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EXCEL ENERGY INC. BIRCH OIL SALES PIPELINE PRE-IMPACT FISHERIES HABITAT ASSESSMENT

Prepared by:

DIVERSIFIED ENVIRONMENTAL SERVICES

OCTOBER 1993

Prepared for:

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EXCEL ENERGY INC. Suite 1400 340-12th Avenue S.W. Calgary, Alberta T2R 1L5

Prepared by:

DIVERSIFIED ENVIRONMENTAL SERVICES Box 6263 Fort St. John, B.C. V1J 4H7

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1.0 INTRODUCTION

Excel Energy Inc. plans to construct an oil pipeline in the area of the Birch oil field in northeastern British Columbia. The project involves the construction of approximately 36 kilometres of pipeline for the purpose of transporting crude oil from Excel's Birch Central oil battery, located near Aitken Creek, to the existing oil gathering system near the Alaska Highway (Figure 1).

This pre-impact fisheries habitat assessment was conducted on October 13 and 14, 1993 to identify and evaluate fish habitat along the proposed ROW's associated with this project.

2.0 GENERAL SITE DESCRIPTION

The project is situated within the Blueberry River watershed which is located in the Peace Lowlands ecoregion. Within this ecoregion, the entire proposed ROW lies within the Boreal White and Black Spruce (BWBS) biogeoclimatic zone.

A total of ten drainage courses are encountered along the proposed ROW. Three of these, Blueberry River, Inglis Creek and Aitken Creek, were confirmed to possess fisheries values and a forth, an unnamed tributary of Aitken Creek contains limited, marginal habitat.

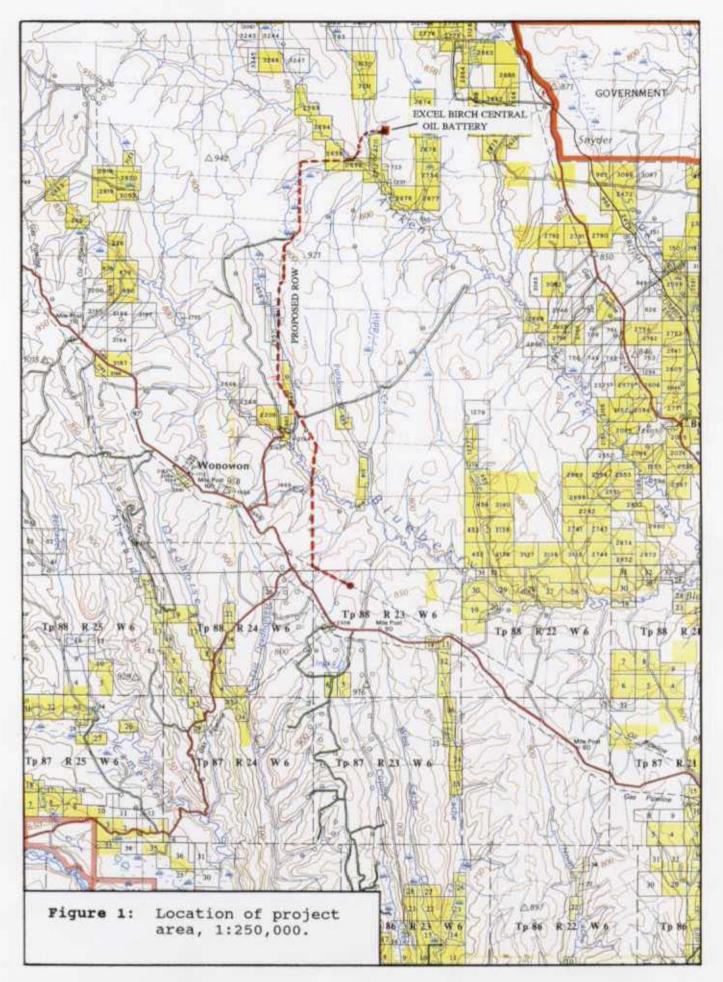
The remainder are small, possibly intermittent, feeder streams which were considered to have no fisheries values.

The proposed crossing of the Blueberry River is situated near the south end of the project and is located along an existing Mobil pipeline ROW (Figure 2).

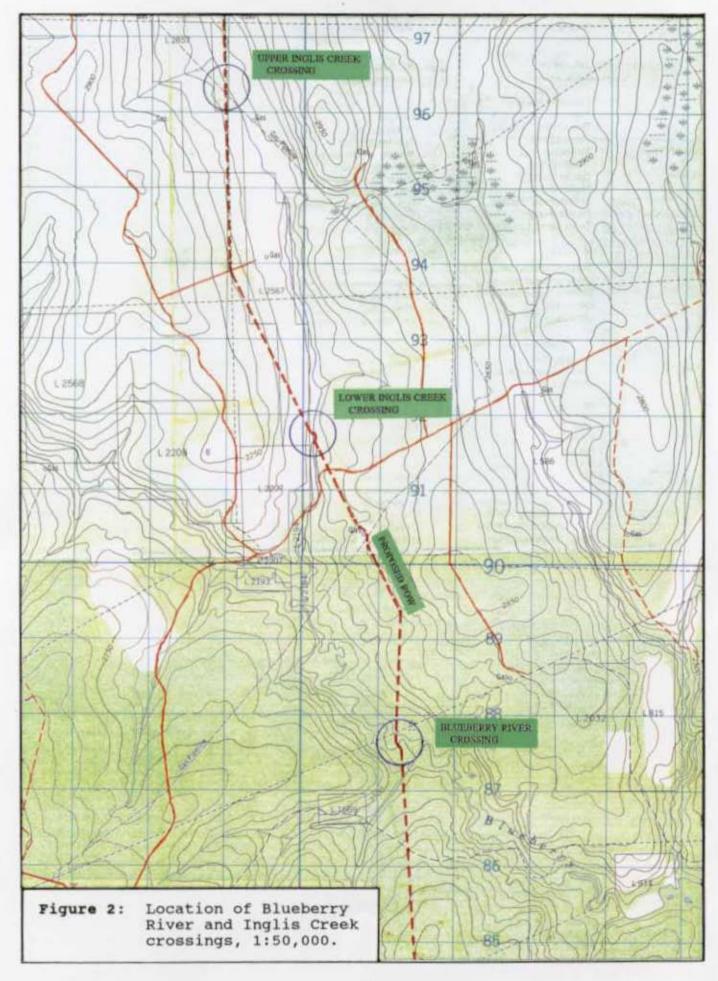
Moving north, the proposed ROW crosses Inglis Creek twice. The first Inglis crossing occurs along an existing pipeline ROW and the second, approximately 5 kilometres upstream, is on a new alignment.

Further north, the Aitken Creek crossing is located immediately adjacent to a newly installed road access and bridge (Figure 3).

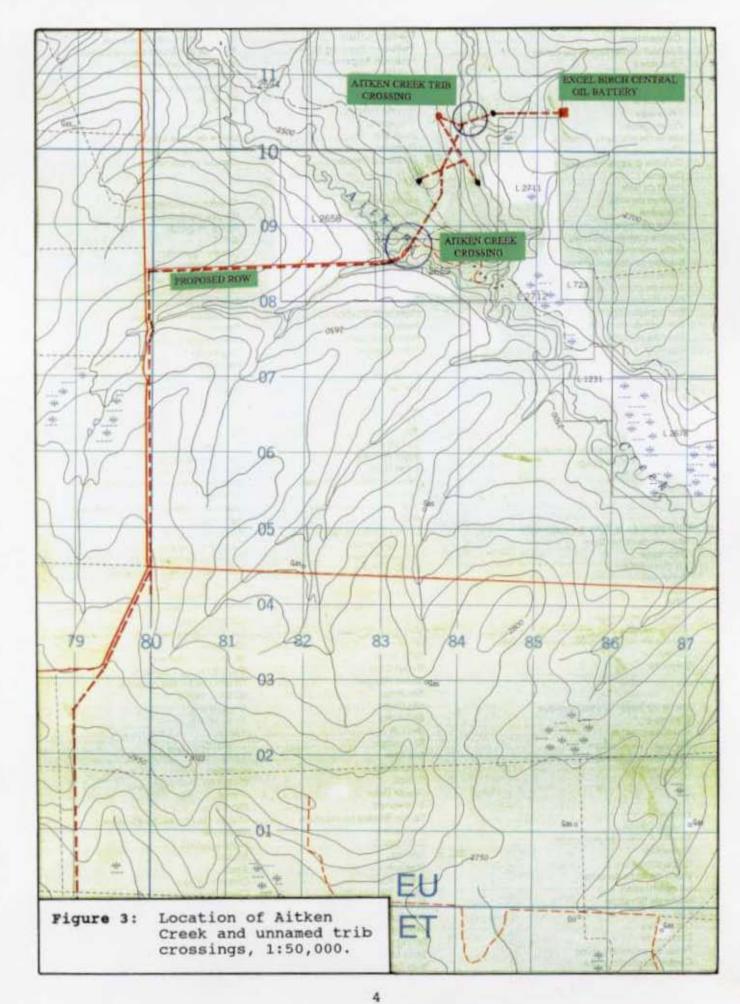
The unnamed tributary of Aitken Creek is crossed at the northern extremity of the proposed ROW, approximately 1,000 metres west of the Excel Birch Central battery.



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3.0 BLUEBERRY RIVER

3.1 METHODS

The Blueberry River was evaluated to determine possible impacts of the proposed pipeline crossing on fish and their habitat. This included an inventory of fish species present and an assessment of fish habitat and related biophysical environment.

Three 100 metre sections of the Blueberry River were evaluated, as per B.C. Environment's Appendix "A", Pre-Impact Assessment For Small Stream Crossings, Sampling Protocol and Mandatory Reporting (Appendix I). Site 1 lay immediately upstream of the proposed crossing, site 2 immediately downstream, and site 3 began 500 metres downstream of the proposed crossing.

All fisheries habitat work was conducted to the standards described in the Fish Habitat Inventory and Information Program (DFO & BCMOE, 1989). This included a photographic record of the sample sites and riparian area. A fish species inventory was undertaken using a Coffelt gas-generator electro-fisher.

3.2 RESULTS

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3.2.1 Biophysical Inventory

The proposed crossing of the Blueberry River is located approximately 70 kilometres upstream of its confluence with the Beatton River.

The river, in the area of the crossing, meanders through a relatively wide valley. Riparian vegetation is dominated by mature white spruce, trembling aspen and balsam poplar. The understory is comprised of willow, rose, grasses, clover, vetch and mosses.

The channel is contained by banks 3 to 4 metres in height. Flood sign was observed up an additional 4 metres above the water surface. At the time of this assessment the flow stage was low.

The river consists of low gradient, pool/riffle habitat, with a relatively low proportion of riffles. The substrate is comprised chiefly of silt and cobble with pockets of gravel throughout (Appendix II).

River banks are relatively unstable and subject to sloughing throughout. Large amounts of silt deposited during past flood conditions were observed. Water turbidity was high as a result of suspended silt, despite low flow conditions and a lack of recent precipitation. Discharge was measured at approximately 0.20 m3/s Water temperature at the time of the assessment was 1.0 degree Celsius. Extensive beaver activity was evident throughout the area. A well maintained beaver dam was located approximately 250 metres downstream of the proposed crossing. The resulting impoundment extended upstream to the crossing site.

3.2.2 Fish Species Inventory

Four species of fish were electro-fished in the three sample sections on the Blueberry River: 25 lake chub, 7 redside shiner, 3 longnose suckers and 4 trout-perch.

4.0 INGLIS CREEK (LOWER CROSSING)

4.1 METHODS

Inglis Creek was evaluated to determine possible impacts of the proposed pipeline crossing on fish and their habitat. This included an inventory of fish species present and an assessment of fish habitat and related biophysical environment.

Three 100 metre sections of Inglis Creek were evaluated, as per B.C. Environment's Appendix "A", Pre-Impact Assessment For Small Stream Crossings, Sampling Protocol and Mandatory Reporting (Appendix I). Site 1 lay immediately upstream of the proposed crossing, site 2 immediately downstream, and site 3 began 500 metres downstream of the proposed crossing.

All fisheries habitat work was conducted to the standards described in the Fish Habitat Inventory and Information Program (DFO & BCMOE, 1989). This included a photographic record of the sample sites and riparian area. A fish species inventory was undertaken using a Coffelt gas-generator electro-fisher.

4.2 RESULTS

4.2.1 Biophysical Inventory

The proposed lower crossing of Inglis Creek is located approximately 2.5 kilometres upstream of its confluence with the Blueberry River.

The stream, in the area of the crossing, is narrowly confined by a shallow valley. Riparian vegetation is dominated by bog birch, wiilow and grasses. No overstory exists.

The channel is contained by banks approximately 0.75 metres in height. Flood sign was observed an additional 2.0 metres above the water surface. At the time of this assessment the flow stage was low.

The stream consists of low gradient, pool/riffle habitat, with a roughly even distribution of pools and riffles. The substrate is comprised mainly of boulders and cobble with limited pockets of gravel. The average wetted width of the stream was 1.5 metres. Average maximum pool depth was approximately 65 centimetres.

Streambanks are relatively stable with the exception of some small scale sloughing and exposed soil. Water turbidity was approximately 30 centimetres. Discharge was measured at approximately 0.02 m3/s. Water temperature at the time of the assessment was 3.0 degrees Celsius.

4.2.2 Fish Species Inventory

Five juvenile arctic grayling were electro-fished in the three samples sections at the lower Inglis Creek crossing.

5.0 INGLIS CREEK (UPPER CROSSING)

5.1 METHODS

Because of the proximity to the lower crossing of Inglis Creek, the upper crossing was assessed comparatively by means of a general visual inspection. No specific sample sections were delineated and no fish species inventory was undertaken.

5.2 RESULTS

The proposed upper crossing of Inglis Creek is located approximately 7.5 kilometres upstream of its confluence with the Blueberry River, 5 kilometres above the lower crossing.

The stream in this area is less confined, as the shallow valley is slightly wider. Riparian vegetation is dominated by dwarf birch, willow, lodgepole pine seedlings and grasses. No overstory exists.

The channel is contained by banks approximately 1.0 metre in height. Flood sign was observed up an additional 1.5 metres above the water surface. At the time of this assessment the flow stage was low.

This portion of the stream consists of low gradient, pool/riffle habitat, with a roughly even distribution of pools and riffles. The substrate is comprised mainly of cobble and large gravel.

Streambanks are composed of sod and fine materials and show evidence of erosion from high flows but are generally quite stable. Water turbidity was approximately 30 centimetres. Discharge was estimated to be comparable to the lower crossing, approximately 0.02 m3/s.

6.0 AITKEN CREEK

6.1 METHODS

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Aitken Creek was evaluated to determine possible impacts of the proposed pipeline crossing on fish and their habitat. This included an inventory of fish species present and an assessment of fish habitat and related biophysical environment.

Two 100 metre sections of Aitken Creek were evaluated, as per B.C. Environment's Appendix "A", Pre-Impact Assessment For Small Stream Crossings, Sampling Protocol and Mandatory Reporting (Appendix I). Site 1 was omitted due to active bridge construction on the upstream side of the proposed crossing. Site 2 lay immediately downstream of the proposed crossing and site 3 began 500 metres downstream.

All fisheries habitat work was conducted to the standards described in the Fish Habitat Inventory and Information Program (DFO & BCMOE, 1989). This included a photographic record of the sample sites and riparian area. A fish species inventory was undertaken using a Coffelt gas-generator electro-fisher.

6.2 RESULTS

6.2.1 Biophysical Inventory

The proposed crossing of Aitken Creek is located approximately 43 kilometres upstream of its confluence with the Blueberry River.

The stream, in the area of the crossing, winds relatively unconfined in a wide, shallow valley. Riparian vegetation is predominantly willow, bog birch, rose and grasses with scattered aspen and spruce. No overstory exists.

The channel is contained by banks up to 4 metres in height. Flood sign was observed an additional 3 to 4 metres above the water surface. At the time of this assessment the flow stage was low.

The stream consists of low gradient, pool/riffle habitat, with a very low proportion of riffles. The substrate is comprised mainly of silt and fines with gravel and small cobble occupying less than 30% of the streambed. The average wetted width of the stream was 4.0 metres.

Streambanks are composed of silt and fine materials and subject to sloughing throughout. The water was moderately turbid due to suspended silt and organic stain. Discharge was measured at approximately 0.10 m3/s. Water temperature at the time of the assessment was 3.0 degrees Celsius.

6.2.2 Fish Species Inventory

Six fish, representing two species, were captured in the two sample sections on Aitken Creek: five lake chub and one longnose sucker.

7.0 UNNAMED AITKEN CREEK TRIBUTARY

This stream is crossed by the proposed ROW at the north end of the project approximately one kilometre west of Excel's Birch Central battery. It is the largest unnamed stream on the ROW. The proposed crossing of this tributary is located approximately three kilometres upstream of its confluence with Aitken Creek.

After a general visual inspection, the stream was deemed to possess only marginal, seasonal fisheries values. Because of the formation of surface ice, electro-fishing was not attempted.

Flow rates were comparable to those in Inglis Creek, however, habitat quality was much lower. Silt and fines comprised a large proportion of the streambed material. Turbidity was relatively high and natural instream cover was lacking. In addition, habitat of similarly low quality is present in Aitken Creek adjacent to the mouth of the tributary.

8.0 DISCUSSION, GENERAL CONCERNS AND RECOMMENDATIONS

8.1 BLUEBERRY RIVER

The Blueberry River system supports a variety of non-sport fish species, and possibly restricted populations of arctic grayling in headwaters areas.

The proposed Excel crossing is located on relatively stable ground at the site of an existing Mobil pipeline crossing. Much of the substrate immediately below the crossing is composed of sand and silt. The beaver dam, located 250 metres below the site, and the resulting impoundment creates an effective silt trap and should allow disturbance-induced silt to slowly settle out before being carried downstream.

Large granular substrate at the crossing site should be replaced when trench backfilling is complete.

8.2 INGLIS CREEK

Inglis Creek was found to contain high quality rearing habitat for juvenile arctic grayling. Clean cobble and boulder substrate, moderately low turbidity and low silt content encourage production the aquatic invertebrate food sources. Deep pools and overhanging banks provide suitable cover.

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Arctic grayling are a high priority species throughout the region and are known to be extremely sensitive to habitat degradation. There are probably relatively few streams in the Blueberry system suitable for this species.

Juvenile grayling utilizing small tributaries as rearing habitat normally move to lower reaches as flow rates and water temperatures decrease in the fall. Deep pools and the presence of grayling in October may indicate overwintering capabilities in Inglis Creek.

Block and pump procedures may be required during trenching operations at both proposed Inglis Creek crossings.

The lower crossing occurs adjacent to an existing pipeline ROW. The proposed Excel ROW is currently being re-aligned or kinked at the crossing site to allow a right angle crossing of the stream.

The proposed upper crossing is located on new cut and is presently being adjusted or kinked at the crossing site to avoid straddling a small intermittent drainage channel on the east bank of the stream. This modification was made to address concerns about ROW erosion during run-off periods and resulting siltation into Inglis Creek.

8.3 AITKEN CREEK

No high quality fish habitat exists in the area of the Aitken Creek crossing. The streambanks and streambed are composed primarily of silt and fines. Clean granular substrate is limited.

The crossing and downstream stretch are located on private property. A high degree of in-stream disturbance is evident and ongoing. Sloughing of abandoned bridge abutments, heavy equipment fords and intensive use of the stream by livestock may have further reduced its suitability for all but the most tolerant of non-sport species.

The proposed ROW follows the edge of an existing road allowance and crosses the stream adjacent to a newly installed bridge.

8.4 UNNAMED AITKEN CREEK TRIBUTARY

No high quality fish habitat exists in the area of the crossing of the unnamed Aitken Creek tributary.

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Appendix I: Appendix "A" Pre-impact Assessment For Small Stream Crossings Sampling Protocol and Manadatory Reporting B.C. Environment

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APPENDIX 'A'

PRE-IMPACT ASSESSMENT FOR SMALL STREAM CROSSINGS. SAMPLING PROTOCOL AND MANDATORY REPORTING.

All fisheries habitat survey work must be conducted to the standards described in the "Fish Habitat Inventory & Information Program" (D.F.O. & B.C.M.O.E., 1989). Copies of the guide and the appropriate forms to be used are available c/o the MOE Fisheries Branch, Inventory and Data Systems Unit, 780 Blanshard St., Victoria B.C., V8V 1X5.

For proposed stream crossings requiring a pre-impact assessment, a habitat survey will be conducted for at least 100m upstream and 100m downstream of the proposed crossing site. An additional 100m section of river will be surveyed approximately 500m downstream the proposed crossing site. Fish presence and abundance will be assessed for each of the sections of river surveyed using appropriate techniques (usually some combination of electrofishing, seining and angling).

Every effort should be made to maintain captured fish alive and in good condition so that they can be released back into the waters from which they were captured. All fish captured should be identified to species and the total number of each species captured will be recorded. All indivduals of sport species should be measured (fork length) to the nearest mm and a non-lethal aging structure should be collected (scales from all species other than Percids from which dorsal spines should be collected). Anaesthetics may be used to quiet fish prior to sampling but fish should be fully recovered before being released into the wild. The following information will be recorded for individuals that die incidentally during capture or handling: weight; sex; maturity; stomach contents; parisites or other lesions. Otoliths should be removed and saved from any char that die. If fish ages are not specifically required for the study in question then aging structures will be included with all the relevant data as part of the final report.

For non-sport species the total number captured and the range of fork lengths for each species will be recorded. A representative sample of each non-sports species (up to 20 individuals representing the full size range captured with the exception that suckers and squawfish longer than 15 cm need not be kept) should be fixed in 10% formalin and delivered to the Regional Fisheries Biologist in Fort St. John.

The final report must include the following information as a minimum:

-a map (1:50,000 scale or less) showing the precise location of all sampling sites;

-a completed Stream Survey Card for each sample location;

-a photographic record with at least one upstream and one downstream shot at each sample location; -all fish data collected, summarized in tabular form;

-techniques, effort (eg. electroshocking seconds), and area sampled (square meters) for each sample location;

-problems encountered that might influence the results;

-a summary of the major habitat components and the fisheries potential for the stream surveyed, comments indicating how typical the surveyed area was relative to the stream as a whole; -an assessment of the probable impacts as a result of the planned in-stream activities.

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Appendix II: Blueberry River Stream Survey Forms, Site Photographs and Fish Data Sheets

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Stream Survey Form; Blueberry River - Site 1, the uppermost site.



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Blueberry River site 1, above proposed crossing: View downstream; 50 m up from bottom of site.



Blueberry River site 1, above proposed crossing: View downstream; from top of site.

STREAM NAME Blueberry River

LOCATION Upstream of proposed crossing

DATE Oct. 13 / 93 SITE NO. 1 UTM 10.5812.62876

ELECTROSHOCKING SECONDS 515 AREA SAMPLED 900 m2

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| | 100% QO | 0 | 0 | 0 | 0 | 10 | 1 | Bedroc | * (8) | a section of | 0 | 0 | | Bars IN. | 6 | 5 | DH | in balance | 0 | ippm | T |
| -11 | Crown Closure | | 0 | 0 | Aspect | SE | 1 | Deolom | 6 | Compad | | | 31 | Water Temi | a roi | 1 | Turt tom | 30 | Gune | 125*0 | - |
| - | | - | - | | DISC | HARGE | | | | | | | _ | | | REA | CH SYN | BOL | - | - | - |
| | Paramet | er. | Value | N | fathod | | | Spe | ofic Dat | 8 | | | | | | | (Fish) | | | | |
| | Wetted Width | iml | | | | | | | - | | | - | | | | _ | | | | | |
| 200 | Mean Depthir | ni - | | | | | | | | | | | | | | | | | | | |
| 20 | Mean Velocity | im/si | | | | | | | E | | | | | | | | | | | | |
| | Discharge (m) | 1/21 | | | | | | | | | | | Wid | N.94Hey.O | namine), | diopiel. | | | | illier I | Material |

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| 1 | COMMENTS |
|---|--|
| | Channel Stability |
| | HIGH DEGREE OF SWARZHDED SILT IN WATER INCREMES COVER. FINES COMPRISED CHIEFLY OF SAND. FINES SETTLED OUT DUE TO DOWNSTREAM BEANER DAM |
| 3 | 100% POOL DUE TO BEAVER DAM DOWNSTREAM |
| | BANKS GENERALLY 3.4 M LOWER 20 M OF SITE WIDENS AND LEPT BANK REDUCED TO IM AT INSIDE BEND |
| 5 | BEAVER DAM APORON 150 M DOWNSTREAM OF SITE. |
| 6 | DECTROSHOCKING SECONDS - 320. CHUB ANDRAGE - 52 mm |
| | RIDARIAN VEGETATION - SPRUCE, ASPEN, BAUSAN DOPUR BALLED BY DC |
| | ADRE WILLOW AND GRASS UNDERSTURY DEPTHD 931015 |

Stream Survey Form; Blueberry River - Site 2, the middle site.



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Blueberry River site 2, below proposed crossing: View downstream; from top of site.



Blueberry River site 2, below proposed crossing: View downstream; from 50 m down from top of site.

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STREAM NAME Blueberry River

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LOCATION Downstream of proposed crossing

DATE Oct. 13 / 93 SITE NO. 2 UTM 10.5813.62877

ELECTROSHOCKING SECONDS 320 AREA SAMPLED 2000 m2

| NO | SP | LENGTH (mm) | COMMENTS | NO | SP | LENGTH (mm) | COMMENTS |
|----|-----|----------------|----------|----|-----|----------------|----------|
| 1 | LKC | 56 | RELEASED | 26 | | | |
| 2 | LKC | 70 | RELEASED | 27 | | | |
| 3 | LKC | 75 | RELEASED | 28 | | | |
| 4 | LKC | 68 | RELEASED | 29 | | | |
| 5 | LKC | 44 | RELEASED | 30 | | | |
| 6 | LKC | 52 | RELEASED | 31 | | | - |
| 7 | LKC | 50 | RELEASED | 32 | | | |
| 8 | LKC | 45 | RELEASED | 33 | | | |
| 9 | LKC | 45 | RELEASED | 34 | | | |
| 10 | LKC | 47 | RELEASED | 35 | | | |
| 11 | LKC | 46 | RELEASED | 36 | | | |
| 12 | LKC | 42 | RELEASED | 37 | | | |
| 13 | LKC | 39 | RELEASED | 38 | | | |
| 14 | RSC | 60 | RELEASED | 39 | | | |
| 15 | RSC | 75 | RELEASED | 40 | | | |
| 16 | RSC | 72 | RELEASED | 41 | | | |
| 17 | RSC | 66 | RELEASED | 42 | | | |
| 18 | | | | 43 | | | |
| 19 | | | | 44 | | | |
| 20 | | | | 45 | | | |
| 21 | | | | 46 | | | |
| 22 | | | | 47 | | | |
| 23 | | | | 48 | | | |
| 24 | | | | 49 | | | 10 |
| 25 | | | | 50 | | | |
| | LKC | AV = 52 | | | RSC | AV = 68 | |

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| | | | | | | | | STR | DFO/ | | FOR | м | | | | | | | | |
|-----|--------------------|-------------------|------------------|-----------------------|-----------------|---------|------|--------------------|---------------|-----------------------------|---------|------|--------|--|---------------|---------------|--------|-------|---------|-----------|
| Str | eam Nan | ne fo | 82 1 To | | BERRY | R | | (Id | call | | | | | | | Act | 20.65 | V | 4 | Method |
| | tershed a | | | | | III | 1 | Loc H | L i a l | and D | 11.12 | In | 1.1 | Reach | No. | Long | thum | | - | |
| Loc | ation | FR. | OHA : | 300 | H BE | ren | CI | Ross | NG | Map# | 94 | A | 13 | Site No | 3 | LINE | riv(m) | 100 | 5 | HC |
| 1 | min | | | | UR 100 | | | | | UTM. | 150 | SMO. | 0.00 | Fish Ca | rd Y | 0 | C | Field | | Hist. |
| Dat | OMYO | 93 | 510 | | Tarran 1110 | | DE | S Orew | BC DI | c/ 10 | 7107.05 | 1000 | | Air Pho | nos | | 0 | | | |
| C | P | ARA | METER | - | VALUE | METH | | 0.0 | | | PECIF | IC D | ATA | | | | 0 | BSTR | UCTI | ONS |
| - | Ave, Cha | an W | dth (m) | | 20.0 | HC | | 1 | _ | | _ | | _ | _ | | | C | Htimi | Туре | 1 Loc'n |
| | Ava Wa | t.Wid | 1h (m) | 1250 | 15.0 | HC | | _ | | | | | | | | _ | | | | 1 |
| - | Table in the later | | lie Depti | | 15 | T | - | - | | _ | | | _ | | | _ | 100 | | | |
| | COLUMN AND | the second second | Depth | (cm) | 50 | T | - | - | | | - | _ | | _ | | - | | - | | |
| | Gradier | 1000 | President of the | - Contract | 1.0 | CL | C | | BED MATE | STREET. | 1 | | C | 110000000000 | BANKS | | | 1 | | |
| | CONTRACTOR OF | trictin | uttie 1 C | CONTRACTOR OF | Dthe/ | GE | | Fines | Cay sill, san | tt (<2mm) | 60 | 60 | - | Heightfind | 2 41/15 | table 20 | | - | | |
| - | Side Cha | 100 | and the second | and the second second | 2-40 240 | GE | | Graveka | smail 52-16 | COUNT | 30 | 20 | 1 | lexture . | 00 | LR | 1 | | | |
| | Oenris | MR%- | in the little of | 4-=[X] | | GE | | La deser | large (18-8- | and the second second | 100 | 10 | 1000 | are writed a set | dinemènt | EN O | | | | DNIA |
| - | - | Stabl | | | 90 | GE | | and the | sm cobible II | Apparent stagent started as | | 5 | | Alternal Astronomy | vanive Platic | and strengthe | 2-5 | 5-10 | ~ | |
| 1 | | | rotal % | | 60 | GE | 100 | LINGHS | Ige cubble r | | 10 | 5 | | | Age | Dry | 0 | M | H | Flood |
| | Sum - | | | 10000 | In Veg Over Veg | | 100 | 10000 | boulder (22) | Septem 1 | - | 0 | | in the second se | ins Hilm) | 3 | Braid | 100 | - | 0 |
| - | 100% | 11111111 | _ | 10 | C Aspect | 20 | 120 | Bedros | Ter. | - | 0 | | | Bars (%) Water Temp | 20 | pH | - | - | 2 ppm | - |
| - | Crown C | ADBUI | | 0 | | HARGE | | Deolon | 12 | Compactio | wird | 2 " | Same. | a aner senta | | Turb.icm) | 20 | Love | 12840 | 1 |
| - | Pa | rame | téc: | Value | Mathod | HANGE | _ | Sór | ofic Data | _ | | - | | | HEA | (Fish) | ABOL | | | |
| | Wetted | _ | 1 | - | | | - | | | _ | | | | | | | | | | |
| 100 | Mean D | epth | (m) | | | - | - | - | - | | | | 1 | | | 1 | | | - | |
| | | | ty im/si | - | | | _ | | | | _ | | | | | 20 | | | | |
| | Dischar | gè (n | 12/s1 | | | | | | | | | | with | h.Valiesi@t | aniet,5itoja) | 0.000 | | | their b | enterinte |
| - | | | | - | | | | | | | | | | | _ | | | | | |
| 100 | College | 1 | FIS | SH SU | MMARY | 1. Call | 10 | 11 | | | STRE | AM | /VALL | EY CR | OSS-SEC | TION | R | | - | 6 |
| 0. | Species | No | | All and the set | Lite Phase | Use Me | thod | IRIa1 | Y. | | | 11 | Lookin | g Down | straami | Service 1 | 21 | | | RB |
| 3 | LSU | 1 | 115 | 11.7. | EBUQHUN0053 | | EL | Contraction of the | È. | | PLAN | VIME | TRIC | VIEW | | 1 | | | | 2 |
| - | RSC | 1 | 108 | | | | | 10 | en la | | | | | | | | | | | 3 |
| | TP | 4 | 62- | | | | | | 000000 | | | | | | | | | | | 10 |
| | LKC | 7 | 43. | | | | | 1 | | | | | | | | | | | | 1 |
| | -Di- | 1 | | | | | | 4 | house | | | | | | | | | | | - |
| | | | | | 1 2 | | | - | - 7 | | | | | | | | | | 10 | <u> -</u> |
| | | | | | | | | - | 4 | 346 | | | | | | | | de | 300 | - |

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| | | | | | | COM | AMENTS | | | |
| Chant | nel Stat | olity 🗌 Det | kis 🚺 Man | agement < | Concerne | Obstructio | ns 📋 Riparian | Zone 🖽 Vall | ley Wall Processes | Etc. |
| HIG | H D | EGRES | OF SU | SOET | deo. | SILT I | N WATE | R INCH | LEASIS CO | NER |
| | | | The state of the s | A second s | the lot of | | | unco de constante | and a manufacture of the | 17112030 |
| En | HE- | COMOR | D CHAN | HIEF | 4 OF | SCANE | 2 | | | |
| | | | WE 5 | | | | | Auc a | 10000 | · 68 m |
| KL | EUTR | ostocia | mig 5 | econt | 5.5 | 30. 4 | ANCE CH | | - | |
| RI | PAR | ernd i | ing s | Picon (| SOR SOR | 30. L | SPEN, | | NERMAR | |
| RI | PAR | ernd i | ing s | Picon (| SOR SOR | 30. 4 | SPEN, | | | |
| RI | PAR | ernd i | ing s | Picon (| SOR SOR | 30. L | SPEN, | | | |
| RI | PAR | ernd i | ing s | Picon (| SOR SOR | 30. L | SPEN, | | | |
| RI | PAR | ernd i | ing s | Picon (| SOR SOR | 30. L | SPEN, | | | |
| RI | PAR | ernd i | ing s | Picon (| SOR SOR | 30. L | SPEN, | | M DODING | |

Stream Survey Form; Blueberry River - Site 3, the lowermost site.



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Blueberry River site 3, 300 m below proposed crossing: View downstream; from top of site.



Blueberry River site 3, 300 m below proposed crossing: View upstream; from bottom of site.

STREAM NAME Blueberry River

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LOCATION 300 m downstream of proposed crossing

DATE Oct. 13 / 93 SITE NO. 3 UTM 10.5814.62876

ELECTROSHOCKING SECONDS 530 AREA SAMPLED 1500 m2

| NO | SP | LENGTH (mm) | COMMENTS | NO | SP | LENGTH (mm) | COMMENTS |
|----|-----|----------------|-----------|----|----|----------------|----------|
| 1 | LKC | 99 | PRESERVED | 26 | | | |
| 2 | LKC | 74 | RELEASED | 27 | | | |
| 3 | LKC | 73 | RELEASED | 28 | | | |
| 4 | LKC | 59 | RELEASED | 29 | | | |
| 5 | LKC | 67 | RELEASED | 30 | | | |
| 6 | LKC | 62 | RELEASED | 31 | | | |
| 7 | LKC | 43 | RELEASED | 32 | | | |
| 8 | LNS | 115 | PRESERVED | 33 | | | |
| 9 | RSC | 68 | RELEASED | 34 | | | |
| 10 | TP | 70 | PRESERVED | 35 | | | |
| 11 | TP | 67 | PRESERVED | 36 | | | - |
| 12 | TP | 62 | PRESERVED | 37 | | | |
| 13 | TP | 67 | RELEASED | 38 | | | |
| 14 | | | | 39 | | | |
| 15 | | | | 40 | | | |
| 16 | | | | 41 | | | |
| 17 | | | | 42 | | | |
| 18 | | | | 43 | | | |
| 19 | | | | 44 | | | |
| 20 | | | | 45 | | | |
| 21 | | | | 46 | | | |
| 22 | | | | 47 | | | |
| 23 | | | | 48 | | | |
| 24 | | | - | 49 | | | |
| 25 | | | | 50 | | | |
| | LKC | AV = 68 | | | TP | AV = 67 | |

Appendix III: Inglis Creek Stream Survey Forms, Site Photographs and Fish Data Sheets

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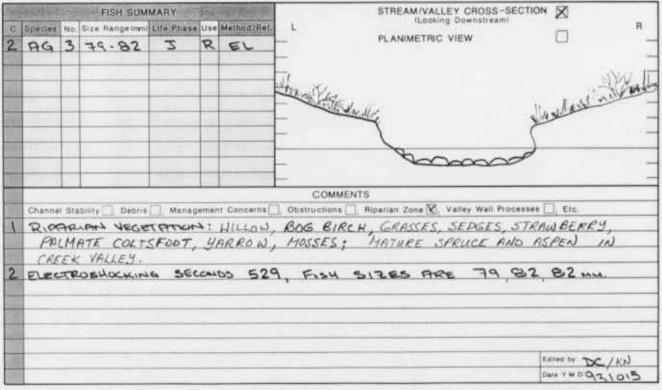
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DFO/MOE STREAM SURVEY FORM

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| - | _ | _ | | _ | _ | _ | | _ | Jin | LAM S | URVEY F | Uni | ×1 | - | | | _ | | - | | - |
|------|-----------------------|----------|---|----------------|--------|----------|---------|-----|----------|--------------|--------------|-------------|------|-------|-----------|--------------|----------|---------|--------|----------|----------|
| Stri | sam Na | me iga | 2111 | JGLIS | > < | CREE | ĸ | _ | 110 | call) | | _ | | | | | A. | 10.6816 | 1 | 4 | Methic |
| Na | ershed | Code | 23 | 324 | all i | 372 | 115 | 1 | 11 | LAN | Lat Later | 1.1 | 1 | 111 | Reach | No. | Lett | gthiki | mil | | |
| .00 | ation 5 | SURV | biet | FR | Mo | PRU | Pose | 0 | PIP | THILS | Map# c | 14 | A/ | 3 | Site No | 1 102 | | LUC NA | n) 10 | 00 | HC |
| | | | | 100 | | up | STR | EM | M | | U.T.M. VO | 58 | 01.6 | 29.18 | Fish C | ard Y | 0 | G. | Eit | id X | Hist. |
| | | | | | ime 1 | 1600 | Agency | De | Craw | BC | oc P | 0108 | | | All Ph | atos | | | | | |
| C. | and the second second | PARAN | and the second se | 8 | VAL | UE | METH. | | _ | | SF | €CIF | 10.0 | ATA | | | | 16 | OBS | RUCT | TONS. |
| | Ave.Ch | nan Wio | th Im) | in a second | 2. | 0 | GE | | | | _ | | _ | | _ | _ | | C | H | m) Typ | e Loci |
| | Ave We | et.Widtt | i fimi | and the second | 1. | 5 | GE | | - | | - | _ | - | _ | _ | _ | | 10 | | | |
| - | Ave.Ma | ax Bitti | Dept | ts (cm) | 15 | 5 | T | | | _ | _ | _ | | - | | | | | | | |
| | Ave.Ma | as Pool | Depth | (cm) | 6 | 5 | T | | - | | | _ | | | | | | 15 | | | |
| 42 | Gradie | ent 🐄 🗌 | 100 | 1 | 0 | .5 | CL | 0 | Print He | ED MAT | ERIAL | | 5 | C | | BANKS | | 1 | | | |
| | S Pool | 10 | 110 3 | Onun | 01 | iner . | GE | 223 | Fines | ciay,silt,sa | me (Cammi | 10 | 10 | - | ieightsmi | 75 %Ukm | table 24 | 0 | | | |
| | Side Ch | M.ne | OCX | 0-10 -0 | -40 |]=+0 | GE | | 10 01 | smail:12!-1 | 6.mml | | 10 | 1 | exture | 0 6 | LH | | | | |
| | Deblis | A:65% | OOK | Q-4 0 = | -15 | 315 | GE | | Gravels | targe II n- | 64mm) | -50 | 20 | | Çø | ntinement | EN C | 9 | FIC | OC U | C NIA |
| | No. | Stable | * | | | | 1 | | 230 | sm.cobbie | 164-528mm1 | 104 | 15 | | atley O | hannel Ratio | 0-2 | 2- | 5 5- | 10 10 | N/A |
| | COV | ER: To | ital 🛸 | | 30 | 2 | GE | | Larges | ige cobbie | (128-256 mm) | 60 | 20 | 1 | S | tage | Dry | C |)) | и н | Fibo |
| 2 | | Dp Pp# | LOD | Roulder | In Veg | Over Veg | | 1 | Sec. | boulder (3) | 256mml | 18 | 25 | | lood Si | gna Htim) | 1.5 | Bri | inded. | Y | Q |
| 2 | \$U(1) 100% | 80 | 0 | 10 | 0 | 0 | 10 | 1.1 | Bearon | A (R) | S HI INCOME | 0 | 0 | - | iars (%) | 0 | pH | | | Gyippr | ŵ |
| | Grown | Closure | | 0 | C | Aspect | 5 | | Duolom | 25 0 | Compaction | 14.1 | ME | | rater Tem | 1 3 | Turkism | 30 | 0 0 | nd 125*1 | ¢1 |
| | | | | | | DISC | HARGE | | - | | - | - | - | | | REA | CH SY | MBC | H. | | - |
| | P | aramete | et . | Value | 5 | Aethod | | | Spe | ofic Data | | | | | | | Fish | £ | | | |
| | Wetted | Width | (ets.) | 1.1 | | T | - | | | | | | | | | | | | | | |
| | Mean 5 | Oepth la | eil. | 0.11 | | T | | | | | | | | | | | | | | | |
| | Mean 1 | Velocity | im/s | 0.24 | | F | 12,54 | | | See See | | | | | | | | | | | |
| | Oischa | rge (m | int. | 0.02 | - | | Des Cal | | | 100 | TO STREET | | | Width | Valley:O | tannel.Biope | | | | Bail | Mittelii |



Stream Survey Form; Inglis Creek - Site 1, the uppermost site.



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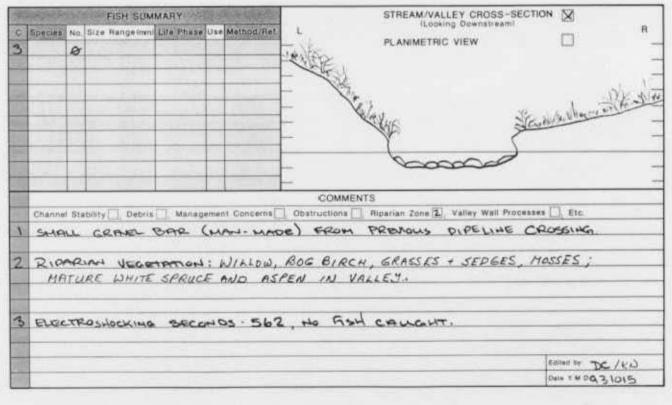
Inglis Creek site 1, above proposed crossing: View downstream; from top of site.

Inglis Creek site 1, above proposed crossing: View upstream; from proposed crossing at bottom of site.



DFO/MOE STREAM SURVEY FORM

| Stiri | am Name (gaz.) | lo 4 G | | 2020 | - | | - | Part Part | call | | 1.0/11 | | - | | | Acc | ess | N | 1 | Methos |
|-------|------------------------------|------------------|---------|--------|----------|-------|------|--|---------------------|--|-----------|--------|--------|-----------------------|---|----------|---------|------------------|-------------------|----------|
| and a | | 2.7 | 121 | C. | | 71 | 11 | 11 1 | 1 | ing and | 1.1.1.1.1 | THE ST | 1111 | Reach | No | - | tham | - | 1 | |
| _ | tershed Code 2 | | | | | | 1.1 | 11 | | Map# | | | - | Site No | 1100 | Lina | _ | | | ine. |
| .00 | iation LINE. C | RC | 15-54PA | 9 - | 10 10 | MOOM | 2 | xun | wirket | - Contraction of the local division of the l | 740 | | | The Contraction | | (N) | C | Find | The second second | HC |
| | | | - ali | | 1.120 | | | Email | - C | | NO.58 | 21.6 | 2011/0 | Air Pho | Concerning of the local distribution of the | 0 | ACCURE. | Filling | | man. |
| _ | PARAMET | | 131 | VAL | | METH. | CC 9 | P COM | BC D | | SPECIF | 10.0 | 67.6 | Ind Plic | 101 | | 100 | DOTE | UCTI | ONC |
| C | Ave Chan Width | | 1000 | | | | - | | _ | | SPEUR | 10.0 | ALA | _ | | | C | - and the second | Type | 40000 |
| - | 1725 STELLER STELLER | mper | 1025 | 25 | | GIE | - | | | | - | | _ | | _ | | ~ | PROM | 1956 | Tenic (|
| | Ave.Wet.Width Im | Constant of | | 2. | | GE | | - | | | _ | - | _ | _ | - | _ | | - | - | - |
| - | Ave Max Rittle D | 77 6 .117 | | 10 | | T | - | - | _ | _ | _ | - | _ | | | _ | 100 | - | - | - |
| | Ave Max Pool De | pth I | (çm) | 6 | | T | - | - | And a second second | | - | _ | - | 100 | 10000000 | _ | 1000 | _ | - | - |
| 10 | Gradient % | - | 1000 | 0. | 5 | CL | C | The Party of the P | ED MATE | | | | C | | BANKS | in Lette | 1993 | - | - | - |
| 2 | NPuol 7 O Hitte | 30 | Run | G | her | GE | | Fines | diay, silt, sar | HE ICOMM | 10 | 10 | | Colory Side Street in | 1.0 -1.0 | | 2 | - | | |
| | Side Chan.% O | c Mc | -0 0 | - 40 | 140 | GE | | Graves | smail 12-11 | immi | | 10 | - | exture | © G | LR | 1 | _ | | |
| | Debris Areas O | 0100 | | -10 |) >15 | GE | 1 | Constant | large It 6-8 | 4mm) | 30 | 20 | 100 | Cor | finement | EN CO | 9 10 | 0 | c uc | N/A |
| _ | Stable % | | 1 | | _ | | | 24 | sm.cobdie | 64-128mm | | 15 | | alley: 🖸 | hanner Ratio | 6-2 | 2-5 | 5-10 | 10+ | N/A |
| | COVER: Total | * | | 40 | 5 | GE | 123 | Larges | lge cobible | 1128-256.4 | - 60 | 15 | | 5 | age . | Dry | 0 | м | H | Floo |
| | Camp. De Podi L | 0.0 | Bookler | in Veg | Over Veg | | | and the second | bouider (>2 | semmi | 1 miles | 30 | | Flood Sk | gris Httimi | 2 | Braid | led | ¥ (| 2 |
| | 100% 60 0 | 0 | 15 | 0 | 10 | 15 | 100 | Bedros | K IRI | - THIN | 0 | 0 | 1 | Sars (%) | 0 | pН | | ¢ | Jopmi | |
| 2 | Crown Closure % | | 9 | C | Aspect | 5 | 1 | Denlom | 30 0 | Compac | | M.C | | Water Samp | 100 13 | fusioni | 30 | Cane | US*C | |
| | | - | - | - | DISC | HARGE | _ | | 1 Second and | | | | - | | REA | CH SYI | ABOL | | | |
| 14 | Parameter | | Value | N | tethod | | - | Spe | cific Data | | | | | | | (Fish) | | | | |
| | Wetted Width in | 1 | | | | | | | | | | | | | | | | | | |
| | Mean Depth (m) | - | 11.2 | | | | | | | 15 | | | | _ | | | | | | |
| | Mean Velocity In | n/s) | 1 | | | 1.18 | | | | | | | | | | | | | | |
| | Discharge (m ³ /s | | | | | 1 | | _ | | | | | INIO | N/WHIHESO | winel(Sider) | | | | Bec. | инсегіні |



Stream Survey Form; Inglis Creek - Site 2, the middle site.





Inglis Creek site 2, below proposed crossing: View downstream; from proposed crossing at top of site.

Inglis Creek site 2, below proposed crossing: View upstream; from bottom of site. STREAM NAME Inglis Creek

LOCATION From proposed crossing downstream for 100 m

DATE Oct. 13 / 93 SITE NO. 2 UTM 10.5801.62916

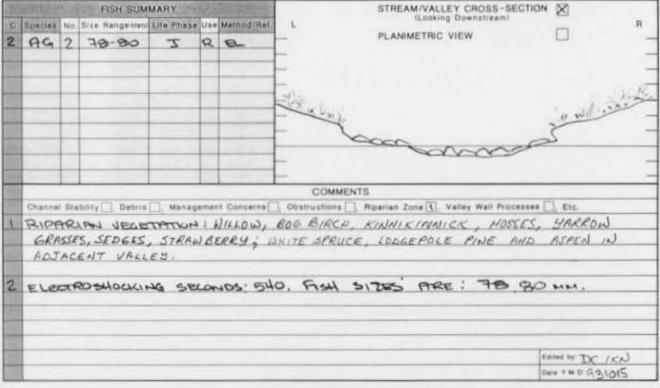
ELECTROSHOCKING SECONDS 562 AREA SAMPLED 200 m2

| NO | SP | LENGTH (mm) | COMMENTS | NO | SP | LENGTH (mm) | COMMENTS |
|----|----|----------------|----------|----|----|----------------|----------|
| 1 | | | NO FISH | 26 | | | |
| 2 | | | | 27 | | | |
| 3 | | | | 28 | | | |
| 4 | | | | 29 | | | |
| 5 | | | | 30 | _ | | |
| 6 | | | | 31 | | | |
| 7 | | | | 32 | | | |
| 8 | | | | 33 | | | |
| 9 | | | | 34 | | | |
| 10 | | | | 35 | | | |
| 11 | | | | 36 | | | |
| 12 | | | | 37 | | | |
| 13 | | | | 38 | | | |
| 14 | | | | 39 | | | |
| 15 | | | | 40 | | | |
| 16 | | | | 41 | | | |
| 17 | | | | 42 | | | |
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| 22 | | | | 47 | | | |
| 23 | | | | 48 | | | |
| 24 | | | | 49 | | | 1.1.1 |
| 25 | | | | 50 | | | |

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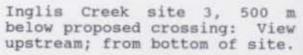
DFO / MOE STREAM SURVEY FORM

| _ | | | _ | | _ | | 9110 | LAU DI | DUALI | FUN | IVI. | | | | | _ | | _ | |
|-----|----------------------|--------|--------|----------|---------|------|---------------------|----------------|---------------|---------|-------|----------|--------------|-------------|------------|----------|-------|--------|----------|
| SU | eam Name (gaz.) 163 | 5115 | 0. | 000 | ×. | | - 69 | patt | | | | | | | Ac | OFER | 14 | | Arthod |
| wea | tershed Code 2.3 | 326 | 1.3 | 7.2 | 1 | 1.1 | 1.1 | 1 march | 1.1.1 | 100 | 1. | 4 | Reach | NO. | Leng | (Diken) | | | |
| Lo | Cation FROM 50 | OH | 124 | non | I CR | 055 | - | | Mapie | 94 | AI | 13 | Site No | 3 | Lina | ut wirm? | 10 | 2 | HC |
| | CUINISTREAM | 600 | | 00 | | 200 | - | , | UT.M. | 10.580 | n 167 | 9.13 | Fish C | y bie | 0 | G | Field | _ | |
| | *YM09310 | | 17 | 130 | Apericy | UES | Crem | BC D | | Photos: | | _ | Air Pho | tes | | - | | | |
| C | | | VALU | | METH. | | - | | | SPECIF | FIC D | ATA | | 1.0 | _ | 0 | BSTRU | JC TIC | INS |
| | Ave Chan Width Im! | de | 3.0 | 0 | GE | | | | | | | | | | | C | Httm | Type | Loc'n |
| | Ave Wet Width Incl | 200 | 2.0 | | GE | | | | | | | | | | | | | | |
| | Ave Mas Hittle Depth | (011) | 10 | | T | | | | | | | | | | | | - | | |
| - | Ave Max Pour Depth | lgml. | 50 | > | T | | | | | - 1- | - 5 | | | | _ | 120 | | | |
| | Gradient % | 1 10 | 1.0 | 2 | CL | C | - E | ED MAT | ERIAL | | 5 | C | | BANKS | | 100 | | | |
| | NPOLIA O MITTIN 60 | man | QIP | | GRE | 1000 | Fines | clay, sill, sa | nit =C(triim) | 10 | 10 | | neightim) | 1.0 %00 | utatile 40 | | 1.11 | | |
| 16 | Sale Charles O P No | | 42 | 1 245 | GE | 100 | and the | email (2-1) | (immi | 20 | 10 | - | Feature | 00 | LR | | | | |
| - | Debris Areas Dicks | | -11 | 200 | GE | 10.0 | Graves | laige it this | 4.000 | 20 | 10 | 12.25 | Co | thearters | EN CO | O) FC | OC. | UÇ | N/A |
| 194 | Stable % | | | | | | | an cobine | 164-128mm | r. 198 | VO | 1 Street | /alley. © | hannel Hab | 0 00 | 2-5 | 5-10 | 10- | N/A |
| | COVER: Total % | | 40 | | GE | | Laigus | fge zübble | 128-256- | - 70 | 20 | | . 5 | ta ga | Dey | 0 | м | * | Flood |
| | Comp De Pour LO.D. | Badder | in the | Oier Yeg | Cutters | 100 | | bounder 112 | S&mm) | 18 | 40 | | Flood Sk | gins Helles | 2 | Braid | ed | 4 (| 0 |
| 10 | 100 50 0 | 35 | 0 | 0 | 15 | 1 | Bedroo | CR IPLE | | 0 | 0 | 1000 | Bars (%) | 20 | gH | | 04 | (mag | |
| 100 | Crown Obsure % | 0 | C | Aspect | 5 | 1000 | D _{po} lom | 40 0 | Compact | | | 1 | materi Tarra | 1013 | Tathini | 30 | Core | 25*01 | |
| | | | | DISCI | HARGE | | | | | | | | | RE/ | ACH SYN | MBOL | | | |
| | Parameter | Value | M | shod | | | 5pe | ofic Data | | | - 11 | | | | (Fish) | | | | |
| | Wetted Width imi | | | | | 1.00 | | 1 | - | | | | | | | | | | |
| | Mean Depth (m) | | | | | | | | | | | | | | | | | | |
| | Mean Velocity (m/s) | | | | | | | | | | | | | | | | | | |
| | Discharge (m??s) | 1 | | | 1 | | | | | | | With | Valley O | ente: Sige | el la la | | 19 | Ber M | Internet |



Stream Survey Form; Inglis Creek - Site 3, the lowermost site.

Inglis Creek site 3, 500 m below proposed crossing: View downstream; from top of site.



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STREAM NAME Inglis Creek

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LOCATION Downstream of the proposed crossing 250 m

DATE Oct. 13 / 93 SITE NO. 3 UTM 10.5801.62913

ELECTROSHOCKING SECONDS 540 AREA SAMPLED 200 m2

| NO | SP | LENGTH (mm) | COMMENTS | NO | SP . | LENGTH (mm) | COMMENTS |
|----|----|----------------|---------------------------------------|----|------|----------------|----------|
| 1 | AG | 78 | RELEASED | 26 | | | |
| 2 | AG | 80 | RELEASED | 27 | | | |
| 3 | | | | 28 | | | |
| 4 | | | | 29 | | | |
| 5 | | | | 30 | | | |
| 6 | | | | 31 | | | |
| 7 | | | | 32 | | | |
| 8 | | | | 33 | | | |
| 9 | | | | 34 | | | |
| 10 | | | | 35 | | | |
| 11 | _ | | | 36 | | | |
| 12 | | | | 37 | | | |
| 13 | _ | | | 38 | | | |
| 14 | _ | | | 39 | _ | | |
| 15 | _ | | | 40 | | | |
| 16 | | | | 41 | | | |
| 17 | _ | | | 42 | | | |
| 18 | | | | 43 | | | |
| 19 | | | · · · · · · · · · · · · · · · · · · · | 44 | | | |
| 20 | | | | 45 | 1.1 | | |
| 21 | | _ | | 46 | _ | | |
| 22 | | | | 47 | | | |
| 23 | _ | | | 48 | | | |
| 24 | ÷ | | | 49 | | | 2 |
| 25 | | | | 50 | | | |

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Appendix IV: Aitken Creek

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Stream Survey Forms, Site Photographs and Fish Data Sheets

| | | | ST | TREAM SU | RVEY | FORM | | | | | | | |
|--|---|-------------|----------|-------------------|------------------------|-----------|---------------|-----------------|---------|------------|--------|---------|---|
| Stream Name igaz I A 174 | EN C. | | | (local) | | | | | | Ato | 823 | Va | Metho |
| Watershed Code 2332 | | 61 | 1 I. 1 | 11111 | 111 | 1.1.1 | 1.1 | Resch No. | | Lengt | filant | | |
| Location FROM CROSSI | | | | | Map# | 94 A | 1.2 | Site No. | 1 | K.ttsmut | wim | 1.00 | > HC |
| ALL AND A STATE OF A S | | | | MANUAL CONT | and the second second | 15631 | | Fish Card | Y | (N) | C | Field p | Contract of the local division of the local |
| Date YMDA 3 1013 | 1.00 1220 | Agency | DES | BC /DO | And and a state of the | hotes | -20,4p.1 | Air Photos | | - | _ | | |
| C PARAMETER | VALUE | METH. | | | | PECIFIC | DATA | | | | 0 | BSTRU | CTIONS |
| Ave Chan Width Im! | 8.0 | HC | | | | | | | | | C | HEREN | Type Loc |
| Ave Wet Witth Init | 4.0 | HC. | | | | | | | | | | | |
| Ave Max Rittle Depth (cm) | 15.0 | T | | | | | | | | | | | |
| Ave Max Pool Depth (cm) | 60.0 | T | | | | 15 | | | | | | | |
| Gradient % | 2.0 | CL | C | BED MATE | RIAL | 8 5 | C | BA | NKS | | 11000 | | |
| NPINI 9 D HITTE / OHUN | Other | GE | Fin | BE | 1. (Cženni) | 606 | 0 | Hoghtimi 1 | Sunat | Die ID | | | |
| Sete Chan N O pt o-to | I las a las at | GE | 10.000 | amail 12-16 | mini | 1 | - Contraction | Taxture (F) | 0 | LB | | | |
| Avera Districter | Contraction of the second s | GE | Gra | inrya 111-64 | Latera i | 20 1 | - | Continer | nert . | EN CO | FC | 00 | (UC) NO |
| Oebria Stable % | | | 0.4 | em cabbie id | 4-128mml | 10 | | Valley: Cherin | e Ratio | 0-2 | 2-5 | 5-10 | 10.9 NI |
| 2 COVER: Total % | 20 | GE | 5 ta | ges lps sobtle it | 28-256.000 | | _ | litage | 100 | Dry (| 0 | M | H F300 |
| Comp De Pour LOS Brush | | a statement | _ | Boulder (125 | dimin) | 5 | | Flood Signs | HEIMI | 4 | Braid | ed | 10 |
| 100% 95 & 5 | 00 | Ø | 500 | TIDEA IRI | 115 | PE | - | 5ars (%) | 50 | 7184 | | 04 | ppenl |
| Orbern Obsure % | C Aspect | SE | 0. | 1cm1 12 C | Conpecto | m () H | - | Water Temp /101 | + 3 | (unb.icen) | 30 | Cune | |
| | DISC | HARGE | | | | ~ | - | | READ | H SYM | BOL | - | |
| Parameter Valu | e Method | 1 | | Specific Data | | | 1 | | | (Figh) | | | |
| Wetted Width (m) 2- | IT | | | | 1111 | | 1 | | | | | | |
| Mean Depthimi .19 | 3 T | | | 1 | | | 1 | | | | | | |
| Mean Velocity Imfal .3 | | | | | | | | | | | | | |
| Discharge (m ³ /s) . 10 | Contraction of the second second | | | | | | Will! | In Party Channe | (Stepel | | | | Dell Maleria |
| | | | | | | _ | | | - | | | | |
| FISH SI | MMARY- | TONY | 10/10/10 | | | STREAM | A/VAL | LEY CROSS | -SEC | TION D | R | | |
| C Species No. Size Rangets | man and the second second | Use Met | hod/het | L | | | IL OOKI | ng Downstrea | uni | | | | R |
| 3 LSU 1 B7 | | | EL | - | | PLANIN | ETRIC | VIEW | | 0 | 3 | | |
| 1KC 1 72 | | | =1 | 1 | | | | | | | | | |
| 100 1 100 | | | - | 1-1 | | | | | | | | | 1000 |
| | | | | HAR | | | | | | | | | AL + |
| | | | - | 13YE | a - | | | | | | | | SV. |
| | 1 1 1 1 | | | Skand | the- | | | | | | | 13 | 1x24 |
| | | | | 1 | 6 | | | | | | | 1 | - |
| | | | | 1 | | - | - | | | - | 1 | - | |
| | | | 1 | 1. | | | | - | | - | | | |
| | | | | I.s | | | | | | | | | |
| | | | | CON | MENTS | | | | | | | | |
| Channel Stability Deb | vis . Manage | ement C | oncerne] | / Obstructio | 6.8 🗍 . Ai | parian Zo | n# 4 | Valley Wall | Proces | 545 []. | Etc. | - | |

DFO/MOE

Stream Survey Form; Aitken Creek - Site 1, below the bridge.

I HIGH DEGREE OF DISTURBANCE BOTH UPSTREAM + DOWNSTREAM OF PROPOSED CROSSING SITE: O LIVESTOCK ACCESS TO CREEK (B) NEW BRIDGE CURRENTLY BEING INSTALLED IMMEDIATELY UPSTREAM OF PROPOSED CROSSING (C) OLD BRIDGE APPROXIMATELY 50M

45 M DOWNSTREAM.

Estate by DC/KN

Dale THE 931015

DOWNSTREAM D BULLDOZER CROSSING OF CREEK APPROXIMATELY

STREAM SURVEY MODIFIED TO AVOID NERVY EQUIPMENT ZONE

DANDELION, AMERICAN VETCH, WILD STRAWBERRY, GRASSES

RIP.RAP UNDER OLD BRIDGE DECK CLASSIFIED AS BOULDERS

2 SILT LOAD, COMEMIED WITH SLIGHTLY TAWLIC WATER, WORKAGED COVER IN POOLS. 3 ELECTROSHOCKING SECONDS 425 ; 2 FISH CAUGHT. 4 RIPPRIAN VEGETATION. BOG BIRCH, WILLOW, ROSE, WHITE SPRUCE, ASPEN

Aitken Creek site 1 below proposed crossing: View upstream; from middle of site.



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Aitken Creek site 1, below proposed crossing: View upstream; from bottom of site.



STREAM NAME Aitken Creek

LOCATION From crossing site, 100 metres downstream

DATE Oct. 13 / 93 SITE NO. 1 UTM 10.5834.63087

ELECTROSHOCKING SECONDS 425 AREA SAMPLED 400 m2

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| NO | SP | LENGTH (mm) | COMMENTS | NO | SP | LENGTH (mm) | COMMENTS |
|----|-----|----------------|-----------|----|----|----------------|----------|
| 1 | LSU | 87 | PRESERVED | 26 | | | |
| 2 | LKC | 72 | PRESERVED | 27 | | | |
| 3 | | | | 28 | | | |
| 4 | | | | 29 | | | |
| 5 | | | | 30 | | | |
| 6 | | | | 31 | | | |
| 7 | | | | 32 | | | |
| 8 | | | | 33 | | | |
| 9 | | | | 34 | | | |
| 10 | | | | 35 | | | |
| 11 | | | | 36 | | | |
| 12 | | | | 37 | | | |
| 13 | | | | 38 | | | |
| 14 | | | | 39 | | | |
| 15 | | | | 40 | _ | | |
| 16 | | | | 41 | | | |
| 17 | | | | 42 | _ | _ | |
| 18 | | | | 43 | | | |
| 19 | | | | 44 | | | |
| 20 | | | | 45 | | | |
| 21 | | | | 46 | | | |
| 22 | | | | 47 | | | |
| 23 | | | | 48 | _ | | |
| 24 | | | | 49 | | | × |
| 25 | _ | | | 50 | | | |

| | | | | | | | STR | EAM SI | JAVEY F | OR | M | | | | | | | |
|------|---|--------------|--------|---------|---------|-----|---------|---------------|-------------|------------|------------|-----------|----------------------------------|--------------|-------------|---------|----------|---------------|
| Stre | sam Name igaz istra | icani | c | | | | | cáli | | | | - | | | Aco | 44.9 | V2 | Method |
| Wat | Intented Code 2.3 | 324 | 0.10 | 335 | 6 | 101 | 11 | 1.1.1 | 1.1.1 | 1.0 | 1.5 | | Beach N | 0. | Lengt | trami | - | |
| | ation 500 H] | | | | | | | | Map# c | 34 | A / | 12 | Site No. | 2 | Lthau | extent | 100 | WK. |
| | CROSSING | | | | | | | | | 503 | | | 5 Fish Car | d Y | O | 4 | Field N | Hist. |
| Det | *YMD RG 10 | 13 | time / | 420 | Agency | bes | Citra | DC P | | lotos | | | Air Phot | 08 | | | | |
| C | PARAMETER | | VAL | UE | METH | | | | SF | PE CIF | 10.0 | ATA | 10 m | | | OB | STRU | CTIONS |
| | Ave.Chan.Wigth Im/ | 0.00 | 10 | 0.0 | HC | | | | | | | | | _ | | C | Httimi 1 | Type Loc'n |
| | Ave.Wet.Width imJ | the state | 6 | é.0 | HC | | | | | | | | | _ | - | | | |
| | Ave Max Riffle Dept | i licrei | 15 | 5.0 | T | | | | | | _ | | | | | | | |
| 12 | Ave.Max.Poor Depth | femi | 61 | 0.0 | T | _ | | | | - | _ | _ | - | | _ | | | |
| 110 | Gradient % | 1000 | 1 | .0 | CL | C | 6 | BED MAT | ERIAL | and street | ÷ . | C | | BANKS | 1 | 1000 | - | |
| mil | * Poor 8 0 Mille 20 |) Millin | 01 | her | GE | | Finna | 1741, 411, 84 | nd scanno | 70 | 90 | | Hanghtimit 2 | 5 SUMER | the 30 | | | |
| TP | Side Chan % O o (2) | e-m[]s | 0-40 |]>40[]] | 6E | | Gravita | 1-11 IZ-11 | nml | 20 | 10 | | Testure | F) G | L R | 1000 | | |
| | Depna Area 50 | 0-31 | 0-11 | | GE | - | | large It 8-8 | # monvil | | 10 | 16 | Cont | (internet)) | EN CO | 3 FC | 0C | UB NIA |
| - | Stable % | | 50 | 0 | GE | | 100 | em cottale | #4-178mmr | 120 | 5 | | Valley Cha | rine Ratio | 0-2 | 2-5 | 5-10 (| 10.) N/A |
| 1 | COVER: Total % | | 2 | 5 | GE | | Laiges | 109-215574 | 178-255-000 | 10 | 5 | 1 | Sta | ge | Dry | \odot | м | H Flood |
| | Comp. Dp Pour LO.D. | Boulder | | Owr Yep | Cuttere | | 32 | beulder 11-2 | 56.mm1 | | 0 | 12.5 | Flood Sign | is Hilmi | 4 | Braide | d 1 | |
| 15 | 100x 85 5 | ø | ø | 5 | 5 | 100 | Bedroe | CA INI | | ø | ø | 1 | Bars (%) | 40 | pH. | | 04 | (pint) |
| 1 | Crown Closure % | ø | C | Aspect | SE. | 10 | D solon | 12 0 | Compactio | 0 | MH | 18 | Water Terror | 0+3 | General and | 30 | Cohē,13 | 5.01 |
| - | | - | - | DISC | HARGE | _ | 1 | | | | | | - | REAC | H SYN | BOL | - | 1. |
| 1000 | Parameter | Vature | | Nethod | | | Spe | ofic Data | | | | | | | (Fiah) | | | |
| | Wetted Width (m) | | | | | | | - | | | | 1 | | | | | _ | - |
| | Mean Depthimi | | | | 1 | | | | | | | | | | | | | |
| | Mean Velocity Im/al | | | | | | | | | | | | | | | | | |
| | Discharge (m3/s) | | | | | | | | | | | 300 | eth Valley Cha | trial.Stoper | 1 | | | led Materiali |
| 0 24 | Fit Specine No. 5-2+ Hi KKC 4 39-1 | ngetm | | | | EL | | X | C | | | | LLEY CRO ing Downst C VIEW | SS-SEC | TION [| | / | |
| | | - | | | | | | 5.4 | _ | _ | | _ | | | | _ | | |
| | | | | | | | | | MMENTS | | | | _ | | | | | |
| 1 | Channel Stability | | | | | | | | one [], Rip | | | _ | | | | Etc. | _ | |
| 2 | SILT LOAD, CO ELECTRO-SHO RIPARIAN VI AMERICAN | CKIN EGET | IG : | SECON | ROG : | RU | RCH, | WE CH | W, ROS | ES! | 39, ASI | 40 PEA | 0, 42, | 86 m | 12 | | | sES, |
| 4 | LIVESTOCK 1 | | | | | | | | | | - | _ | _ | | _ | - | - | |

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Stream Survey Form; Aitken Creek - Site 2, the lowermost site.

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Aitken Creek site 2, 500 m below proposed crossing: View upstream; from bottom of site.



Aitken Creek site 2, 500 m below proposed crossing: View downstream; from middle of site.

STREAM NAME Aitken Creek

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LOCATION 500 metres downstream of proposed crossing

DATE Oct. 13 / 93 SITE NO. 2 UTM 10.5834.63085

ELECTROSHOCKING SECONDS 379 AREA SAMPLED 600 m2

| NO | SP | LENGTH (mm) | COMMENTS | NO | SP | LENGTH (mm) | COMMENTS |
|----|-----|----------------|-----------|----|-----|----------------|----------|
| 1 | LKC | 39 | PRESERVED | 26 | | | |
| 2 | LKC | 40 | PRESERVED | 27 | | | |
| 3 | LKC | 42 | PRESERVED | 28 | | | |
| 4 | LKC | 86 | PRESERVED | 29 | | | |
| 5 | | | | 30 | | | |
| 6 | | | | 31 | - | | |
| 7 | | | | 32 | | | |
| 8 | | | | 33 | | | |
| 9 | | | | 34 | | | |
| 10 | | | | 35 | | | |
| 11 | | | | 36 | 2 | | |
| 12 | | | | 37 | | | |
| 13 | _ | | | 38 | | | |
| 14 | | | | 39 | | | |
| 15 | | | | 40 | | | |
| 16 | | | | 41 | | | |
| 17 | _ | | | 42 | | | |
| 18 | | | | 43 | | | |
| 19 | _ | | | 44 | - ÷ | | _ |
| 20 | | | | 45 | | | |
| 21 | | | | 46 | | | |
| 22 | | | | 47 | | | |
| 23 | | | | 48 | | | |
| 24 | | | | 49 | 4 | | 2 |
| 25 | | | | 50 | | | |