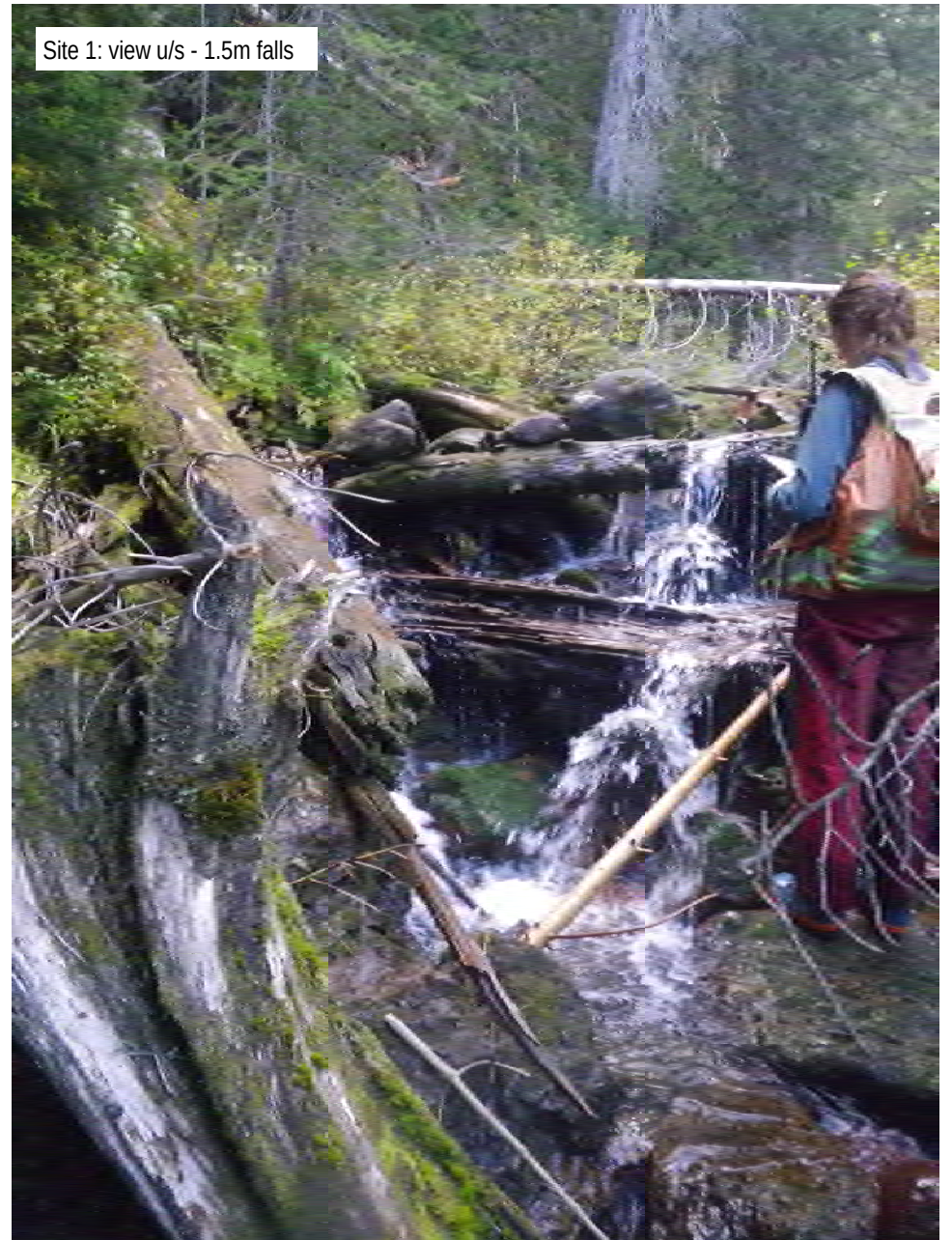
Site 1: CV outlet



Site 1: view u/s



Site 1: view u/s - 1.5m falls



Site 1: view d/s



SITE DATA

2022 Fish Habitat Assessment in the BCTS Babine Business Area - Smithers Field Unit - Block BU_CHAP_1, _3, & _4

Site: 2

SITE REFERENCE														
Gazetted Name:		WSC: 480-697200-42700-52200				Map: 093L.087		Access: FT		Riparian Class: S5				
Local Name: Stream D		TWC:		Reach: 1.2		Assessed Lg: 175		Crew: MJ/NK						
UTM Z.E.N: 9 645222 6082674		Method: GP2		Survey Date: 2022-09-27		Time: 9:30		Agency: C016						
CHANNEL														
Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:	Temp: 7.8 pH: 7.2 Cond: 44 Turbidity: C
Channel Width (m):	4.8	3.9	4.8	5.7	5.9	5.4							5.08	
Wetted Width (m):	2.4	2.9	2.7	1.7	4.5	2.4							2.77	
Res. Pool Dp (m):	0.42	0.28	0.37	0.23	0.36	0.45							0.35	
Bankfull Depth (m):	0.4	0.5	0.4										0.43	
Chan. Gradient (%):	5	17	25	12									14.75	
Flow Stage: L		Channel Conditions:				Flood Signs: None								
COVER														
CoverTotal:	SWD	LWD	B	CB	DP	OV	IV	Canopy: 1-20%		LWD Function & Distr: F/C		IV Type: M		
A	T	S	B	N	T	T	N							
LB Shape: V		LB Texture: B		LB Riparian Vegetation: C		LB Riparian Vegetation Stage: MF								
RB Shape: V		RB Texture: B		RB Riparian Vegetation: C		RB Riparian Vegetation Stage: MF								
CHANNEL MORPHOLOGY														
Dom Substrate: B		D95 (cm): 100		Morphology: CPb		Strm Patt: SI		Confmnt: CO		Coupling: CO		Islands: O		
Subdom Substr: C		D (cm): 35		Bars: DIAG		Disturbance Indicators: D2S3								
FEATURES														
Feature	H (m)	L (m)	Comment									UTM Z.E.N		
SAMPLING														
Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab				
EF	519	175	600	70	5									
Species	Stage	Total #	Min L	Max L	Act	Sampling Comments								
NFC			0											
COMMENTS														
Comm 1	Rhab - excellent habitat for DV, very abundant boulder cover with plenty of small pools.													
Comm 2	Shab - poor overall - gravel patches at channel fringes and pool crests are present but not very common.													
Comm 3	Ohab - fair - although pools are <50cm they would provide sufficient winter cover d/t good flow.													
Comm 4	No fish habitat above 1.5m high waterfall - no isolated fish population present; NFC by Triton in 1997 u/s and in tributary -49000-4014.													
Comm 5														
Comm 6														
Comm 7														
Comm 8														

Site 2: view u/s



Site 2: view d/s



SITE DATA

2022 Fish Habitat Assessment in the BCTS Babine Business Area - Smithers Field Unit - Block BU_CHAP_1

Site: 3

SITE REFERENCE													
Gazetted Name:		WSC: 480-697200-42700-49001				Map: 093L.087		Access: FT		Riparian Class: S6			
Local Name: Stream A		TWC:		Reach: 2		Assessed Lg: 100		Crew: MJ/NK					
UTM Z.E.N: 9 645349 6081494		Method: GP2		Survey Date: 2022-09-27		Time: 14:16		Agency: C016					
CHANNEL													
Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	2.7	3	2.1	3	4	3.6	2.2						2.94
Wetted Width (m):	0.6	1.4	0.5	2.1	1.6	1.8	1.5						1.36
Res. Pool Dp (m):	0.2	0.15	0.21	0.3	0.22	0.18	0.2						0.21
Bankfull Depth (m):	0.4	0.34	0.37										0.37
Chan. Gradient (%):	28	16	11	30									21.25
Flow Stage: L Channel Conditions: Flood Signs: None													
COVER													
CoverTotal:	SWD	LWD	B	CB	DP	OV	IV						
T	S	D	T	N	N	T	N	Canopy: 41-70% LWD Function & Distr: A/E IV Type: N					
LB Shape: V		LB Texture: GC		LB Riparian Vegetation: C		LB Riparian Vegetation Stage: MF							
RB Shape: V		RB Texture: GC		RB Riparian Vegetation: C		RB Riparian Vegetation Stage: MF							
CHANNEL MORPHOLOGY													
Dom Substrate: C		D95 (cm): 50		Morphology: CP		Strm Patt: SI		Confmnt: CO		Coupling: CO		Islands: N	
Subdom Substr: G		D (cm): 25		Bars: N		Disturbance Indicators: B2C1							
FEATURES													
Feature	H (m)	L (m)	Comment									UTM Z.E.N	
SAMPLING													
Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab			
EF	69	100	600	80	6								
Species	Stage	Total #	Min L	Max L	Act	Sampling Comments							
NFC			0										
COMMENTS													
Comm 1	No fish habitat - stream with no useful habitat, pools shallow, no complexity in the channel, no suitable instream cover for fish at high flows.												
Comm 2	Eroded banks indicate volatile flows, section of channel alternate between steep and moderate gradients.												
Comm 3	No Shab & Ohab; Rhab - poor at best during low flows.												
Comm 4	Stream is inaccessible to fish d/t 28% gradient just u/s of Babine Lake Road at the start of the site.												
Comm 5	NFC by Triton in 1996 just u/s of the site.												
Comm 6													
Comm 7													
Comm 8													

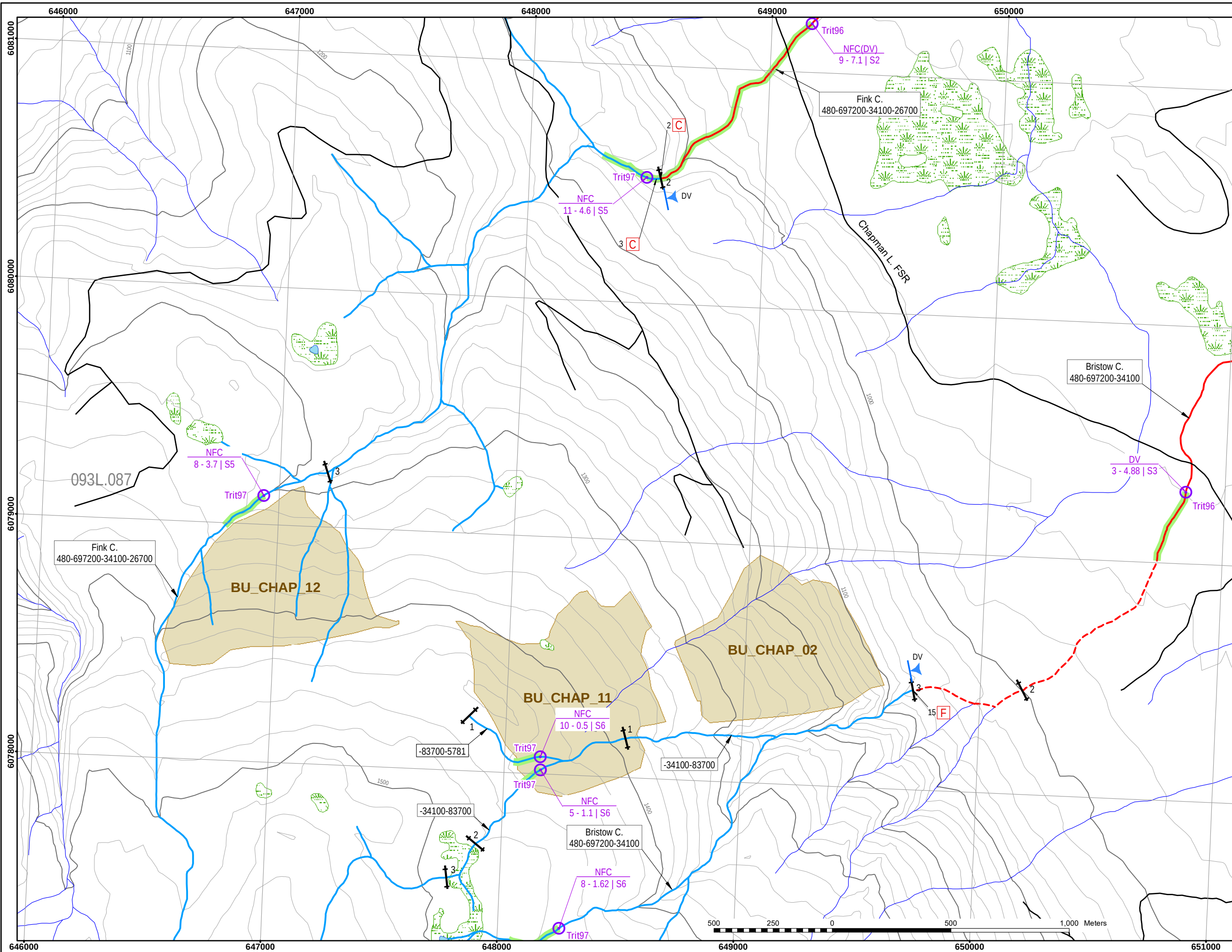
Site 3: view u/s



Site 3: view d/s



Appendix II: Block BU_CHAP_2, 11, 12 - Map



2022 Fish Habitat Assessment in the BCTS Babine Business Area

Smithers Field Unit
Blocks BU_CHAP_2, 11, & 12

Scale 1:15,000

Projection: BC Albers
Datum: NAD 83
Coordinates: UTM Zone 9
d Survey: No Field Assessment



Inventory and Mapping by:

- S1--S4— Game Fish Present or Accessible (Field Confirmed)
—S5—S6— Non-Game Fish Present or Accessible (Field Confirmed)
—S5—S6— No Fish Present
— NCD
— FSZ
— Current Assessment
— Observed Spawning Habitat
— Past Assessment
- - - No Watercourse
- - - Assumed Game Fish Presence
- - - Assumed Non-Game Fish Presence
— Flows to Confirmed NFB Stream
— Other Watercourses

- | | |
|---|---|
|  | Crossing Enhancement |
|  2 | Site with ID |
|  RLL01 | Past Assessment Site with
Company and Year Reference |

Fish Info (Inferred)
† Spawning Fish

NFC(RB) (EF:123"/456m)

1 - 2.3 | S3

Slope (%)

Channel width (m)

Urban Class

Forest Class

Stream Assessment Information
(Historical info in purple)

- | | | | |
|--|--------------------------|--|----------------------------------|
| | Beaver Dam | | Ground Flow |
| | Cascade Canyon | | Spring |
| | Culvert | | Minnow Trap Location |
| | Dewatering | | Unmapped Tributary |
| | Waterfall | | Stream Diversion |
| | Undefined Barrier | | Stream Reach with ID |
| | Underground Channel | | Class Transition within Reach |
| | Velocity Barrier | | Game Fish Record (DBC) |
| | Debris Jam | | Non-Game Fish Record (DBC) |
| | Sediment Wedge | | Game Fish Distribution Limit |
| | Fisheries Sensitive Zone | | Non-Game Fish Distribution Limit |
| | Dissipation | | Game Fish Field Observation |
| | | | Non-Game Fish Field Observation |

Height 2 30 Length Feature Parameters

Stream Name
123-456000-7890

Legend:

- Existing Roads
- Proposed Roads
- 1:20K Map Tile
- 1:20K Map Tile Label
- 20 m Contours and 100 m Labels
- Proposed Block with ID
- Lakes/Rivers with ID
- Wetlands

Abbreviations:

AGRA	AGRA Earth & Environmental Ltd.	KO	Kokanee
AIM	AIM Aological Consultants Ltd.	LKC	Lake chub
BB	Burbot	LNC	Longnose dace
BCCF	BC Conservation Foundation	LSU	Longnose sucker
BCE	BC Environment	LT	Lake trout
BRC	Biofor Resource Consulting Ltd.	LW	Lake whitefish
BRU	Bridgelo sucker	m	meter(s)
BT	Bull trout	ML	Marlim Ecological Consulting LTD.
BTC	BioTerra Consulting Ltd.	MT	Minnow Trap
Carm	Carmanah Research Ltd.	MW	Mountain whitefish
CasE	Cascade Biological Services Ltd.	NA	Not applicable
CA	Crinkly sculpin	NB	No Drains
CS	Culps (general)	NFB	Non-fish bearing
CCG	Slimy sculpin	NFC	No fish captured
CCT	Coastal cutthroat trout	NS	Not sampled
CH	Chinook salmon	NSC	Northern pine minnow
CHS	Choho salmon	PB	Philip Burns
CSG	Crispin S. Guppy	RB	Rainbow trout
CSU	Coarsescale sucker	RL	R&L Environmental Services Ltd.
DEC	Data BC	RSC	Redside shiner
DEC	Davis Environmental Consulting Ltd.	SK	Sockeye salmon
DN	Dip Net	SKR	SKR Consultants Ltd.
DV	Dolly Varden char	SU	Suckers (general)
DWB	DWB Consulting Services Ltd.	TR	Trout (general)
EC	Ecological Catalogue	Trit	Triton Environmental Consultants Ltd.
ECl	ECI Erosion Control Inc.	TWC	Temporary Watershed Code
Enol	Enbrium Consulting Inc.	UNBC	University of Northern BC
ED	Environmental Dynamics Inc	UW	Underwater Photo
EFI	Electrofishing	VO	Visual Observation
FINS	FINS Consulting Ltd.	WRC	Westroad Resource Consultants Ltd.
h	hour(s)	WSC	Watershed Code
HW	Habitat Wizard		minutes
HCF	I.C. Ramsay and Associates	*	seconds
IRC	Integrated Resource Consultants Inc.	*	No data

**Appendix III: Block BU_DEEP_9A - Site Data Form, Photos, and
Map**

SITE DATA

2022 Fish Habitat Assessment in the BCTS Babine Business Area -
Smithers Field Unit - Block BU_DEEP_9A

Site: 4

SITE REFERENCE

Gazetted Name: WSC: 460-517700-58200 Map: 093L.057 Access: FT
Local Name: TWC: Reach: 2 Assessed Lg: 420 Crew: MJ/MK
UTM Z.E.N: 9 648353 6044819 Method: GP2 Survey Date: 2022-09-28 Time: 9:50 Agency: C016

Riparian
Class:

S6

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	1.4	1.2	1.2	0.9	0.8	1.6	1.6						1.24
Wetted Width (m):	1	0.8	0.9	0.8	0.7	1.5	1.2						0.99
Res. Pool Dp (m):	0.2	0.2	0.1	0.1	0.15	0.2	0.2						0.16
Bankfull Depth (m):	0.25	0.2	0.25										0.23
Chan. Gradient (%):	4	12	8	10									8.5

WATER

Temp: 6.3
pH: 7
Cond: 197
Turbidity: C

Flow Stage: L Channel Conditions: Flood Signs: None

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV
M	T	T	T	D	N	S	N

Canopy: 41-70% LWD Function & Distr: F/E IV Type: M

LB Shape: U LB Texture: FC LB Riparian Vegetation: C LB Riparian Vegetation Stage: MF
RB Shape: U RB Texture: FC RB Riparian Vegetation: C RB Riparian Vegetation Stage: MF

CHANNEL MORPHOLOGY

Dom Substrate: F D95 (cm): 25 Morphology: CP Strm Patt: SI Confmnt: CO Coupling: CO Islands: N
Subdom Substr: G D (cm): 8 Bars: N Disturbance Indicators: C1S3

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N
C	1.3	5	5m@27% - last cascade above steep gully - impassable to fish.	9 648353 6044819

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
EF	206	420	400	80	4					

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments
NFC			0			Sampling in both reaches.

COMMENTS

Comm 1	No fish habitat - small stream with no perennial habitat for fish and inaccessible from downstream reaches d/t 1800m long and steep gully w number of cascades.
Comm 2	No Shab or Ohab, Rhab is usable.
Comm 3	R3 is a flat wetland with a couple of old and partially breached beaver dams; stream is shallow with fines in the channel bed - no Ohab or Shab.
Comm 4	
Comm 5	
Comm 6	
Comm 7	
Comm 8	

Site 4: view u/s



Site 4: view u/s - 1.3m high cascade



Site 4: view d/s



**Appendix IV: Block BU_DEEP_34, 40 - Site Data Forms, Photos,
and Map**

SITE DATA

2022 Fish Habitat Assessment in the BCTS Babine Business Area - Smithers Field Unit - Block BU_DEEP_34 & _40

Site: 5

SITE REFERENCE														
Gazetted Name:		WSC: 460-325400-62400				Map: 093L.077		Access: FT		Riparian Class: *				
Local Name: Burbridge L. 00624BULK		TWC:		Reach: 8		Assessed Lg: 150		Crew: MJ/MK						
UTM Z.E.N: 9 644551 6065883		Method: GP2		Survey Date: 2022-09-28		Time: 15:00		Agency: C016						
CHANNEL														
Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:	
Channel Width (m):														
Wetted Width (m):														
Res. Pool Dp (m):														
Bankfull Depth (m):														
Chan. Gradient (%):														
Flow Stage:		Channel Conditions:			Flood Signs:									
COVER														
CoverTotal:	SWD	LWD	B	CB	DP	OV	IV	Canopy:		LWD Function & Distr:			IV Type:	
LB Shape:		LB Texture:		LB Riparian Vegetation:				LB Riparian Vegetation Stage:						
RB Shape:		RB Texture:		RB Riparian Vegetation:				RB Riparian Vegetation Stage:						
CHANNEL MORPHOLOGY														
Dom Substrate:		D95 (cm):		Morphology:		Strm Patt:		Confmnt:		Coupling:		Islands:		
Subdom Substr:		D (cm):		Bars:		Disturbance Indicators:								
FEATURES														
Feature	H (m)	L (m)	Comment									UTM Z.E.N		
SAMPLING														
Method	EF sec	Samp L (m)		EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab			
MT							5		17h	0.2 - 0.6	B			
Species	Stage	Total #	Min L	Max L	Act	Sampling Comments								
NFC			0			MT1 - 0.2m @ UTM 9. 644478. 6065883; MT2 - 0.2m @ UTM 9. 644491. 6065904; MT3 - 0.3m @ UTM 9. 644536. 6065953; MT4 - 0.2m @ UTM 9. 644549. 6065955; MT5 - 0.6m @ UTM 9. 644572. 6065949.								
COMMENTS														
Comm 1	Fish sampling in Burbridge Lake.													
Comm 2	Lake is shallow - it appears that depth is ~1m.													
Comm 3	Bottom covered with ~ 0.5m detritus/organic matter - distinct smell of H2S when disturbed, bottom also releases suspected CH4 - frequent bubbles of gas observed with no smell attached.													
Comm 4	Suspect O2 deficiency year round.													
Comm 5	No suitable habitat for fish year round.													
Comm 6														
Comm 7														
Comm 8														

Site 5: view across - Burbridge Lake



SITE DATA

2022 Fish Habitat Assessment in the BCTS Babine Business Area - Smithers Field Unit - Block BU_DEEP_34 & _40

Site: 6

SITE REFERENCE														
Gazetted Name: Burbridge C.				WSC: 460-325400-62400				Map: 093L.077				Access: FT		Riparian Class: *
Local Name: Stream A				TWC:		Reach: 6		Assessed Lg: 80		Crew: MJ/MK				
UTM Z.E.N: 9 643776 6066126				Method: GP2		Survey Date: 2022-09-28		Time: 15:55		Agency: C016				
CHANNEL														
Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:	Temp: pH: Cond: Turbidity:
Channel Width (m):														
Wetted Width (m):														
Res. Pool Dp (m):														
Bankfull Depth (m):														
Chan. Gradient (%):														
Flow Stage:		Channel Conditions:				Flood Signs:								
COVER														
CoverTotal:	SWD	LWD	B	CB	DP	OV	IV	Canopy:		LWD Function & Distr:			IV Type:	
LB Shape:	LB Texture:		LB Riparian Vegetation:				LB Riparian Vegetation Stage:							
RB Shape:	RB Texture:		RB Riparian Vegetation:				RB Riparian Vegetation Stage:							
CHANNEL MORPHOLOGY														
Dom Substrate:		D95 (cm):		Morphology:		Strm Patt:		Confmnt:		Coupling:		Islands:		
Subdom Substr:		D (cm):		Bars:		Disturbance Indicators:								
FEATURES														
Feature	H (m)	L (m)	Comment										UTM Z.E.N	
SAMPLING														
Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab				
MT						5		16h51'	0.6 - 0.9	B				
Species	Stage	Total #	Min L	Max L	Act	Sampling Comments								
NFC			0			MT1 - 0.9m @ UTM 9. 643775. 6066140; MT2 - 0.6m @ UTM 9. 643779. 6066135; MT3 - 0.7m @ UTM 9. 643782. 6066131; MT4 - 0.7m @ UTM 9. 643791. 6066121; MT5 - 0.8m @ UTM 9. 643800. 6066114.								
COMMENTS														
Comm 1	Fish sampling in a small pond.													
Comm 2	Pond depth is ~1.5m.													
Comm 3	Bottom covered with ~ 0.5m detritus/organic matter - distinct smell of H2S when disturbed.													
Comm 4	Suspect O2 deficiency during summer and winter.													
Comm 5	Only seasonal Rhab available for game fish.													
Comm 6														
Comm 7														
Comm 8														

Site 6: view across - Pond in Reach 6



SITE DATA

2022 Fish Habitat Assessment in the BCTS Babine Business Area - Smithers Field Unit - Block BU_DEEP_34 & _40

Site: 7

SITE REFERENCE														
Gazetted Name: Burbridge C.				WSC: 460-325400-62400				Map: 093L.077				Access: FT		Riparian Class: S6
Local Name: Stream A				TWC:		Reach: 5.2		Assessed Lg: 200		Crew: MJ/HR				
UTM Z.E.N: 9 643557 6066027				Method: GP2		Survey Date: 2022-10-19		Time: 9:00		Agency: C016				
CHANNEL														
Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:	Temp: 6.5 pH: 7.6 Cond: 330 Turbidity: C
Channel Width (m):	0.7	1.7	1.2	1.2	1	1.3							1.18	
Wetted Width (m):	0.7	1	1	0.6	0.5	1.3							0.85	
Res. Pool Dp (m):	0.23	0.23	0.12	0.25	0.2	0.16							0.2	
Bankfull Depth (m):	0.4	0.3	0.3										0.33	
Chan. Gradient (%):	6	6	7	5									6	
Flow Stage: L				Channel Conditions:				Flood Signs: None						
COVER														
CoverTotal:	SWD	LWD	B	CB	DP	OV	IV	Canopy: 41-70%				LWD Function & Distr: F/E		IV Type: A
A	S	T	T	D	N	T	N							
LB Shape: U		LB Texture: F		LB Riparian Vegetation: C				LB Riparian Vegetation Stage: MF						
RB Shape: U		RB Texture: F		RB Riparian Vegetation: C				RB Riparian Vegetation Stage: MF						
CHANNEL MORPHOLOGY														
Dom Substrate: F		D95 (cm): 25		Morphology: CP		Strm Patt: IR		Confmnt: OC		Coupling: DC		Islands: O		
Subdom Substr: C		D (cm): 10		Bars: N		Disturbance Indicators: C4								
FEATURES														
Feature	H (m)	L (m)	Comment										UTM Z.E.N	
F	1		Over bedrock with decent jump pool - potentially passable to fish at high flows.										9 643551 6066025	
F	1.8		Over bedrock, no jump pool - impassable to fish.										9 643557 6066027	
SAMPLING														
Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab				
EF	111	110	300	80	4									
Species	Stage	Total #	Min L	Max L	Act	Sampling Comments								
NFC			0											
COMMENTS														
Comm 1	No fish habitat above 1.8m high waterfall; no isolated fish population present.													
Comm 2	No Ohab - no deep pools in the creek, pond and lake u/s are too shallow.													
Comm 3	No Shab - only very few gravel pockets mixed with 50-60% of organic fines.													
Comm 4	Rhab - limited to summer, overall good cover but water becomes stagnant and filmy d/t carbohydrates presence and also developing orange algae by the end of summer - seasonal O2 depletion.													
Comm 5	NFC by Triton in 1997.													
Comm 6														
Comm 7														
Comm 8														

Site 7: view u/s



Site 7: view d/s



Site 7: 1.0m waterfall



Site 7: 1.8m waterfall



SITE DATA

2022 Fish Habitat Assessment in the BCTS Babine Business Area - Smithers Field Unit - Block BU_DEEP_34 & _40

Site: 8

SITE REFERENCE														
Gazetted Name: Burbridge C.				WSC: 460-325400-62400				Map: 093L.077				Access: FT		Riparian Class: S4/S6
Local Name: Stream A				TWC:		Reach: 5.1		Assessed Lg: 930		Crew: MJ/HR				
UTM Z.E.N: 9 642762 6065676				Method: GP2		Survey Date: 2022-10-19		Time: 9:50		Agency: C016				
CHANNEL														
Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:	Temp: 6.5 pH: 7.6 Cond: 330 Turbidity: C
Channel Width (m):	1.77	1.6	1.54	1.61	1.05	1.2							1.46	
Wetted Width (m):	1.41	1.6	1.24	1.27	0.68	0.66							1.14	
Res. Pool Dp (m):	0.15	0.33	0.41										0.3	
Bankfull Depth (m):	0.2	0.2	0.4										0.27	
Chan. Gradient (%):	14	19	17	7									14.25	
Flow Stage: L				Channel Conditions:				Flood Signs: None						
COVER														
CoverTotal:	SWD	LWD	B	CB	DP	OV	IV	Canopy: 41-70%				LWD Function & Distr: F/E		IV Type: M
T	S	D	S	N	T	T	N							
LB Shape: U				LB Texture: CB		LB Riparian Vegetation: C				LB Riparian Vegetation Stage: MF				
RB Shape: U				RB Texture: CB		RB Riparian Vegetation: C				RB Riparian Vegetation Stage: MF				
CHANNEL MORPHOLOGY														
Dom Substrate: G		D95 (cm): 35		Morphology: CP		Strm Patt: SI		Confmnt: FC		Coupling: PC		Islands: O		
Subdom Substr: C		D (cm): 20		Bars: SIDE		Disturbance Indicators:								
FEATURES														
Feature	H (m)	L (m)	Comment										UTM Z.E.N	
VB	1.7	9	9m@19%, 1.62m/s@HF, 1.32m/s@MF - barrier to juvenile fish										9 643109 6065811	
BR		8	Collapsed WBC, sediments buildup @ inlet.										9 642897 6065753	
SAMPLING														
Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab				
EF	277	530	300	80	4									
Species	Stage	Total #	Min L	Max L	Act	Sampling Comments								
NFC			0											
COMMENTS														
Comm 1	Rhab - poor - moderately steep creek; very little instream cover for high flows, deep pools sparse - only two observed.													
Comm 2	Shab - none - angular substrate with ~40-50% fines.													
Comm 3	Ohab - none - too shallow.													
Comm 4	Potentially used by CT from the lower reach on rare occasions.													
Comm 5	Fish absence indicated by the abundance of scuds, mayflies and stoneflies - but fish use can't be precluded below the velocity barrier, low gradient d/s.													
Comm 6	There is no conducive habitat for adult CT u/s of the velocity barrier, which is impassable to the juvenile fish; marks the transition S4/S6.													
Comm 7	Habitat is fragmented by several small cascades and falls between velocity barrier and 1.8m falls.													
Comm 8	Additional obstructions: 0.5m high by 0.8m cascade @ UTM 9. 643253. 6065857 ; 0.5m high waterfall (F) over boulders, no jump pool, UTM 9. 643257. 6065857.													

Site 8: view u/s - 0.5x0.8m cascade



Site 8: view u/s - 1.7x9m velocity barrier



Site 8: view u/s



Site 8: view u/s



Site 8: view u/s - sediments buildup at collapsed wooden box culvert



2022 Fish Habitat Assessment
in the BCTS Babine Business Area

Smithers Field Unit
Block BU_DEEP_34 & 40

Scale 1:10,000



Projection: BC Albers
Datum: NAD 83
Coordinates: UTM Zone 9
Field Survey: Sep 28 - 29, Oct 19, 2022



Inventory and Mapping by:

- S1--S4 Game Fish Present or Accessible (Field Confirmed)
- S5--S6 Non-Game Fish Present or Accessible (Field Confirmed)
- S5--S6 No Fish Present
- NCD NCD
- FSZ FSZ
- Current Assessment
- Observed Spawning Habitat
- Past Assessment
- No Watercourse
- Assumed Game Fish Presence
- Assumed Non-Game Fish Presence
- Flows to Confirmed NFB Stream
- Other Watercourses

- X Crossing Enhancement
- 2 Site with ID
- ORLL01 Past Assessment Site with Company and Year Reference

Fish Info (Inferred)
*- Spawning Fish

NFC(RB) (EF:123"/456m)
1 - 2.3 | S3

Stream Assessment Information
(Historical info in purple)

- Slope (%)
- Channel Width (m)
- Rebar Class (Inferred)
- Beaver Dam
- Cascade
- Canyon
- Culvert
- Dewatering
- Waterfall
- Undefined Barrier
- Underground Channel
- Velocity Barrier
- Debris Jam
- Sediment Wedge
- Fisheries Sensitive Zone
- Dissipation
- Wooden Box/Bridge
- Ground Flow
- Spring
- Minnow Trap Location
- Unmapped Tributary
- Stream Diversion
- Stream Reach with ID
- Class Transition within Reach
- Game Fish Record (DBC)
- Non-Game Fish Record (DBC)
- Game Fish Distribution Limit
- Non-Game Fish Distribution Limit
- Game Fish Field Observation
- Non-Game Fish Field Observation

- Height (m)
- Length (m)
- Stream Name
- 123-456000-78900
- Existing Roads
- Proposed Roads
- 1:20K Map Tile
- 1:20K Map Tile Label
- 20 m Contours and 100 m Labels
- Proposed Block with ID
- Lakes/Rivers with ID
- Wetlands
- Feature Parameters
- Stream ID (Name and/or WSC and/or TWC)
- Existing Roads
- Proposed Roads
- 1:20K Map Tile
- 1:20K Map Tile Label
- 20 m Contours and 100 m Labels
- Proposed Block with ID
- Lakes/Rivers with ID
- Wetlands

Abbreviations:

AGRA	AGRA Earth & Environmental Ltd.	KO	Kokanee
AIM	AIM Ecological Consultants Ltd.	LKC	Lake chub
BB	Burbot	LNC	Longnose dace
BCCF	BC Conservation Foundation	LSU	Longnose sucker
BCE	BC Environment	LT	Lake trout
BRC	Biofor Resource Consulting Ltd.	LW	Lake whitefish
BSU	Bridgellip sucker	m	meter(s)
BT	Bull trout	ML	Marlim Ecological Consulting LTD.
BTC	BioTerra Consulting Ltd.	MT	Minnow Trap
Carm	Carmanah Research Ltd.	MW	Mountain whitefish
Casc	Cascadia Biological Services Ltd.	N/A	Not applicable
CAS	Prickly sculpin	ND	No Drainage
CC	Sculpins (general)	NFB	Non-fish bearing
CCG	Slimy sculpin	NFC	No fish captured
CCT	Coastal cutthroat trout	NS	Not sampled
CH	Chinook salmon	NSC	Northern pike minnow
CO	Coho salmon	NSR	Northern pike minnow
CSG	Crispin S. Guppy	PB	Philip Burns
CSU	Coarsescale sucker	RB	Rainbow trout
DBC	Data BC	RLL	RL&L Environmental Services Ltd.
DEC	Davis Environmental Consulting Ltd.	RSC	Redside shiner
DN	Dip Net	SK	Sockeye salmon
DV	Dolly Varden char	SKR	SKR Consultants Ltd.
DWB	DWB Consulting Services Ltd.	SU	Suckers (general)
EC	Ecological Catalogue	TR	Trout (general)
ECI	ECI Erosion Control Inc.	Trit	Triton Environmental Consultants Ltd.
Ecol	Ecobrium Consulting Inc.	TWC	Temporary Watershed Code
EDI	Environmental Dynamics Inc.	UNBC	University of Northern BC
EF	Electrofishing	UW	Undewater Photo
FINS	FINS Consulting Ltd.	VO	Visual Observation
h	hour(s)	WRC	Westroad Resource Consultants Ltd.
HW	Habitat Wizard	WSC	Watershed Code
ICR	I.C. Ramsay and Associates	*	minutes
IRC	Integrated Resource Consultants Inc.	*	seconds
		*	No data

**Appendix V: Block BU_DEEP_39 - Site Data Form, Photos, and
Map**

SITE DATA

2022 Fish Habitat Assessment in the BCTS Babine Business Area -
Smithers Field Unit - Block BU_DEEP_39

Site: 9

SITE REFERENCE

Gazetted Name: WSC: 460-487900-11100-77624 Map: 093L.067 Access: FT
Local Name: Stream D TWC: Reach: 1 Assessed Lg: 105 Crew: MJ/HR
UTM Z.E.N: 9 643516 6061383 Method: GP2 Survey Date: 2022-10-19 Time: 14:25 Agency: C016

**Riparian
Class:**

S6

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	1.18	1.24	0.93	0.91	1.39	1.27							1.15
Wetted Width (m):	1.18	0.26	0	0	0.41	0.22							0.35
Res. Pool Dp (m):	0.28	0.19	0.19										0.22
Bankfull Depth (m):	0.24	0.3	0.24										0.26
Chan. Gradient (%):	9	4	8										7

WATER

Temp: 7
pH: 7.4
Cond: 155
Turbidity: C

Flow Stage: L Channel Conditions: INT Flood Signs: None

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV
A	T	T	T	S	T	D	T

Canopy: 21-40% LWD Function & Distr: F/E IV Type: AM

LB Shape: U LB Texture: C LB Riparian Vegetation: M LB Riparian Vegetation Stage: MF
RB Shape: U RB Texture: C RB Riparian Vegetation: M RB Riparian Vegetation Stage: MF

CHANNEL MORPHOLOGY

Dom Substrate: C D95 (cm): 20 Morphology: CP Strm Patt: SI Confmnt: CO Coupling: CO Islands: N
Subdom Substr: F D (cm): 0.1 Bars: N Disturbance Indicators: C1S3

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N
C	0.8	3.5	Combination of 24% slope & underground flow over cobbles/boulders - impassable.	9 643516 6061383
C	0.8	4	4m@21%	9 643546 6061374

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
EF	62	110	400	80	4					

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments
NFC			0			

COMMENTS

Comm 1	No fish habitat - stream with poor habitat at low flows d/t orange algae in channel - O2 deficit.
Comm 2	No Shab or Ohab observed.
Comm 3	Stream is inaccessible from Lemieux C. d/t cascade at mouth followed by another ~30m u/s; no isolated fish popultion present above.
Comm 4	NFC by Triton in 1997 u/s.
Comm 5	
Comm 6	
Comm 7	
Comm 8	

Site 9: view u/s - 0.8x3.5m cascade at mouth



Site 9: view u/s - 0.8x4m cascade 30m u/s



Site 9: view u/s



Site 9: view d/s



Appendix VI: Block BU_DEEP_43, 44 - Map

