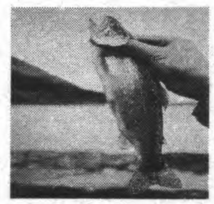
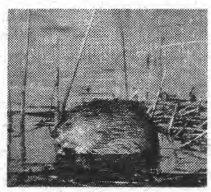
Canada Alberta Northwest Territories

Northern River Basins Study







NORTHERN RIVER BASINS STUDY PROJECT REPORT NO. 32

A GENERAL FISH AND RIVERINE HABITAT INVENTORY, ATHABASCA RIVER APRIL TO MAY, 1992






Date Due

Prepared for the
Northern River Basins Study
under Project 3117-B1

by
R.L. & L. Environmental Services Ltd.

Community Contributors:
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PREFACE:

The Northern River Basins Study was initiated through the "Canada-Alberta-Northwest Territories Agreement Respecting the Peace-Athabasca-Slave River Basin Study, Phase II - Technical Studies" which was signed September 27, 1991. The purpose of the Study is to understand and characterize the cumulative effects of development on the water and aquatic environment of the Study Area by coordinating with existing programs and undertaking appropriate new technical studies.

This publication reports the method and findings of particular work conducted as part of the Northern River Basins Study. As such, the work was governed by a specific terms of reference and is expected to contribute information about the Study Area within the context of the overall study as described by the Study Final Report. This report has been reviewed by the Study Science Advisory Committee in regards to scientific content and has been approved by the Study Board of Directors for public release.

It is explicit in the objectives of the Study to report the results of technical work regularly to the public. This objective is served by distributing project reports to an extensive network of libraries, agencies, organizations and interested individuals and by granting universal permission to reproduce the material.

This report contains referenced data obtained from sources external to the Northern River Basins Study. Individuals interested in using external data must obtain permission to do so from the donor agency.

NORTHERN RIVER BASINS STUDY
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Whereas the above publication is the result of work conducted under the Northern River Basins Study and the terms of reference for that project are deemed to be fulfilled,
IT IS THEREFORE REQUESTED BY THE STUDY OFFICE THAT;
this publication be subjected to proper and responsible review and be considered for release to the public.

(Dr. F.J. Wrona, Ph.D., Science Director) — 28 JAN 94 (Date)

Whereas it is an explicit term of reference of the Science Advisory Committee "to review, for scientific content, material for publication by the Board",
IT IS HERE ADVISED BY THE SCIENCE ADVISORY COMMITTEE THAT;
this publication has been reviewed for scientific content and that the scientific practices represented in the report are acceptable given the specific purposes of the project and subject to the field conditions encountered.
SUPPLEMENTAL COMMENTARY HAS BEEN ADDED TO THIS PUBLICATION: [ ] Yes [✓] No

(Dr. P. A. Larkin, Ph.D., Chair) — 14 Feb 94 (Date)

Whereas the Study Board is satisfied that this publication has been reviewed for scientific content and for immediate health implications,
IT IS HERE APPROVED BY THE BOARD OF DIRECTORS THAT;
this publication be released to the public, and that this publication be designated for: [ ] **STANDARD AVAILABILITY** [ ] **EXPANDED AVAILABILITY**

(Bev Burns, Co-chair) — April 7/94 (Date)

(Lucille Partington, Co-chair) — April 7/94 (Date)

A GENERAL FISH AND RIVERINE HABITAT INVENTORY, ATHABASCA RIVER, APRIL TO MAY, 1992

STUDY PERSPECTIVE

> ***Related Study Questions***
>
> *6) What is the distribution and movement of fish species in the watersheds of the Peace, Athabasca and Slave rivers? Where and when are they most likely to be exposed to changes in water quality and where are their important habitats?*
>
> *12) What native traditional knowledge exists to enhance the physical science studies in all areas of enquiry?*
>
> *13b) What are the cumulative effects of man made discharges on the water and aquatic environment?*
>
> *14) What long term monitoring programs and predictive models are required to provide an ongoing assessment of the state of the aquatic ecosystems?*

The distribution, abundance and movement of fish is a major interest to the residents of the Peace, Athabasca and Slave rivers because they see these attributes as indicators of the aquatic ecosystems health. The extent to which these aspects are affected by development is a major area of interest to the Study. Information on the composition of the fish community, its seasonal use of riverine habitats for spawning, growth, overwintering and feeding, will assist investigators in understanding the influence of development and discharge on fish and fish behaviour.

Although various reaches of the lower Athabasca River had been subjected to previous field investigations, no prior work had been done on the Athabasca River from its source to the mouth. A fisheries survey of the Athabasca River was carried out during spring 1992 to characterize the composition and general abundance of fish within the mainstream river and lower tributaries soon after ice break-up. At best, the work was a snap shot of the aquatic ecosystem following the critical ice cover period. This initial information is important to designing subsequent field and laboratory investigations of behavioural and physiological change.

Fish species composition, abundance, distribution, and habitat characteristics were determined for ten reaches between Jasper Lake, Jasper National Park and Lake Athabasca. A total of 20 fish species were identified during the survey. Forage fish such as the flathead chub, trout-perch and lake chub dominated the numbers of fish caught. Despite having a distribution limited to the upper Athabasca River, mountain whitefish was the most abundant sport fish caught. A longitudinal demarcation of species presence resulted in mountain whitefish, bull trout, arctic grayling, rainbow trout being encountered only in the upper reaches of the Athabasca River, whereas walleye, northern pike and goldeye were more abundant in downstream sections. Longnose sucker was the most abundant coarse fish species and were distributed throughout the study area. In general, fish species diversity and abundance were greater in the lower reaches of the Athabasca River.

Fish populations have previously been extensively surveyed in the lower Athabasca River, but this was the first investigation to examine fish populations from the proximity of the river's headwaters to its mouth. Like the lower portion of the Athabasca River some other reaches of the river have been studied as a consequence of proposed resource development activities but very little has been done in the river above Smith. While these latter works have assisted us in better understanding the composition and dynamics of fish populations within the Athabasca River much work is needed to understand the interaction and dependency of fish populations in the Athabasca River and its tributaries. This survey has established a template for subsequent investigations of fish habitat and populations. In general, preliminary data have now been assembled to guide more detailed investigations of fish populations and their interaction with the available habitats of the Athabasca River and its tributaries. Additional investigations are required before linkages can be made between contaminant levels in edible fish, life history patterns, and fish health.

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The following employees of R.L. & L. Environmental Services Ltd. contributed to the collection of field data, analysis, or report preparation.

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Local assistance was provided by Curtiss Girard of Ft. Chipewyan.

REPORT SUMMARY

In spring 1992, R.L. & L. Environmental Services Ltd. was contracted by the Northern River Basins Study to carry out a general fish inventory of the Athabasca River and the lower reaches of its major tributaries. The information was required for monitoring and modelling the effects of current and future development on the resident and migratory fish populations of the Athabasca River. The objectives of this study were to (1) conduct a baseline fish/fish habitat inventory for the entire length of the Athabasca River, (2) provide recommendations for follow-up studies, (3) update existing fish/fish habitat inventory data, (4) collect samples of fish for contaminant analyses, and (5) conduct an assessment of tributaries in the study area. To accomplish these objectives, field studies were conducted at ten representative intensive survey sites in early spring 1992 on the Athabasca River. An assessment of forty-seven tributaries to the Athabasca River also was conducted.

Fish capture methods included boat electrofishing, gillnetting, beach seining, setlining, drift netting, and backpack electrofishing. All captured fish were identified, enumerated, measured, and weighed. Ageing structures were removed from a representative number of individuals for analysis. All fish were externally examined for evidence of disease or parasites. Individuals that succumbed were internally examined for evidence of parasites, disease or malformation of organs, sex, maturity, and stomach contents.

Two habitat classification systems were utilized to document and characterize river conditions. The first was based on river channel characteristics (e.g., Multiple Island Channel) and selected special habitat features (e.g., Backwater). Within intensive survey sites, a bank habitat classification system was used to reflect the association of fish species with channel margin habitats. This system was based on physical bank processes and conditions within major categories of bank forms (e.g., armoured/stable).

A total of 20 fish species were recorded from the Athabasca River study area. Of these, nine were classed as sport fish, two as coarse fish, and the remainder were forage fish. Major sport species, in order of decreasing abundance, included mountain whitefish, walleye, goldeye, northern pike, burbot, and Arctic grayling. Low numbers of bull trout, rainbow trout, and lake whitefish also were collected. Fish species distribution and abundance varied between sampling locations. Mountain whitefish dominated the sport fish catch in the upper and middle reaches of the Athabasca River but were absent from the catch in the lower reaches. Walleye were absent from the catch in the two uppermost reaches of the study area and exhibited a sporadic distribution in the rest of the mainstem, being more abundant in the Fort McMurray area. Goldeye first appeared in the catch below the Pembina River confluence but were more abundant in the lower reaches of the Athabasca River. Northern pike were encountered in low abundance in all reaches. Burbot abundance was low throughout the study area, while Arctic grayling were collected only from a single reach in the upper portion of the drainage.

Longnose sucker and white sucker were the two coarse fish species recorded from the study area. Longnose sucker were dominant and were encountered in all reaches. White sucker were encountered throughout most study reaches, although usually in low abundance.

Nine forage fish species were collected within the study area; flathead chub were the most abundant followed by trout-perch and emerald shiner.

Evidence of possible spawning use of the Athabasca River by spring spawning sport and coarse fish species was noted at some sites (based on either the presence of adults in spawning condition or young-of-the-year). Captures of walleye in spawning condition (i.e., ripe and spent males and spent females) at sites 8 and 9 suggested that spawning may have occurred within these areas. Mountain Rapids at Site 8 may provide suitable spawning habitats for walleye. The capture of young-of-the-year walleye at Site 9 provided indirect evidence of spawning activity either in Reach 9 or in nearby upstream reaches or tributaries (e.g., MacKay River).

Northern pike in spawning condition (i.e., gravid or ripe females) were captured along mainstem margins at sites 3, 5, 9, and 10. However, the absence of site-specific spawning areas (based on concentrations of adults in spawning condition) and the lack of suitable spawning habitat (i.e., vegetation, shallow-water, little or no current) indicates limited spawning use of the mainstem Athabasca River.

The presence of ripe female goldeye at Site 8 suggested that this species utilized this area of the Athabasc River for spawning. Spawning habitats for coarse and forage fish species and rearing, feeding/holding, and overwintering habitats for all fish species were identified.

Habitat mapping of major channel habitat types was completed for the mainstem Athabasca River. The upper and lower reaches (i.e., reaches 2, 3, 9, and 10) were characterized by Type M channel (i.e., multiple Channel) whereas Type U channel (i.e., Unobstructed Channel) predominated in the middle reaches of the Athabasca River (i.e., reaches 4, 5, 6, 7, and 8). Type S channels were not frequently encountered in the study area. Channel type distribution within the intensive survey sites was similar to that recorded for the reaches. The distribution and composition of bank habitat types were mapped at all intensive survey sites. A total of eighteen bank habitat types were identified at the 10 intensive survey sites. These included armoured/stable, depositional and erosional bank habitat types. Preferred habitats utilized by fish were identified. Bankside habitats associated with armoured/stable bank types exhibited the greatest use by sport and coarse fish. Forage fish and juvenile coarse fish selected depositional bank types. Lowest fish use was recorded along erosional bank types.

Forty-seven tributaries of the Athabasca River were examined and rated for overall sport fish production potential, based on habitat conditions and fish species encountered at the time of the survey. This rating applied only to an area sampled within the influence of the Athabasca River (i.e., maximum upstream distance sampled for any tributary was 4000 m upstream of its confluence with the Athabasca River). Habitat conditions within representative sections were mapped and fish populations were investigated using either boat-mounted or backpack electrofishing equipment.

Fish for contaminant analyses were collected from 12 sites. Fish were collected according to protocols stipulated by the Northern River Basins Study, maintained frozen on dry ice, and subsequently shipped to Edmonton.

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SECTION 1
INTRODUCTION

1.1 STUDY DESCRIPTION

Although considerable fisheries information has been collected over the years in the Athabasca River system below Grand Rapids (e.g., through AOSERP studies, Syncrude/Suncor environmental studies, Peace-Athabasca Delta studies), less is known about the locations of critical fish habitat and fish species composition, distribution, and abundance in the middle and upper reaches of the Athabasca River. This information is required to monitor the sensitivity of resident and migratory fish populations to present developments in the basin (e.g., pulp mills, oil sands plants, petrochemical developments, municipal effluent treatment plants) and to allow predictive modelling of potential impacts of any future developments.

R.L. & L. Environmental Services Ltd. was contracted in April 1992 to conduct an inventory of fish and fish habitat of the Athabasca River mainstem and lowermost reaches of selected tributaries between the outlet of Jasper Lake and Lake Athabasca. An additional component of the study involved collecting fish for contaminant analyses. The study period (21 April to 21 May 1992) was selected to correspond to spring flow regimes before the onset of freshet conditions, which normally begin in mid to late May.

1.2 STUDY OBJECTIVES

The general objectives of the study as outlined in the Terms of Reference (Appendix A) were as follows:

- To conduct a baseline fish/fish habitat inventory during spring 1992,
- To provide recommendations and strategies for follow-up inventories and fish migration studies during subsequent seasons and years of the Northern River Basins Study,
- To integrate and update fish/fish habitat inventory data gathered from this study with existing information on the fish/fish habitat of the Athabasca River drainage basin, and
- To obtain samples of fish from selected areas throughout the drainage for analysis of contaminants.

1.3 STUDY AREA

The primary study area included the mainstem Athabasca River from the outlet of Jasper Lake downstream to the confluence at Lake Athabasca. The study area reaches, intensive survey site locations, and surveyed tributaries are illustrated in Figure 1.1.

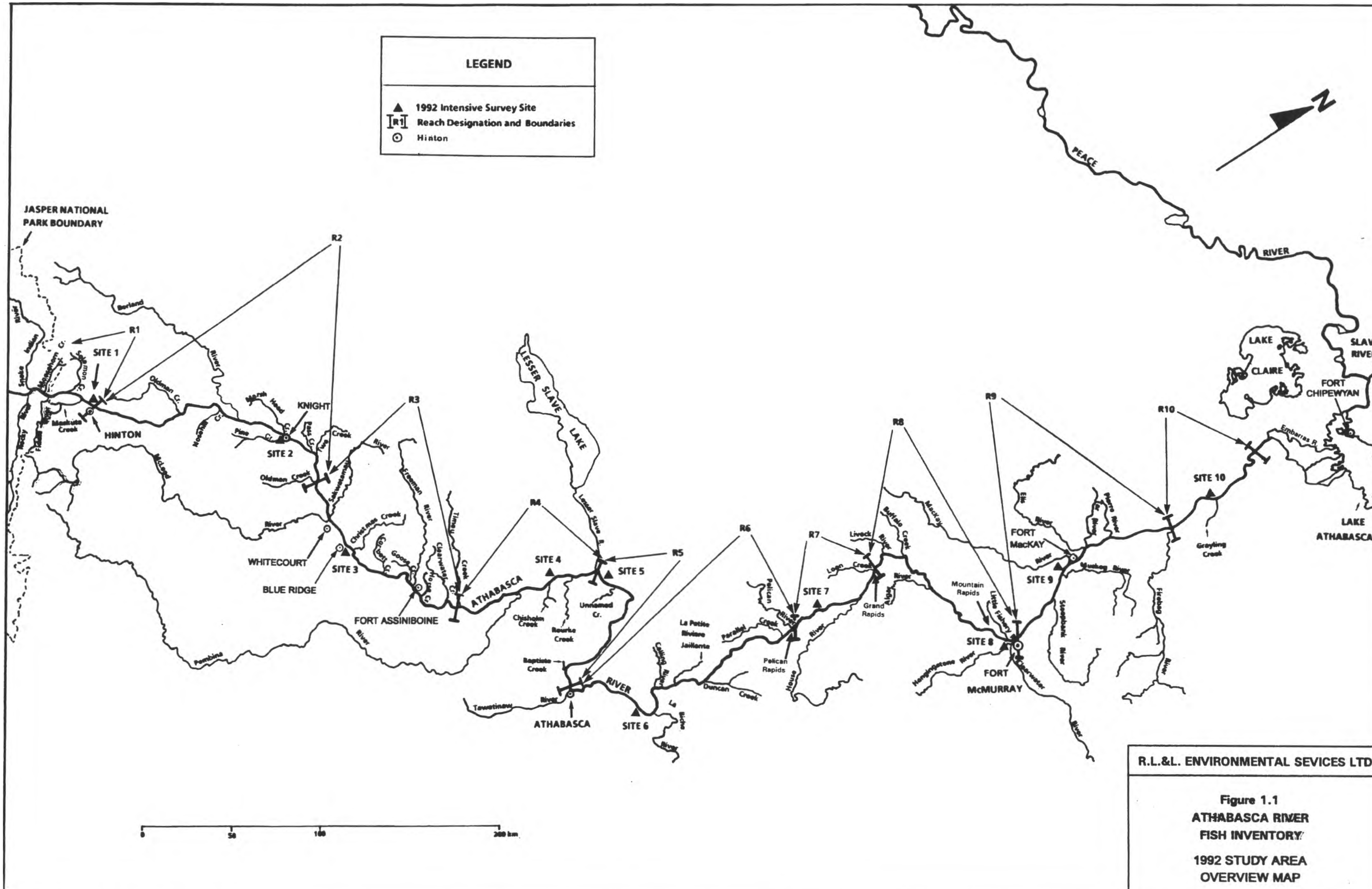

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Figure 1.1
ATHABASCA RIVER
FISH INVENTORY

1992 STUDY AREA
OVERVIEW MAP

SECTION 2
METHODS

2.1 AQUATIC HABITAT ASSESSMENT

2.1.1 Study Reach and Intensive Survey Site Selection

The initial phase of the intensive survey site selection involved classification of the Athabasca River into homogenous segments or reaches based on a preliminary review of National Topographic Series (NTS) maps (1:250 000 and 1:50 000 scale) and available reports.

In total, 10 preliminary study reaches were identified on the Athabasca River between Jasper Lake and Lake Athabasca (Table 2.1). Criteria involved in the reach allocation process included the following:

- differences in major channel characteristics (singular vs. braided channel, islands, etc.),
- point sources of industrial (pulp mill and oil sands extraction) and domestic (sewage) effluent,
- entry of major tributaries, and
- length of reach (i.e., as it relates to the distance between survey sites).

Table 2.1 Athabasca River study reaches.

REACH NO.	LOCATION	SELECTION RATIONALE[a]
1	Jasper Lake to Hinton	Habitat Separation
2	Hinton to above Whitecourt	Habitat Separation, Domestic/Industrial Effluent
3	Above Whitecourt (Oldman Creek) to below Fort Assiniboine	Habitat Separation, Domestic/Industrial Effluent
4	Below Fort Assiniboine (Vega Crossing) to Lesser Slave River	Habitat Separation
5	Lesser Slave River to Athabasca	Domestic/Industrial Effluent
6	Athabasca to Pelican Rapids	Habitat Separation, Domestic/Industrial Effluent
7	Pelican Rapids to Grand Rapids	Habitat Separation
8	Grand Rapids to Fort McMurray	Habitat Separation/Fish Movement Blockage
9	Fort McMurray to Firebag River	Habitat Separation, Domestic/Industrial Effluent
10	Firebag River to Embarras River	Habitat Separation

[a]Major factors differentiating reach from adjacent reaches.

The intensive survey sites were selected using 1:50 000 NTS maps and aerial photographs. Each site had to meet specific criteria. It had to (1) be representative of the river reach in which it was located; (2) provide pertinent biological and hydraulic information that would aid in answering project-related questions; (3) be of a sufficient size to provide a range of representative habitats, yet small enough to allow efficient analysis using relatively simple sampling techniques; (4) wherever possible, be accessible by vehicle (i.e., to provide logistic support); and (5) be situated within one-day boat travel from adjacent sites.

Access to all intensive survey sites was by jet-drive riverboat. Tent camps were established at each site. A four-wheel drive truck provided logistic support into most sites (gear transportation, gas, resupplying, etc.). However, vehicle support could not be used at Sites 7 and 10 (Figure 1.1). A local riverboat and operator were chartered to provide logistic support into Site 7, and logistic support at Site 10 was provided by chartered aircraft from Fort McMurray.

2.1.2 Habitat Availability and Utilization

A habitat approach was used to document present conditions of the fisheries resources of the Athabasca River. This approach required that the existing habitat conditions at each site be documented in sufficient detail to allow seasonal comparisons. In addition, it required that the utilization patterns of fish species within the sites be identified with respect to the available habitat.

The first requirement was met using a combination of field measurements and observations; channel cross section surveys and photographs of existing habitat observed at each site were used for this purpose. Habitat classifications used in this study were based on gross morphological, surficial, and hydraulic characteristics and, therefore, are very broad and generalized in scope.

Major channel habitat types and bankside habitat classifications were identified based on a habitat classification system developed for use on the Peace River by R.L. & L. Environmental Services Ltd. (Hildebrand 1990). These classification systems were adapted for use on the Athabasca River. The major channel and bank habitat types are described in detail in Appendices B1 and B2, respectively.

Mapping was done on aerial photographs and ground-truthed by boat at intensive survey sites. A detailed listing of the air photo series used is provided in Appendix B4.

Fish Species Habitat Selection

The use of a particular habitat type by fish was identified by their presence or absence within the special habitat features and bank habitat types (i.e., macro-habitats) in the Athabasca River mainstem. Because these macro-habitats often exhibited a wide range of variables, including depth, velocity, substrate, and cover, they likely contained distinct micro-habitats selected by fish for their various life-history functions. The identification and measurement of habitat variables on a micro-habitat level is preferred because it allows the development of habitat preference criteria and habitat suitability curves, quantifiable parameters developed for use in instream flow assessments (Bovee and Cochnauer 1977). The micro-habitat approach was not used in this study for the following reasons:

- the large study area, limited available sampling time, and general overview nature of the study;

- the difficulties in accurately measuring micro-habitat variables in deep or fast river areas sampled by boat electrofishing (a primary sampling method) and determining the exact capture location of a fish in turbid water conditions; and

- the emphasis on important (i.e., sport fish) species; most sport fish captured were adults or large juveniles, size-classes that can utilize a wide range of habitat conditions and, therefore, require large sample sizes to accurately define micro-habitat selection criteria.

Because of these limitations, the approach used in this study was qualitative and limited to a general description of macro-habitat selection based on capture results and field observations. During the collection of these data, similarities in the habitat parameters selected by a particular species were observed among sample sites. This observation, combined with a need to generate a large data base, resulted in the grouping of macro-habitat selection observations for each species from all sample sites in the study area. The following assumptions were made in the grouping of these data:

- the observation of a fish species within a range of habitat parameters (i.e., within a macro-habitat type) is indicative of habitat selection, as species tend to select the most favourable conditions within a stream (Trihey 1979); and

- a particular species' life stage will select similar habitat parameters throughout its range.

The primary habitat parameters evaluated in the present study were depth, velocity, substrate, and cover. Although these parameters generally are associated with the definition of micro-habitats, in this study they were used to provide a broad definition of macro-habitats. Limitations of the sampling methods resulted in one or more of these parameters remaining relatively consistent in all sampled areas. For example, the capture efficiency of boat electrofishing is greatly reduced at depths over 3 m; therefore, habitats sampled by this method generally ranged from 1 to 2 m in depth. Gill nets were most effective when set in habitats with low current velocity and depths greater than the net height (i.e., >2.5 m). Seining was limited to shallow (<1.0 m depth) channel margin habitats with a relatively smooth bottom type.

In addition to measurements of the four habitat parameters given above, observations of species habitat selection with regard to water temperature and turbidity were noted.

Habitat Data Collection and Field Measurements

a) Fish Sampling

The determination of fish use patterns with respect to habitat availability or preference was an important component of the fish sampling program. In addition to supplying data regarding the relative abundance and distribution of fish, the three major capture methods (i.e., seining, gill netting, and electrofishing) provided generalized species habitat criteria data required to develop information on the range and preferred habitat conditions selected by the fish species in the study area.

Habitat data collected during electrofishing and gill netting operations included depths, substrate composition, and identification of available cover types associated with capture locations of sport fish species. Where possible, flow velocity was measured with a Swoffer Model 2100 series velocity meter, although most areas sampled by boat electrofishing and gill netting were generally too deep (i.e., >1.0 m) to permit velocity measurements using the meter with a wading rod. Flow velocities in deep- and fast-water areas were visually estimated due to the difficulties in obtaining accurate velocity measurements from a large boat. Estimated velocities were assigned Low (<50 $cm \cdot s^{-1}$), Moderate (50-100 $cm \cdot s^{-1}$), or High (>100 $cm \cdot s^{-1}$) ratings.

Habitat data collected during seining operations included water temperature, depths, velocities, substrate composition, water clarity, and cover type. During seining, an attempt was made to sample discrete habitat types within a narrow range of physical parameters.

Substrate classification was based on a subjective evaluation using the modified Wentworth rating system presented in Table 2.2.

Table 2.2 Substrate rating system.

TYPE	SIZE RANGE (mm)	CODE
Bedrock	-	BE
Boulder	>256	BO
Cobble	65-256	CO
Pebble	17-64	PE
Gravel	3-16	GR
Sand	0.06-2	SA
Silt	0.06-0.004	SI
Clay	<0.004	CL
Detritus	-	DE

Where substrate could be visually identified, the percentage composition of each substrate type was estimated. In deeper areas, bottom type was determined either using a 3.0 m long aluminum pole to "feel" the bottom or from echo sounder tracings. Substrate classification in these areas was generally limited to the identification of the dominant/co-dominant types (e.g., sand/silt, cobble/boulder, etc.).

b) Stream Flow

Water surface elevations were recorded to allow an evaluation of habitat conditions associated with or produced by differing flow regimes at a future date. A temporary benchmark (TBM) was established at each intensive survey site and consisted of a 25 cm long spike driven into the base of a tree situated above the high-water mark. The benchmark was marked with orange surveyor tape; an aluminum site marker affixed to the tree identified the site as an R.L. & L. benchmark. Water-surface elevations were determined by differential levelling, using an automatic level and surveyor's rod. Assumed elevations of 100.00 m were used at each site.

c) Channel Morphometry

Within intensive survey sites, channel cross-sectional profiles and bankside habitat configurations were determined using a Lowrance X-15 chart recording computer sonar. Transects of selected habitat types were surveyed using the sonar to provide a better definition of habitat characteristics (Appendix C). Additional transects were conducted at both the upstream and downstream ends of the intensive survey sites and at the benchmarks. Photographic records of water-level conditions and habitat conditions also were obtained at each site (Appendix I).

2.2 FISH POPULATION INVENTORY

Fish were collected by a variety of methods that included electrofishing (boat and backpack), multi-mesh gill nets, seines, dip nets, drift nets, and setlines. Capture methods were used in a manner that endeavoured to provide a representative sample of the fish community at the species and life-stage levels (i.e., adult, juvenile, and young-of-the-year). Samples taken within each reach will enable comparisons of fish abundance, size, and occurrence between reaches, habitat types, and for different sampling periods. All sites were related to a legal land description, Universal Tranverse Mercator Coordinates for Zone 11 (using a Trimble Navigation Transpak Global Positioning System (GPS), and corrected as necessary), and the national hydrometric watershed code.

2.2.1 Boat Electrofishing

The primary objectives of the boat electrofishing program were to (1) locate concentrations of fish, (2) obtain specimens for life history analysis, and (3) provide data on species composition and relative abundance at each site and within available bank habitat types. Electrofishing was conducted along representative bank habitat types at each study site and in selected special habitat features (e.g., snyes).

At most sites, sampling was conducted from a 5.5 m Smith-Root SR-18 electrofishing boat with a GPP-5.0 electrofishing system and propelled by a 200 hp outboard jet unit. The amperage output of the electrofishing system ranged from 4 to 6 A, with pulse rate and width set at 60 pps and 507 ms, respectively.

Sites 8, 9, and 10 were sampled from an 6.8 m Valco aluminum riverboat propelled by a 200 hp outboard jet unit. Boat electrofishing from the Valco was conducted using a Smith-Root Type VIA electrofishing system. A 4000 W generator provided input voltage of 230 V AC at approximately 15 A. Output voltages from 0 to 1000 V DC (pulsed) (116-V steps) at 0.1-10 A were available to the operator. Highest capture effectiveness occurred with the unit producing 4-6 A; voltage generally was set at either 504 or 672 V DC to produce the desired amperage (i.e., depending on depth, substrate, and conductivity). A pulse rate of 60 pps was utilized with pulse width normally set between 5 and 7 ms.

The boat electrofishing procedure consisted of drifting downstream at motor idle with the boat maintained near shore. The netters attempted to capture all fish stunned by the electrical field. Fish avoiding the netters but positively identified were enumerated and recorded as "observed" at the end of each sample section. Following capture, fish were placed in an on-board holding tank until processed.

All fish over 250 mm in length and not required for other components of the study (e.g., contaminant analyses) were marked with a numbered Floy FD68B anchor tag. In addition to the tag number, each tag carried the address of the Northern River Basins office in Edmonton. Only fish in good physical condition and exhibiting normal behaviour were tagged. The tag was first immersed in an antiseptic, then inserted using a Dennison Mark II applicator gun into the dorsal musculature immediately below the dorsal fin between the pterygiophores. The tag was then checked to ensure it was inserted securely. Information obtained from each tagged fish included species, fork length (mm), weight (g), tag number, date of tagging, location of release, and sex and maturity when they could be determined through external examination.

Pertinent data recorded at boat electrofishing sections included fish captured or observed, section length (km), sampling time (s), habitat conditions (depth, velocity, substrate, cover type, etc.), water temperature and conductivity, and electrofisher settings. Indices of fish abundance (catch-per-unit-effort) were generated utilizing distance sampled (i.e., number of fish captured per km of shoreline). Distance sampled, rather than time sampled, was chosen as the basis for CPUE indices because this unit of measure was consistent at all sites. Use of distance sampled also allowed comparisons of CPUE indices between sites.

2.2.2 Gill Nets

A gill netting program was implemented to determine fish use of quiet-water habitats within each intensive survey site. Gill net panels (15.2 m long x 2.4 m deep) with a range of mesh sizes (3.8, 6.4, 8.9, and 11.4 cm stretched measure monofilament mesh) were employed to maximize the array of species and sizes of fish captured. To the extent possible, gill nets were set in major holding areas (backwaters, snyes, etc.). Nets generally were set overnight. Data collected at each netting location included set duration, depth, velocity, substrate, cover characteristics, water temperature, and Secchi disc visibility. Set efficiency was recorded as the degree of net fouling rated from 1 to 4, where 1=high efficiency (net clean) and 4=low efficiency (net heavily fouled). Owing to the low availability of backwaters and snyes of sufficient size and depth, gill nets could not be set at most sites. CPUE data were generated for each set on a net-unit basis (i.e., 1 net unit=100 m^2 of gill net surface area fished for the equivalent of a 12-hour period).

2.2.3 Seines

A seining program was undertaken at each intensive survey site to determine the distribution, abundance, and habitat preferences of fish utilizing shallow-water habitats (i.e., forage fish, young-of-the-year and juvenile sport and coarse fish). Seine hauls were conducted in a variety of shallow water habitats. A 5.0 m (length) by 1.5 m (depth) beach seine, with 1.27 cm nylon mesh (collection bag of 0.6 cm mesh) was utilized. Physical parameters recorded at seine haul sites included depth, velocity, and substrate composition. Haul length, width, and efficiency, along with water temperature and Secchi visibility, also were recorded. CPUE data (no. fish/100 m^2 of seined area) were calculated for each species.

2.2.4 Setlines

Baited setlines (consisting of 20 No. 7/0 regular shank hooks, with a one metre interval between each hook), generally set overnight, were used primarily to capture species that were difficult to obtain by other methods (e.g., burbot). Bait consisted of various fish species that succumbed during capture by other sample methods or were sacrificed for life-history data. Setline sites were established in all of the intensive study sections; CPUE data (no. fish/100 hook hours) were generated for each set.

2.2.5 Drift Nets

A drift net sampling program was established in each intensive survey site to determine the distribution and abundance of young-of-the-year fall and winter spawning species (i.e., mountain whitefish, lake whitefish, burbot, and bull trout). The primary method consisted of setting a drift net attached to metal rods anchored in the substrate to capture larval fish in the drift. Each drift net consisted of a 1 m long funnel constructed of 153 μm nitex netting terminating in a 1 L perforated collection bottle also covered with 153 μm nitex netting. The sampling area of the 30 x 60 cm rectangular opening was 1800 cm^2. At each intensive survey site, two nets were set overnight in various habitat types along nearshore areas of the mainstem Athabasca River. Dip netting for larvae occupying stream margins and quiet backwaters also was conducted. Data collected at each net location included set duration, depth, velocity, substrate, water temperature, and Secchi disc visibility. Specimens collected were preserved in 90% alcohol. CPUE data (no. fish/hour) were generated for each set.

2.2.6 Backpack Electrofishing

The objectives of the backpack electrofishing sampling program were to sample nearshore areas that could not be sampled by other methods and to provide additional information on the distribution and abundance of young-of-the-year. A Smith-Root Type XI backpack electrofisher was utilized. Pertinent data recorded at each sampling site included fish captured or observed, section length, sampling time, habitat conditions (depth, velocity, substrate, cover type, etc.) water temperature, and electrofisher settings. CPUE data (no. fish/s) were generated for each section.

2.3 TRIBUTARY HABITAT ASSESSMENT

2.3.1 Aquatic Habitat Assessment

Habitat Data Collection and Field Measurements

Habitat surveys were conducted in the lower sections of forty-seven of the fifty-one specified tributaries (Table 2.3). The tributaries were assessed to determine their potential suitability for providing critical habitats for specific life requisite functions (spawning/migration, rearing, adult feeding/holding, overwintering) of mainstem Athabasca River sport fish populations. Four tributaries were not sampled (Loon Creek, Livock

Table 2.3 Athabasca River tributaries (confluence and lower reach) examined during spring sampling period, 1992.

REACH	TRIBUTARY	LAND DESCRIPTION
R1	Rocky River	48-28-W5
	Snake Indian River	48-28-W5
	Moosehorn Creek	49-27-W5
	Fiddle River	49-27-W5
	Solomon Creek	49-27-W5
	Maskuta Creek	51-25-W5
R2	Oldman Creek	55-22-W5
	Berland River	58-20-W5
	Nosehill Creek	58-20-W5
	Pine Creek	60-18-W5
	Marsh Head Creek	60-18-W5
	Pass Creek	61-16-W5
	Two Creeks	61-15-W5
	Oldman Creek	60-14-W5
R3	Sakwatamau River	60-12-W5
	McLeod River	60-12-W5
	Christmas Creek	60-10-W5
	Corbett Creek	61-7-W5
	Goose Creek	61-6-W5
	Freeman River	61-6-W5
	Horse Creek	61-5-W5
	Clearwater Creek	63-4-W5
R4	Timeu Creek	63-3-W5
	Pembina River	66-2-W5
	Chisholm Creek	68-2-W5
	Rourke Creek	70-1-W5
R5	Unnamed Creek	8-72-25-W4
	Baptiste Creek	67-23-W4
R6	Tawatinaw River	66-22-W4
	Calling River	70-19-W4
	La Biche River	69-18-W4
	La Petite Riviere Jaillante	73-18-W4
	Duncan Creek	73-18-W4
	Parallel Creek	78-17-W4
	Pelican River	79-17-W4
R7	House River	83-16-W4
	Loon Creek[a]	84-17-W4
R8	Livock River[a]	86-18-W4
	Buffalo Creek[a]	87-17-W4
	Algar River[a]	87-14-W4
	Hangingstone River	89-9-W4
	Little Fishery River	89-9-W4
	Clearwater River	89-9-W4
R9	Steepbank River	92-10-W4
	MacKay River	94-11-W4
	Muskeg River	94-10-W4
	Ells River	96-11-W4
	Tar River	96-11-W4
	Pierre River	97-10-W4
R10	Firebag River	101-9-W4
	Grayling Creek	104-9-W4

[a]Not surveyed; inaccessible by boat due to presence of Grand Rapids.

River, Buffalo Creek, and Algar River) due to their proximity to non-navigable Class VI rapids (i.e., Grand Rapids). Tributaries were sampled immediately upstream of the zone of influence from the Athabasca River. Sampling sections varied in length from 100 m to 2000 m depending on the size of the tributary.

Within the selected sampling section, habitat was rated and quantified (i.e., percentage composition based on visual estimates) into discrete cover types using the R.L. & L. Stream Habitat Classification System (Appendix B3). This system has been used effectively on many streams in Alberta and provides a rapid means of assessing carrying capacity for specific life requisites (i.e., spawning, rearing, adult feeding/holding, overwintering) for the various streams.

Pertinent habitat data (relating to major habitat limiting factors) recorded at each sampling site included bank erosion and cover, instream cover, substrate size and type, and depth. The investigated section also was assigned a preliminary habitat suitability rating for target species (i.e., sport fish) and life requisite functions. Photographic records were taken of each sampling site.

2.3.2 Fish Collection

The electrofishing program provided data on species composition and relative abundance at each site. Backpack electrofishing was conducted along each bank and, water depth permitting, throughout the stream channel. A Smith-Root Type XI electrofisher unit was used in streams that were shallow. In some of the larger creeks and rivers either a Smith-Root SR-18 electrofishing boat with a GPP-5.0 electrofishing system or a Valco aluminum riverboat fitted with a Smith-Root Type VIA electrofishing unit was utilized. Settings and methods were similar to those described in Section 2.2.1.

The fish sampling sections corresponded to sections sampled for the tributary habitat assessment component. Pertinent data recorded at the electrofishing sections included number of fish captured or observed, sampling time, water temperature and conductivity, and electrofisher settings.

2.4 LIFE HISTORY COLLECTIONS

Life history data were collected from all fish. This information included fork length (to the nearest millimetre) and weight (g); sex and maturity were determined by dissection, external examination, or release of sexual products. Appropriate ageing structures as suggested by Mackay et al. (1990) were collected from a subsample of sport fish. Ageing was conducted using the appropriate laboratory technique for each structure. Stomach content data, obtained from sport fish succumbing to the capture method, were visually identified in the field. These fish were subsequently examined internally and externally for evidence of disease, parasites, and malformation of organs. Released fish were externally examined. Since all fish encountered appeared to be healthy, "Gross Pathology" forms were not filled out.

The procedure used for assessing feeding habits followed the method described by Thompson (1959), which is a modification of the numerical method used by Hynes (1950). The stomach was examined and evaluated for fullness and allotted a certain number of points (i.e., 20 points for a full stomach and 0 points for an empty stomach). After points were allotted for the degree of fullness, the stomach was opened and the points were distributed among individual food categories observed based on volume. To account for the presence of empty stomachs, values of zero were incorporated into the analysis. This was accomplished by subtracting the total points of food items observed in a sample of fish from the total potential points for that sample (i.e., number of fish in sample x 20 minus total points of food items observed). The resulting value was allotted to an "empty category". A point total was then calculated for each food group.

All fish life history data was entered onto computerized data sheets; data analysis was conducted using FISHPAK, an in-house software developed by G. Ash. Data output included length, weight, sex and maturity, and capture data for individual fish and combined length-frequency, weight-frequency, length-weight regression, and condition factor data for each species. Length and weight frequency distributions for each species have been provided for each site and gear type. This information has been submitted on disc in ASCII format.

2.5 CONTAMINANT FISH

Methods for the collection of fish for contaminant analyses and a list of fish collected are presented in Appendix F.

SECTION 3
REACH INVENTORY

3.1 PREVIOUS STUDIES

Wallace and McCart (1984) completed an extensive review of the literature dealing with fish inventory studies conducted on the Athabasca River Basin. The following provides a brief overview of their findings. A limited amount of fisheries inventory information exists for the upper portion of the Athabasca River (i.e., Jasper Park boundary to Fort Assiniboine). Early studies conducted by Dempsey in 1945 found that this section of river supported populations of rainbow trout, Dolly Varden, Arctic grayling, northern pike, lake whitefish, and mountain whitefish. Non-sport fish species included brook stickleback, pearl dace, white sucker, and longnose sucker. During 1955, Miller encountered similar species assemblages from Hinton to Fort Assiniboine. More recent work completed by Alberta Fish and Wildlife in 1980 indicated the presence of walleye, flathead chub, and goldeye.

Prior to 1984, fish populations were not studied extensively between Fort Assiniboine and Grand Rapids, which is approximately 140 km upstream of Fort McMurray (Wallace and McCart 1984). In 1988, Beak completed a general fisheries inventory in the vicinity of the Calling River (B. Schelast, Biologist, Sentar Consultants Ltd., pers. comm.). This was followed by detailed fisheries studies by Sentar Consultants Ltd. within the Alberta-Pacific Forest Industries Inc. (ALPAC) study area in 1991 and 1992. Fish species encountered in this area included mountain whitefish, northern pike, goldeye, burbot, and walleye.

The section of the Athabasca River between Grand Rapids and Fort McMurray lies within the former Alberta Oil Sands Environmental Research Program (AOSERP) study area and, as such, was studied in detail (Wallace and McCart 1984). This section of river serves as a major spawning area for several species of fish. A lake whitefish population that overwinters in Lake Athabasca utilizes the Mountain and Cascade rapids for fall spawning. McCart et al. (1982) estimated that a minimum of 300 000 lake whitefish spawn in the area. Tripp and McCart (1979) suggested that walleye migrating from Lake Athabasca and the lower Athabasca River may also spawn in this area. This hypothesis was based on catches of young-of-the-year fish, and not the presence of spawning walleye. The same researchers established that longnose suckers also use the area for spring spawning. Wallace and McCart (1984) stated that Cascade Rapids was at least a partial barrier to the movements of fish. The existing data suggest that densities of fish are consistently higher in the reach of the Athabasca River from Fort McMurray to Cascade Rapids than in the reach immediately upstream of these rapids. They based this statement on CPUE values generated from gillnet and minnow seine catches.

The Athabasca River between Fort McMurray and the Peace-Athabasca Delta is within the former AOSERP study area. As such, the mainstem river and its tributaries have been intensively studied (Wallace and McCart 1984). Species composition, fish distribution and life histories of major fish species have been documented. As many as 27 species of fish have been identified in the area. Many of the major fish species utilize the Athabasca River mainstem as a migratory route between overwintering, summer feeding, and spawning areas. The relative abundance of various fish utilizing the Athabasca River mainstem in the vicinity of Mildred Lake has been provided by Bond (1980). Trout-perch were the most abundant species (25% of all catches) followed by longnose and white suckers (32%). Lake whitefish (8%) and goldeye (10%) were common, followed by walleye (6%), northern pike (3%), and yellow perch (1%).

Since 1984, several fisheries inventories have been completed in the area. In 1988, Beak completed an inventory in the vicinity of the Suncor Tar Sands Plant (B. Schelast, pers. comm.). Fisheries surveys on the mainstem river and several tributaries (e.g., MacKay River) also have been conducted on a regular basis as part of Syncrude's monitoring program (T. VanMeer, Environmental Coordinator, Syncrude Canada Ltd., pers. comm.).

3.2 PRESENT STUDY

The present study area extended from the Peace-Athabasca Delta (Km 0.0) to Jasper Lake (Km 1278.0). The Athabasca River was divided into 10 major reaches, based on river gradient, channel morphology, and point sources of industrial and domestic effluent. Ten intensive survey sites (one in each reach) were established in sections of river considered representative of habitat conditions within that particular reach (refer to Appendix G for maps of sampling locations at intensive survey sites).

The Athabasca River can exhibit widely fluctuating annual flows. The hydrograph in Figure 3.1a illustrates the seasonal variations at three Water Survey of Canada gauging stations; Hinton (upstream), Athabasca (middle), and Fort McMurray (downstream) for the period 1965-1990. Lowest discharges occur during winter months (i.e., January, February, March, and December), with flows peaking in late June and early July. By mid-summer, flows are already decreasing, stabilizing by early December.

Figure 3.1b illustrates mean daily discharges during the study period for the Athabasca River at Hinton, Athabasca, and Fort McMurray. Discharges during the study period were lowest at Hinton and highest at Fort McMurray. This difference reflects the addition of tributary waters to the mainstem Athabasca River. Water-level fluctuations were similar at all three locations, but a lag time of six days occurred between Hinton and Fort McMurray.

The Athabasca River has a moderate gradient in its upper and middle reaches (Figure 3.2). Reach lengths ranged from 52 to 189 km; average channel gradients ranged from 0.08 to 1.37 m/km (Table 3.1).

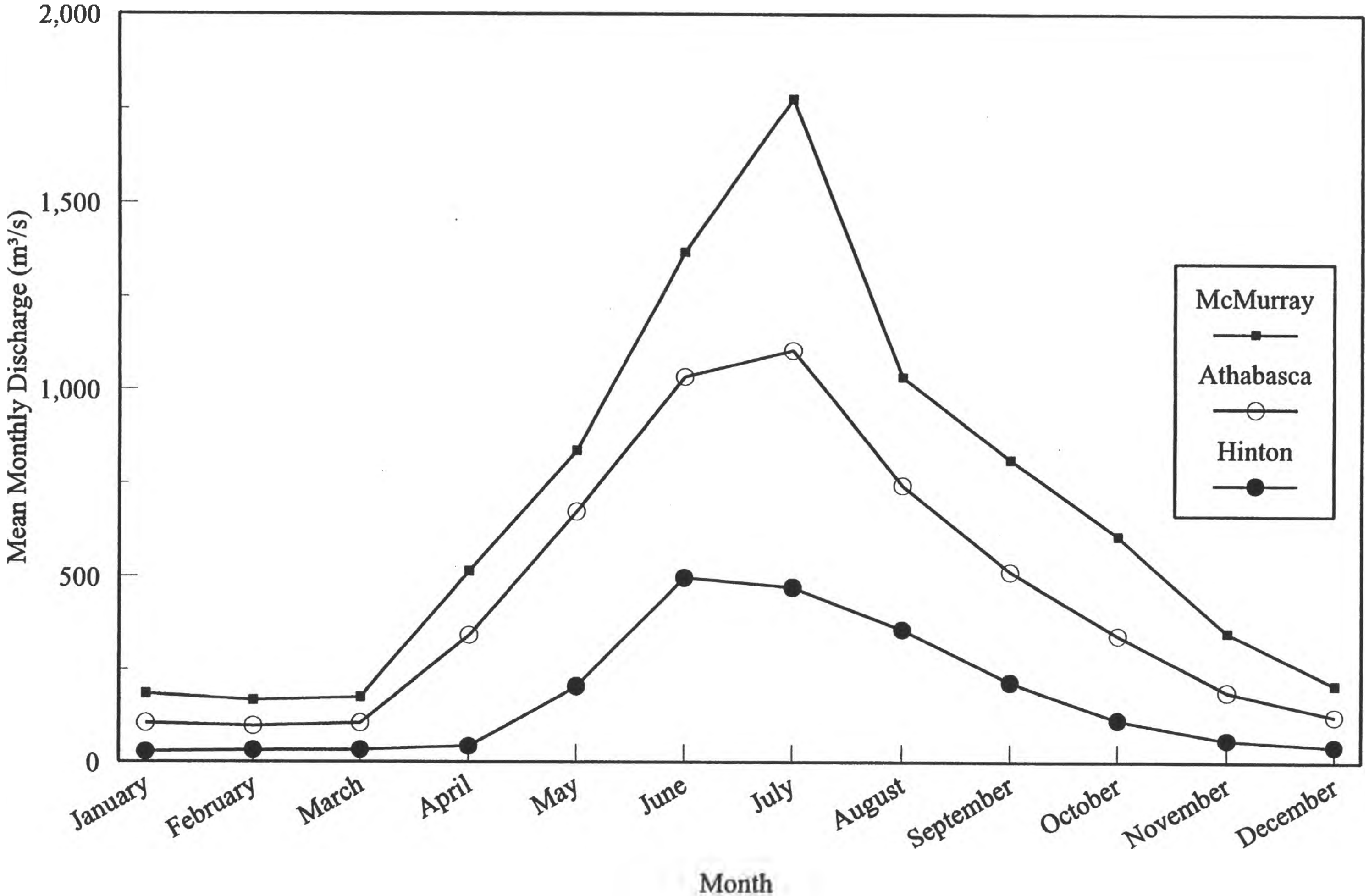

Figure 3.1a Mean monthly discharge (m^3/s) at three stations on the Athabasca River from 1965 to 1990 (Source: Historical streamflow summary, Alberta. Env. Can. 1991).

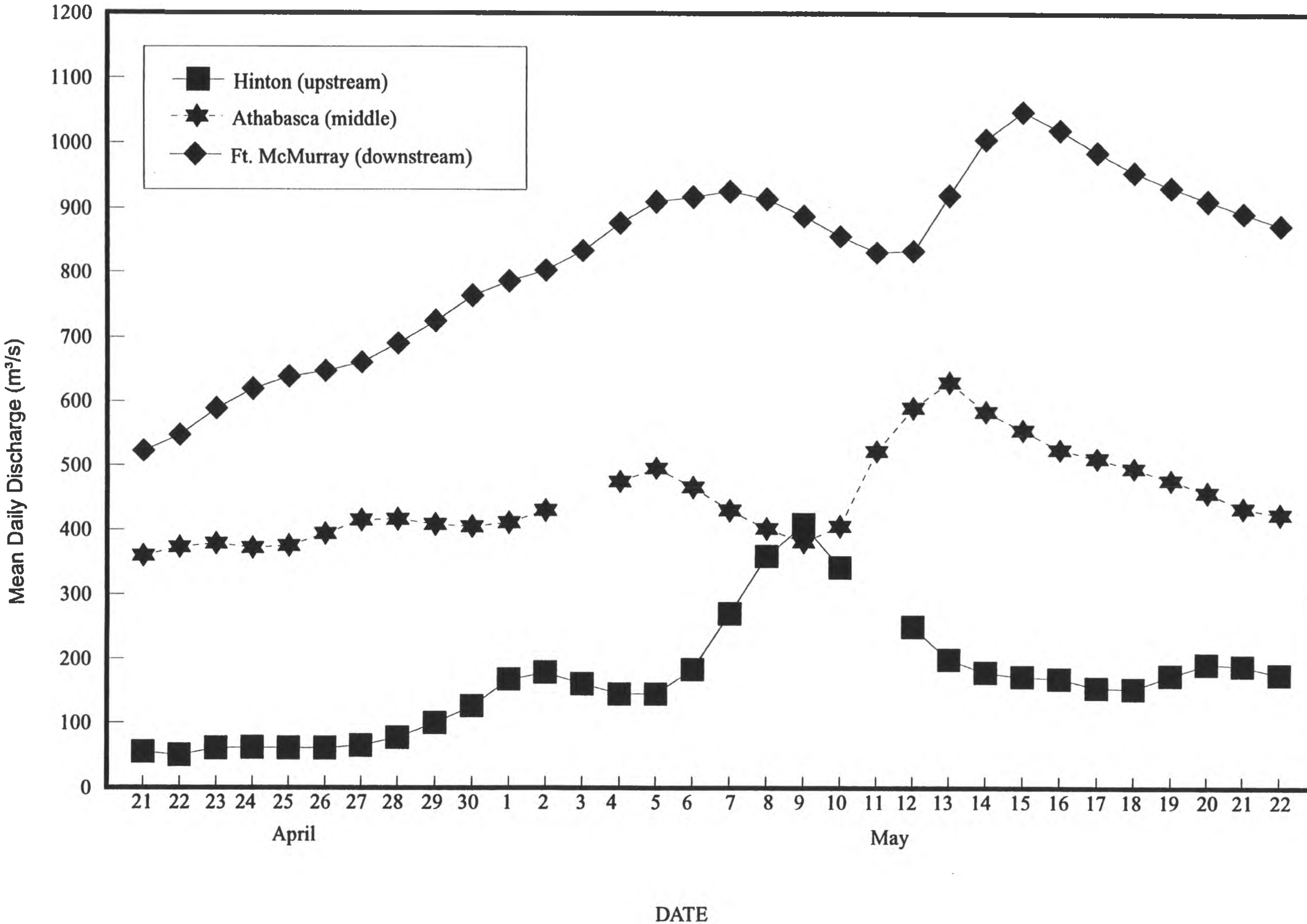

Figure 3.1b Mean daily discharges measured at Hinton, Athabasca and Fort McMurray, 21 April to 22 May 1992. Source: River Forecast Centre, Alberta Environment.

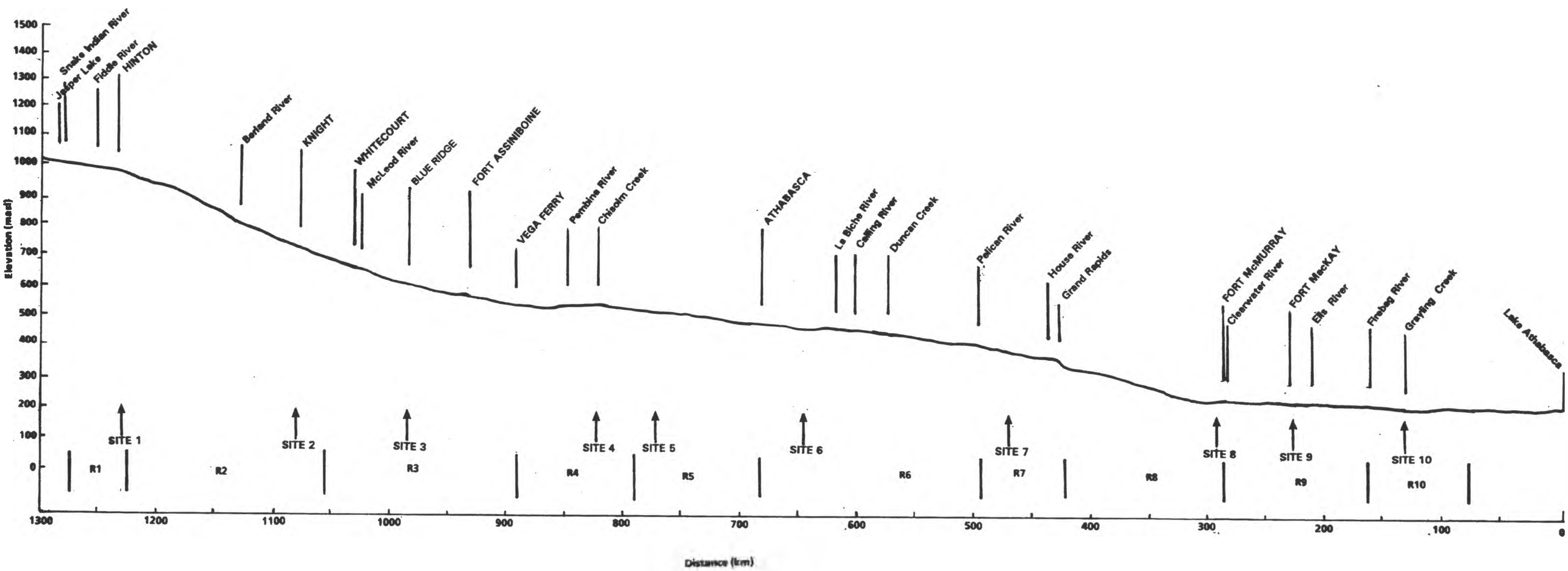

Figure 3.2 Gradient profile of the Athabasca River in Alberta, illustrating reach (R) boundaries, site locations, and major features.

Table 3.1 Major sampling reaches of the Athabasca River from Jasper Lake (Km 1278.0) to the Embarras River (Km 78.7).

REACH	REACH DESIGNATION	REACH LOCATION (km)	REACH LENGTH (km)	AVG. CHANNEL GRADIENT* (m/km)	INTENSIVE SURVEY SITE LOCATION (km)
R1	Hinton	1278.0 - 1226.0	52.0	0.99	1232.4 - 1236.8
R2	Knight	1226.0 - 1056.9	169.1	1.37	1099.5 - 1108.2
R3	Blue Ridge	1056.9 - 890.0	166.9	0.92	1000.4 - 1008.0
R4	Vega Crossing	890.0 - 790.0	100.0	0.28	819.5 - 829.5
R5	Lesser Slave River	790.0 - 683.5	106.5	0.39	773.0 - 782.0
R6	AlPac	683.5 - 494.5	189.0	0.35	626.0 - 634.2
R7	Pelican Rapids	494.5 - 423.0	71.5	0.98	452.2 - 461.1
R8	Fort McMurray	423.0 - 288.0	135.0	0.93	296.0 - 305.0
R9	Fort MacKay	288.0 - 163.0	125.0	0.17	229.8 - 239.3
R10	Embarras River	163.0 - 78.7	84.3	0.08	128.1 - 136.0

*Gradients calculated from contour intervals (1:50 000 NTS maps).

A summary of the physical and chemical parameters recorded for the Athabasca River during the study is provided in Table 3.2. Water temperatures ranged from 6.0 to 14.0 °C. Water clarity tended to decrease in a downstream direction; conductivity values ranged from 209 to 316 µS/cm.

Major channel types in the Athabasca River were mapped for the entire mainstem in the study area. Type M (Multiple Channel) was the dominant channel type encountered in some of the upper areas of the Athabasca River (i.e., reaches 2 and 3) (Table 3.3), whereas Type U (Unobstructed Channel) was dominant in the midsections (i.e., reaches 4 to 8). In the farthest downstream reaches (reaches 9 and 10), the dominant channel habitat reverted back to Type M. The length and percent composition of channel types within each reach and at each site are discussed in the following subsections. Channel habitat types are described in Appendix B1.

Eighteen bank habitat types were recorded at the 10 intensive survey sites (refer to Appendix B2 for bank type description and codes). Armoured/stable bank habitats predominated at sites 1, 4, and 7, whereas sites 5, 6, 9, and 10 exhibited primarily erosional bank habitats. The percent composition of bank habitats in each intensive survey site are presented in the following sub-sections. The distribution of bank habitat types at each intensive survey site is illustrated in Appendix H.

In total, 20 fish species were captured from the Athabasca River study area during the 1992 spring sampling programs (Table 3.4). For discussion purposes, fish species were classed as sport fish (i.e., species of sport, domestic, or commercial fisheries importance), coarse fish (i.e., catostomids), and forage fish (e.g., cyprinids and cottids). Of the nine sport fish species captured, Arctic grayling, bull trout, and rainbow trout were encountered only in the upper reaches of the Athabasca River, whereas walleye, northern pike, and goldeye tended to be most abundant in downstream sections. At Site 1, a few individual rainbow trout and lake whitefish were captured during a concurrent radio-telemetry study for Northern River Basins Study (Sub-Project 3121). Mountain whitefish was the dominant sport fish species in the study area, contributing 37.9% to the total sport and coarse fish catch (Table 3.5). Bull trout and rainbow trout combined contributed <1% to the total. Longnose sucker, the most abundant coarse fish species, was distributed throughout the study area and contributed 27.5% to the total sport and coarse fish catch.

Table 3.2 - Physical and chemical water quality parameters recorded in the Athabasca River, 1992.

SITE (Reach)	SURVEY DATE	WATER TEMPERATURE (°C)	WATER CLARITY (m)	CONDUCTIVITY (μS/cm)
1	26 Apr. - 27 Apr.	6.0	0.46	-
2	22 Apr. - 23 Apr.	6.5	0.80	209
3	25 Apr. - 26 Apr.	7.0	0.44	307
4	28 Apr. - 30 Apr.	13.5	0.43	314
5	2 May - 3 May	13.5	0.36	289
6	5 May - 6 May	14.0	0.38	284
7	9 May - 10 May	13.0	0.38	277
8	13 May - 14 May	11.0	0.21	258
9	16 May - 17 May	11.0	0.28	268
10	19 May - 20 May	8.0	0.24	316

Table 3.3 Availability and percent composition of major channel types within reaches of the Athabasca River, spring 1992.

REACH	MAJOR CHANNEL TYPE[a]	LENGTH AND % COMPOSITION OF MAJOR CHANNEL TYPES			REACH	MAJOR CHANNEL TYPE[a]	LENGTH AND % COMPOSITION OF MAJOR CHANNEL TYPES		
		No. units[b]	Total Length (km)	Percent Composition (%)			No. Units[b]	Total Length (km)	Percent Composition (%)
1	U	6	38.2	73	6	U	12	183.0	97
	S	6	3.6	7		S	11	6.0	3
	M	2	10.2	20		M	0	-	0
	Combined	14	52.0	100		Combined	23	189.0	100
2	U	43	74.6	44	7	U	3	70.3	98
	S	12	9.6	6		S	3	1.2	2
	M	35	34.9	50		M	0	-	0
	Combined	90	169.1	100		Combined	6	71.5	100
3	U	29	53.3	32	8	U	3	132.6	98
	S	11	10.2	6		S	2	1.8	1
	M	18	103.4	62		M	1	0.6	1
	Combined	58	166.9	100		Combined	6	135.0	100
4	U	11	90.4	90	9	U	31	43.0	35
	S	6	3.6	4		S	15	13.8	11
	M	4	6.0	6		M	22	67.8	54
	Combined	21	100.0	100		Combined	68	125.0	100
5	U	6	102.6	96	10	U	19	26.6	32
	S	2	0.6	1		S	12	12.1	14
	M	3	3.3	3		M	8	45.6	54
	Combined	11	106.5	100		Combined	39	84.3	100

[a] U = Unobstructed; S = Singular; M = Multiple (see Appendix B1 for detailed explanations).
[b] Number of times each major channel type occurred within the length of each reach.

In total, 2425 forage fish were captured. Flathead chub was the dominant species and contributed 45.4% to the forage fish species composition. Summary information for catch-per-unit-effort (CPUE) and percent composition of fish species encountered in each intensive survey site is presented in the following section. Raw catch data and CPUE values for all sampling methods are presented in Appendix D, Tables D1 to D19.

Table 3.4 Fish species encountered in the mainstem Athabasca River, spring 1992.

SPECIES	CODE	SCIENTIFIC NAME	DISTRIBUTION		
			Km 1236.8-1000.4 (Sites 1-3)	Km 452.2-829.5 (Sites 4-7)	Km 128.1-305.0 (Sites 8-10)
SPORT FISH					
Arctic grayling	ARGR	*Thymallus arcticus* (Pallas)	*		
Bull trout	BLTR	*Salvelinus confluentus* (Suckley)	*		
Rainbow trout	RNTR	*Oncorhynchus mykiss* (Walbaum)	*[a]		
Mountain whitefish	MNWH	*Prosopium williamsoni* (Girard)	*	*	
Lake whitefish	LKWH	*Coregonus clupeaformis* (Mitchill)	*[a]	*	*
Walleye	WALL	*Stizostedion vitreum* (Mitchill)	*	*	*
Northern pike	NRPK	*Esox lucius* Linnaeus	*	*	*
Goldeye	GOLD	*Hiodon alosoides* (Rafinesque)		*	*
Burbot	BURB	*Lota lota* (Linnaeus)	*	*	*
COARSE FISH					
Longnose sucker	LNSC	*Catostomus catostomus* (Forester)	*	*	*
White sucker	WHSC	*Catostomus commersoni* (Laepede)	*	*	*
FORAGE FISH					
Brook stickleback	BRST	*Culaea inconstans* (Kirtland)			*
Emerald shiner	EMSH	*Notropis atherinoides* Rafinesque	*	*	*
Flathead chub	FLCH	*Hybopsis gracilis* (Richardson)		*	*
Fathead minnow	FTMN	*Pimephales promelas* (Rafinesque)		*	*
Lake chub	LKCH	*Couesius plumbeus* (Agassiz)	*	*	*
Longnose dace	LNDC	*Rhinichthys cataractae* (Valenciennes)	*	*	*
Spottail shiner	SPSH	*Notropis hudsonius* (Clinton)	*	*	*
Trout-perch	TRPR	*Percopsis omiscomaycus* (Walbaum)	*	*	*
Spoonhead sculpin	SPSC	*Cottus ricei* (Nelson)			*
Sculpin spp.			*	*	*

[a] Captured during concurrent radio telemetry study.

Forty-seven tributaries of the Athabasca River were sampled during the spring survey period (Table 3.6). A general discussion of tributaries within each reach of the Athabasca River is presented in the following subsections. Detailed information relating to habitat, species captured, and an evaluation of each tributary's potential for sport fish production are presented in Appendix E.

Table 3.5 Percent composition of fish species captured in the mainstem Athabasca River study area by all sampling methods, spring 1992.

Fish Species	Site 1		Site 2		Site 3		Site 4		Site 5		Site 6		Site 7		Site 8		Site 9		Site 10	
	No.	Percent Comp.	No.	Percent Comp.	No.	Percent Comp.	No.	Percent Comp.	No.	Percent Comp.	No.	Percent Comp.	No.	Percent Comp.	No.	Percent Comp.	No.	Percent Comp.	No.	Percent Comp.
Sport Fish																				
Arctic grayling			20	31.7																
Bull trout	3	1.3	2	3.2																
Rainbow trout	2	1.0	2	3.2																
Mountain whitefish	169	75.4	9	14.3	102	61.5	54	24.8	66	36.5	2	3.2	14	33.3						
Lake whitefish							1	0.4									1	3.1		
Walleye					4	2.4	17	7.8	9	4.9	24	38.1	3	7.1	51	55.4	11	34.4	4	25
Northern pike			1	1.6	5	3.0	2	0.9	3	1.7	4	6.3			4	4.3	3	9.4	5	31.3
Goldeye							9	4.1	6	3.3	7	11.1			25	27.2	8	25.0	3	18.7
Burbot	3	1.3	4	6.3	7	4.2	5	2.3	4	2.2	1	1.6	2	4.8	2	2.2				
Coarse Fish																				
Longnose sucker	47	21.0	24	38.1	28	16.9	100	45.9	50	27.6	16	25.4	23	54.8	9	9.8	4	12.5	1	6.3
White sucker			1	1.6	20	12.0	30	13.8	43	23.8	9	14.3			1	1.1	5	15.6	3	18.7
TOTAL	**224**	**100**	**63**	**100**	**166**	**100**	**218**	**100**	**181**	**100**	**63**	**100**	**42**	**100**	**92**	**100**	**32**	**100**	**16**	**100**
Forage Fish																				
Brook stickleback															2	0.9				
Emerald shiner							103	25.9	15	6.8	76	19.0	44	16.4	8	3.8	26	6.8		
Flathead chub							84	21.1	82	37.3	110	27.4	138	51.3	121	57.6	137	35.9	429	90.8
Fathead minnow									1	0.5					11	5.2	2	0.5		
Lake chub	3	15.0	3	10.7	7	26.9	54	13.5	4	1.8	126	31.4	2	0.7	2	0.9	32	8.4		
Longnose dace					2	7.7	10	2.5	32	14.5	13	3.2	6	2.2	7	3.6	9	2.4	1	0.2
Spottail shiner			2	7.1			98	24.6	13	5.9	21	5.2					6	1.6	1	0.2
Trout perch			4	14.3	2	7.7	41	10.3	29	13.2	47	11.7	69	25.6	44	21.0	162	42.5	41	8.8
Spoonhead sculpin	1	5.0			2	7.7			3	1.4			1	0.4	2	0.9	2	0.5		
Sucker spp.			19	67.9	9	34.6			12	5.4	5	1.3	1	0.4	11	5.2	2	0.5		
Sculpin spp.					1	3.8	1	0.3												
Cyprinid spp.	16	80.0			3	11.6	7	1.8	29	13.2	3	0.8	8	3.0	2	0.9	3	0.9		
TOTAL	**20**	**100**	**28**	**100**	**26**	**100**	**398**	**100**	**220**	**100**	**401**	**100**	**269**	**100**	**210**	**100**	**381**	**100**	**472**	**100**

Table 3.6 Athabasca River tributaries sampled during the spring survey 1992.

REACH	TRIBUTARY	KM LOCATION	REACH	TRIBUTARY	KM LOCATION
1	Rocky River	1277.6	5	Unnamed Creek	772.5
	Snake Indian River	1272.1		Baptiste Creek	696.3
	Moosehorn Creek	1265.8	6	Tawatinaw River	683.5
	Fiddle River	1261.7		La Biche River	622.1
	Solomon Creek	1249.8		Calling River	606.7
	Maskuta Creek	1234.9		La Petite Riviere Jaillante	594.4
2	Oldman Creek	1175.2		Duncan Creek	573.5
	Nosehill Creek	1136.5		Parallel Creek	505.8
	Berland River	1129.1		Pelican River	497.7
	Marsh Head Creek	1102.9	7	House River	439.0
	Pine Creek	1102.8	8	Hangingstone River	-
	Pass Creek	1077.4		Little Fishery River	292.1
	Two Creeks	1076.2		Clearwater River	286.5
	Oldman Creek	1056.9	9	Steepbank River	253.9
3	Sakwatamau River	1027.3		Muskeg River	239.2
	McLeod River	1026.3		MacKay River	235.3
	Christmas Creek	1000.6		Ells River	217.9
	Corbett Creek	965.5		Tar River	215.9
	Goose Creek	843.1		Pierre River	201.5
	Freeman River	936.0	10	Firebag River	162.9
	Horse Creek	926.2		Grayling Creek	130.8
	Clearwater Creek	897.5			
4	Timeu Creek	884.1			
	Pembina River	845.5			
	Chisholm Creek	824.2			
	Rourke Creek	807.0			

3.3 REACH 1

3.3.1 Physical Habitat

Reach 1 (R1) of the Athabasca River extended from Jasper Lake to Hinton and was 52 km in length (Figure 1.1). This reach exhibited a moderate gradient (0.99 m/km) throughout most of its length, although a few localized sections of high gradient were encountered (Table 3.1; Figure 3.2).

Water clarity was low to moderate in R1, because of glacial silt and sediment input from wind and wave action on exposed depositional bars in Jasper and Brule lakes.

Type U and Type M channels contributed 73 and 20%, respectively, to the total available channel length in R1 (Table 3.3). Type S channel, a minor component in the reach, contributed 7% to the total channel length (refer to Appendix B1 and B2 for habitat codes and descriptions).

The intensive survey site (Site 1) in R1 was 4.4 km long and located upstream of Hinton, approximately 1 km downstream of Highway 40. Type U, the dominant channel at Site 1, contributed 75% to the total available channel length (Table 3.7). The remainder of the site was made up of Type S channel (25%).

Table 3.7 Percent composition of major channel and bank habitat types at Site 1, Athabasca River, spring 1992.

MAJOR CHANNEL TYPE[a]	LENGTH (km)	PERCENT COMPOSITION	BANK HABITAT TYPE[b]	LENGTH (km)	PERCENT COMPOSITION
U	3.3	75	A1	1.5	20
S	1.1	25	A2	2.4	32
M	-	-	A3	1.3	17
			D1	0.6	8
			E1	0.2	3
			A1/D2	1.5	20
TOTAL	4.4	100		7.5	100

[a] U - Unobstructed Channel; S - Singular Island; M - Multiple Island.
[b] Refer to Appendix B2 for habitat codes and descriptions.

At Site 1, five of the 18 bank types identified in the Athabasca River were recorded. Armoured bank habitats (A1, A2, and A3) were dominant and contributed 69% to the total. This was the highest value recorded for armoured bank habitat at any intensive survey site. Depositional (D1) and erosional (E1) habitats were an infrequent component of the bank complex; together they contributed only 11% to the total available bank habitat. One special habitat feature noted at this site was a large backwater (BW) found in association with a steep eroding bank.

3.3.2 Fish Resources

Fish species diversity at Site 1 was low. Four sport fish species, one coarse fish species, and two species of forage fish were encountered (Table 3.8).

Mountain whitefish, the most abundant sport fish species recorded at Site 1, contributed 76.4% to the combined sport and coarse fish catch (Table 3.8). The presence of most size-classes (adult, and juvenile) indicated use of the area by this species for feeding and rearing. Habitats utilized by adult mountain whitefish at Site 1 were located in areas of moderate current velocities adjacent to A1, A2, and E1 bank types. Larger juveniles selected habitats of higher velocities (i.e., RAPIDS), whereas smaller juveniles utilized areas of low to moderate velocities adjacent to armoured/stable (A1 and A2) bank types.

Rainbow trout, bull trout, and burbot were the other sport fish species recorded at Site 1; all three species exhibited low abundance indices in the area (Table 3.8; Figure 3.3). Insufficient numbers of these species were captured to determine habitat selection preferences.

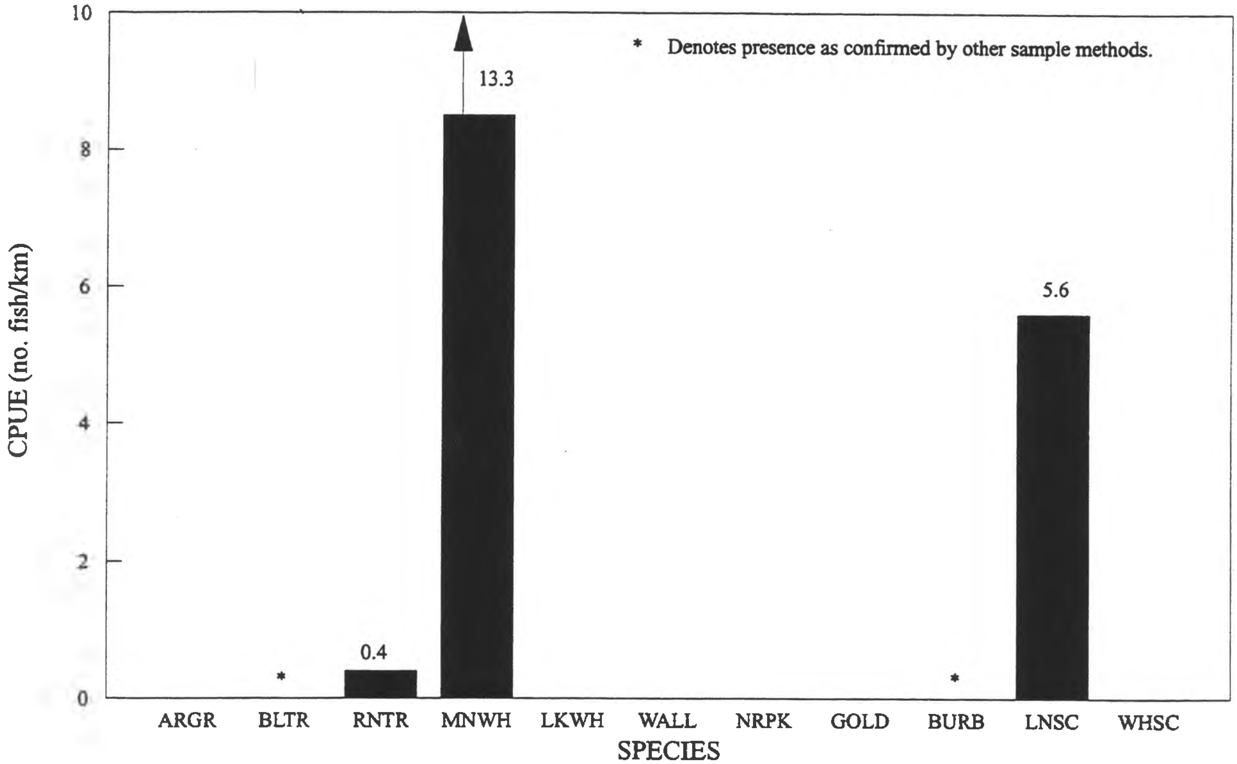

Figure 3.3 Catch-per-unit-effort values for sport and coarse fish captured by boat electrofishing at Site 1, Athabasca River, spring 1992

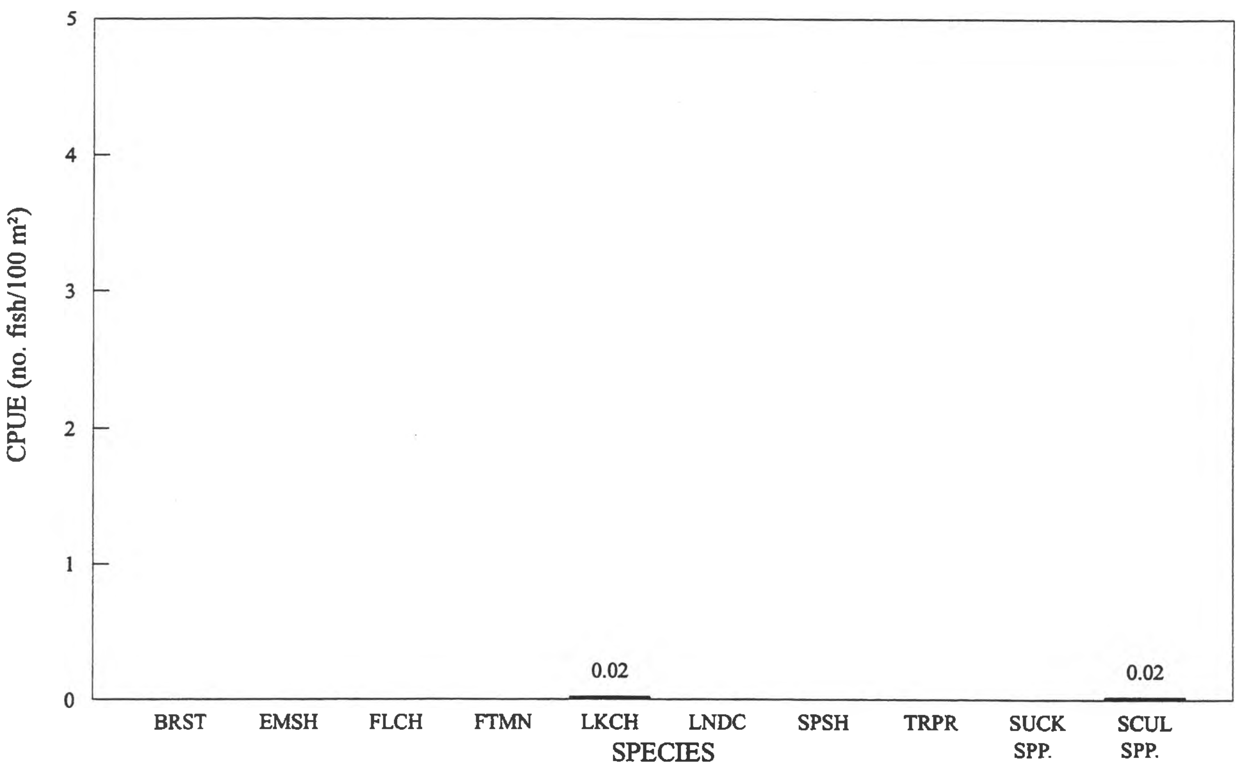

Figure 3.4 Catch-per-unit-effort values for forage fish captured by beach seining at Site 1, Athabasca River, spring 1992.

Longnose sucker was the only coarse fish species captured at Site 1. The presence of adults and juveniles in the catch suggested a use of the area for feeding and rearing. Both size-classes were most abundant in areas of low current velocities in association with D1 bank types. Forage fish species diversity and catch rates at Site 1 were low (Table 3.8; Figure 3.4). These fish were captured in shallow-water habitats exhibiting low current velocities adjacent to D1 bank types.

Table 3.8 Fish species composition at Site 1, Athabasca River, spring 1992.

SPORT AND COARSE FISH SPECIES	SIZE-CLASSES		TOTAL CAPTURED[b]	%	FORAGE FISH SPECIES	TOTAL CAPTURED[b]	%
	Y-O-Y	JUV/AD[a]					
Arctic grayling					Flathead chub		
Mountain whitefish		*	179	76.4	Lake chub	1	5.5
Lake whitefish					Longnose dace		
Bull trout		*	3	1.3	Emerald shiner		
Rainbow trout		*	2[c]	0.9	Spottail shiner		
Northern pike					Fathead minnow		
Walleye					Trout-perch		
Goldeye					Brook stickleback		
Burbot		*	3	1.3	Spoonhead sculpin		
Longnose sucker		*	47	20.1	Sculpin spp.	1	5.5
White sucker					Sucker spp.		
					Cyprinid spp.	16	88.9
TOTAL			**234**	**100**		**18**	**100**

[a] Combined due to difficulties in differentiating between these life stages solely on the basis of size.
[b] Data for all sampling methods combined.
[c] Captured during concurrent radio telemetry study.

3.3.3 Tributaries

Six tributaries were sampled in R1 (Table 3.9). For the most part, RUN (R3) was the dominant habitat followed by RIFFLE (RF) and RIFFLE/BOULDER GARDEN (RF/BG). POOL habitats were recorded only in Solomon Creek and were created by numerous beaver impoundments. FLAT habitat was a minor component of the overall available habitat in most streams. An exception was Moosehorn Creek, where, because of the presence of shallow beaver impoundments, FLAT habitat contributed 75% to the total available habitat.

The dominant substrate encountered in most tributaries consisted mainly of cobbles, gravels, and pebbles. Exceptions were Solomon and Moosehorn creeks, where silt was the predominant substrate, a reflection of beaver activity (i.e., beaver ponds) in these systems.

Table 3.9 Tributaries sampled in Reach 1, Athabasca River, spring 1992.

TRIBUTARY	KM LOCATION	UPSTREAM BOUNDARY[a] (m)	LENGTH (m)	AVG. WIDTH (m)	AVG. DEPTH (m)	CHANNEL TYPE	SPECIES ENCOUNTERED[b]	DOMINANT HABITAT[c]
Rocky River	1277.6	230	150	5-15	0.3	Erosional	MNWH	R3 & RF
Snake Indian River	1272.1	320	120	15-30	0.8	Erosional	LKCH, MNWH	R3
Moosehorn Creek	1265.8	175	150	<5	0.3	Erosional	-	F3
Fiddle River	1261.7	450	140	15-30	0.3	Erosional	-	RA/BG & RF/BG
Solomon Creek	1249.8	200	40	10-15	0.3	Erosional	BKTR	R3
Maskuta Creek	1234.9	165	100	<5	0.3	Erosional	-	R3

[a] Upstream boundary - distance in metres from confluence with Athabasca River.
[b] Species code explanation provided in Table 3.4.
[c] Refer to Appendix B3 for habitat codes and descriptions.

The largest tributary sampled in Reach 1 was the Snake Indian River; its lower reach contained suitable habitat for all life stages of cold water sport fish species, including bull trout, rainbow trout, and mountain whitefish.

The lower reaches of Moosehorn Creek were inaccessible to fish from the Athabasca River because of the presence of beaverdams. Suitable habitat for rearing was available for trout species and mountain whitefish, but the small size of the system provided limited habitats for larger size-classes of fish.

The lower reaches of Maskuta and Solomon creeks were accessible to fish from the Athabasca River during spring flows, with suitable habitats available for use by adult sport fish species (i.e., ARGR, MNWH, RNTR, and BLTR) for feeding and overwintering. Spawning areas were available for Arctic grayling and rainbow trout, and suitable rearing areas for these species also were present. The presence of large beaverdams in the lower reaches of Solomon Creek limited its potential as a spawning area for Athabasca River fish, although these are only temporary obstructions. Watters (1975) recorded a rainbow trout population during his investigations of Solomon Creek. In the present study, brook trout was the only species recorded from the creek.

Three mountain whitefish were captured in the Rocky River. At the time of sampling, low discharge rates in this stream reduced the potential for fish use. However, under higher flows, the system could provide suitable spawning and rearing habitat for mountain whitefish.

When sampled in May, the Fiddle River at its confluence with the Athabasca River was dry; this prevented fish movement into or out of the tributary. Higher stream flows during the summer period could provide access to habitats in the lower reaches suitable for rearing and spawning use by fall spawners, such as mountain whitefish and bull trout.

3.4 REACH 2

3.4.1 Physical Habitat

Reach 2 (R2) was one of the longest reaches in the study area. The Athabasca River in this reach flowed in a northeasterly direction over its 169.1 km length. The average gradient of 1.37 m/km was the highest recorded in all surveyed reaches (Table 3.1). Water clarity in R2 also was the highest recorded for all reaches (Table 3.2).

The dominant channel habitat in Reach 2 was Type M channel, which contributed 50% to the total available channel length (Table 3.3); Type U and Type S channel types contributed 44 and 6%, respectively (refer to Appendix B1 and B2 for habitat codes and descriptions).

The intensive survey site (Site 2), located in the upper half of the reach, was 8.7 km in length (Table 3.10). Type M and Type U channels contributed 56 and 44%, respectively, to the total available channel length at Site 2.

Site 2 was characterized by high diversity of bank habitat types; ten types were recorded (Table 3.10). Depositional bank habitats (D2 and D3) predominated (43% of the total) followed by armoured/stable habitats (A1, A2, A3, and A4), which contributed 39%. Four types of erosional habitats were present, but their combined contribution was low (16% of the total). One small, shallow BW habitat was noted in association with an armoured bank.

Table 3.10 Percent composition of major channel and bank habitat types at Site 2, Athabasca River, spring 1992.

MAJOR CHANNEL TYPE[a]	LENGTH (km)	PERCENT COMPOSITION	BANK HABITAT TYPE[b]	LENGTH (km)	PERCENT COMPOSITION
U	3.8	44	A1	2.7	13
S	-	-	A2	3.5	17
M	4.9	56	A3	1.5	8
			A4	0.2	1
			D2	7.8	39
			D3	0.9	4
			E4	0.5	2
			E4B	1.0	5
			E5	0.2	1
			E6	1.5	8
			A2/E3	0.3	2
TOTAL	**8.7**	**100**		**20.1**	**100**

[a] U - Unobstructed Channel; S - Singular Island; M - Multiple Island.
[b] Refer to Appendix B2 for habitat codes and descriptions.

3.4.2 Fish Resources

In total, eleven fish species were recorded at Site 2. Mountain whitefish, the dominant sport fish species, contributed 71.6% to the combined sport and coarse fish catch (Table 3.11). Catch rates for mountain whitefish at Site 2 were lower than those reported for this species at Site 1 (Figure 3.5). Arctic grayling also were relatively common at this site. Burbot, bull trout, rainbow trout, and northern pike were the other sport fish present at Site 2, but their contributions to the total catch were relatively minor.

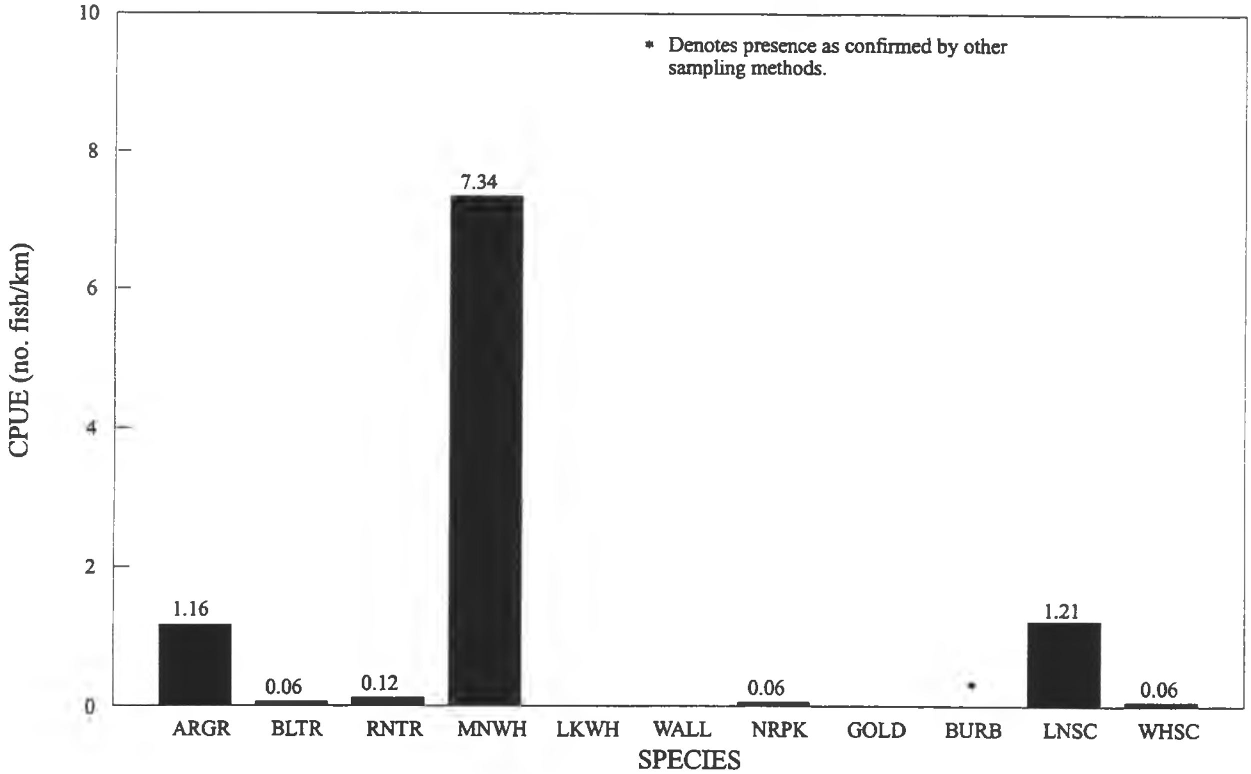

Figure 3.5 Catch-per-unit-effort values for sport and coarse fish captured by boat electrofishing at Site 2, Athabasca River, spring 1992.

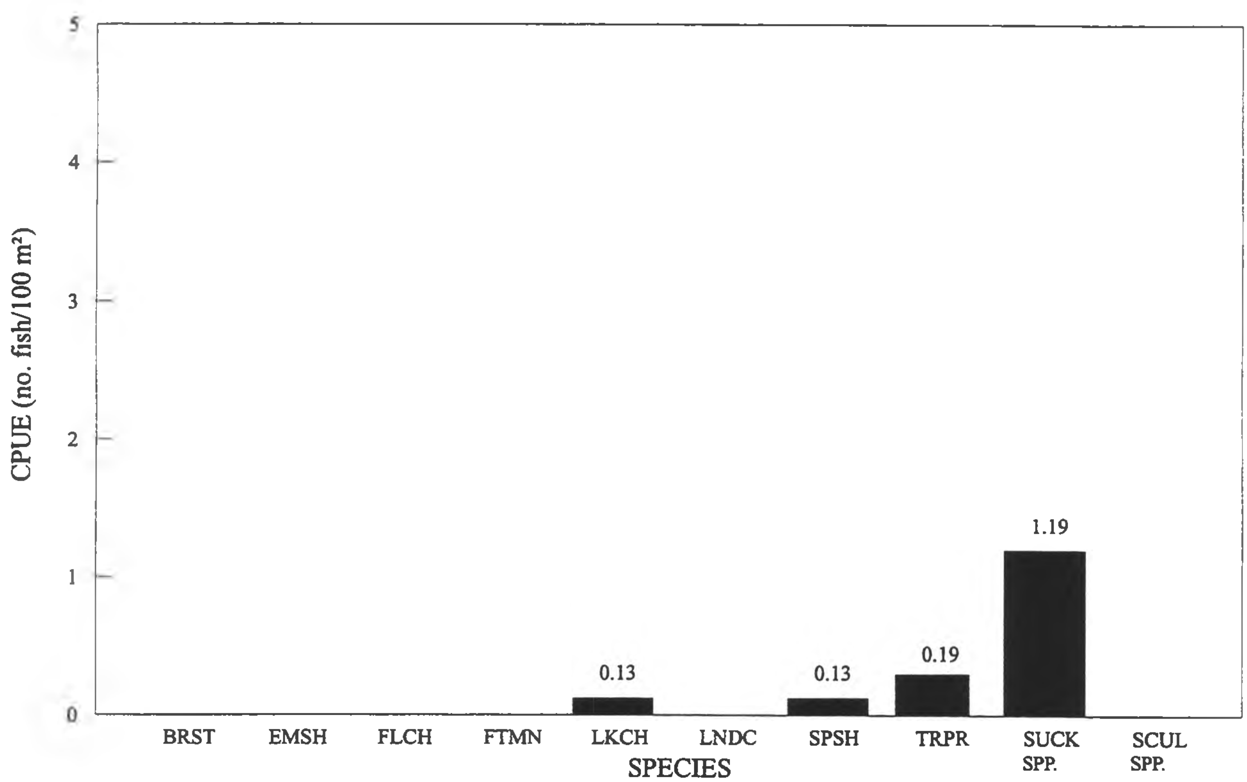

Figure 3.6 Catch-per-unit-effort values for forage fish captured by beach seining at Site 2, Athabasca River, spring 1992.

Table 3.11 Fish species composition at Site 2, Athabasca River, spring 1992.

SPORT AND COARSE FISH SPECIES	SIZE-CLASSES		TOTAL CAPTURED[b]	%	FORAGE FISH SPECIES	TOTAL CAPTURED[b]	%
	Y-O-Y	JUV/AD[a]					
Arctic grayling		*	20	10.5	Flathead chub		
Mountain whitefish		*	136	71.6	Lake chub	3	10.7
Lake whitefish					Longnose dace		
Bull trout		*	2	1.1	Emerald shiner		
Rainbow trout		*	2	1.1	Spottail shiner	2	7.1
Northern pike		*	1	0.5	Fathead minnow		
Walleye					Trout-perch	4	14.3
Goldeye					Brook stickleback		
Burbot		*	4	2.1	Spoonhead sculpin		
Longnose sucker		*	24	12.6	Sculpin spp.		
White sucker		*	1	0.5	Sucker spp.	19	67.9
					Cyprinid spp.		
TOTAL			190	100		28	100

[a] Combined due to difficulties in differentiating between these life stages solely on the basis of size.
[b] Data for all sampling methods combined.

The presence of adult and juvenile mountain whitefish in the catch suggested a use of this area for most life requisites. Habitats selected by adults were generally associated with A1, A3, and D2 bank types. These areas were characterized by moderate velocities and boulder substrates. Larger juvenile mountain whitefish were most abundant in RIFFLE/RAPID habitats adjacent to D2 bank types characterized by moderate to high velocities. Smaller juveniles selected shallow depositional habitats (i.e., D2) characterized by moderate velocities and gravel/cobble substrates.

Arctic grayling also utilized habitats adjacent to A1, A3, and D2 bank types; these habitats were characterized by gravel and cobble substrates and high velocities.

Burbot and northern pike were not abundant at Site 2 during the sampled period. Burbot were absent in the electrofishing catch but were captured by setlines set adjacent to depositional habitats (i.e., D2 and D3). These habitats exhibited low current velocities with gravel/cobble substrates. The captured burbot were adults taken from depths that ranged from 1.3 to 2.0 m. The single northern pike captured was a gravid male. Suitable spawning habitat for this species was not identified at Site 2, and as such, it is unknown whether this species would spawn in the immediate vicinity or in some of the tributaries. This individual was captured from a shallow backwater adjacent to an A3 bank type.

Longnose sucker was the dominant coarse fish in the catch at Site 2. Areas associated with A3 bank types were utilized by both adults and juveniles. These habitats exhibited moderate current velocities; overhead cover was provided by turbidity. Only one adult white sucker was captured. The abundance of juvenile suckers in beach seine catches indicates a use of the area for rearing and possibly for spawning.

Lake chub, spottail shiner, and trout-perch were the forage species recorded at Site 2. All three species exhibited a similar abundance in the catch and a sporadic distribution throughout the survey site (Figure 3.6). They were captured in areas of moderate current velocities and turbidity adjacent to armoured/stable bank types (i.e., A1 and A2 types). Instream cover was provided by large substrate (i.e., cobble and boulder).

3.4.3 Tributaries

Eight tributaries were sampled in Reach 2 (Table 3.12). RUN (R3) was the dominant habitat in four of the tributaries, whereas BOULDER/GARDEN (RA/BG, RF/BG, R3/BG) habitat was dominant in the remainder.

Table 3.12 Tributaries sampled in Reach 2, Athabasca River, spring 1992.

TRIBUTARY	KM LOCATION	UPSTREAM BOUNDARY[a] (m)	LENGTH (m)	AVG. WIDTH (m)	AVG. DEPTH (m)	CHANNEL TYPE	SPECIES ENCOUNTERED[b]	DOMINANT HABITAT[c]
Oldman Creek	1175.2	100	100	<5	0.5	Erosional	MNWH, BKTR, RNTR, LNDC, LNSC	RA/BG
Berland River	1129.1	400	400	30-60	>1.0	Erosional	MNWH, ARGR, BURB, LNDC	R2 & R3
Nosehill Creek	1136.5	220	100	5-15	0.4	Erosional	LNDC	RF/BG
Marsh Head Creek	1102.9	209	120	5-15	0.4	Erosional	-	R3/BG
Pine Creek	1102.8	285	120	5-15	0.4	Erosional	-	R3/BG
Pass Creek	1077.4	210	120	15-30	0.3	Erosional	Scul. spp.	R3
Two Creeks	1076.2	280	130	15-30	0.7	Erosional	TRPR, Sucker spp., Scul. spp.	R3
Oldman Creek	1056.9	397	150	15-30	0.3	Erosional	LKCH, LNDC, Sucker spp.	R3

[a] Upstream boundary - distance in metres from confluence with Athabasca River.
[b] Species code explanation provided in Table 3.4.
[c] Refer to Appendix B3 for habitat codes and descriptions.

Substrate in the examined tributaries consisted mainly of boulders, cobbles, pebbles, and gravels. Fines (silt/sand) did not contribute appreciably to the substrate composition in any of these systems.

Sport fish were captured in two tributaries, Oldman Creek (Km 1175.2) and the Berland River. The lower reaches of Oldman Creek did provide potential rearing habitats for trout species, mountain whitefish, and Arctic grayling. The size of the creek, however, limited use by larger size-classes of fish. Mountain whitefish, Arctic grayling, and burbot were captured in the lower reaches of the Berland River. Feeding and overwintering habitats for adult sport fish from the Athabasca River were available in the sampled section. There also appeared to be suitable rearing areas for the species captured in the Berland River.

Of the remaining tributaries, Two Creeks was the only tributary that provided suitable feeding and overwintering habitats for adult sport fish residing in the Athabasca River. Potential spawning and rearing habitats were not available in the sampled section of this tributary. The lower reaches of Pine, Marsh Head, Nosehill, Pass, and Oldman creeks had low potential for any of the life history requisites by sport fish from the Athabasca River mainstem.

3.5 REACH 3

3.5.1 Physical Habitat

In Reach 3 (R3) the Athabasca River flowed in a northeasterly direction (Figure 1.1) for a distance of 166.9 km (Table 3.1). The average channel gradient was 0.92 m/km, with moderate current velocities encountered in many sections.

The dominant channel type in R3 was Type M (62% of the total channel length; Table 3.3). Type U and Type S channels contributed 32 and 6%, respectively, to the total available channel length (refer to Appendix B1 and B2 for habitat codes and descriptions).

The intensive survey site (Site 3) was 7.6 km in length. The dominant channel type was Type M (52% of the total channel length). This channel type was found predominantly in the upper and lower sections of the site. The lower section was characterized by numerous large islands and flowing side channels. Type U and Type S channels contributed 37 and 11%, respectively, to the total channel length.

Depositional bank types (D1-D3) were dominant at Site 3 (49% of the total available bank habitat), although both armoured and erosional types also were well represented (Table 3.13). Six erosional bank types were recorded; together they contributed 24% to the total bank habitat. Armoured/stable banks were co-dominant with erosional banks. The armoured/stable banks consisted mainly of A1 and A2 types. Two SN habitats were recorded at Site 3; these were situated within the island complex.

Table 3.13 Percent composition of major channel and bank habitat types at Site 3, Athabasca River, spring 1992.

MAJOR CHANNEL TYPE[a]	LENGTH (km)	PERCENT COMPOSITION	BANK HABITAT TYPE[b]	LENGTH (km)	PERCENT COMPOSITION
U	2.8	37	A1	2.7	12
S	0.8	11	A2	2.3	10
M	4.0	52	A3	0.3	1
			D1	1.8	8
			D2	8.1	36
			D3	1.2	5
			E1	2.4	11
			E2	0.9	4
			E3	0.3	1
			E4	0.3	1
			E4B	0.8	4
			E6	0.6	3
			A1/E6	0.1	1
			A2/E3	0.6	3
TOTAL	7.6	100		22.4	100

[a] U - Unobstructed Channel; S - Singular Island; M - Multiple Island.
[b] Refer to Appendix B2 for habitat codes and descriptions.

3.5.2 Fish Resources

Nine fish species were encountered at Site 3 (Table 3.14). Mountain whitefish remained the dominant sport fish species and contributed 58.6% to the total sport and coarse fish species catch. Mountain whitefish adults and juveniles were the only maturity stages in the catch. Adults tended to utilize areas of high current velocities associated with A2, E2, and D2 bank types, whereas juveniles preferred D2 and D3 bank types in areas of moderate velocities.

Rainbow trout and bull trout were absent from the catch. Walleye, northern pike, and burbot were relatively abundant compared with their abundance in upstream reaches (Figure 3.7). Walleye were captured in habitats with moderate velocities and cobble/gravel substrates, adjacent to E1 bank types. Three of the captured walleye were ripe males. It is unknown whether these individuals would spawn in the vicinity (i.e., suitable spawning areas were not identified) or in some of the larger tributaries (e.g., McLeod River). Northern pike (two individuals were gravid females) selected SN habitats and, to a lesser extent, small BW habitats associated with A2 bank types. In the Peace River, SN habitats were critical habitats utilized by northern pike for spawning and rearing during the spring period (Hildebrand 1990). During the present study, spawning habitats within the SNYES in the Athabasca River were marginal. During higher flow discharges, these areas would be more suitable for spawning northern pike.

Most burbot (n=5) were taken by setline. They tended to select habitats associated with D1 bank types (i.e., low current velocities, substrate, and depths of 4 m) and, to a lesser extent, SN habitats. One individual was captured by electrofishing in an area of fast current velocity, with cobble/boulder substrates, adjacent to an A2 bank type. The other individual was captured by beach seine in habitats associated with D2 bank types. The area was characterized by slow current velocities with cobble/boulder substrates.

Longnose sucker was the dominant coarse fish species at Site 3, contributing 20.7% to the combined sport and coarse fish catch. Adults and larger juveniles captured during electrofishing surveys were recorded in association with E1 and D3 bank types. Habitats selected in these areas exhibited moderate to high current velocities, and cobble/boulder substrates. Cover was provided by turbidity and submerged woody debris. The presence of adult males in both gravid and ripe spawning condition indicated that suitable habitat may have been available for spawning in this reach. White suckers were more abundant than at upstream sites. The catch consisted mainly of adults, two of which were in spawning condition (i.e., gravid males). Habitat selection by white suckers was similar to that of longnose suckers.

Lake chub dominated the forage fish catch (Table 3.14), followed by juvenile suckers, longnose dace, sculpins, and unidentified cyprinid species. Catch-per-unit-effort values for beach seines are illustrated in Figure 3.8. Forage fish species at Site 3 were generally recorded in association with D1 and D2 bank types. These areas were characterized by low to moderate current velocities with cobble/gravel/pebble substrates.

Table 3.14 Fish species composition at Site 3, Athabasca River, spring 1992.

SPORT AND COARSE FISH SPECIES	SIZE-CLASSES		TOTAL CAPTURED[b]	%	FORAGE FISH SPECIES	TOTAL CAPTURED[b]	%
	Y-O-Y	JUV/AD[a]					
Arctic grayling					Flathead chub		
Mountain whitefish		*	102	58.6	Lake chub	12	36.3
Lake whitefish					Longnose dace	2	6.1
Bull trout					Emerald shiner		
Rainbow trout					Spottail shiner		
Northern pike		*	5	2.9	Fathead minnow		
Walleye		*	4	2.3	Trout-perch	3	9.1
Goldeye					Brook stickleback		
Burbot		*	7	4.0	Spoonhead sculpin		
Longnose sucker		*	36	20.7	Sculpin spp.	2	6.1
White sucker		*	20	11.5	Sucker spp.	11	33.3
					Cyprinid spp.	3	9.1
TOTAL			174	100		33	100

[a] Combined due to difficulties in differentiating between these life stages solely on the basis of size.
[b] Data for all sampling methods combined.

3.5.3 Tributaries

Eight tributaries were sampled in Reach 3 (Table 3.12). FLAT habitats dominated four of the tributaries (Corbett, Goose, and Christmas creeks, and the Freeman River). Substrates in these tributaries consisted exclusively of silt. Corbett Creek was inaccessible to fish from the Athabasca River due to the presence of a large beaverdam immediately upstream from the mouth. The stream channel of the Freeman River contained water from its confluence with the Athabasca River to a point approximately 800 m upstream. From this point upstream, the river was dry. Both Corbett Creek and the Freeman River, as well as Goose and Christmas creeks, did not have suitable habitats in their lower reaches to sustain any of the life stages of sport fish residing in the Athabasca River.

RUN (R1, and R2) habitats were dominant in the McLeod and Sakwatamau rivers; substrates consisted primarily of cobbles, pebbles, and gravels. Suitable feeding and overwintering habitats for adult sport fish that reside in the Athabasca River were present in sampled sections of both tributaries. Rearing habitats also were present but to a lesser extent.

The dominant habitat types in Horse and Clearwater creeks were RIFFLE/BOULDER GARDEN (RF/BG) and RIFFLE (RF), respectively. Boulder/cobble substrates were dominant in Horse Creek, whereas smaller substrates (i.e., cobble/gravel) were dominant in Clearwater Creek. Suitable rearing habitat was recorded for most sport fish species, but because of the small size of the creeks, they provided limited feeding and overwintering habitat for larger size-classes.

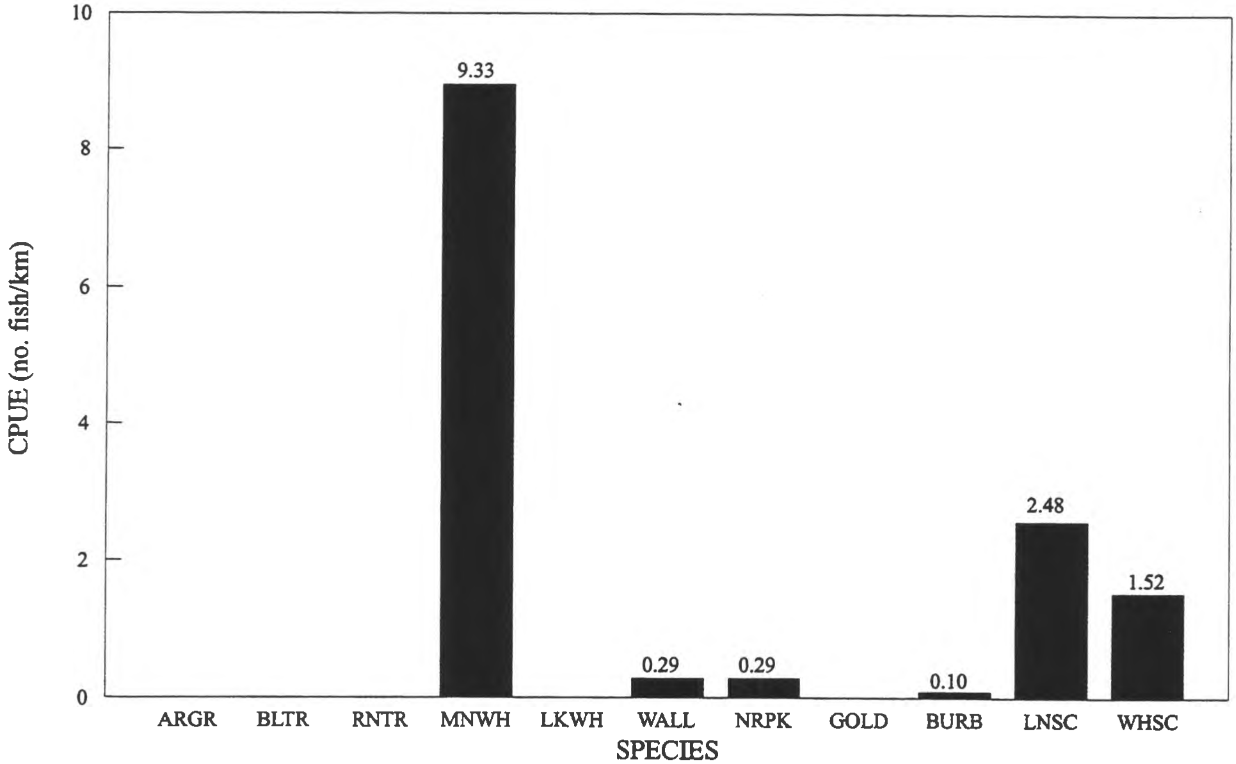

Figure 3.7 Catch-per-unit-effort values for sport and coarse fish captured by boat electrofishing at Site 3, Athabasca River, spring 1992.

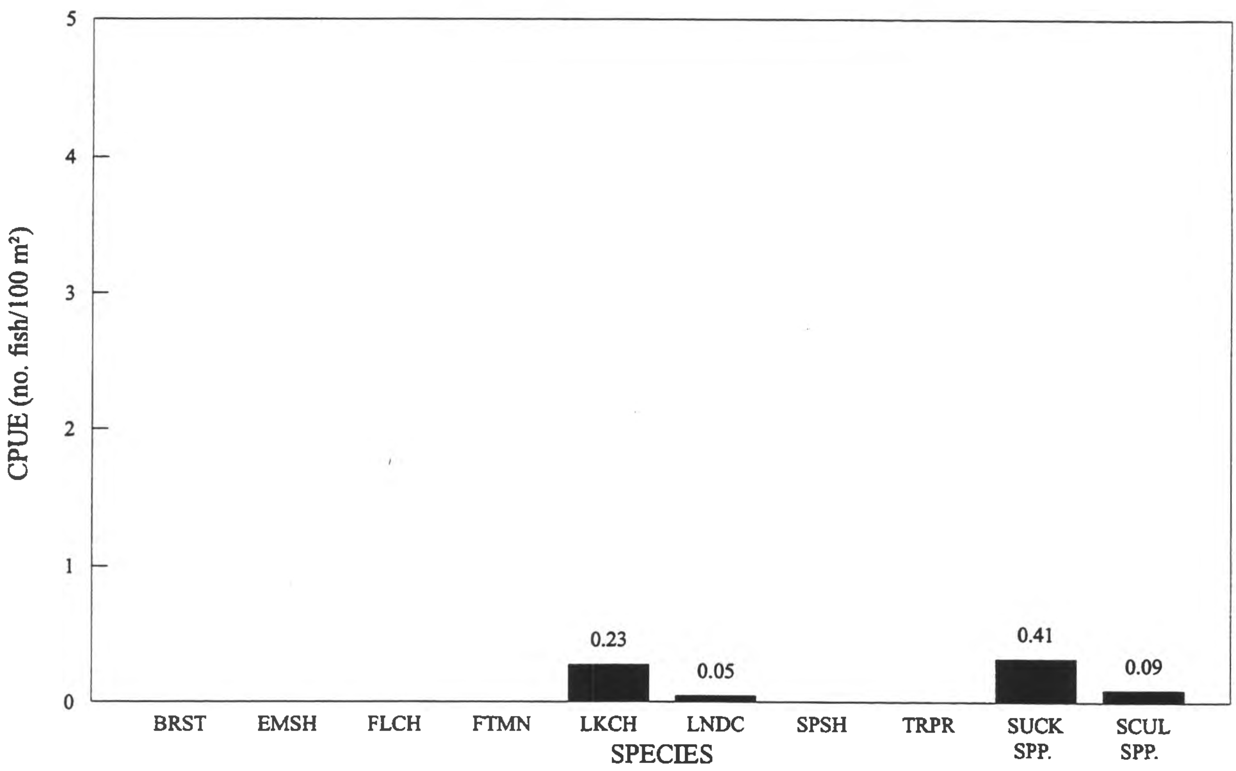

Figure 3.8 Catch-per-unit-effort values for forage fish captured by beach seining at Site 3, Athabasca River, spring, 1992.

Table 3.15 Tributaries sampled in Reach 3, Athabasca River, spring 1992.

TRIBUTARY	KM LOCATION	UPSTREAM BOUNDARY[a] (m)	LENGTH (m)	AVG. WIDTH (m)	AVG. DEPTH (m)	CHANNEL TYPE	SPECIES ENCOUNTERED[b]	DOMINANT HABITAT[c]
Sakwatamau River	1027.3	380	130	15-30	>1.0	Depositional	LNDC	R2
McLeod River	1026.3	1500	1500	>60	2.4	Erosional	MNWH, LNSC, WHSC	R1
Christmas Creek	1000.6	200	100	5-15	>1.0	Depositional	-	F3
Corbett Creek	965.5	350	200	<5	>1.0	Depositional	-	F1 & F3
Goose Creek	843.1	300	100	<5	>1.0	Depositional	-	F2
Freeman River	936.0	354	142	15-30	>1.0	Depositional	-	F3
Horse Creek	926.2	180	100	<5	0.2	Erosional	WHSC, LKCH, Sucker spp.	RF/BG
Clearwater Creek	897.5	270	120	<5	0.2	Erosional	Scul. spp., Cyprinid spp.	RF

[a] Upstream boundary - distance in metres from confluence with Athabasca River.
[b] Species code explanation provided in Table 3.4.
[c] Refer to Appendix B3 for habitat codes and descriptions.

3.6 REACH 4

3.6.1 Physical Habitat

The Athabasca River within Reach 4 (R4) flowed in a northeasterly direction for 100.0 km (Figure 1.1). The average channel gradient was 0.28 m/km, one of the lowest recorded in the study area (Table 3.1). The water clarity was moderate (0.43 m) and similar to that recorded in R3 (Table 3.2).

Type U channel contributed 90% to the total available channel length in R4 (Table 3.3; refer to Appendix B1 and B2 for habitat codes and descriptions). Type M and S channels contributed 6 and 4%, respectively.

Site 4, the longest intensive survey site in the study area (10.0 km), was located in the vicinity of the Chisholm townsite. The major channel type was Type U; Type S and Type M channels were not present within the site (Table 3.16).

Armoured/stable bank types at Site 4 consisted of A1 and A2 types and contributed 69% (combined) to the total available bank habitat (Table 3.16). Depositional habitats (D1 and D2) also were available, with D2 bank type predominating (15%). Erosional bank types (E1 and E2) contributed less than 10% to the total available bank habitat.

3.6.2 Fish Resources

Mountain whitefish was the dominant sport fish recorded at Site 4 (Table 3.17, Figure 3.9). The presence of both adults and juveniles indicates that this area is utilized for feeding, rearing, and possibly overwintering. Both size-classes tended to select habitats with moderate to high current velocities adjacent to A2 bank types. Substrates consisted primarily of cobble/gravel, with overhead cover provided by turbidity.

Table 3.16 Percent composition of major channel and bank habitat types at Site 4, Athabasca River, spring 1992.

MAJOR CHANNEL TYPE[a]	LENGTH (km)	PERCENT COMPOSITION	BANK HABITAT TYPE[b]	LENGTH (km)	PERCENT COMPOSITION
U	10.0	100	A1	11.6	63
S	-	-	A2	1.2	6
M	-	-	D1	0.1	1
			D2	3.0	15
			E1	0.1	1
			E2	1.4	8
			A1/D2	1.1	6
TOTAL	10.0	100		18.5	100

[a] U-Unobstructed Channel, S-Singular Island, M-Multiple Island.
[b] Refer to Appendix B2 for habitat codes and description.

Table 3.17 Fish species composition at Site 4, Athabasca River, spring 1992.

SPORT AND COARSE FISH SPECIES	SIZE-CLASSES		TOTAL CAPTURED[b]	%	FORAGE FISH SPECIES	TOTAL CAPTURED[b]	%
	Y-O-Y	JUV/AD[a]					
Arctic grayling					Flathead chub	84	18.1
Mountain whitefish		*	54	24.8	Lake chub	54	11.6
Lake whitefish		*	1	0.5	Longnose dace	10	2.2
Bull trout					Emerald shiner	103	22.2
Rainbow trout					Spottail shiner	98	21.1
Northern pike		*	2	0.9	Fathead minnow		
Walleye		*	17	7.8	Trout-perch	41	8.7
Goldeye		*	9	4.1	Brook stickleback		
Burbot		*	5	2.3	Spoonhead sculpin		
Longnose sucker		*	101	46.3	Sculpin spp.	1	0.2
White sucker		*	29	13.3	Sucker spp.	67	14.4
					Cyprinid spp.	7	1.5
TOTAL			218	100		465	100

[a] Combined due to difficulties in differentiating between these life stages solely on the basis of size.
[b] Data for all sampling methods combined.

Walleye were present in setline and boat electrofishing catches (Appendix D, Table D13). Most of these individuals were adults, although a few juveniles also were present in the catch. Two walleye were ripe males, which suggested a possible use of the area or larger tributaries (e.g., Pembina River) for spawning. Habitats selected by walleye were adjacent to D2 bank types and characterized by low current velocities, high turbidity, and shallow depths (<1.0 m). Substrates in these areas were predominantly gravel/cobble. Site 4 was the farthest upstream that goldeye were encountered; this species contributed 4.1% to the catch (Table 3.17). All were mature adults, which may indicate a primary use of the area for feeding. Two northern pike and one lake whitefish also were captured at Site 4. Insufficient numbers of these species were captured to determine habitat associations or use for life history requisites.

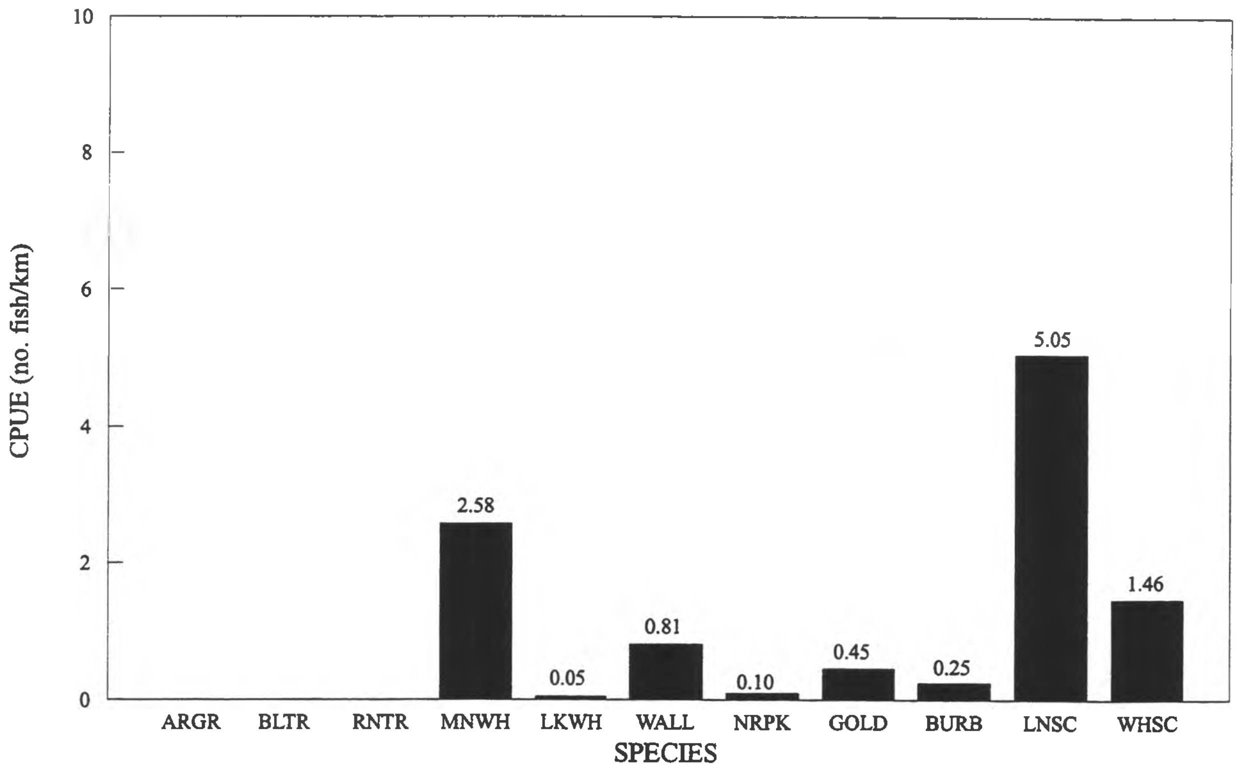

Figure 3.9 Catch-per-unit-effort values for sport and coarse fish captured by boat electrofishing at Site 4, Athabasca River, spring 1992.

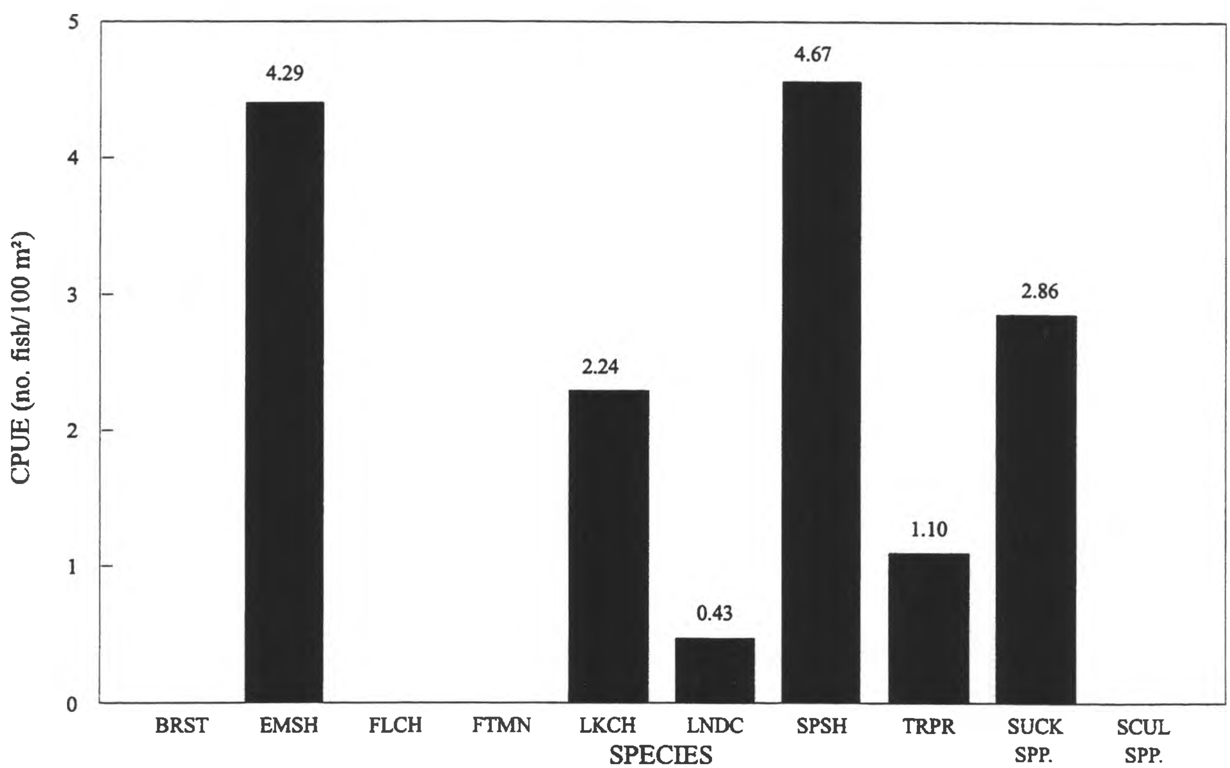

Figure 3.10 Catch-per-unit-effort values for forage fish captured by beach seining at Site 4, Athabasca River, spring 1992.

Longnose suckers were more abundant than white suckers at Site 4; these species contributed 46.3 and 13.3%, respectively, to the sport and coarse fish catch. The capture of several individuals of both species in spawning condition (i.e., gravid males and females) indicated a probable use of the area for spawning. The presence of juvenile suckers indicated a use of the area for rearing purposes. Adults and larger juveniles of both species tended to select discrete BW habitats associated with A2 bank types with low current velocities and gravel/cobble substrates.

Six forage fish species were captured. Emerald shiners, spottail shiners, and flathead chub dominated the catch (Table 3.17; Figure 3.10). Flathead chub and emerald shiners were located in a variety of habitats throughout this section of river, while trout-perch and lake chub were recorded mainly from habitats adjacent to E1 and E2 bank types. These habitats were characterized by low current velocities and silt/sand substrates.

3.6.3 Tributaries

The Pembina River was the largest tributary sampled in Reach 4. The habitat was predominantly RUN with silt/sand as the dominant substrates. Three sport fish species, walleye, goldeye, and burbot, were captured in the Pembina River (Table 3.18). Suitable feeding and overwintering habitats for adults of these sport fish species were available in the lower reaches as well as rearing habitats for juvenile walleye, goldeye, and burbot. Westworth (1990) documented the presence of these species as well as Arctic grayling, mountain whitefish, rainbow trout, and northern pike in other sections of the Pembina River.

Table 3.18 Tributaries sampled in Reach 4, Athabasca River, spring 1992.

TRIBUTARY	KM LOCATION	UPSTREAM BOUNDARY[a] (m)	LENGTH (m)	AVG. WIDTH (m)	AVG. DEPTH (m)	CHANNEL TYPE	SPECIES ENCOUNTERED[b]	DOMINANT HABITAT[c]
Timeu Creek	884.1	420	120	<5	0.2	Erosional	TRPR, LKCH, Sucker spp., Scul. spp.	RF
Pembina River	845.5	1700	800	30-60	0.8	Erosional	WALL, BURB, GOLD, FLCH, EMSH, SNSC	R1 & R3
Chisholm Creek	824.2	420	120	5-15	0.3	Erosional	LNSC	R3
Rourke Creek	807.0	340	110	5-15	0.5	Erosional	BRST, Sucker spp., Cyprinid spp.	R3

[a] Upstream boundary - distance in metres from confluence with Athabasca River.
[b] Species code explanation provided in Table 3.4.
[c] Refer to Appendix B3 for habitat codes and descriptions.

In Rourke and Chisholm creeks, the dominant habitat type was RUN (R3), whereas in Timeu Creek, RIFFLE (RF) habitat was dominant. Cobbles, pebbles, and gravels were the dominant substrate types in all three tributaries. Sands/silts were present but did not contribute significantly to the overall composition. Sport fish were not captured in these tributaries. The presence of juvenile sucker species in Rourke and Timeu creeks indicates a use of the area for rearing and may provide indirect evidence of spawning in these tributaries. The lower sections of these three tributaries had a low suitability for use by sport fish from the Athabasca River.

3.7 REACH 5

3.7.1 Physical Habitat

In Reach 5 (R5), the Athabasca River generally flowed in a southerly direction over its 106.5 km length (Figure 1.1). The average channel gradient was 0.39 m/km, with moderate current velocities. Water clarity was slightly lower than in Reach 4, probably because of sediment input from the Lesser Slave River.

Type U channel habitat contributed 96% to the total available channel length in R5; Type M and Type S contributed 3 and 1%, respectively (Table 3.3; refer to Appendix B1 and B2 for habitat codes and descriptions).

Site 5, the intensive survey site in R5, was located immediately downstream of the R4-R5 boundary. The site was 9 km in length, with Type U as the dominant channel type (78%) followed by Type M (22%); Type S channel habitat was not encountered (Table 3.19).

Table 3.19 Percent composition of major channel and bank habitat types at Site 5, Athabasca River, spring 1992.

MAJOR CHANNEL TYPE[a]	LENGTH (km)	PERCENT COMPOSITION	BANK HABITAT TYPE[b]	LENGTH (km)	PERCENT COMPOSITION
U	7.0	78	A1	0.8	5
S	-	-	A2	3.5	20
M	2.0	22	D1	0.3	2
			D2	1.8	10
			E1	2.6	15
			E2	2.7	16
			E4	0.5	3
			E6	0.9	5
			A2/E5	4.2	24
TOTAL	9.0	100		17.3	100

[a] U - Unobstructed Channel; S - Singular Island; M - Multiple Island.
[b] Refer to Appendix B2 for habitat codes and descriptions.

A total of eight bank habitat types were identified within the intensive survey site (Table 3.19). Erosional bank habitats were dominant and contributed 39% to the total. Armoured/stable (A1 and A2) and depositional (D1 and D2) bank habitat types contributed 25 and 12%, respectively.

Special habitat features recorded were BW and SHC habitats. Numerous small BW habitats were present in association with A2/E5 bank habitats.

3.7.2 Fish Resources

Five sport fish species (mountain whitefish, walleye, goldeye, burbot, and northern pike) were encountered at Site 5 (Table 3.20, Figure 3.11).

Table 3.20 Fish species composition at Site 5, Athabasca River, spring 1992.

SPORT AND COARSE FISH SPECIES	SIZE-CLASSES		TOTAL CAPTURED[b]	%	FORAGE FISH SPECIES	TOTAL CAPTURED[b]	%
	Y-O-Y	JUV/AD[a]					
Arctic grayling					Flathead chub	89	37.7
Mountain whitefish		*	66	36.5	Lake chub	6	2.5
Lake whitefish					Longnose dace	34	14.4
Bull trout					Emerald shiner	15	6.4
Rainbow trout					Spottail shiner	17	7.2
Northern pike		*	3	1.7	Fathead minnow	6	2.5
Walleye		*	9	5.0	Trout-perch	29	12.2
Goldeye		*	6	3.2	Brook stickleback		
Burbot		*	4	2.2	Spoonhead sculpin		
Longnose sucker		*	50	27.6	Sculpin spp.	3	1.3
White sucker		*	43	23.8	Sucker spp.	18	7.6
					Cyprinid spp.	19	8.2
TOTAL			**181**	**100**		**236**	**100**

[a] Combined due to difficulties in differentiating between these life stages solely on the basis of size.
[b] Data for all sampling methods combined.

Mountain whitefish, the dominant sport fish species recorded at Site 5, contributed 36.5% to the total sport and coarse fish catch. The presence of adults and juveniles indicated a use of this area for feeding, rearing, and possibly overwintering. Walleye, goldeye, burbot, and northern pike were present in low numbers during the spring survey. All captured goldeye and northern pike were adults; one goldeye was a gravid female whereas one northern pike was a ripe female. Spawning habitat for goldeye and northern pike were not identified at the time of the survey; however, small BW habitats associated with A2/E5 bank habitats may provide suitable spawning areas for these species at higher flows.

There did not appear to be any discernable trends in habitat selection at Site 5. Generally, fish were distributed along mainstem margins adjacent to a variety of bank types, including A1, E1, and E2 bank types. Habitats were characterized by low to moderate current velocities. Overhead cover was provided by turbidity; instream cover was generally absent.

Longnose and white suckers were co-dominant at Site 5; they contributed 27.6 and 23.8%, respectively, to the total sport and coarse fish catch. Adults and juveniles of both species were recorded. Small, localized BW habitats with gravel substrates were utilized by both size-classes; these areas were closely associated with D2 bank types. The presence of ripe white suckers (male and female) suggests a possible use of the area for spawning.

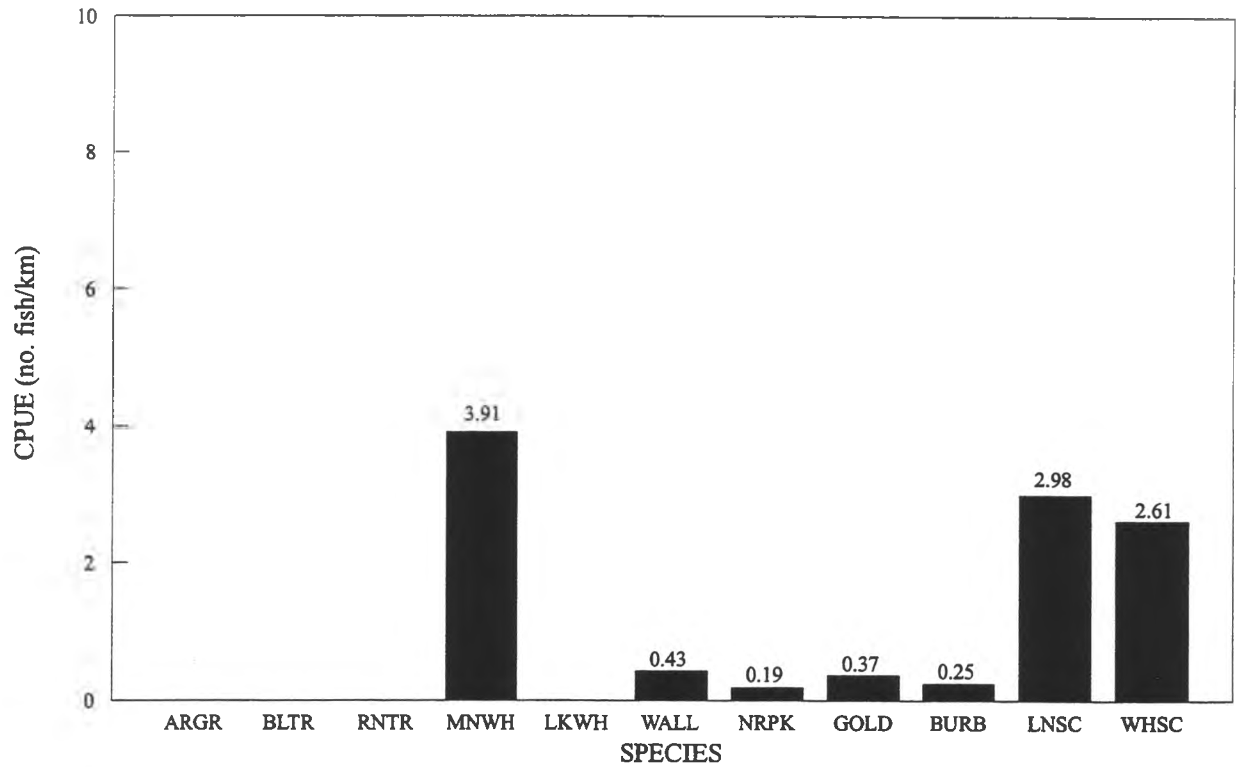

Figure 3.11 Catch-per-unit-effort values for sport and coarse fish captured by boat electrofishing at Site 5, Athabasca River, spring 1992.

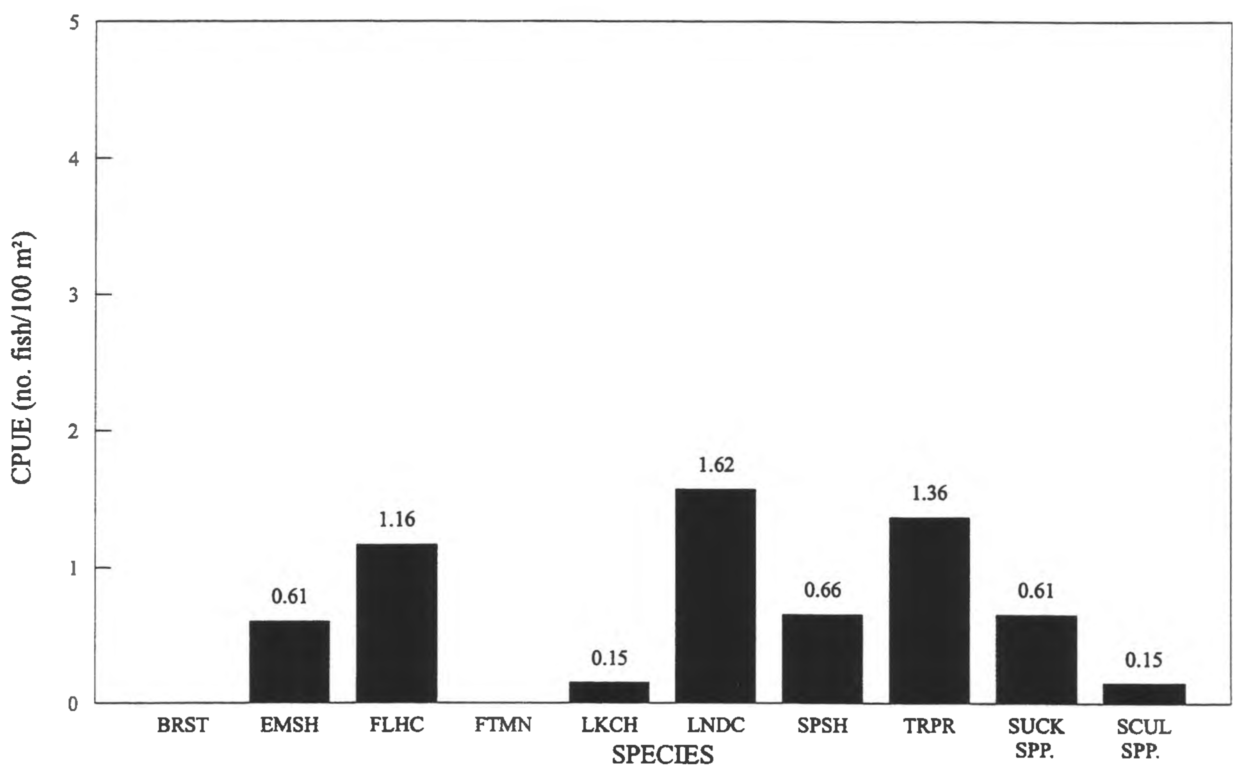

Figure 3.12 Catch-per-unit-effort values for forage fish captured by beach seining at Site 5, Athabasca River, spring 1992.

Flathead chub was the most abundant forage fish in the catch, followed (in decreasing order of abundance) by longnose dace and trout-perch (Table 3.20). Lake chub, emerald shiner, spottail shiner, and fathead minnow also were present in the catch. Longnose dace were the most abundant forage fish species in beach seine captures at Site 5 (Figure 3.12). Forage fish species at Site 5 utilized similar habitats to that recorded for sucker species.

3.7.3 Tributaries

The lower reaches of the two tributaries sampled in Reach 5 did not exhibit any potential for use by sport fish present in the mainstem (Table 3.21).

Table 3.21 Tributaries sampled in Reach 5, Athabasca River, spring 1992.

TRIBUTARY	KM LOCATION	UPSTREAM BOUNDARY[a] (m)	LENGTH (m)	AVG. WIDTH (m)	AVG. DEPTH (m)	CHANNEL TYPE	SPECIES ENCOUNTERED[b]	DOMINANT HABITAT[c]
Unnamed Creek	772.5	298	120	<5	0.4	Depositional	LKCH, BRST, Sucker spp.	R3
Baptiste Creek	696.3	198	130	<5	0.2	Erosional	LKCH, LNSC, WHSC, FTMN, SPSH, Sucker spp.	RF/BG

[a] Upstream boundary - distance in metres from confluence with Athabasca River.
[b] Species code explanation provided in Table 3.4.
[c] Refer to Appendix B3 for habitat codes and descriptions.

The lower section of Unnamed Creek was accessible to fish from the Athabasca River. RUN (R3) was the predominant habitat type; substrate consisted of silt (95%). The water was extremely turbid (visibility=0.06 m), probably because of extensive bank erosion.

Surface flows in Baptiste Creek at its confluence with the Athabasca River were low; beaverdams located approximately 200 m upstream from the mouth restricted fish movements into the creek. Habitat in areas not influenced by beaverdams was predominantly RIFFLE/BOULDER GARDEN (RF/BG) characterized by boulder, cobble, and gravel substrates. In areas of lower current velocities, higher proportions of fine substrate types were encountered. The presence of juvenile sucker species indicates a use of Baptiste Creek for rearing by these species. Fathead minnow (n=33) was the most abundant cyprinid species. Two spottail shiners and one lake chub also were captured.

3.8 REACH 6

3.8.1 Physical Habitat

Reach 6 was the longest reach (189.0 km) identified in the Athabasca River. The average channel gradient in R6 was 0.35 m/km (Table 3.1). Current velocities within the reach were rated as moderate. Water clarity was similar to values recorded in the adjacent upstream reach (Table 3.2).

The dominant major channel type in R6 was Type U, which contributed 97% to the total channel length (Table 3.3). The remaining 3% was composed of Type S channel; Type M channels were not recorded in this reach (refer to Appendix B1 and B2 for habitat codes and descriptions).

The intensive survey site (Site 6; length=8.2 km) was characterized by channel Types U and S (Table 3.22), in a proportion that was typical of Reach 6.

Table 3.22 Percent composition of major channel and bank habitat types at Site 6, Athabasca River, spring 1992.

MAJOR CHANNEL TYPE[a]	LENGTH (km)	PERCENT COMPOSITION	BANK HABITAT TYPE[b]	LENGTH (km)	PERCENT COMPOSITION
U	7.8	95	A2	3.5	22
S	0.4	5	D1	0.4	3
M	-	-	D2	0.2	1
			E1	3.6	23
			E2	7.5	48
			A2/E5	0.5	3
TOTAL	**8.2**	**100**		**15.7**	**100**

[a] U - Unobstructed Channel; S - Singular Island; M - Multiple Island.
[b] Refer to Appendix B2 for habitat codes and descriptions.

The diversity of available bank habitat types at Site 6 was low. Erosional bank habitats were dominant and contributed 71% (combined) to the total available habitat. Armoured/stable bank types consisted exclusively of A2 habitat; this bank habitat contributed 22% to the total available bank habitat. Depositional habitats (D1 and D2), a minor bank habitat component in Site 6, contributed only 4% to the total available shoreline length.

3.8.2 Fish Resources

Walleye was the dominant sport fish species captured at Site 6 (Table 3.23, Figure 3.13). Walleye were captured by setlines, beach seine, and boat electrofishing (Appendix D, Table D15). This species contributed 38.1% to the sport and coarse fish catch. During electrofishing surveys, adult and juvenile walleye were captured adjacent to most of the bank habitat types sampled, although some preference for A2, E1, E2, and D1 bank types was noted. In general, bank habitats selected by this species exhibited shallow depths (0.5 to 1.0 m) with low to moderate current velocities. Substrates ranged from sand/silt to cobble/boulder. Some instream cover was provided by bank slumping; overhead cover was available in the form of turbidity. Young-of-the-year walleye were captured in beach seines in the confluence area of a small tributary. Selected habitats were adjacent to D2 bank types and were characterized by low current velocities, shallow depths, gravel/cobble substrates, and high turbidity. The presence of all life stages of this species in the catch indicated that suitable habitats were available for rearing, feeding, overwintering, and possibly spawning.

Table 3.23 Fish species composition at Site 6, Athabasca River, spring 1992.

SPORT AND COARSE FISH SPECIES	SIZE-CLASSES		TOTAL CAPTURED[b]	%	FORAGE FISH SPECIES	TOTAL CAPTURED[b]	%
	Y-O-Y	JUV/AD[a]					
Arctic grayling		*			Flathead chub	110	27.4
Mountain whitefish			2	3.2	Lake chub	126	31.4
Lake whitefish					Longnose dace	13	3.3
Bull trout					Emerald shiner	76	19.0
Rainbow trout					Spottail shiner	21	5.3
Northern pike		*	4	6.3	Fathead minnow		
Walleye	*	*	24	38.1	Trout-perch	47	11.7
Goldeye		*	7	11.1	Brook stickleback		
Burbot		*	1	1.6	Spoonhead sculpin		
Longnose sucker		*	16	25.4	Sculpin spp.		
White sucker		*	9	14.3	Sucker spp.	5	1.2
					Cyprinid spp.	3	0.7
TOTAL			**63**	**100**		**401**	**100**

[a] Combined due to difficulties in differentiating between these life stages solely on the basis of size.
[b] Data for all sampling methods combined.

Goldeye, the second most abundant sport fish at Site 6, contributed 11.1% to the total sport and coarse fish catch. Bankside habitats selected by adults were E1 bank types, characterized by moderate velocities, and gravel/cobble substrates. Young-of-the-year and juvenile goldeye were absent from the catch. Primary use of the area was for feeding.

Northern pike distribution at this site was sporadic. The capture of two males in spawning condition (i.e., one was gravid, the other was spent) may indicate use of the area for spawning purposes, although suitable spawning habitat was not noted. Mountain whitefish and burbot also were captured at Site 6, but their contribution to the total catch (3.2 and 1.6%, respectively) precluded assessments of habitat preferences or life-stage usage.

Longnose sucker was the dominant coarse fish at Site 6. The capture of most life stages indicated suitable habitat was available for most life history requisites. White suckers were less abundant than longnose sucker. The capture of adult and juvenile life stages suggested a use of the area for feeding and rearing. Both species were commonly recorded in association with E1 and E2 bank types. These areas had moderate velocities and gravel/cobble substrates.

Lake chub was the most abundant forage species at Site 6. Flathead chub, emerald shiner, and trout-perch also were well represented in the catch (Table 3.23, Figure 3.14). In general, all forage fish species selected habitats associated with D1 bank types. These areas exhibited low current velocities and silt/sand substrates.

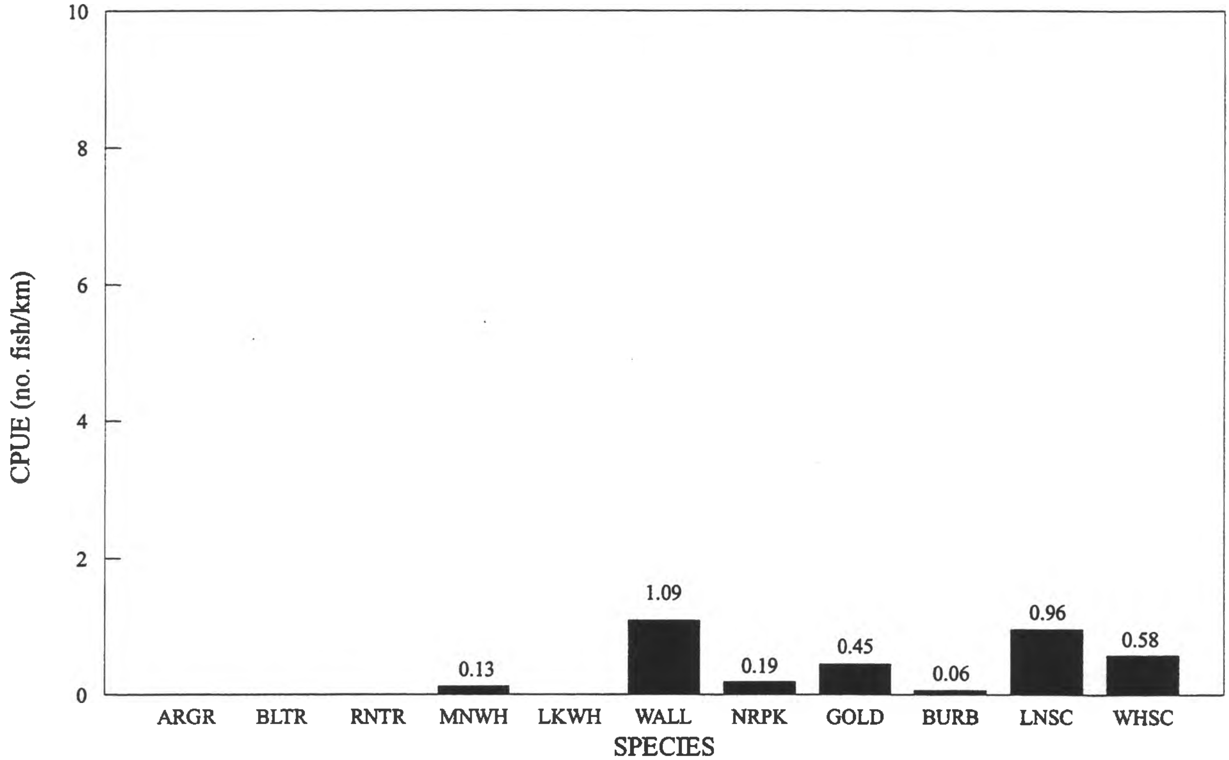

Figure 3.13 Catch-per-unit-effort rates for sport and coarse fish captured by boat electrofishing at Site 6, Athabasca River, spring 1992.

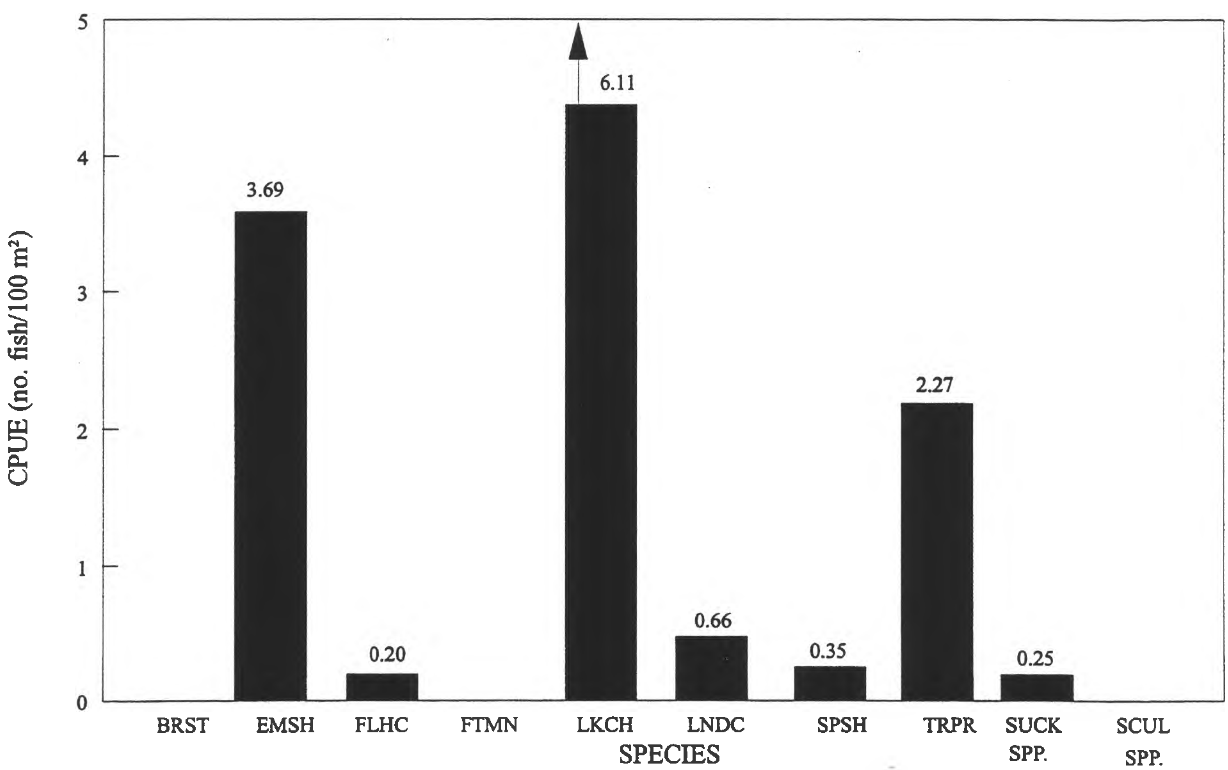

Figure 3.14 Catch-per-unit-effort rates for forage fish captured by beach seining at Site 6, Athabasca River, spring 1992.

3.8.3 Tributaries

Seven tributaries were sampled in Reach 6 (Table 3.24). The dominant habitat type in most was RUN (R3, R3/BG). The exception was the Pelican River, where RAPID (RA) was dominant. In most of the tributaries, substrates consisted mainly of cobbles, pebbles, and gravels. Exceptions were Duncan Creek and La Petite Riviere Jaillante, where sands/silts contributed significantly to the substrate composition.

Table 3.24 Tributaries sampled in Reach 6, Athabasca River, spring 1992.

TRIBUTARY	KM LOCATION	UPSTREAM BOUNDARY[a] (m)	LENGTH (m)	AVG. WIDTH (m)	AVG. DEPTH (m)	CHANNEL TYPE	SPECIES ENCOUNTERED[b]	DOMINANT HABITAT[c]
Tawatinaw River	683.5	305	115	5-15	0.4	Erosional	NRPK	R3/BG
La Biche River	622.1	520	100	30-60	0.6	Erosional	-	R3
Calling River	606.7	210	120	30-60	0.3	Erosional	-	R3
La Petite Riviere Jaillante	594.4	270	110	<5	0.2	Erosional	LNSC, WHSC, LKCH, Sucker spp.	R3
Duncan Creek	573.5	220	100	5-10	0.4	Erosional	LNDC, LKCH, LNSC, WHSC, Sucker spp.	R3
Parallel Creek	505.8	210	100	5-15	0.4	Erosional	LKCH, FTMN, LNSC, LNDC, BRST, Sucker spp.	R3/BG
Pelican River	497.7	400	100	30-60		Erosional	LKCH, FLCH, LNDC, BRST	RA

[a] Upstream boundary - distance in metres from confluence with Athabasca River.
[b] Species code explanation provided in Table 3.4.
[c] Refer to Appendix B3 for habitat codes and descriptions.

The lower sections of all tributaries sampled in R6 were accessible to fish from the Athabasca River. Potential spawning habitats for use by sport fish species from the mainstem Athabasca River were not available in the lowermost surveyed section of the La Biche and Calling rivers, but may have been available farther upstream. Both systems, however, contained areas with limited rearing potential for northern pike, walleye, and burbot as well as feeding areas for adult life stages. Only the La Biche River appeared to have habitats with sufficient depths for overwintering use. The lower reaches of the Tawatinau River also contained areas with limited rearing potential for northern pike, walleye, and burbot but lacked areas for feeding and overwintering by adults.

The Tawatinau, La Biche, and Calling rivers were the only tributaries in this reach that exhibited some potential in their lowermost sections for use by sport fish from the Athabasca River. Westworth (1990) documented the presence of walleye and northern pike in both the La Biche and Calling rivers, as well as Arctic grayling in the Calling River.

3.9 REACH 7

3.9.1 Physical Habitat

In Reach 7 (R7) the Athabasca River flowed in a northeasterly direction for a distance of 71.5 km (Figure 1.1). Average channel gradient was high (0.98 m/km), and as a result, current velocities were high with numerous rapids (Table 3.1). Water clarity was similar to that recorded in R6 (Table 3.2).

The percent composition of major channel types in R7 was similar to Reach 6. Type U, the dominant major channel type, contributed 98% to the total channel length (refer to Appendix B1 and B2 for habitat codes and descriptions). Type S channel contributed 2% to the total, whereas Type M channel was absent from R7. Special habitat features recorded in R7 included a series of three rapids; Pelican, Stony, and JoliFou.

The intensive survey site (Site 7) was 8.9 km in length and was made up exclusively of Type U channel habitat (Table 3.25).

Table 3.25 Percent composition of major channel and bank habitat types at Site 7, Athabasca River, spring 1992.

MAJOR CHANNEL TYPE[a]	LENGTH (km)	PERCENT COMPOSITION	BANK HABITAT TYPE[b]	LENGTH (km)	PERCENT COMPOSITION
U	8.9	100	A1	0.2	1
S	-	-	A2	6.8	43
M	-	-	A3	1.7	11
			D2	1.7	11
			E1	0.8	5
			E2	2.3	14
			E4	1.8	11
			E6	0.6	4
TOTAL	8.9	100		15.9	100

[a] U - Unobstructed Channel; S - Singular Island; M - Multiple Island.
[b] Refer to Appendix B2 for habitat codes and descriptions.

At Site 7, bank types consisted mainly of armoured/stable bank habitat (A1, A2, and A3) (Table 3.25). A2 bank type dominated (43% of the total). Erosional bank habitat contributed 34% to the total, with E2 as the dominant type. Depositional habitats (D2) represented a minor component of bank habitats at Site 7.

3.9.2 Fish Resources

Of the nine sport fish species recorded in the study area, only three were encountered at Site 7 (Table 3.26). Mountain whitefish, the dominant sport fish species at Site 7, contributed 33.3% to the total sport and coarse fish catch. Juveniles made up the majority of the mountain whitefish catch, indicating that a primary use of this area was for rearing and feeding. RIFFLE and RAPID habitats were utilized by both adult and juvenile size-classes. These mainstem habitats were generally associated with A2 and A3 bank types. Instream cover was provided by substrate roughness (i.e., boulders). Juvenile mountain whitefish also were recorded in areas of moderate current velocities adjacent to D2 bank types.

Table 3.26 Fish species composition at Site 7, Athabasca River, spring 1992.

SPORT AND COARSE FISH SPECIES	SIZE-CLASSES		TOTAL CAPTURED[b]	%	FORAGE FISH SPECIES	TOTAL CAPTURED[b]	%
	Y-O-Y	JUV/AD[a]					
Arctic grayling					Flathead chub	138	51.3
Mountain whitefish		*	14	33.3	Lake chub	2	0.7
Lake whitefish					Longnose dace	6	2.2
Bull trout					Emerald shiner	44	16.4
Rainbow trout					Spottail shiner		
Northern pike					Fathead minnow		
Walleye		*	3	7.1	Trout-perch	69	25.7
Goldeye					Brook stickleback		
Burbot		*	2	4.8	Spoonhead sculpin		
Longnose sucker		*	23	54.8	Sculpin spp.	1	0.4
White sucker					Sucker spp.	1	0.4
					Cyprinid spp.	8	2.9
TOTAL			**42**	**100**		**269**	**100**

[a] Combined due to difficulty in differentiating between these life stages solely on the basis of size.
[b] Data for all sampling methods combined.

Walleye were present in low numbers at Site 7 in both electrofishing (Table 3.26) and setline catches (Appendix D, Table D16). Catch rates for walleye were substantially lower than those recorded at Site 6 (Figure 3.15). Walleye captured by electrofishing utilized habitats associated with A2 bank types. These habitats were characterized by moderate current velocities and gravel/cobble substrates. Walleye captured by setlines were in areas of slow current velocity with gravel/silt/sand substrates, in depths of 2.0 m adjacent to D2 bank types. All captured individuals were adults.

Burbot were captured on setlines adjacent to D2 bank types in depths of 2.0 m. Slow current velocities and silt/sand substrates characterized these habitats.

Longnose sucker was the only coarse fish species recorded at Site 7. The presence of juvenile and adult size-classes indicated a use of the area for most life requisites. Longnose sucker (juveniles and adults) tended to select moderate velocity areas along D2 bank margins.

Flathead chub, the dominant forage fish at Site 7, contributed 51.3% to the forage fish catch (Table 3.26). The presence of all life stages suggested that suitable habitats were available for all life requisites of this species. Trout-perch were the second most abundant forage species in the area (Figure 3.16). Both flathead chub and trout-perch at Site 7 were commonly found in association with longnose sucker. The majority of emerald shiners were recorded from habitats characterized by low current velocities, shallow water depths, and gravel/silt substrates in association with D2 bank types.

Based on the presence of most life stages for all forage species, it appears that suitable habitats for all life history requisites were available in the area.

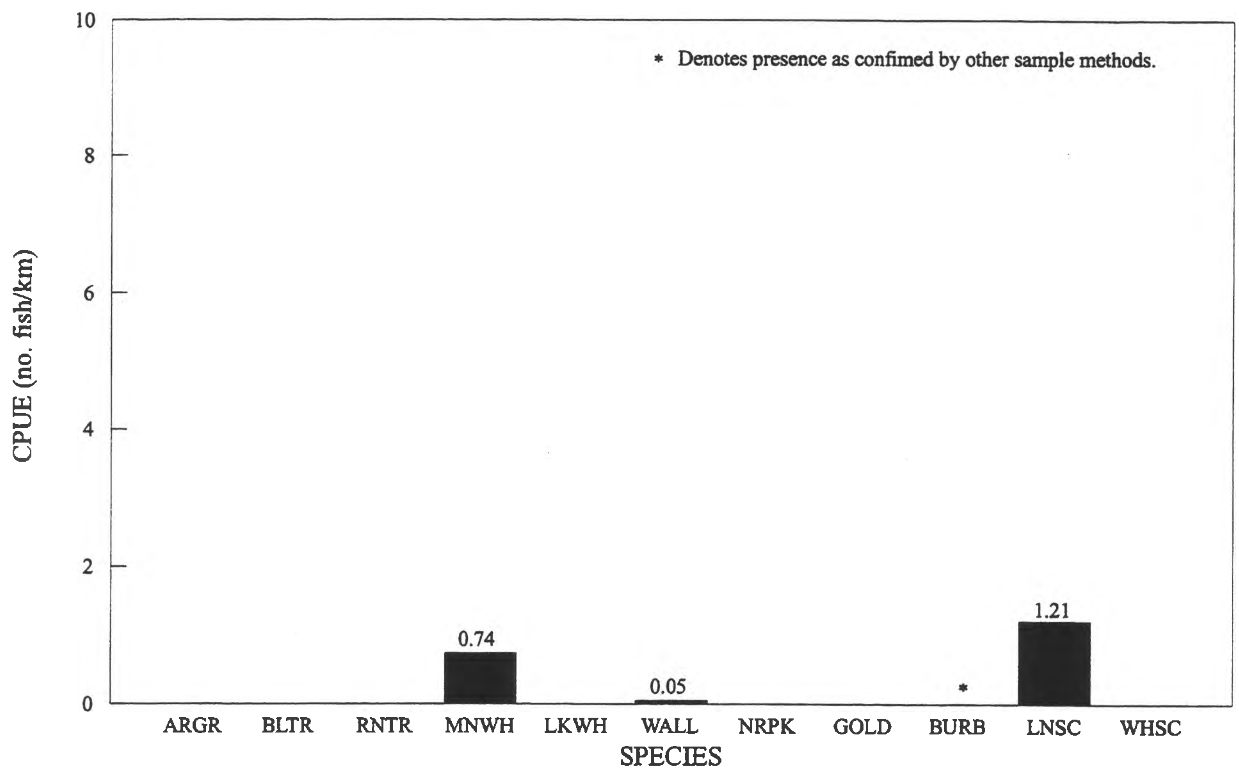

Figure 3.15 Catch-per-unit-effort values for sport and coarse fish captured by boat electrofishing at Site 7, Athabasca River, spring 1992.

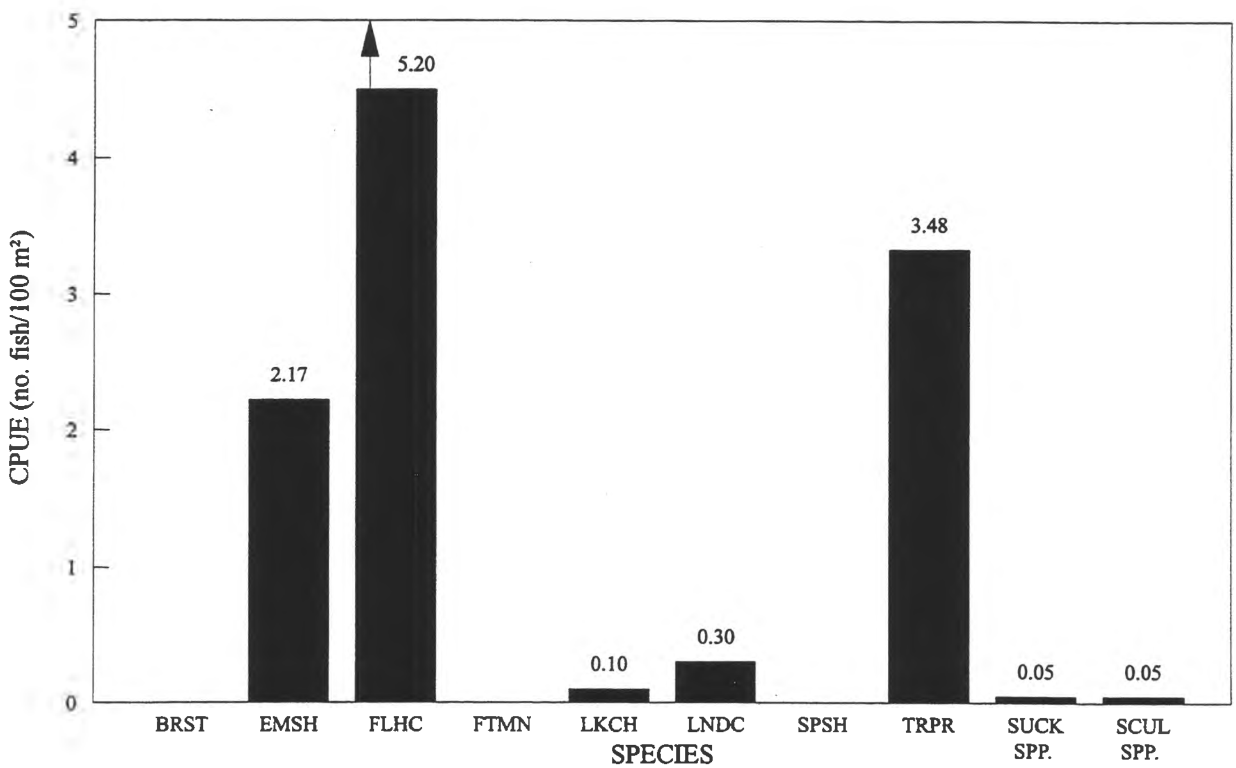

Figure 3.16 Catch-per-unit-effort values for forage fish captured by beach seining at Site 7, Athabasca River, spring 1992.

3.9.3 Tributaries

The House River was the only tributary sampled in R7 (Table 3.27). Tributaries, such as Loon and Buffalo creeks and Livock and Algar rivers, were not sampled due to unsafe river conditions in the vicinity of Grand Rapids. RUN (R3) was the only habitat type recorded in the House River; substrates consisted primarily of sand/silt. Sport fish were not captured at the site. Limited availability of instream and bank cover, as well as low habitat diversity, may limit the potential for sport fish in the lower House River. Westworth (1990) documented the presence of walleye, Arctic grayling, mountain whitefish, and northern pike from the upper reaches of the House River.

Table 3.27 Tributaries sampled in Reach 7, Athabasca River, spring 1992.

TRIBUTARY	KM LOCATION	UPSTREAM BOUNDARY[a] (m)	LENGTH (m)	AVG. WIDTH (m)	AVG. DEPTH (m)	CHANNEL TYPE	SPECIES ENCOUNTERED[b]	DOMINANT HABITAT[c]
House River	439.0	700	700	30-60	0.5	Erosional	LNSC	R3

[a] Upstream boundary - distance in metres from confluence with Athabasca River.
[b] Species code explanation provided in Table 3.4.
[c] Refer to Appendix B3 for habitat codes and descriptions.

3.10 REACH 8

3.10.1 Physical Habitat

Reach 8 (R8) of the Athabasca River was 135 km long and flowed in a northeasterly direction (Figure 1.1). Most of the reach was situated within a series of twelve rapids, including Brule, Boiler, Middle, Long, Crooked, Rock, Cascade, and Mountain rapids. Average channel gradient was 0.93 m/km (Table 3.1), and as a result, current velocities were high. Water clarity was lower in R8 than in R7 (Table 3.2).

Type U channel habitat contributed 98% to the total available channel length in R8 (Table 3.3). Type S and Type M channels (combined) contributed 2% to the total channel length (refer to Appendix B1 and B2 for habitat codes and descriptions).

The intensive survey site (Site 8) included Mountain Rapids, the rapids situated farthest downstream in R8. Site 8 was 9 km long, and similar to Site 7, the major channel habitat consisted exclusively of Type U (Table 3.28).

Nine bank habitat types were recorded within Site 8 during the spring sampling period. Depositional habitat (D1 and D3) contributed 33% to the total available bank habitat. Armoured/stable bank types (primarily A2 type) also contributed 33% to the total habitat. Erosional habitats (E2, E3, and E4) also were abundant at Site 8, with E2 and E4 bank types being dominant. Canyon bank habitats (C2B and C3) were present but contributed only 9% to the total bank habitat.

Table 3.28 Percent composition of major channel and bank habitat types at Site 8, Athabasca River, spring 1992.

MAJOR CHANNEL TYPE[a]	LENGTH (km)	PERCENT COMPOSITION	BANK HABITAT TYPE[b]	LENGTH (km)	PERCENT COMPOSITION
U	9.0	100	A2	5.4	32
S	-	-	A3	0.2	1
M	-	-	C2B	1.4	8
			C3	0.2	1
			D1	2.7	16
			D3	2.9	17
			E2	1.8	11
			E3	0.6	4
			E4	1.5	10
TOTAL	9.0	100		16.4	100

[a] U - Unobstructed Channel; S - Singular Island; M - Multiple Island.
[b] Refer to Appendix B2 for habitat codes and descriptions.

3.10.2 Fish Resources

Walleye, the dominant sport fish species at Site 8, contributed 55.4% to the combined sport and coarse fish catch (Table 3.29). Both juvenile and adult size-classes of walleye were captured. The majority of adults that were in spawning condition were ripe males, although a few spent males and one spent female also were captured. Spawning habitats for walleye in rivers are rocky areas in whitewater below rapids or falls (Scott and Crossman 1973). Suitable spawning habitats for walleye were available at Site 8 in the form of Mountain Rapids. Boat electrofishing CPUE values for walleye at Site 8 were considerably higher than at any of the other intensive survey sites sampled during the spring period (Figure 3.17).

Table 3.29 Fish species composition at Site 8, Athabasca River, spring 1992.

SPORT AND COARSE FISH SPECIES	SIZE-CLASSES		TOTAL CAPTURED[b]	%	FORAGE FISH SPECIES	TOTAL CAPTURED[b]	%
	Y-O-Y	JUV/AD[a]					
Arctic grayling					Flathead chub	125	57.8
Mountain whitefish					Lake chub	2	1.0
Lake whitefish					Longnose dace	7	3.3
Bull trout					Emerald shiner	8	3.8
Rainbow trout					Spottail shiner		
Northern pike		*	4	4.3	Fathead minnow	11	5.3
Walleye		*	51	55.4	Trout-perch	43	20.6
Goldeye		*	25	27.2	Brook stickleback	2	1.0
Burbot		*	2	2.2	Spoonhead sculpin		
Longnose sucker		*	9	9.8	Sculpin spp.	2	1.0
White sucker		*	1	1.1	Sucker spp.	11	5.2
					Cyprinid spp.	2	1.0
TOTAL			92	100		209	100

[a] Combined due to difficulties in differentiating between these life stages based solely on size.
[b] Data for all sampling methods combined.

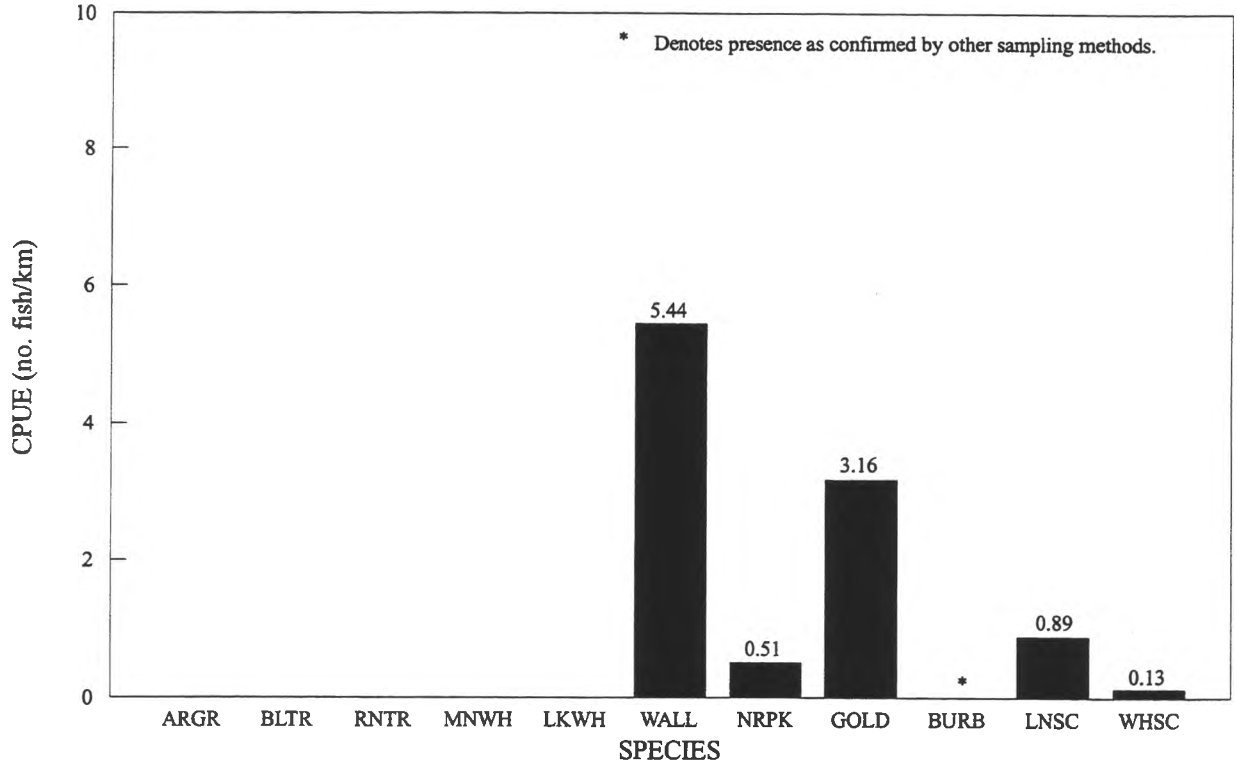

Figure 3.17 Catch-per-unit-effort values for sport and coarse fish captured by boat electrofishing at Site 8, Athabasca River, spring 1992.

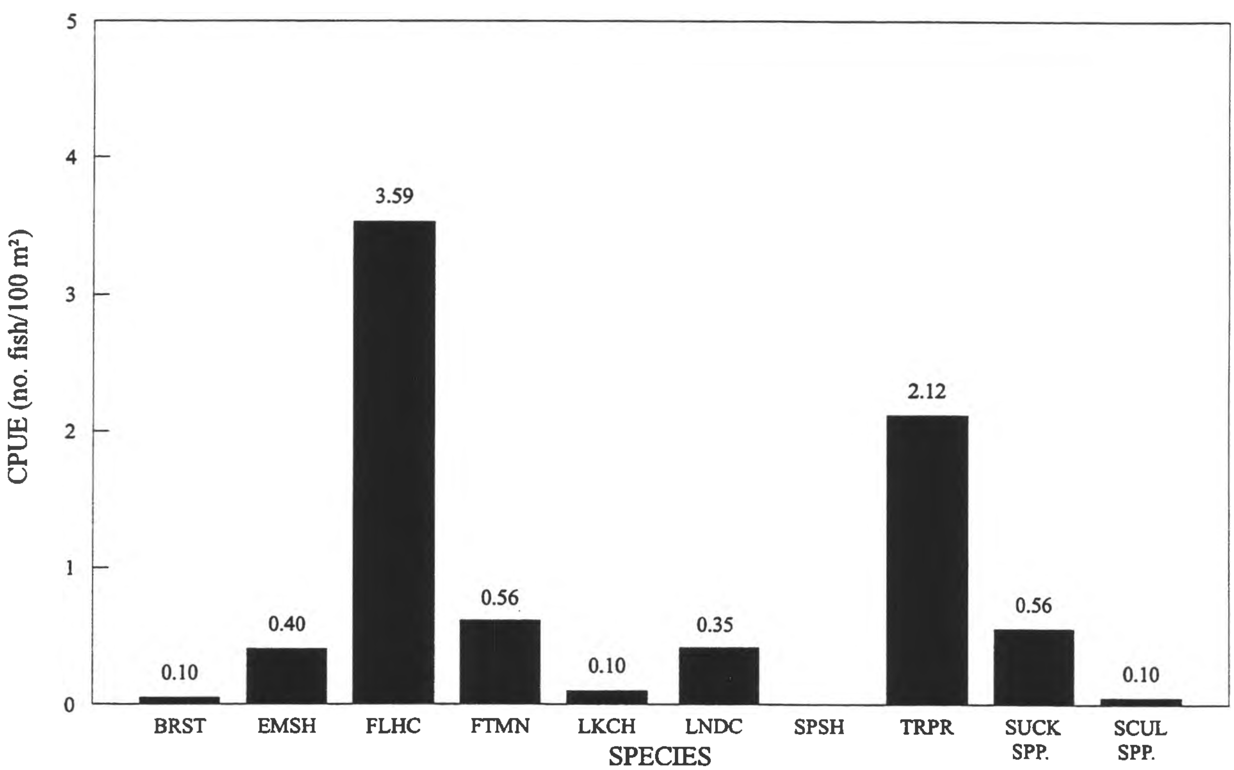

Figure 3.18 Catch-per-unit-effort values for forage fish captured by beach seining at Site 8, Athabasca River, spring 1992.

Goldeye also were well represented in the catch. Most adults in the catch were ripe females. Since ripe goldeye females spawn very quickly, the presence of these individuals is indicative of use of the area for spawning, although typical spawning habitats for this species (i.e., large quiet BW or side channels; Scott and Crossman 1973) were not abundant in the reach. After spawning in the present area, the semi-buoyant goldeye eggs likely drift downstream to lower gradient reaches for hatching and rearing.

During electrofishing surveys, adult walleye and goldeye were recorded in association with a variety of bank types, including A3, C2B, C3, E2, and E4. Habitats selected in these areas exhibited high current velocities and shallow depths (i.e., 0.5 m) with boulder/cobble substrates. Adult goldeye also were encountered along LEDGE habitats. Overhead cover was provided by high levels of turbidity; instream cover was present in the form of instream boulders and bedrock fractures.

Northern pike and burbot were recorded in low abundance at Site 8 (Appendix D, Table D17). Adults of both species were the only life stage captured. Both species selected small BW habitats associated with A3 bank types, which were characterized by high current velocities and high turbidity.

Longnose sucker was the dominant coarse fish species recorded at Site 8. The presence of adults and juvenile size-classes suggests that the habitat was for feeding and rearing purposes. White suckers were infrequent in the catch; only one individual was captured during boat electrofishing. Habitat selection by longnose and white suckers was similar to that noted for sport fish species at Site 8.

Forage fish species diversity was high at Site 8 (Table 3.29, Figure 3.18). Flathead chub and trout-perch were the dominant forage fish species; these species contributed 57.8 and 20.6% to the catch, respectively. Most life stages of flathead chub were present; larger juveniles and adults were found mainly in habitats with high current velocities associated with C2B bank types. Overhead cover was mainly in the form of turbidity. Smaller individuals utilized small localized backwaters associated with the irregular shoreline of D3 bank types. Trout-perch were captured in habitats associated with depositional (D1 and D3) bank types. These areas exhibited low current velocities, shallow depths, and cobble/gravel substrates.

3.10.3 Tributaries

The Hangingstone, Little Fishery, and Clearwater rivers were the three tributaries sampled in R8 (Table 3.30). The dominant habitat was RUN (R3) in both the Clearwater and Hangingstone rivers, whereas RUN/BOULDER GARDEN (R3/BG) was dominant in the Little Fishery River. Cobbles, pebbles, and gravels were the dominant substrates in the Hangingstone and Little Fishery rivers; silt and sand were the only substrates recorded in the Clearwater River. Bank erosion and siltation were high in the lower sections sampled of all three tributaries.

Potential spawning habitats for use by sport fish species from the mainstem Athabasca River were not available in any of the sampled sections of the three tributaries. The lower reaches of all three systems, however, contained areas with limited rearing potential for northern pike and walleye. Owing to its small size, the Little Fishery River provided limited habitat for larger size-classes of fish. Both the Hangingstone and Clearwater rivers appeared to have potential as feeding areas for adult sport fish species, but only the Clearwater River exhibited habitats with sufficient depths for overwintering use. Westworth (1990) documented the presence of Arctic grayling, mountain whitefish, walleye, and northern pike from the Hangingstone and Clearwater rivers as well as lake whitefish, goldeye, and burbot from the Clearwater River.

Table 3.30 Tributaries sampled in Reach 8, Athabasca River, spring 1992.

TRIBUTARY	KM LOCATION	UPSTREAM BOUNDARY[a] (m)	LENGTH (m)	AVG. WIDTH (m)	AVG. DEPTH (m)	CHANNEL TYPE	SPECIES ENCOUNTERED[b]	DOMINANT HABITAT[c]
Hangingstone River	-	388	105	30-60	0.5	Erosional	-	R3
Little Fishery River	292.1	220	110	5-10	0.4	Erosional	FTMN, LKCH, Sucker spp.	R3/BG
Clearwater River	286.5	2000	2000	30-60	0.5	Erosional	WHSC, WALL, NRPK	R3

[a] Upstream boundary - distance in metres from confluence with Athabasca River.
[b] Species code explanation provided in Table 3.4.
[c] Refer to Appendix B3 for habitat codes and descriptions.

3.11 REACH 9

3.11.1 Physical Habitat

The Athabasca River within this 125.0 km long reach (R9) flowed in a northeasterly direction (Figure 1.1). The low average channel gradient (0.17 m/km) produced low to moderate current velocities throughout the reach (Table 3.1). Water clarity was similar to that recorded in R8 (Table 3.2).

The dominant channel type in R9 was Type M, which contributed 54% to the total available channel length (Table 3.3) (refer to Appendix B1 and B2 for habitat codes and descriptions). Type U was the second most abundant major channel type (35%) followed by Type S (11%).

The intensive survey site (Site 9) was 9.5 km in length, with the upstream end of the site located at the Muskeg River. The site was characterized by Type M channel, which contributed 91% to the total available channel length (Table 3.31). Type U and Type S channels contributed 9% (combined) to the total channel length.

Seven bank habitat types were present at Site 9. Erosional habitat types (E1 and E2) were dominant, and contributed 75% (combined) to the total available bank habitat.

Depositional bank habitat consisted mainly of the D1 type that contributed 14% to the total. Limited amounts of armoured/stable bank habitat were available at Site 9. Special habitat features recorded at Site 9 included shoals (SHF).

Table 3.31 Percent composition of major channel and bank habitat types at Site 9, Athabasca River, spring 1992.

MAJOR CHANNEL TYPE[a]	LENGTH (km)	PERCENT COMPOSITION	BANK HABITAT TYPE[b]	LENGTH (km)	PERCENT COMPOSITION
U	0.7	7	A1	1.9	8
S	0.2	2	A2	0.3	1
M	8.6	91	C2B	0.2	1
			D1	3.5	14
			D2	0.3	1
			E1	12.6	52
			E2	5.7	23
			A1/C1	0.1	<1
TOTAL	9.5	100		24.6	100

[a] U - Unobstructed Channel; S - Singular Island; M - Multiple Island.
[b] Refer to Appendix B2 for habitat codes and descriptions.

3.11.2 Fish Resources

Four sport fish species were recorded from Site 9. Walleye was the dominant species, contributing 34.4% to the sport and coarse fish species catch (Table 3.32). Larval stages of walleye were captured in drift nets (Appendix D, Table D18). The presence of young-of-the-year in the catch, and the presence of numerous adults in spawning condition (i.e., ripe males and spent females), indicated spawning activity either in Reach 9, upstream reaches, or larger tributaries (e.g., MacKay River) within the reach. Suitable walleye spawning habitat was not recorded in the mainstem Athabasca River in Reach 9 but was recorded in Reach 8. Adult walleye captured by electrofishing were generally adjacent to A1 bank types. The selected habitats had moderate current velocities and gravel substrates. Young-of-the-year caught in drift nets were captured in similar habitats as adults. Walleye captured by setlines were adjacent to D1 bank types in areas of low current velocities with sand substrates in depths of 1.5 to 2.0 m.

Table 3.32 Fish species composition at Site 9, Athabasca River, spring 1992.

SPORT AND COARSE FISH SPECIES	SIZE-CLASSES		TOTAL CAPTURED[b]	%	FORAGE FISH SPECIES	TOTAL CAPTURED[b]	%
	Y-O-Y	JUV/AD[a]					
Arctic grayling					Flathead chub	137	36.2
Mountain whitefish					Lake chub	32	8.5
Lake whitefish		*	1	3.1	Longnose dace	9	2.4
Bull trout					Emerald shiner	26	6.9
Rainbow trout					Spottail shiner		
Northern pike		*	3	9.4	Fathead minnow	2	0.5
Walleye	*	*	11	34.4	Trout-perch	162	42.9
Goldeye		*	8	25.0	Brook stickleback		
Burbot					Spoonhead sculpin	6	1.6
Longnose sucker	*		4	12.5	Sculpin spp.	2	0.5
White sucker		*	5	15.6	Sucker spp.	2	0.5
					Cyprinid spp.		
TOTAL			32	100		378	100

[a] Combined due to difficulty in differentiating between these life stages based solely on size.
[b] Data for all sampling methods combined.

Goldeye also were relatively abundant at Site 9 (Table 3.32, Figure 3.19). All captured goldeye were adults. Goldeye were generally distributed in habitats characterized by moderate current velocities adjacent to A1, A2, E1, and E2 bank types. Suitable spawning habitats (i.e., large, quiet BW or side channels; Scott and Crossman 1973) were not recorded at this site. Based on the available data, there is no evidence to suggest that goldeye spawn in the vicinity of Site 9.

Lake whitefish and northern pike also were present at Site 9. Only one lake whitefish (captured at the confluence with the MacKay River) and two northern pike were captured. One of the northern pike was a ripe female, the other was a juvenile. Limited spawning habitats (i.e., shallow vegetated areas) for northern pike were recorded in certain sections of the Athabasca River in Reach 9.

White sucker was the dominant coarse fish species in the area. Captured specimens included both adults and juveniles. The capture of larval stages of longnose sucker in drift nets situated in the mainstem Athabasca River indicated a use of upstream areas in the vicinity of Site 9 for spawning purposes. Habitat selection by white suckers was similar to that reported for goldeye.

Trout-perch and flathead chub were the most abundant forage fish species at Site 9 (Table 3.32, Figure 3.20). Lake chub, longnose dace, emerald shiner, and sculpins also were well represented in the catch. The presence of most life stages of trout-perch and flathead chub indicated that suitable habitat was available for all life requisites. Forage fish species utilized similar bank habitats as those utilized by goldeye, but they exhibited a closer affinity to the shore in shallower depths.

3.11.3 Tributaries

All six tributaries sampled in R9 were low gradient, depositional streams (Table 3.33). The habitat in the Pierre, Steepbank, Ells, and Tar rivers was predominantly RUN (R3, and R2), characterized by silt/sand substrates. Bank erosion and siltation was high, with low to moderate bank and instream cover. The lower reaches of the Tar and Steepbank rivers appeared to have suitable areas for feeding and overwintering use by adult walleye and northern pike. However, they had limited spawning and rearing habitat for sport fish species residing in the Athabasca River.

The Muskeg River contained predominantly RUN (R3) habitat, with pebbles and gravels contributing significantly to the substrate composition. Bank erosion was high, with limited instream and bank cover. Potential spawning habitats for use by sport fish from the mainstem Athabasca River were not available in the lower reaches of the Muskeg River. However, the lower sections did contain areas with limited rearing and feeding potential for species such as northern pike and walleye.

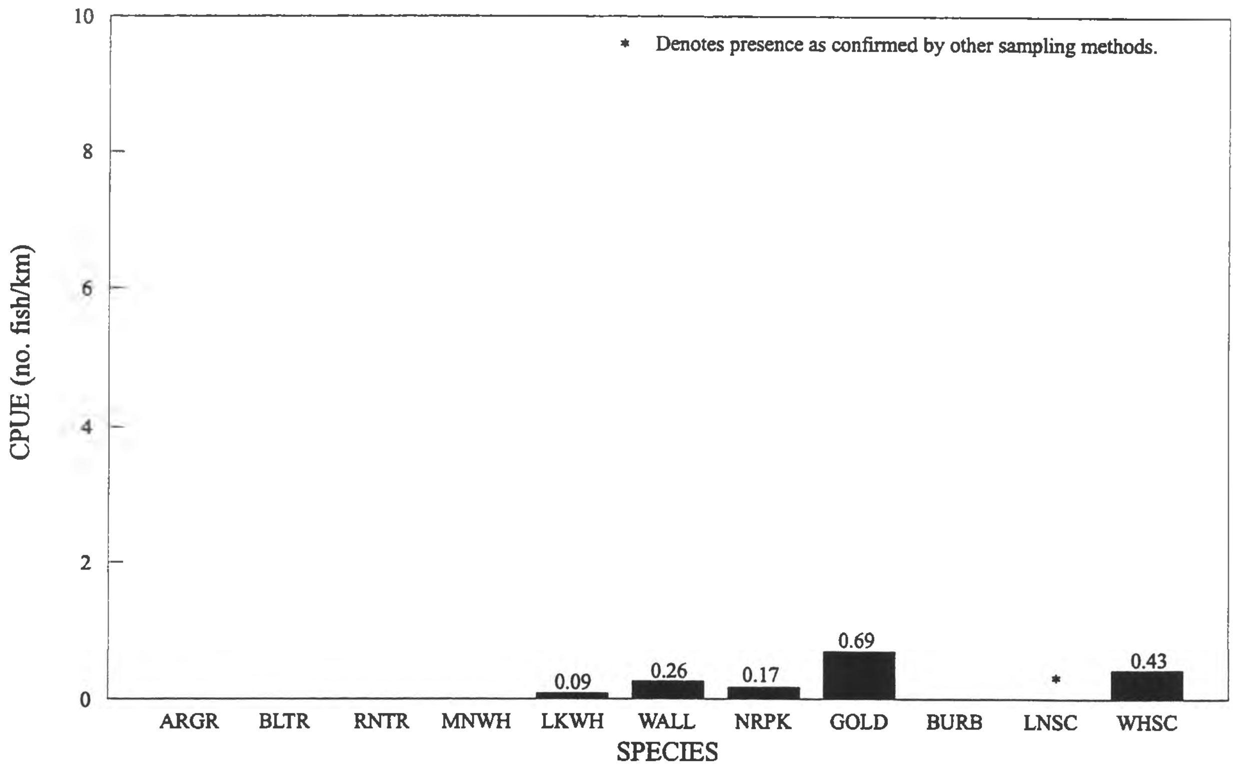

Figure 3.19 Catch-per-unit-effort values for sport and coarse fish captured by boat electrofishing at Site 9, Athabasca River, spring 1992.

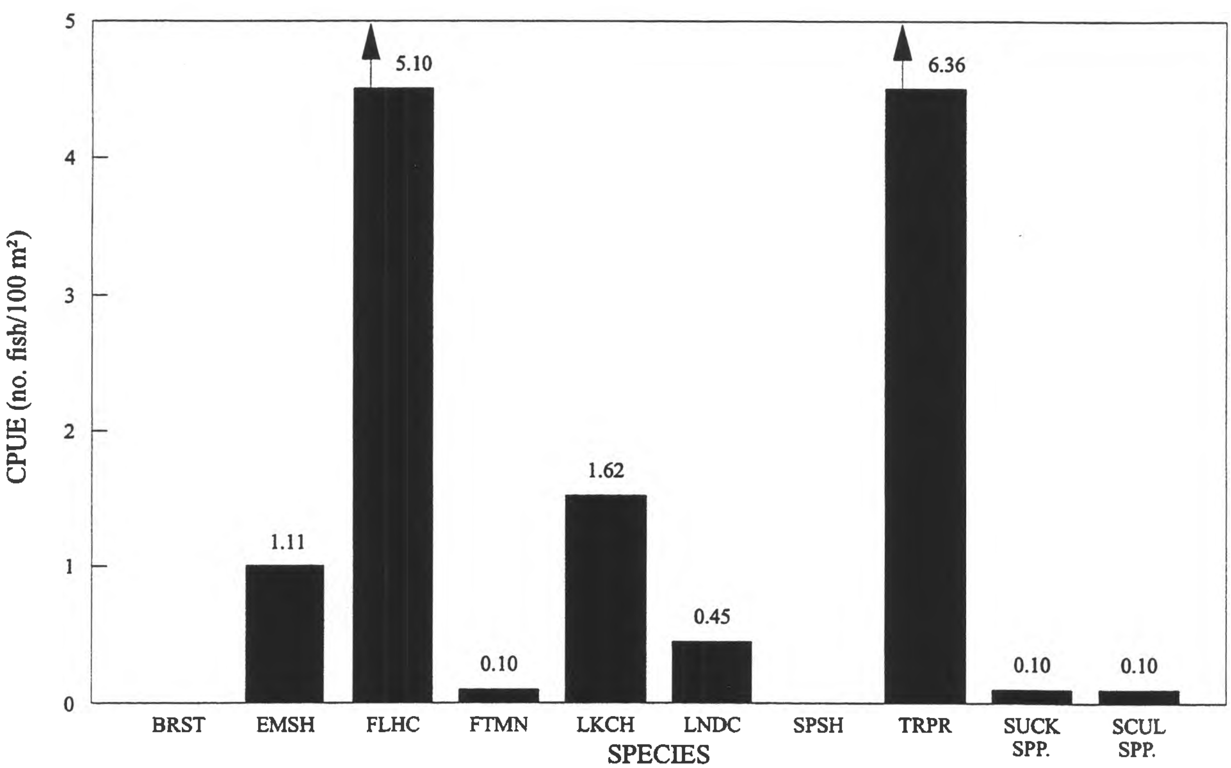

Figure 3.20 Catch-per-unit-effort values for forage fish captured by beach seining at Site 9, Athabasca River, spring 1992.

Table 3.33 Tributaries sampled in Reach 9, Athabasca River, spring 1992.

TRIBUTARY	KM LOCATION	UPSTREAM BOUNDARY[a] (m)	LENGTH (m)	AVG. WIDTH (m)	AVG. DEPTH (m)	CHANNEL TYPE	SPECIES ENCOUNTERED[b]	DOMINANT HABITAT[c]
Steepbank River	253.9	650	650	15-30	0.8	Depositional	-	R2
Muskeg River	239.2	500	500	15-30	0.6	Depositional	WHSC	R3
MacKay River	235.3	1500	1500	30-60	0.3	Depositional	TRPR, FLCH, WALL, WHSC	R3
Ells River	217.9	800	800	30-60	0.5	Depositional	-	R3
Tar River	215.9	800	800	30-60	0.8	Depositional	-	R2
Pierre River	201.5	120	60	10-15	0.5	Depositional	Scul. spp.	R3

[a] Upstream boundary - distance in metres from confluence with Athabasca River.
[b] Species code explanation provided in Table 3.4.
[c] Refer to Appendix B3 for habitat codes and descriptions.

Similar to the other tributaries sampled in R9, RUN (R3, and R2) was the dominant habitat type in the MacKay River. Sand/silt predominated the substrate although cobbles, pebbles, and gravel were present. Bank erosion was moderate, and the amount of bank and instream cover was low. One walleye was captured in the MacKay River; in addition, white suckers and forage fish, such as trout-perch and flathead chub, were captured. Although suitable spawning habitats were not recorded, the lower section provided feeding and overwintering habitats as well as limited rearing habitat for larger size-classes of sport fish. Westworth (1990) documented the presence of Arctic grayling, walleye, and northern pike in all tributaries sampled in Reach 9 with the exception of the Tar River. Burbot were reported from the Ells and MacKay rivers; goldeye also were documented in the Ells River.

3.12 REACH 10

3.12.1 Physical Habitat

In Reach 10 (R10), the Athabasca River flowed in a northeasterly direction for 84.3 km to the Embarras River, the reach's lowermost boundary. Seventy-eight kilometres downstream of the Embarras River, the Athabasca empties into the Peace/Athabasca Delta (Figure 1.1). The average channel gradient (0.08 m/km) was the lowest recorded in the study area, and the mainstem was characterized by low current velocities (Table 3.1). Water clarity remained similar to that recorded in the two previous upstream reaches (Table 3.2).

The major channel type in R10 was Type M (54% of the total channel length); Type S and Type U were present in lower abundance (14 and 32%, respectively) (Table 3.3; refer to Appendix B1 and B2 for habitat codes and descriptions).

The intensive survey site was 7.9 km long (Site 10). Channel type composition was similar to that recorded for Reach 10. Extensive braiding with numerous vegetated islands and well-developed side channels were common features in the area (Table 3.34).

Table 3.34 Percent composition of major channel and bank habitat types at Site 10 Athabasca River, spring 1992.

MAJOR CHANNEL TYPE[a]	LENGTH (km)	PERCENT COMPOSITION	BANK HABITAT TYPE[b]	LENGTH (km)	PERCENT COMPOSITION
U	-	-	D1	4.4	14
S	-	-	E1	19.5	62
M	7.9	100	E2	0.6	2
			E4	6.8	22
TOTAL	7.9	100		31.3	100

[a] U - Unobstructed Channel; S - Singular Island; M - Multiple Island.
[b] Refer to Appendix B2 for habitat codes and descriptions.

Bank habitat diversity was the lowest recorded for all survey sites on the Athabasca River. Erosional bank habitats predominated (E1, E2, and E4) and contributed 86% to the total available bank habitat. Depositional habitats were recorded, but these consisted solely of D1; armoured/stable banks were not present at Site 10. Special habitat features recorded included shoals (SHF).

3.12.2 Fish Resources

Sport fish diversity at Site 10 was low (Table 3.35; Figure 3.21). Northern pike, walleye, and goldeye, the three sport fish species recorded at Site 10, were all recorded at low levels of abundance.

Table 3.35 Fish species composition at Site 10 Athabasca River, spring 1992.

SPORT AND COARSE FISH SPECIES	SIZE-CLASSES		TOTAL CAPTURED[b]	%	FORAGE FISH SPECIES	TOTAL CAPTURED[b]	%
	Y-O-Y	JUV/AD[a]					
Arctic grayling					Flathead chub	429	90.9
Mountain whitefish					Lake chub		
Lake whitefish					Longnose dace	1	0.2
Bull trout					Emerald shiner		
Rainbow trout					Spottail shiner	1	0.2
Northern pike		*	5	31.3	Fathead minnow		
Walleye		*	4	25.0	Trout-perch	41	8.7
Goldeye		*	3	18.8	Brook stickleback		
Burbot					Spoonhead sculpin		
Longnose sucker		*	1	6.3	Sculpin spp.		
White sucker		*	3	18.8	Sucker spp.		
					Cyprinid spp.		
TOTAL			16	100		472	100

[a] Combined due to difficulties in differentiating between these life stages based solely on size.
[b] Data for all sampling methods combined.

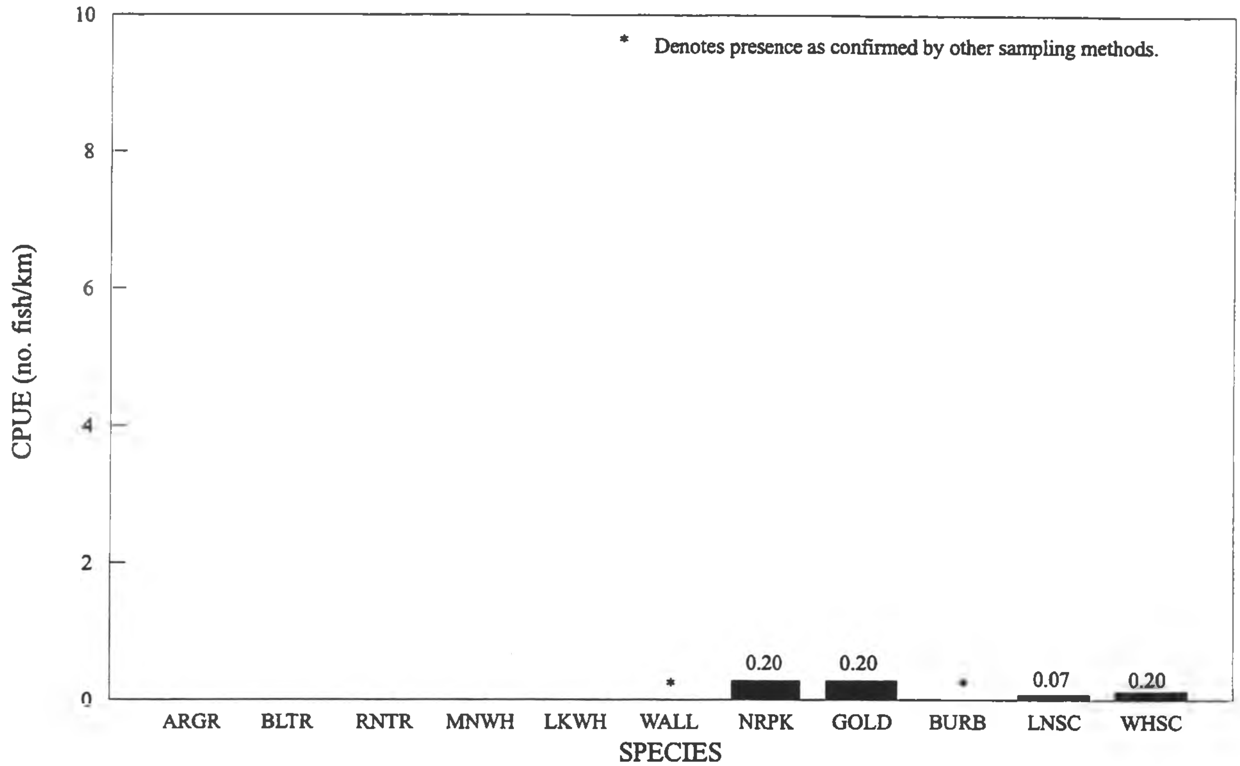

Figure 3.21 Catch-per-unit-effort values for sport and coarse fish captured by boat electrofishing at Site 10, Athabasca River, spring 1992.

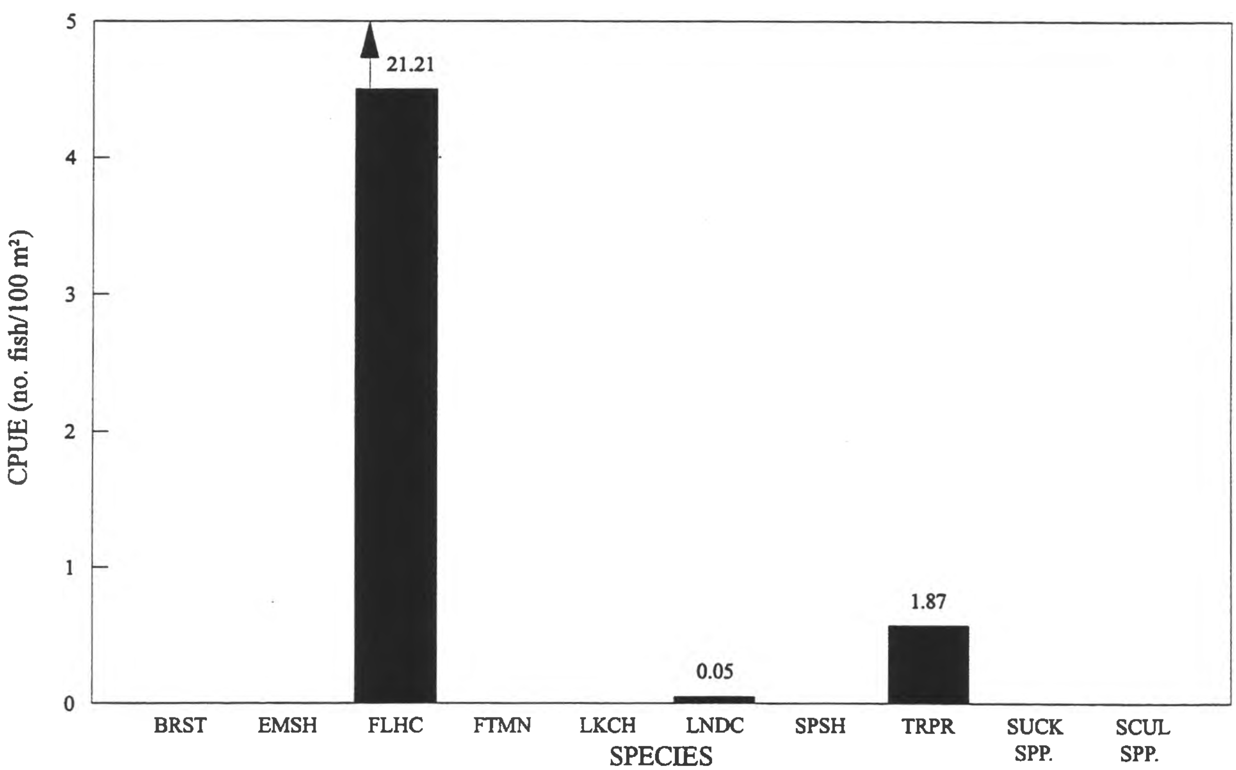

Figure 3.22 Catch-per-unit-effort values for forage fish captured by beach seining at Site 10, Athabasca River, spring 1992.

Walleye at Site 10 were captured by setlines; the catch consisted of four adults. Northern pike were present in both electrofishing and setline catches. Most northern pike captured were adults, one of which was a female in spawning condition (i.e., ripe). All goldeye captured at Site 10 were adults. The presence of mainly adult and juvenile maturity classes of all sport fish species indicated a primary use of the area for feeding, holding, and rearing functions. Suitable overwintering habitats also were available at Site 10 for all of these fish species. Walleye, goldeye, and northern pike were captured mainly in habitats adjacent to E1 and E2 bank types. These habitats were characterized by slow current velocities and depths in excess of 1.0 m. Instream cover was available in the form of root wads and woody debris.

Coarse fish species were not abundant at Site 10. Two white suckers and one longnose sucker were captured by electrofishing.

Flathead chub, the dominant forage fish species in the area, contributed 90.9% to the total forage fish catch. Trout-perch, the second most abundant species, contributed 8.7% to the total forage fish catch. All life stages of both species were present, which suggested that suitable habitat was available for all life requisites. Longnose dace and spottail shiner were present, but in low abundance (Table 3.35, Figure 3.22, Appendix D, Table D19). The forage fish and juvenile sucker species encountered at Site 10 utilized shallow-water habitats along D1 bank margins associated with islands. Current velocities in these habitats were slow and substrates were predominantly sand.

3.12.3 Tributaries

The Firebag River and Grayling Creek were the two tributaries sampled in R10 (Table 3.36). Both were characterized by RUN (R2) type habitats, with a predominance of silt/sand substrates. Instream and bank cover availability and suitability was rated as moderate for both systems. Fish were not captured in Grayling Creek, although one adult northern pike was observed. Two northern pike juveniles were captured from the Firebag River. Suitable rearing and feeding habitats for both walleye and northern pike were available in the Firebag River. Westworth (1990) documented the presence of Arctic grayling, lake whitefish, walleye, northern pike, and burbot in other sections of the Firebag River. Grayling Creek exhibited limited feeding and overwintering habitat potential for most sport fish species.

Table 3.36 Tributaries sampled in Reach 10, Athabasca River, spring 1992.

TRIBUTARY	KM LOCATION	UPSTREAM BOUNDARY[a] (m)	LENGTH (m)	AVG. WIDTH (m)	AVG. DEPTH (m)	CHANNEL TYPE	SPECIES ENCOUNTERED[b]	DOMINANT HABITAT[c]
Firebag River	162.9	1000	1000	30-60	0.3	Depositional	NRPK	R2
Grayling Creek	130.8	2000	2000	30-60	1.0	Depositional	NRPK[d]	R2

[a] Upstream boundary - distance in metres from confluence with Athabasca River.
[b] Species code explanation provided in Table 3.4.
[c] Refer to Appendix B3 for habitat codes and descriptions.
[d] Observed; not captured.

3.13 RELATIONSHIP BETWEEN PHYSICAL HABITATS AND FISH DISTRIBUTION

One of the main assumptions used to determine fish-habitat relationships is the assumption that a particular maturity stage of a species will utilize similar habitats throughout the range of that species. In the course of sampling throughout the Athabasca River, similarities in the bank habitat selected by a particular species maturity class were recorded. These observations are summarized in the following discussions.

3.13.1 Sport Fish

Mountain whitefish

Mountain whitefish adults and juveniles in the Athabasca River were found primarily in habitats with moderate current velocities (50-100 cm/s) and gravel/cobble/boulder substrates along mainstem margins. Habitats selected by both maturity-classes generally were associated with armoured/stable bank types (Table 3.37). Depths generally ranged from 1.0 to 1.5 m. Overhead cover was available in the form of turbulence, depth, and to a certain extent, turbidity. Instream cover was provided by substrate roughness. In areas where higher velocities (i.e., RAPIDS) were present, juvenile mountain whitefish tended to select these habitats. A more limited selection of areas associated with depositional (i.e., D2) and erosional (i.e., E2) bank types was noted for juveniles and less frequently for adults. These areas were characterized by moderate to high current velocities and gravel/cobble substrates. Yearling mountain whitefish captured in beach seines were most abundant in areas of low to moderate current velocities and gravel/cobble substrates along mainstem margins. These areas were generally associated with D2 and, to a lesser extent, A1/A2 bank types. Yearling mountain whitefish were infrequently captured in areas adjacent to erosional bank types.

Table 3.37 Use of major bank habitat classifications by sport and coarse fish species captured by electrofishing in the Athabasca River, spring 1992.

BANK HABITAT TYPE[a]	NUMBER OF BANK HABITAT UNITS SAMPLED	PERCENTAGE OF BANK HABITAT UNITS WHERE FISH SPECIES WERE RECORDED[b]							
		MNWH	NRPK	WALL	ARGR	GOLD	BURB	LNSC	WHSC
A	19	79	26	53	5	16	26	89	63
A/D	6	83		17	50			67	
A/E	13	77	8	23	15	15		77	46
C	3		33	67		33			
D	11	73	9	9	9			73	55
E	18	39	39	44		67	22	44	61

[a] A=Armoured/stable; D=Depositional; E=Erosional; C=Canyon. For an explanation of habitat codes see Appendix B2.
[b] For species code explanation, see Table 3.4; percent value represents the number of bank habitat types sampled in which a species was recorded.

Northern pike

Northern pike utilized shallow mainstem margins along a variety of bank habitats, which included armoured/stable, depositional, and erosional types (Table 3.37). Generally, this species tended to select habitats of low to moderate current velocities; depths and substrates in these areas were variable. Where SNYE habitats were present, northern pike adults exhibited a selection for these quiet water areas. Two SNYE habitats were encountered at Site 3, and at both locations northern pike were captured (either by boat electrofishing or setlines).

Walleye

Adult and juvenile walleye were captured by boat electrofishing and setlines adjacent to most of the bank habitat types sampled; however, a greater use of armoured/stable and erosional bank habitats was noted (Table 3.37). Generally, bank habitats selected by walleye were adjacent to areas with low (<50 cm/s) to moderate (50-100 cm/s) current velocities. Substrates ranged from silt/sand to cobbles and gravels. Young-of-the-year were captured at Site 6 in the confluence area of a small tributary. The habitat selected by this maturity-class exhibited low current velocities, shallow depths, gravel/cobble substrates, and high turbidity. Young-of-the-year walleye also were captured at Site 9 in drift nets adjacent to armoured/stable bank habitat (A1). These areas were characterized by moderate current velocities, shallow depths, high turbidity, and cobble/gravel substrates.

Arctic grayling

Arctic grayling were recorded only from the upper reaches of the Athabasca River at Site 2. Adult and larger juvenile Arctic grayling were captured by electrofishing, most often adjacent to armoured/stable bank habitats (A1 and A3) in combination with small areas of depositional habitats (i.e., D2). These areas exhibited characteristics of both bank types (i.e., predominantly gravel/cobble substrates and low to moderate current velocities). Arctic grayling were infrequently recorded in association with only depositional bank types (Table 3.37).

Goldeye

All maturity classes of goldeye were captured by electrofishing in areas of low to moderate current velocities. Overhead cover was provided by depth and turbidity, with instream cover generally absent. Habitats selected by this species were generally associated with erosional bank types and, to a lesser extent, with armoured/stable banks (Table 3.37).

Burbot

The majority of burbot recorded in the Athabasca River study area were adults or juveniles. Burbot captured by boat electrofishing and setlines were most often found in habitats that exhibited moderate current velocities, adjacent to armoured/stable and erosional bank types (Table 3.37). Capture depths for the setlines usually ranged from 0.5 to 4.0 m; substrates were variable.

Others

Other sport fish species captured in the study area were rainbow trout, bull trout, and lake whitefish. These species were captured in sufficient numbers to determine habitat selection trends. The trout and char species were distributed sporadically in the upper reaches of the Athabasca River. The two captured lake whitefish were captured from areas associated with armoured/stable and erosional bank habitat types.

3.13.2 Coarse Fish

White and longnose sucker (adults and juveniles) captured by boat electrofishing were recorded adjacent to most of the bank habitat types sampled (Table 3.37). A slight preference for armoured/stable and erosional bank types was noted for both species. Generally, depths and current velocities in selected habitats were variable and substrates ranged from silt/sand to cobbles and gravels. Smaller juveniles (i.e., yearlings) selected shallow-water habitats with low current velocities in association with depositional banks.

3.13.3 Forage Fish

The majority of forage fish were captured by beach seining in shallow-water habitats. Emerald shiner, lake chub, longnose dace, and trout-perch were recorded in habitats with low current velocities and a predominance of cobble/gravel substrates along mainstem margins. Habitats selected generally were associated with depositional bank types (Table 3.38). A more limited use of areas associated with armoured/stable bank types was noted.

Flathead chub were first encountered at Site 4 and were recorded in shallow-water habitats throughout the study area. Adults and juveniles tended to utilize areas of greater depth and current velocities than smaller fish. Insufficient data are available for other forage fish species to determine habitat preferences.

Table 3.38 Use of major bank habitat classifications by fish species captured in seine hauls in the Athabasca River, spring 1992.

BANK HABITAT TYPE[a]	NUMBER OF BANK HABITAT UNITS SAMPLED	PERCENTAGE OF BANK HABITAT UNITS WHERE FISH SPECIES WERE RECORDED[b]													
		BRST	EMSH	FLCH	FTMN	BURB	LKCH	LNDC	MNWH	SCUL SPP.	SPSH	SUCK. SPP.	TRPR	WHSC	WALL
A	14	-	14	36	14	-	21	29	14	21	7	29	57	-	-
AD	3	-	-	33	-	-	-	-	100	-	-	-	-	-	-
AE	1	-	100	100	-	-	100	100	-	-	100	100	100	-	-
D	35	3	57	57	3	3	34	51	23	17	11	60	66	6	3

[a] A=Armoured/stable; D=Depositional; E=Erosional; C=Canyon. For an explanation of habitat codes, see Appendix B2.

[b] For species code explanation, see Table 3.4; percent value represents the number of bank habitat types sampled in which a species was recorded.

SECTION 4
DISCUSSION

Major channel types in the Athabasca River were mapped for the entire mainstem in the study area. The upper and lower reaches (i.e., reaches 2, 3, 9, and 10) were characterized by Type M channel (i.e., Multiple Channel), whereas Type U channels (i.e., Unobstructed Channel) predominated in the middle reaches of the Athabasca River (i.e., reaches 4, 5, 6, 7, and 8). Type U channel types also were dominant in Reach 1. Type S channels were not frequently encountered in the study area. The distribution of channel types within the intensive survey sites was similar to that recorded for the reaches.

The distribution and composition of bank habitat types were mapped at all sites within the study area. A total of eighteen bank habitat types were identified at the 10 intensive survey sites. Armoured/stable bank habitats were dominant at some upper (Site 1) and middle (sites 4 and 7) sites of the Athabasca River. These bank habitats also were co-dominant with depositional bank habitats at sites 2 and 8. Bank habitats at Site 3 were characterized by depositional bank types. At the remaining sites (i.e., sites 5, 6, 9, and 10), erosional bank habitat types were dominant.

Relationships between major channel types, availability of bank habitat types, and fish diversity did not appear to be well defined in the Athabasca River. The habitat classification system used to characterize river conditions was first developed to characterize conditions on the Peace River (Hildebrand 1990). In that particular study, habitat mapping from the first field survey was verified in two subsequent sampling trips. Based on just one field survey on the Athabasca River, it is difficult to determine a definitive relationship between fish diversity, channel types, and bank habitat types.

Mountain whitefish, the dominant sport fish encountered in the study area, was most abundant in the upper and middle reaches of the Athabasca River. Walleye were less abundant than mountain whitefish, but were common throughout the study area. Northern pike exhibited a lower abundance relative to walleye throughout most of the study area, as did burbot. Goldeye were recorded only from the middle and lower reaches of the Athabasca River. The remaining sport fish (i.e., Arctic grayling, rainbow trout, and bull trout) were infrequently encountered only from the uppermost reaches of the Athabasca River.

Longnose sucker was the most abundant coarse fish; juveniles and adults were recorded from most sites throughout the study area.

The most abundant forage fish species recorded in the study area was flathead chub. They were not recorded upstream of Site 4. Trout-perch and lake chub, although not as abundant as flathead chub, were common throughout the study area.

CRITICAL HABITATS

The following discussion summarizes the locations of suspected critical habitats for fish species in the Athabasca River for the four major life requisite functions (i.e., spawning, rearing, feeding, and overwintering).

Spawning

Spawning sites for fall spawning fish species in the Athabasca River (i.e., mountain whitefish, lake whitefish, and bull trout) were not defined. Suitable spawning habitats for mountain whitefish were recorded in reaches 1 and 2. Spawning areas for bull trout were not identified during the present study but were identified in upstream tributaries in subsequent telemetry studies (Sub-Project 3121).

The major spring spawning sport fish species in the Athabasca River study area include goldeye, walleye, rainbow trout, and northern pike. Although site-specific spawning locations for spring spawning species were not identified during the study, the presence of gravid/ripe individuals and young-of-the-year provided indirect indications of spawning use within the study site or nearby areas.

Evidence of probable mainstem spawning by goldeye was noted at Site 8. The presence of goldeye in pre-spawning (i.e., gravid) condition at Site 5 (near Lesser Slave River) also suggests that some spawning may occur in the vicinity or in nearby larger tributaries (e.g., Lesser Slave River). In general, the suitability and availability of potential habitats for documented goldeye spawning (i.e., large, quiet backwaters and side channels) was low throughout the mainstem Athabasca River at the flows observed in the spring survey. However, it is likely that spawning occurred in higher gradient areas such as Site 8, with the semi-buoyant eggs drifting to downstream reaches for hatching and rearing.

Adult male walleye in spawning condition (i.e., ripe) were recorded at sites 3, 4, 8, 9, and 10 on the Athabasca River mainstem. Male walleye in spent condition also were encountered at Site 8. Female walleye in spent condition were captured at sites 8 and 9. The capture of ripe and spent males and spent female walleye at Site 8 suggested spawning may have occurred within the general area. Spawning habitats for walleye in rivers are rocky areas in white water below rapids, falls, or dams (Scott and Crossman 1973). Suitable spawning habitats for walleye were available at Site 8 (i.e., Mountain Rapids). In a study conducted by Tripp et al. (1979) in the vicinity of the present Site 8, walleye spawning areas and the extent of the spawning runs could not be determined because of the low number of captured spawning walleye. Based on the distribution and abundance of young-of-the-year walleye, spawning was suspected to have occurred upstream of Cascade Rapids. During the same study, large concentrations of young-of-the-year also were recorded downstream of Mountain Rapids. In the present study, the capture of young-of-the-year walleye at Site 9 provided indirect evidence of spawning activity in either Reach 9 or upstream reaches; suitable spawning habitats were not recorded in the mainstem Athabasca River in Reach 9. Therefore, the presence of young-of-the-year walleye may indicate a downstream drift from upstream areas where suitable spawning habitats were recorded (i.e., Site 8) or drift out of tributaries (e.g., MacKay River). The presence of spent females may indicate use of the area for feeding purposes by these post-spawners.

Adult northern pike were recorded at most sites during the spring 1992 survey. Gravid (pre-spawning) females were captured at two sample locations in Reach 3 (Blue Ridge). Ripe females were encountered in Reach 5 (Lesser Slave River), Reach 9 (Ft. MacKay), and Reach 10 (Embarras). Site-specific mainstem spawning areas (based on concentrations of adults in spawning condition) were not located during the study. Machniak (1975) indicated that pike generally spawn over flooded aquatic or terrestrial vegetation in shallow water areas with minimal current. In the Peace River researchers (Hildebrand 1990) suspected that northern pike utilized SNYE habitats for spawning. SNYE habitats and nearshore habitats with flooded vegetation and quiet water were rare in the Athabasca River. SNYE habitats were recorded only at Site 3, and at the flows present, these potential spawning habitats were of marginal quality. During higher flows later in the spring, these areas would become more suitable for spawning northern pike. A limited amount of quiet, nearshore habitat with flooded terrestrial vegetation was present at Site 9.

The presence of longnose and white sucker adults in spawning condition was considered as an indirect evidence that spawning probably occurred in the mainstem Athabasca River or in nearby tributaries. Juvenile suckers were more abundant in the upper and middle study reaches of the Athabasca River, which might indicate that spawning was more prevalent in these areas.

Rearing

Rearing habitat was defined as habitat utilized by young-of-the-year or juvenile fish. Juvenile goldeye were mainly recorded from the lower reaches of the Athabasca River; however, abundance in these areas was low.

Yearling mountain whitefish were captured from the upper Athabasca River (i.e., Reaches 1-4) during spring. Their absence from the lower reaches reflects reduced habitat suitability. Juvenile mountain whitefish were recorded from the majority of reaches, with the exception of reaches 8, 9, and 10. They generally selected armoured/stable and depositional bank habitat types.

The absence of young-of-the-year northern pike in the mainstem Athabasca River suggests that spawning and rearing habitats for this species are primarily located in tributaries. Juveniles of this species were recorded only from the lower reaches of the Athabasca River. Only one individual was captured at each of sites 9 and 10, which suggested that suitable rearing habitat in the mainstem was limited. The capture of two juvenile northern pike from the Firebag River indicated suitable rearing habitats were available in this system.

Young-of-the-year walleye were captured at sites 6 and 9. At Site 6, they were captured within the confluence of a small tributary adjacent to depositional bank habitats (i.e., D2). This area was characterized by low current velocities, shallow depths, gravel/cobble substrates, and high turbidity. This type of bank habitat was not frequently encountered at Site 6. At Site 9, young-of-the-year walleye were captured adjacent to armoured/stable bank types (i.e., A1). This habitat was characterized by moderate current velocities and gravel substrates. Armoured/stable bank types were relatively uncommon at Site 9. Rearing habitats for young-of-the-year walleye appeared to be limited at sites 6 and 9.

Rearing areas for coarse and forage fish were abundant and widely distributed throughout the mainstem Athabasca River. Juveniles suckers (spp.) were recorded at most intensive survey sites. Rearing habitats for both coarse and forage fish were generally located in shallow margins adjacent to depositional bank habitat types.

Adult Feeding, Holding, and Overwintering

Adult goldeye were encountered in habitats adjacent to both armoured/stable and erosional bank habitats; however, they were recorded more frequently adjacent to erosional bank types. These areas exhibited low current velocities and a predominance of silt/sand substrates. Adult mountain whitefish were generally associated with armoured/stable banks rather than depositional and erosional bank habitats. Northern pike did not select a particular bank type, and their distribution was sporadic throughout the study area. Walleye appeared to frequent armoured/stable bank habitats more often than either depositional or erosional bank types.

Coarse fish species were recorded adjacent to most of the bank habitat types sampled, although both longnose and white suckers were captured more frequently alongside armoured/stable bank types.

The availability and distribution of potentially suitable overwintering habitats can only be discussed in general terms. Availability of deep-water (i.e., >7 m, Hildebrand 1990) habitats in the mainstem was very limited in all study reaches of the Athabasca River. Potential overwintering sites for mountain whitefish were observed in the upper and middle reaches of the study area, mainly between sites 2 and 5. Potentially suitable overwintering habitats for walleye were noted at sites 6 and 9. Suitable overwintering habitat for coarse and forage fish species appeared to be widely available throughout the Athabasca River. Based on preliminary observations, one of the limiting factors of the Athabasca River is a lack of deep, quiet water habitats for use by adults for feeding, holding, and overwintering activities.

SECTION 5 RECOMMENDATIONS FOR FURTHER STUDIES

The following summarizes the major difficulties encountered during the spring 1992 program, with recommendations for program changes and identification of further studies. The order in which they are presented does not necessarily reflect a ranking of importance.

1) Program Components

The 1992 spring study consisted of many individual components. The overall study included three major components: (1) inventory of the mainstem Athabasca River at intensive survey sites; (2) habitat and fisheries assessment of 51 tributaries; and (3) collection of fish for contaminant analyses. General problems with this approach are discussed below.

The data collected from the tributary surveys in spring 1992 are probably indicative of mainstem fish associations rather than tributary use. Only a short reach of creek/river could be sampled upstream of the mainstem confluence; thus, habitat and fish utilization in this area is not necessarily representative of habitat conditions and fish populations in upstream reaches. Because of the short time frame available, only limited effort could be spent on each tributary. In several instances, sampling of six to eight tributaries was required in one day (eight to ten hours of sampling), in addition to mainstem travel of 185 km between sites.

The collection of fish for contaminant analyses created major logistic and sample design problems. Attempts to "fit" the collections into the inventory sampling program of the mainstem Athabasca River did not work effectively, as in many cases, the sites for fish collections did not coincide with the intensive survey sites. Additional effort had to be allocated to process the samples (i.e., labelling bags/tags) and to ensure that samples were kept frozen. A full-time expeditor was required to expedite samples back to Edmonton and to deliver dry ice, etc. to the field crews.

To ensure that sufficient time is available for thorough sampling and mapping, an inventory program such as that conducted on the mainstem Athabasca River should be unhindered by other components. During spring 1992, two to three days were available for each intensive survey site; thus only basic presence and absence of species and overview habitat assessments could be completed. The requirements of these major study components cannot be accomplished in such a short time frame. They require separate studies to provide credible data. If funding is to be a problem, the most important tasks need to be identified and study efforts focussed on these.

2) Logistic and Site Difficulties

The size of the mainstem study area (1278 km of river) was very large, and difficult to sample effectively in the allocated time frame (i.e., 4 weeks). Distances between sites were long, in some instances 150 to 185 km, which meant that travel between sites often required a full day. Access (for large riverboats) was also limited throughout the study area. At the time of sampling in early spring, access sites along the Athabasca River were often blocked by pan ice resulting from break-up, making these areas inaccessible for launching. River travel and sampling in the upper study sites (i .e., between Jasper Lake and Whitecourt) was hindered due to low water levels during early periods of the survey. In lower reaches, road access to Sites 7 and 10 was not available; therefore, arrangements had to be made for alternate transportation (i.e., aircraft charter) and logistic support.

Because of the overall size of the study area, and the need to collect information during the same seasonal time period from all reaches of the river, changes in the sampling effort for the study area should be considered for subsequent studies. One alternative would entail increasing sampling effort (i.e., two crews working simultaneously in upstream and downstream reaches of the study area). Another alternative would be to reduce the size of the present study area by avoiding duplications. Two reaches of the Athabasca River (Sites 6 and 7) were being studied under environmental programs funded by ALPAC. Information sharing programs may allow elimination of these sites from the NRBS study area, or at least allow a substantial change in effort. Considerable data has already been accumulated (e.g., AOSERP programs) for the lower Athabasca, and additional baseline sampling of this area is not cost effective.

3) Sampling Methodologies

Owing to limited numbers of snyes and deep backwaters, the gillnetting program was not effective during early spring on the Athabasca River. In the future, an alternative to gillnetting may be to increase the number of setlines utilized at each site. This technique was effective in the present study. Unlike gill nets, setlines can be used in a variety of habitats and at various depths; current velocities are not as critical with this sampling method. Electrofishing by a dedicated electrofishing jetboat was effective in most reaches of the study area. However, in the shallow areas of the upstream reaches (i.e., Jasper Park) during spring and fall, a lightweight inflatable drift-boat, equipped with a boat electrofisher unit, generator, and dual anodes, could be a more effective alternative. This system has been used successfully in other studies on small or shallow rivers (i.e., Crowsnest River) conducted by R.L. & L. Environmental Services Ltd. More focus on backpack electrofishing would also allow a greater diversity of shallow-water habitats to be sampled and provide more data on young-of-the-year fish species (e.g., distribution, life history information, and young-of-the-year habitat associations).

4) Specific Recommendations for Subsequent Sampling Programs

Recommendations for subsequent sampling programs on the Athabasca River are as follows.

a) Objectives

Additional work is required to define mainstem fall spawning habitats. This may entail concentrating effort on different species in different reaches of the river. The species of primary interest would be mountain whitefish in the upper and middle reaches and bull trout in the upper reaches.

The larger tributaries require individual studies to determine their importance and association with mainstem fish populations. This is important for species such as bull trout, which may migrate long distances to critical spawning habitat in tributaries.

Fish habitat associations should focus on late-fall (i.e., pre-winter) conditions to identify critical habitats and potential selection of areas during the low-flow, low-oxygen periods of winter.

Subsequent sampling programs should also focus on ground truthing the habitat mapping that was initiated in the spring survey at intensive survey sites. Hildebrand (1990) verified his findings of the first field survey in two subsequent sampling trips, and this ensured that the habitat mapping was "fine-tuned." Modifications to the mapping system may be required in the upper reaches of the Athabasca River above Smith, as bankside habitats in these areas are quite different from those developed for the Peace River mapping.

At the present inventory level, sampling programs in the lower reaches (i.e., Fort McMurray area), other than for contaminant data collection, are redundant. Most of this area has received the benefit of intensive AOSERP research. In contrast, the upstream reaches have rarely been investigated.

Based on the spring sampling program, reach selections in the upper portion of the Athabasca River should be revised. To better define habitat/fish associations, the upper reaches (Jasper Lake to Lesser Slave River) should be sub-divided, and new intensive survey sites established in each reach.

b) Timing

Terms of Reference should be available at an earlier date. If the mission of the NRBS is to provide credible scientific data, then the study design has to be defensible, and sufficient time allowed to prepare and implement field programs. A minimum of 10 days is required to prepare proposals, and if successful, at least two weeks lead time is necessary to prepare for the field work.

Sampling for species such as bull trout requires that crews be in the field no later than the first week of September. As mountain and lake whitefish spawn later in the fall (i.e., mid-October), work on these species could be initiated at a later date.

c) Planning

Development of future study programs for the Athabasca River requires a departure from the objectives and methodologies that may be appropriate for other systems, such as the Peace River. Relative to the Peace River, the planning process must realize that the Athabasca River (1) is unregulated and, therefore, shows extensive flow fluctuations; (2) has a different bank structure; and (3) morphologically changes from a high-gradient mountain stream to a low-gradient large river.

Planning should identify and address one objective at a time and must also consider safety in the time and logistic requirements placed on the study contractor. At the present time, there is also no clear differentiation between potential monitoring and technical or inventory studies.

SECTION 6
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APPENDIX A

TERMS OF REFERENCE

NORTHERN RIVER BASINS STUDY

TERMS OF REFERENCE - SCHEDULE A
PROJECT 31 FISH/FISH HABITAT INVENTORIES

SUB-PROJECT 3117 - GENERAL FISH INVENTORIES - ATHABASCA RIVER

Objectives

A. To conduct a baseline fish/fish habitat inventory with major emphasis on:

1. Documentation of the distribution and relative abundance of fish species and fish habitat on the mainstem Athabasca River and its major tributaries (Schedule A1) in the spring season.

2. Identification of known or suspected critical fish habitats and characterization of these habitats.

3. Fish collection to assess habitat associations, migration and general life history in the study area.

4. Documentation of young-of-year fish distribution on the mainstem Athabasca River and the lower reach of its major tributaries.

5. Habitat characterization of the mainstem Athabasca River and the lower reach of its major tributaries.

6. Identification of sites where large numbers of fish can be efficiently marked for future follow-up inventories.

B. To provide recommendations and strategies for follow-up inventories and fish migration studies during subsequent seasons and years of the Northern River Basins Study.

C. To integrate and update fish/fish habitat inventory data gathered from this study with existing information on the fish/fish habitat of the Athabasca River drainage basin (Refer to the Fish/Fish Habitat Database File).

The contractor will:

1. Prior to initiating any field work, determine, in cooperation with Study Office staff, all details relating to sampling design (inclusive of statistical confidences) and analytical methods to be utilized by the contractor during the course of the study. Sampling and analytical methods may become the standard for subsequent studies.

2. Provide an overview of the Athabasca River and the lower reach of its major tributaries (including those tributaries identified in Schedule A1 from the outlet of Jasper Lake in Jasper National Park to its confluence with Lake Athabasca, describing the physical characteristics of the river and the parameters used to differentiate and describe the various reaches of the river.

3. Divide the mainstem river into reaches in consultation with the Study Office. Define the boundaries of the first reach of each major tributary immediately above the influence of flooding from the Athabasca River. Establish representative sampling stations for each reach for this study in accordance with the conditions outlined in Schedule A2. The general characteristics of each reach are to be described.

4. Determine the frequency and percent abundance of habitat types in the Athabasca River and the lower reach of its major tributaries through field reconnaissance, aerial photos and maps. The habitat types to be considered are described in Schedule A3. Habitat sampling efforts in the mainstem Athabasca River should be concentrated in areas where fish are found and should be conducted in a fashion that will provide representative evaluation of river reaches in the study area and facilitate comparison of fish utilization of habitat types. Sample station location and methods are to be standardized to enable repetitive comparable sampling in various seasons and years.

   Habitat documentation will include but not be limited to:

   - a description of stream channel profile longitudinally, horizontally and vertically, for the habitat area being described,

   - descriptions and aerial photographs of each habitat type, ie. depth profile, velocities, refuge, substrates (Bovee and Cochnauer 1977) and other distinguishing features,

   - providing self-descriptive line drawings for each habitat section showing pertinent characteristics, sample sites, and relative depth details.

   - maintain photographic record of habitats sampled.

5. Sample fish populations during the spring using a variety of the following methods; electrofishing(boat and backpack), multi-mesh gill nets, large and small seines, dip-nets, traps, baited hooks, drift nets. Capture methods, including sonar, are to be used in a manner that will ensure a representative sample of the fish community within each reach and enable comparisons of fish abundance, size, and occurrence between reaches, habitat types, and for different sampling periods.

6. Collect specified fish species for subsequent contaminant analysis at the locations and according to the processing and transportation protocols outlined in Schedule A4.

7. Identify to species and enumerate all fish captured. Record the general condition and health of each fish sampled.

8. Conduct Young-of-Year (y-o-y) investigations within the general synoptic survey during the spring, considering:

   - all fish species with emphasis on sport, domestic and commercial fish

   - characterize habitats where y-o-y are found

- use y-o-y distribution data to identify potential mainstem and tributary spawning sites

- assess and prioritize tributaries with respect to their importance in providing critical habitats (ie. spawning, rearing) for mainstem fish populations. All tributaries having (or thought to have) significant migrations of fish are to be identified

9. Determine the length-frequency distribution for each fish species by gear type and by reach. These will be based on total catch or where large numbers are taken, on a maximum of 50 individuals per sampling site.

10. Initiate fish movement studies, through the use of conventional tagging techniques, to support long-term Northern River Basins Study of fish migration. All northern pike, walleye, whitefish, bull trout, goldeye and burbot of sufficient size not required for other study needs outlined in these Terms of Reference are to be conventionally tagged, measured and released alive. Information to be recorded includes: species, unique tag number, location, date of capture and length.

11. All incidental mortalities of sport, domestic and commercial fish inclusive of burbot, long nose and common suckers are to be sampled for length and weight, sex and maturity, field identification of stomach contents and the appropriate ageing structure (McKay et al.) retained.

12. Cross reference all fish sample data to life stage, habitat type, reach, date, location and gear used. All captures should be related to time of capture, legal land description, Universal Transverse Mercator coordinates for Zone 11, the national hydrometric watershed code and habitat type location.

13. Ensure that the Athabasca River study is integrated into the overall Northern River Basins Study program and that study data and samples are provided to other basin studies in a timely and competent fashion.

14. The draft and final reports are to contain recommendations on areas requiring follow-up inventories, as well as improvements in sampling methods.

15. Endeavour to utilize local contractors and services for the field studies,

16. Make every effort to minimize fish mortality. All sacrificed fish are to be disposed of in a manner acceptable to the Alberta Fish & Wildlife Division. Appropriate non-lethal capture methods will be used in a manner that will enable comparisons of abundance, size and occurrence during the sampling period.

17. Progress reports, final manuscripts, electronic data files, samples and photographic materials are to be delivered to the Study Office as per Schedule B. The format for the final report will follow the editorial style of the Canadian Journal of Fisheries and Aquatic Sciences.

18. Utilize statistical methods that achieve the highest level of confidence and power based on possible limited sample sizes.

19. Jointly prepare, with consultants hired to do similar work on other portions of the Peace, Athabasca and Slave Rivers and their major tributaries, a summary report on their findings. The report is to include an assessment of the species composition, abundance, habitat, rearing areas, movements and aggregations, and recommendations on the design and direction of further studies.

20. Develop a photographic record of equipment and techniques to sample. Include photographs of the habitat types for each reach, sampling equipment, unique features, equipment while in use and fish. Use some measure in photographs to differentiate size when the subject material would merit this need. Use 35 mm, 200 ASA Fuji slide film in a camera having a 50-55 mm lens. Maintain records to associate photographs with sample material.

** THE CONTRACTOR IS EXPECTED TO DESIGN AN INVENTORY APPROACH THAT BEST SERVES THE OVERALL NORTHERN RIVER BASINS STUDY OBJECTIVE, WHICH IS TO ASSESS THE CUMULATIVE IMPACTS OF DEVELOPMENT CURRENTLY AND FOR THE FUTURE.

INVENTORY AND STATISTICAL METHODS WILL BE SUBJECT TO SCIENTIFIC AND PUBLIC REVIEW AND THEREFORE SHOULD BE DEFENSIBLE WITHIN THE FRAMEWORK OF THE NORTHERN RIVER BASINS STUDY **

NORTHERN RIVER BASINS STUDY
SUB-PROJECT 3117 - GENERAL FISH INVENTORIES - ATHABASCA RIVER

SCHEDULE A1

LIST OF MAJOR TRIBUTARIES

Major tributaries to be sampled:

RIVER	LAND DESCRIPTION
Rocky River	48-28-W5
Indian River	48-28-W5
Moosehorn Creek	49-27-W5
Fiddle River	49-27-W5
Solomon Creek	49-27-W5
Maskuta Creek	51-25-W5
Oldman Creek	55-22-W5
Berland River	58-20-W5
Nosehill Creek	58-20-W5
Pine Creek	60-18-W5
Marsh Head Creek	60-18-W5
Pass Creek	61-16-W5
Two Creek	61-15-W5
Oldman Creek	60-14-W5
Sakwatamau River	60-12-W5
McLeod River	60-12-W5
Christmas Creek	60-10-W5
Corbett Creek	61-7-W5
Goose Creek	61-6-W5
Freeman River	61-6-W5
Horse Creek	61-5-W5
Clearwater Creek	63-4-W5
Timeu Creek	63-3-W5
Pembina River	66-2-W5
Chisholm Creek	68-2-W5
Rourke Creek	70-1-W5
Unnamed (right bank)	8-72-25-W4
Baptiste Creek	67-23-W4
Tawatinaw River	66-22-W4
Calling River	70-19-W4
La Biche River	69-18-W4
La Petite Riviere Jailan	71-19-W4
Duncan Creek	73-18-W4
Parallel Creek	78-17-W4
Pelican River	79-17-W4
House River	83-16-W4
Loon Creek	84-17-W4
Livock River	86-18-W4

SCHEDULE A1

LIST OF MAJOR TRIBUTARIES

RIVER	LAND DESCRIPTION
Buffalo Creek	87-17-W4
Algar River	87-14-W4
Hangingstone River	89-9-W4
Little Fishery River	89-9-W4
Clearwater River	89-9-W4
Steepbank River	92-10-W4
MacKay River	94-11-W4
Muskey River	94-10-W4
Ells River	96-11-W4
Tar River	96-11-W4
Pierre River	97-10-W4
Firebag River	101-9-W4
Grayling Creek	104-9-W4

NORTHERN RIVER BASINS STUDY
SUB-PROJECT 3117 - GENERAL FISH INVENTORIES - ATHABASCA RIVER

SCHEDULE A2

CRITERIA FOR ESTABLISHING REPRESENTATIVE FISH SAMPLING STATIONS

Each Sample station shall:

1. Be a representative of the river reach in which it is located.

2. Provide pertinent biological and hydraulic information of relevance to the study.

3. Be large enough to provide a range of representative habitats yet small enough to permit efficient analysis using relatively simple sampling techniques.

4. Be assessable by road wherever possible to facilitate logistical support.

5. Be situated within one day boat to and from adjacent sites.

NORTHERN RIVER BASINS STUDY
SUB-PROJECT 3117 - GENERAL FISH INVENTORIES - ATHABASCA RIVER

SCHEDULE A3

HABITAT CLASSIFICATION AND DOCUMENTATION SYSTEM FOR USE IN FISHERIES SURVEYS CONDUCTED UNDER THE NORTHERN RIVER BASINS STUDY

1. CHANNEL TYPES

TYPE U - UNOBSTRUCTED CHANNEL

- only one main channel; permanent islands absent; side bars occasionally present with only limited development of exposed mid-channel bars during low flows.

TYPE S - SINGULAR ISLAND

- presence of two channels around single, permanent island; side bars and mid-channel bars often present at low flows.

TYPE M - MULTIPLE ISLAND

- more than two channels and permanent islands present; generally exhibit extensive side bar and mid-channel bar development during low flows.

TYPE F - FALLS

- a special channel type used to identify the unique habitat at Vermilion Falls.

2. SPECIAL HABITAT FEATURES

Tributary Confluences (TC)

- confluence area of tributary entering mainstem; classified according to flow at time of survey and wetted width at mouth

T1 - intermittent flow (dry/trickle); ephemeral stream
T2 - flowing; width at mouth <5.0 m
T3 - flowing; width at mouth 5-15 m
T4 - flowing; width at mouth 15-30 m
T5 - flowing; width at mouth 30-60 m
T6 - flowing; width at mouth >60 m

Shoal (SH)

- shallow (<1.0 m depth), submerged areas of coarse (SHC) or fine (SHF substrates generally found in mid-channel areas or associated with depositional areas around islands and side bars. Shoal boundaries are to be visually assessed and approximate locations mapped.

Backwater (BW)

- discrete, localized area of variable size, exhibiting a reversed flow direction relative to the main current; generally produced by bank irregularities; velocities variable but generally lower than in adjacent main flow; substrate similar to that in adjacent channel although usually with a higher percentage of fines. For the purposes of this study, only BW areas larger than 15 m in length and 10 m width are to be mapped; maximum depths will be determined by sonar along the eddy line between BW and mainstem flows.

Rapid (RA)

- area characterized by turbulent, broken surface (i.e., standing waves, chutes, whirlpools, etc.); water velocity high (greater than 1.5 $m \bullet s^{-1}$); substrates consist of large boulder or bedrock with low fines deposition.

Snye (SN)

- area characterized by a non-flowing body of water (generally within a side channel) which retains a connection to a flowing channel at its downstream end; most commonly associated with braided channel areas but also occur in singular channels in association with point or side-bar development; substrate mainly silt/sand maximum depth at the mouth to be recorded by sonar; depths within the snye proper to be recorded for snyes within fish sampling areas.

Slough (SL)

- a non-flowing body of water located in the flood plain but completely isolated from flowing waters except during annual or irregular flood events. Often exhibit more extensive littoral development in comparison to snye areas (dependant upon frequency of inundation); substrate of silt and organic material; water levels maintained by seepage, springs, precipitation, etc.; slough identification was based primarily on air photo interpretation.

The classification of major habitat units Type U, Type S, and Type M is to be based on field observations and air photo interpretation. For example, in instances where a single permanent island is present, but one of the channels around the island is dry, the habitat classification could be either Type U (Unobstructed channel) or Type S (Singular Island) depending on conditions within the dry channel. If the dry channel exhibits a low relief at the inlet and is devoid of permanent vegetation, suggesting it contained annual flows during some portion of the open water season (e.g., during spring run-off or freshet flows), the area is to be classed as Type S habitat. If, however, the entrance to the dry channel is at a level near the high water mark, well vegetated with either grasses or willows and appears to contain flows only during extreme flood events, the channel will be classed as Type U. These criteria are also to be used to differentiate between Type S and Type M channel habitats.

3. BANK HABITAT TYPES

Category	Code	Description
Armoured/Stable	A1	Banks generally stable and at repose with cobble/small boulder/gravel substrates predominating; uniform shoreline configuration with few/minor bank irregularities; velocities adjacent to bank generally low-moderate, instream cover limited to substrate roughness (i.e., cobble/small boulder interstices); overhead cover provided by turbidity.
	A2	Banks generally stable and at repose with cobble/small boulder and large boulder substrates predominating; irregular shoreline configuration generally consisting of a series of armoured cobble/boulder outcrops that produce Backwater habitats; velocities adjacent to bank generally moderate with low velocities provided in BW habitats; instream cover provided by BW areas and substrate roughness; overhead cover provided by depth and turbidity; occasionally associated with C1, E4, and E5 banks.
	A3	Similar to A2 in terms of bank configuration and composition although generally with higher composition of large boulders/bedrock fractures; very irregular shoreline produced by large boulders and bed rock outcrops; velocities adjacent to bank generally moderate to high; instream cover provided by numerous small BW areas, eddy pools behind submerged boulders, and substrate interstices; overhead cover provided by depth and turbidity; exhibits greater depths offshore than found in A1 or A2 banks; often associated with C1 banks.
Canyon	C1	Valley walls forming banks; bank substrate consists primarily of large cobble/boulder/bedrock fractures; generally stable at bank-water interface although on upper bank slumps/rock falls common; typically deep with high current velocities offshore; abundant velocity cover provided by substrate roughness and frequent bank irregularities.
	C2	Steep, stable bedrock banks associated with canyon cliffs or bedrock outcrops; deep to moderate depths offshore with generally moderate to fast current velocities; regular bank form; velocity cover occasionally provided by bedrock fractures in channel.

Category	Code	Description
Depositional	D1	Low relief, gently sloping bank type with shallow water depths offshore; substrate consists predominantly of fines (i.e., sand/silt); low current velocities offshore; instream cover generally absent or, if present, consisting of shallow depressions produced by dune formation (i.e., in sand substrates) or embedded cobble or boulders and vegetative debris; this bank type is generally associated with bar formations.
	D2	Low relief, gently sloping bank type with shallow water depths offshore; substrate consists of coarse materials (i.e., gravels/cobbles); low-moderate current velocities offshore; areas with higher velocities usually producing riffle areas; overhead cover provided by surface turbidity or surface turbulence in riffle areas; instream cover provided by substrate roughness; often associated with bar formations; and shoal habitat.
Erosional	E1	High, steep, eroding banks often with terraced profile; banks unstable, frequently slumping and eroding; substrate consists of sand/silt materials; moderate to high off-shore current velocities; steep bank profile extends under water surface resulting in deep water immediately offshore; instream cover provided by abundant submerged bankside vegetation (i.e., trees, shrubs, root wads, etc.) that has fallen into the channel from the eroding bank crest; overhead cover provided by partially submerged vegetation, depth and turbidity.
	E2	Similar to A1 except without the high amount of instream vegetative debris (i.e., banks generally clean); depths offshore generally shallower than along E1 banks.
	E3	High, steep and eroding banks, substrate consists of loose till deposits (i.e., gravel/cobble/sand mixture); moderate to high current velocities offshore; moderate depths offshore; instream cover availability limited to substrate roughness; overhead cover provided by turbidity.

Category	Code	Description
	E4	Steep, eroding or slumping high wall bank; substrates variable but primarily consisting of fines (i.e., clays/silts); moderate to high current velocities offshore; depths offshore generally moderate to deep; instream cover limited to occasional BW formed by bank irregularities; overhead cover provided by depth and turbidity.
	E5	Low, steep banks, often with terraced profile; predominantly composed of silt/sand substrates; generally low current velocities offshore; depths offshore variable but generally shallow to moderate; instream cover usually absent; this bank type is often associated with BW habitats in A1 and A2 bank types; overhead cover provided by turbidity.
Composite e.g., A2/C2		These classifications are used in situations where the bank-water interface (i.e., nearshore bank) is predominantly one bank type but was still strongly influenced by the adjacent far shore bank (e.g., A2/C2 used where the nearshore bank is type A2 but was produced by active bedrock fracturing from the far shore bank type C2). In these composite bank types, the first bank type given is the dominant type at the bank-water interface.

4. SUBSTRATE ANALYSIS

Substrate Classes

Plant detritus/organic material
Mud/Soft Clay
Silt
Sand
Gravel (0.2 - 5.0 cm diameter)
Cobble (5.1 - 20.0 cm diameter)
Boulder (>20.0 cm diameter)
Bedrock

Where substrates can be visually identified, the percentage composition of each substrate type is to be estimated. In deeper areas, bottom type will be determined by "feeling" the bottom or from echo sounder tracing. Substrate classification in these areas will generally be limited to the identification of the dominant/co-dominant types (e.g., sand/silt, cobble or boulder etc.).

5. ESTABLISHING WATER LEVELS

To assist in evaluating habitat conditions associated with or produced by differing flow regimes comparative water level data will be collected. A temporary benchmark (TBM) will be established above the high water mark at each study site. The benchmark is to be marked with orange surveyors tape and identified as the contractor's benchmark. Water surface elevations will be determined by differential levelling using an automatic level and surveyors rod. Assumed or local elevations of 100 m are to be used at each site with water surface elevations being surveyed once at each site during each sample period.

Discharge data are to be obtained for each site during each sample period from the nearest Water Survey of Canada (WSC) gauging stations.

6. DESCRIPTION OF CHANNEL MORPHOMETRY

Within intensive survey sites, channel cross sectional profiles and bankside habitat configurations will be determined. Transects of selected habitat types will be surveyed using sonar to provide a better definition of habitat characteristics. Additional transects will be conducted outside study sites in areas where large concentrations of fish are identified. Photographic records of water level conditions and habitat conditions occurring at each site will also be maintained.

NORTHERN RIVER BASINS STUDY
SUB-PROJECT 3117 - GENERAL FISH INVENTORIES - ATHABASCA RIVER

SCHEDULE A4

A. FISH SAMPLING PROTOCOL - CONTAMINANT ANALYSIS

1. Fish may be collected using a variety of techniques including:
   - Electro-shocking
   - Gill nets
   - Seines
   - Drift nets
   - Set lines
   - Angling

2. All samples must be submitted as intact whole fish.

3. All fish samples are to be frozen as soon as possible after collection.

4. Details of species, length, date, location and the collector's name must be recorded with the sample number for each sample.

5. All fish must either be:

   (a) immediately processed (length) and directly placed into Department of Fisheries and Oceans recommended contaminant free plastic bags and the bags specifically labelled, or

   (b) placed into stainless steel buckets or basins (rinsed for each site with a solvent series as described in the "Instrument and Equipment Cleaning Procedure" provided below) and kept cool until processed, and then placed into Department of Fisheries and Oceans recommended contaminant free plastic bags and the bags specifically labelled.

   Instrument and Equipment Cleaning Procedures:

   i) washed with tap water and laboratory detergent,

   ii) rinsed with tap water and deionized water (18 meg-ohm),

   iii) rinsed with pesticide grade acetone, hexane, dichloromethane and hexane, respectively, and

   iv) air dried and heated to 325°C for six hours. All cleaned instruments and equipment to be wrapped in heat treated (325°C) aluminum foil until required.

   N.B. Placing fish in ordinary plastic bags will contaminate the samples.

6. Pack small forage fish in composite groups of 10 or more for each species.

7. Pack large fish individually as per (5) above. Place ten (10) individually bagged fish of each major size class, for each important species, in a large bag. Record date, species, size class and sample number, and attach specific label. Important species for the various parts of the study area are:

   Peace River

   i) Upper reaches (above Peace River)

      - Mountain whitefish, northern pike and longnose suckers.

   ii) Middle reaches (Peace River to Vermilion Chutes)

      - Goldeye, walleye, northern pike and long nose suckers.

   iii) Lower reaches (Vermilion Chutes to Confluence with Slave River)

      - Goldeye, walleye, northern pike and longnose suckers.

   Slave River (All Reaches)

   - Lake whitefish, goldeye, northern pike, and longnose suckers.

   Athabasca River

   i) Upper reaches (above Whitecourt)

      - Mountain whitefish, bull trout and northern pike.

   ii) Middle reaches (Whitecourt to Cascade Rapids)

      - Goldeye, walleye, northern pike and longnose suckers.

   iii) Lower reaches (below Cascade Rapids).

      - Goldeye, walleye, northern pike, longnose suckers and lake whitefish.

8. The use of dry ice for initial freezing and shipping is the approved method. Alternatives are ice packs and then ice, and may be used only as a secondary means on occasion where there may exist a shortfall in available dry ice.

9. The use of sturdy styrofoam coolers is most practical and is recommended. Styrofoam coolers of weak construction may not assure constant freezing and may break down during shipping. Coleman type coolers may be used but may not necessarily be returned immediately for repetitive use; include return address for these.

10. Place dry ice both on top and bottom of coolers to assure that no freeze-thaw cycles will occur.

    N.B.

    Any freeze-thaw, however moderate it may be, will cause contaminant migration within a sample and this may affect contaminant concentration levels in tissues.

11. Ship samples as soon as possible or, if not possible, samples must be kept frozen in a freezer at -20°C until shipping.

    Any contractor/consultant or government personnel that is transporting fish to Edmonton must contact one of the following people before leaving place of origin:

Earle Baddaloo	Work:	(403) 427-6102
	Home:	(403) 434-8967
Sub Ramamoorthy	Work:	(403) 427-6102
	Home:	(403) 435-8137

If the above personnel are not in, a message indicating fish is on its way and approximate time of arrival in Edmonton must be left with the secretary (in office) between 8:15 a.m. and 4:30 p.m., or on an answering machine (home) after 4:30 p.m., before leaving place of origin.

Upon arrival in Edmonton with specimens from Northern River Basins Study projects, contractor(s) or consultant(s) should contact one of the above personnel again.

If the above personnel cannot be contacted on a weekday (Monday to Friday), contractor(s)/consultant(s) should proceed directly to **VERSACOLD only between 8:00 a.m. and 4:00 p.m. Drop cargo (fish) off at VERSACOLD under the name of Earle Baddaloo, Alberta Environment. DO NOT LEAVE FISH OUTSIDE OF VERSACOLD!!**

VERSACOLD IS OPEN BETWEEN 0800 AND 1600 HOURS. MONDAY THROUGH FRIDAY.

ADDRESS: 9002 - 20 Street
Edmonton, Alberta

TELEPHONE: (403) 464-1770
CONTACT: Mr. Merve Permann

If fish tissue arrive after 4:00, contractor(s)/consultant(s) must make every effort to contact Mr. Baddaloo or Dr. Ramamoorthy so that alternate storage for the night or weekend may be found.

It is, therefore, imperative to call contacts before leaving place of origin so that they (contacts) will be aware of the transport activity and can make arrangements for the arrival of the specimens.

WEEKEND TRANSPORT

If fish has to be transported to Edmonton on the weekend (Saturday, Sunday or public holiday), the contractor(s)/consultant(s) or government personnel should contact Mr. Baddaloo or Dr. Ramamoorthy on the last working day before the weekend or public holiday. (If contacts are not available, messages must be left with the secretary.) Again, before leaving place of origin, please call contacts at home and leave a message if they are not there; and upon arrival in Edmonton, please call contact again.

12. Any deviation from the above established protocol/procedure should be justified and accounted for in writing and a detailed description of what was done is to be submitted with the fish sample; this is to assure credibility and validity of results.

B. FISH SAMPLING LOCATIONS - CONTAMINANT ANALYSIS

Athabasca River

1. Weldwood Mill, Hinton, zone of influence from effluent.
2. Alberta Newsprint, Whitecourt, zone of influence from effluent.
3. Millar Western, Whitecourt, zone of influence from effluent.
4. Alberta Energy Company Mill, Lesser Slave River zone of likely influence from effluent.
5. Alberta Pacific Mill, zone of likely influence from effluent.
6. Fort McMurray area mid-point.
7. Fort McKay Indian Reserve area mid-point.
8. Athabasca Delta.
9. Athabasca Lake.
10. Lesser Slave Lake or Lac La Biche.
11. Gregoire Lake.
12. Brule Lake.

NORTHERN RIVER BASINS STUDY
SUB-PROJECT 3117 - GENERAL FISH INVENTORIES - ATHABASCA RIVER

SCHEDULE B

DUE DATES FOR DELIVERABLES

1.	Joint Presentation of Progress and Results (meeting) with first cut of recommendations	June 15, 1992
2.	Draft Report	July 2, 1992
3.	Draft - Summary Report	July 2, 1992
4.	Final Project Report and Joint Summary Report incorporating review comments two weeks after receipt of the reviewed draft reports.	
5.	Supply ten (10) copies and the camera-ready original of the final draft and reports as well as electronic disks	
6.	Report compiled data in the electronic and written protocols agreed to with the study office.	

__Payment__

1. Subject to prior approval from the Department, payment will be made based on monthly invoices submitted up to the maximum contract amount of $129,966.

2. (a) Travel expenses incurred in performing the services will be paid as follows:

    (i) accommodation - at cost on submission of receipts;
    (ii) transportation - at cost on submission of receipts;
    (iii) meals - at cost on submission of receipts or as specified below without receipts:

    - Breakfast - $5.80
    - Lunch - $7.40
    - Dinner - $13.50

   (b) Incidental expenses incurred in performing the services will be reimbursed at cost on submission of receipts.

   (c) Travel by private vehicle will be reimbursed at the rate of $0.27 per kilometre and this shall include fuel and maintenance.

APPENDIX B

HABITAT CLASSIFICATION
AERIAL PHOTOGRAPH SERIES

APPENDIX B1
MAJOR HABITAT TYPES - CLASSIFICATION SYSTEM

CHANNEL TYPES

TYPE U - UNOBSTRUCTED CHANNEL

- only one main channel; permanent islands absent; side bars occasionally present with only limited development of exposed mid-channel bars during low flows.

TYPE S - SINGULAR ISLAND

- presence of two channels around single, permanent island; side bars and mid-channel bars often present at low flows.

TYPE M - MULTIPLE ISLAND

- more than two channels and permanent islands present; generally exhibited extensive side bar and mid-channel bar development during low flows.

TYPE R - RAPIDS

- a special channel type used to identify the unique habitat at Grand Rapids area.

SPECIAL HABITAT FEATURES

Tributary Confluences (TC)

- confluence area of tributary entering mainstem; classified according to flows at time of survey and wetted width at mouth

T1 - intermittent flow (dry/trickle); ephemeral stream
T2 - flowing; width at mouth <5.0 m
T3 - flowing; width at mouth 5-15 m
T4 - flowing; width at mouth 15-30 m
T5 - flowing; width at mouth 30-60 m
T6 - flowing; width at mouth >60 m

Shoal (SH)

- shallow (<1.0 m depth), submerged areas of coarse (SHC) or fine (SHF) substrates generally found in mid-channel areas or associated with depositional areas around islands and side bars. Shoal boundaries were visually assessed and approximate locations mapped; the occurrence of shoals was likely underestimated due to the inability to examine all available mainstem areas.

Backwater (BW)

- discrete, localized area of variable size, exhibiting a reversed flow direction relative to the main current; generally produced by bank irregularities; velocities variable but generally lower than in adjacent main flow; substrate similar to that in adjacent channel although usually with a higher percentage of fines. For the purposes of this study, only BW areas larger than 15 m in length and 10 m width were mapped; maximum depths were determined by sonar along the eddy line between BW and mainstem flows.

Rapid (RA)

- area characterized by turbulent, broken surface (i.e., standing waves, chutes, whirlpools, etc.); water velocity high (greater than 1.5 m·s-1); substrate consisted of large boulder or bedrock with low fines deposition.

Snye (SN)

- area characterized by a non-flowing body of water (generally within a side channel) which retained a connection to a flowing channel at its downstream end; most commonly associated with braided channel areas but also occurred in singular channels in association with point or side-bar development; substrate mainly silt/sand; depths within the snye proper were only recorded at snyes in intensive study sites.

Slough (SL)

- a non-flowing body of water located in the flood plain but completely isolated from flowing waters except during annual or irregular flood events. Often exhibited more extensive littoral development in comparison to snye areas (dependent upon frequency of inundation); substrate of silt and organic material; water levels maintained by seepage, springs, precipitation, etc.; slough identification was based primarily on air photo interpretation.

Log Jam (LJ)

- accumulation of woody debris generally located on upstream or downstream tips of islands, heads of side channels or stream meanders; depths offshore variable; velocities offshore variable; provide excellent instream cover.

The classification of major habitat units Type U, type S, and Type M was subjectively based on field observations and air photo interpretation. For example, in instances where a single permanent island was present, but one of the channels around the island was dry, the habitat classification could be either Type U (Unobstruction channel) or Type S (Singular Island) depending on conditions within the dry channel. If the dry channel exhibited a low relief at the inlet and was devoid of permanent vegetation, suggesting it contained annual flows during some portion of the open water season (i.e., during spring run-off or freshet flows), the area was classed as Type S habitat. If, however, the entrance to the dry channel was at a level near the high water mark, well vegetated with either grasses or willows and appeared to contain flows only during extreme flood events, the channel was classed as Type U. These criteria also were used to differentiate between Type S and Type M channel habitats.

APPENDIX B2
BANK HABITAT TYPES - CLASSICATION SYSTEM

Category	Code	Description
Armoured/ Stable	A1	Banks generally stable and at repose with cobble/small boulder/gravel substrates predominating; uniform shoreline configuration with few/minor bank irregularities; velocities adjacent to bank generally low-moderate, instream cover limited to substrate roughness (i.e., cobble/small boulder interstices); overhead cover provided by turbidity or occasional deadfall/sweeper.
	A2	Banks generally stable and at repose with cobble/small boulder and large boulder substrates predominating; irregular shoreline configuration generally consisting of a series of armoured cobble/boulder outcrops that produce Backwater habitats; velocities adjacent to bank generally moderate with low velocities provided in BW habitats; instream cover provided by BW areas and substrate roughness; overhead cover provided by depth and turbidity and woody occasionally associated with C1, E4, and E5 banks.
	A3	Similar to A2 in terms of bank configuration and composition although generally with higher composition of large boulders/bedrock fractures; very irregular shoreline produced by large boulders and bed rock outcrops; velocities adjacent to bank generally moderate to high; instream cover provided by numerous small BW areas, eddy pools behind submerged boulders, and substrate interstices; overhead cover provided by depth and turbidity; exhibits greater depths offshore than found in A1 or A2 banks; often associated with C1 banks.
	A4	Rip-rap substrates consisting of angular boulder-sized materials; may be native rock or concrete debris; often associated with high velocity areas; generally with deep water situated immediately offshore; instream cover provided by substrate roughness; overhead cover provided by depth and turbulence; similar in many ways to A3 habitat but generally with smooth bank profile.
Canyon	C1	Valley walls forming banks; bank substrate consists primarily of large cobble/boulder/bedrock fractures; generally stable at bank-water interface although on upper bank slumps/rock falls common; typically deep with high current velocities offshore; abundant velocity cover provided by substrate roughness and frequent bank irregularities.

	C2	Steep, stable bedrock banks associated with canyon cliffs or bedrock outcrops; deep to moderate depths offshore with generally moderate to fast current velocities; regular bank form; velocity cover occasionally provided by bedrock fractures in channel.
	C2B	Similar to C2 but bank is regular with no instream cover.
	C3	Valley wall forming banks, bank substrate consists primarily of fines with some gravel/cobble at base; moderately eroding at bank-water interface, slumping on upper bank common. Moderate-high velocities - no instream cover.
Depositional	D1	Low relief, gently sloping bank type with shallow water depths offshore; substrate consists predominantly of fines (i.e., sand/silt); low current velocities offshore; instream cover generally absent or, if present, consisting of shallow depressions produced by dune formation (i.e., in sand substrates) or embedded cobble/boulders and vegetative debris; this bank type was generally associated with bar formations.
	D2	Low relief, gently sloping bank type with shallow water depths offshore; substrate consists of coarse materials (i.e., gravels/cobbles); low-moderate current velocities offshore; areas with higher velocities usually producing riffle areas; overhead cover provided by surface turbidity or surface turbulence in riffle areas; instream cover provided by substrate roughness; often associated with bar formations; and shoal habitat.
	D3	Similar to D2 but with coarser substrates (i.e., large cobble/small boulder) more dominant; boulders often embedded in cobble/gravel matrix; generally found in areas with higher average flow velocities than D1 or D2 banks; instream cover abundantly available in form of substrate roughness; overhead cover provided by surface turbulence; often associated with fast riffle or rapid areas offshore; generally moderate to high velocities offshore; transitional bank type that exhibits characteristics of both Armoured and Depositional bank types.
Erosional	E1	High, steep eroding banks often with terraced profile; banks unstable, frequently slumping and eroding; substrate consists of sand/silt materials; moderate to high off-shore current velocities; steep bank profile extends under water surface resulting in deep water immediately offshore; instream cover provided by abundant submerged bankside vegetation (i.e., trees, shrubs, root wads, etc.) that have fallen into the channel from the eroding bank crest; overhead cover provided by partially submerged vegetation, depth

		and turbidity.
	E2	Similar to E1 except without the high amount of instream vegetative debris (i.e., banks generally clean); depths offshore generally shallower than along E1 banks.
	E3	High, steep and eroding banks, substrate consists of loose till deposits (i.e., gravel/cobble/sand mixture); moderate to high current velocities offshore; moderate depths offshore; instream cover availability limited to substrate roughness; overhead cover provided by turbidity.
	E4	Steep, eroding or slumping highwall bank; substrates variable but primarily consisting of fines (i.e, clays/silts); moderate to high current velocities offshore; depths offshore generally moderate to deep; instream cover limited to occasional BW formed by bank irregularities; overhead cover provided by depth and turbidity.
	E4B	Same as E4, but instream cover also provided by LJ and woody debris.
	E5	Low, steep banks, often with terraced profile; predominantly composed of silt/sand substrates; generally low current velocities offshore; depths offshore variable but generally shallow to moderate; instream cover usually absent; this bank type is often associated with BW habitats in A1 and A2 bank types; overhead cover provided by turbidity.
	E6	Low slumping/eroding bank, substrates may be either cobble/gravel or silt with occasional cobble/gravel patches; depths offshore moderate; velocities moderate-high instream cover provided by abundant woody debris or occasional boulder; overhead cover provided by overhanging trees and depth and turbidity; numerous small BW often with A1 or A2 habitats right at bank interface.
Composite	e.g., A2/C2	These classifications were used in situations where the bank-water interface (i.e., nearshore bank) was predominantly one bank type but was still strongly influenced by the adjacent farshore bank (e.g., A2/C2 used where the nearshore bank was type A2 but was produced by active bedrock fracturing from the farshore bank type C2). In these composite bank types, the first bank type given is the dominant type at the bank-water interface.

APPENDIX B3
HABITAT CLASSIFICATION AND RATING SYSTEM

A) Riffle - Portion of channel with increased velocity relative to Run and Pool habitat types; broken water surface due to effects of submerged or exposed bed materials; relatively shallow (less than 25 cm) during moderate to low flow periods.

Riffle (RF) - Typical riffle habitat type; limited submerged or overhead cover for juveniles and adult life stages; coarse substrate

Riffle-Boulder Garden (RF/BG) - Riffle habitat type with significant occurrence of large boulders; availability of significant instream cover for juveniles (to lesser extent adults) at moderate to high flow events.

B) Rapids (RA) - Portion of channel with highest velocity relative to other habitat types. Deeper than Riffle (ranging from 25-50 cm); often formed by channel constriction. Substrate extremely coarse; dominated by large cobble and boulder material. Instream cover provided in pocket eddies (P3) and associated with cobble/boulder substrate.

C) Run - Portion of channel characterized by moderate to high current velocity relative to Pool and Flat habitat; water surface largely unbroken. Deeper than Riffle habitat type. Can be differentiated into four types; deep-slow, deep-fast, shallow-slow, and shallow-fast.

Run (Class 1) (R1) - Highest quality Run habitat type. Maximum depth exceeding 1.5 m; average depth 1.0 m. High instream cover at all flow conditions (submerged boulders/bedrock fractures, depth). Generally of deep-slow type (to lesser extent deep-fast) and situated proximal to upstream food production area (i.e., RF, R3).

Run (Class 2) (R2) - Moderate quality Run habitat type. Maximum depth reaching or exceeding 1.0 m, generally exceeding 0.75 m. High instream cover during all but low flow events (baseflow). Generally of either deep-fast type or moderately deep-slow type.

Run (Class 2)/Boulder garden (R2/BG) - Moderate quality Run habitat type; presence of large boulders in channel; high instream cover (boulder, bedrock fractures, turbulence) at all but low-flow events (baseflow). Depth characteristics similar to R2; however, required maximum depth lower due to cover afforded by boulders.

Run (Class 3) (R3) - Lowest quality Run habitat type. Maximum depth of 0.75 m, but averaging <0.50 m. Low instream cover at all but high flow events. Generally of shallow-fast or shallow-slow types.

Run (Class 3)/Boulder garden (R3/BG) - Similar to R3 in depth and velocity characteristics; presence of large boulders in channel offers improved instream cover during moderate and high flow events.

D) Flat (FL) - Area of channel characterized by low current velocities (relative to RF and Run cover types); near-laminar (i.e., non-turbulent) flow character. Depositional area featuring predominantly sand/silt substrate. Differentiated from Pool habitat type on basis of high channel uniformity and lack of direct riffle/run association. More depositional in nature than R3 habitat (sand/silt substrate, lower food production, low cover, etc.).

Flat (Class 1) (F1) - High quality Flat habitat type. Maximum depth exceeding 1.5 m; average depth 1.0 m or greater.

Flat (Class 2) (F2) - Moderate quality Flat habitat type. Maximum depth exceeding 1.0 m; generally exceeding 0.75 m.

Flat (Class 3) (F3) - Low quality Flat habitat type. Maximum depth of 0.75 m, averaging less than 0.50 m.

E) Pool - Discrete portion of channel featuring increased depth and reduced velocity (downstream oriented) relative to Riffle and Run habitat types.

Pool (Class 1) (P1) - Highest quality Pool habitat type. Maximum depth exceeding 1.5 m; average depth 1.0 m or greater; high instream cover at all flow-conditions (submerged boulder, bedrock fractures, depth, bank irregularities). Generally featuring high Riffle and/or Run association (i.e., food input). Often intergrades with deep-slow type of R1.

Pool (Class 2) (P2) - Moderate quality Pool habitat type. Maximum depth reaching or exceeding 1.0 m, generally exceeding 0.75 m. High instream cover at all but low flow events (baseflow).

Pool (Class 3) (P3) - Low quality pool habitat type. Maximum depth of 0.75 m, averaging <0.50 m. Low instream cover at all but high flow events. Includes small pocket eddy type habitat.

F) Features - Includes the following instream features:

Chutes (CH) - Area of channel constriction; generally resulting in channel deepening and increased velocity. Associated habitat types are R1, R2.

Ledges (LG) - Areas of bedrock intrusion into the channel; often creates Chutes and Pool habitat.

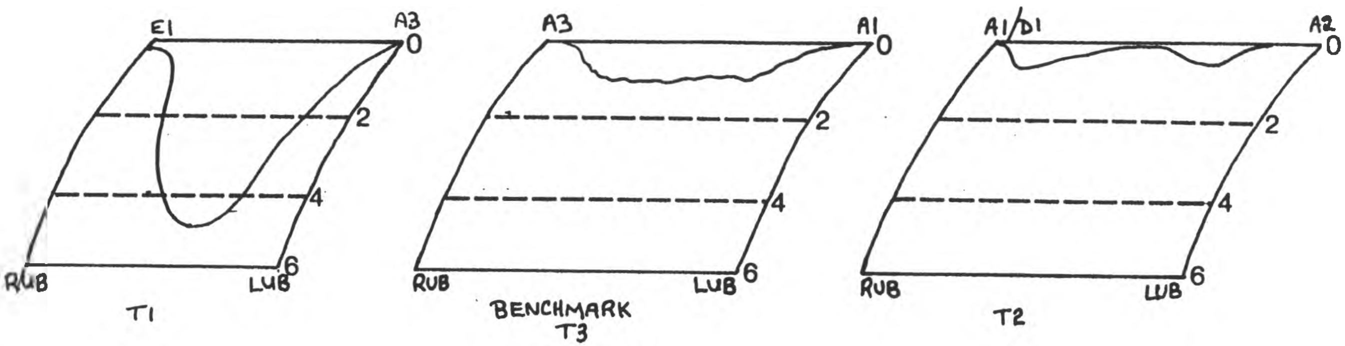
Other - Miscellaneous features (fallen tree, large boulder, etc.)

Appendix B4 Air photo coverage of Athabasca River in Alberta.

SITE	RIVER LOCATION	DATE FLOWN	NTS MAP SHEET	SCALE	ROLL NO.	JOB NO.	PHOTO NO.
1	km 1236.8 to 1232.3	85-06-17	83F/5	1:60 000	AS 3143	85-123	257
2	km 1108.2 to 1099.5	85-05-13	83K/2	1:60 000	AS 3139	85-123	72
3	km 1008.0 to 1000.4	71-10-07	83J/3	1:60 000	AS 4209	91-274	158
4	km 829.5 to 819.5	91-09-27	83J/16	1:60 000	AS 4208	91-274	91
5	km 782.0 to 773.0	83-08-07	83P/4	1:60 000	AS 2790	83-143P	26
	km 782.0 to 773.0	83-07-31	83P/4	1:60 000	AS 2790	83-143P	104
6	km 634.2 to 626.0	83-08-07	83I/15	1:60 000	AS 2776	83-143P	152
7	km 462.9 to 452.2	84-06-25	84A/2	1:60 000	AS 3056	84-102P	92
	km 462.9 to 452.2	84-09-16	84A/2	1:60 000	AS 3056	84-102P	227
8	km 305.0 to 296.0	84-06-22	74D/12,11	1:60 000	AS 3059	84-102P	234
9	km 239.2 to 229.3	84-09-15	74E/4	1;60 000	AS 3051	84-102P	30
10	km 136.0 to 128.2	84-06-26	74E/14,74L/3	1:60 000	AS 3050	84-102	37

APPENDIX C

CHANNEL PROFILES IN METRES



16/05/92

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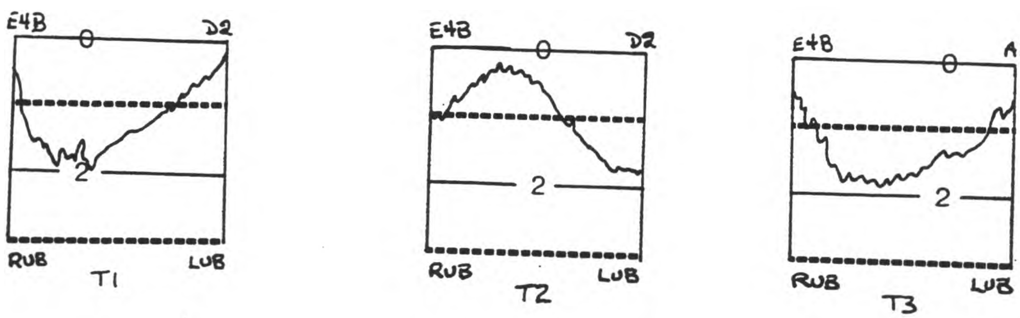
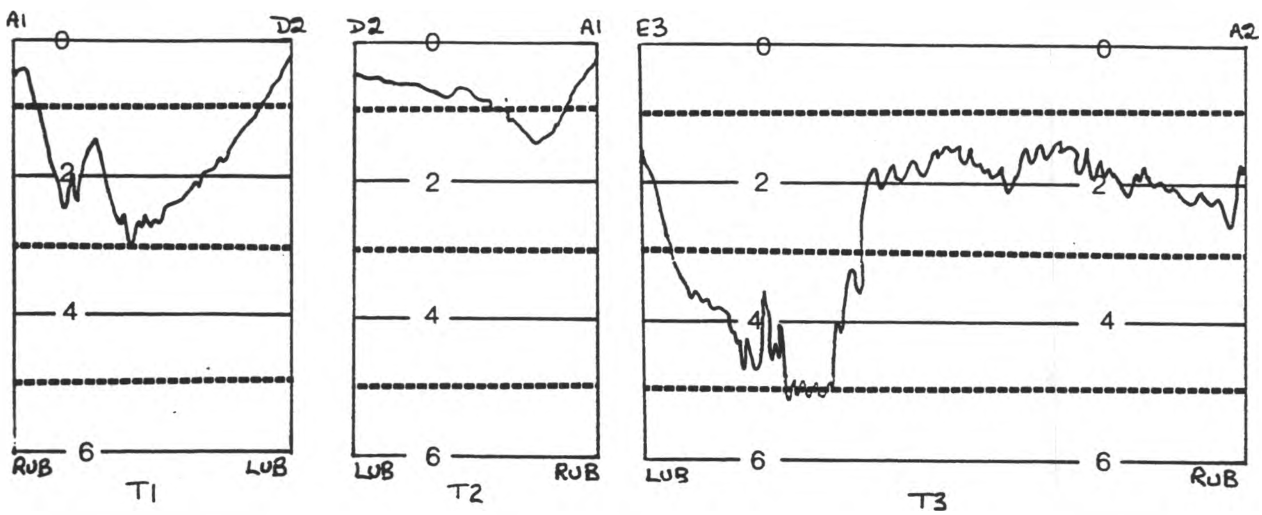


23 /04 /92

SITE 2



26/04/92

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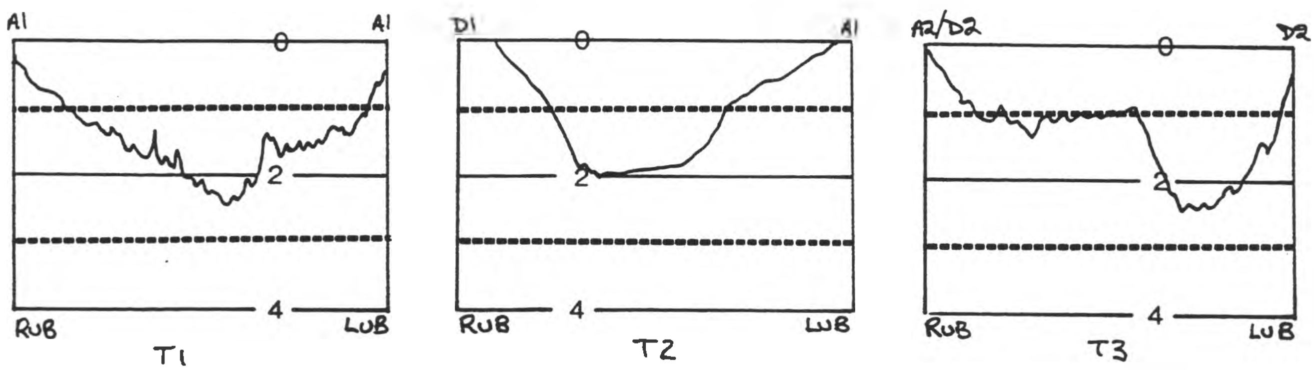

30/04/92

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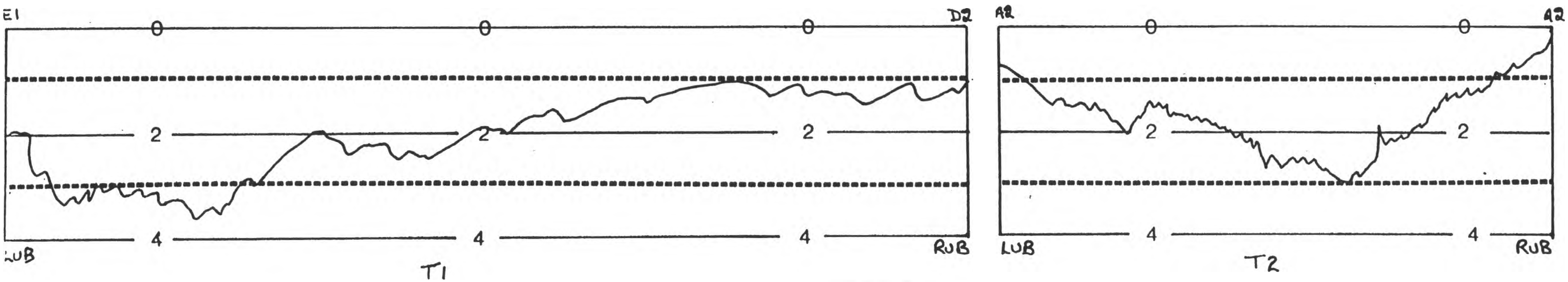
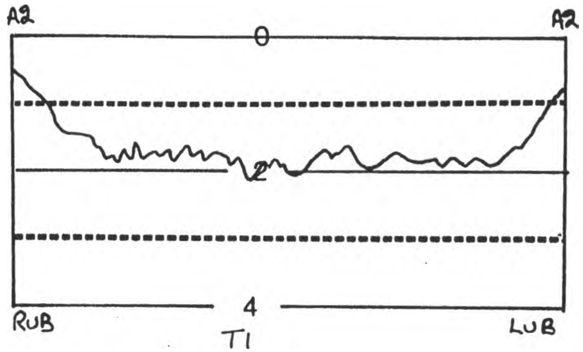
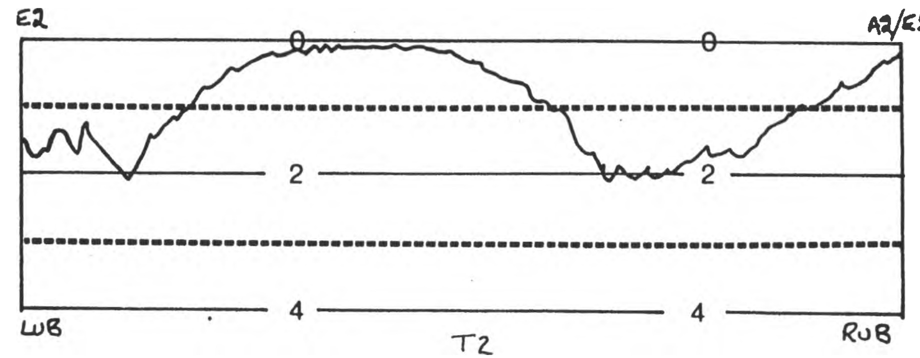


03/05/92

SITE 5





06/05/92

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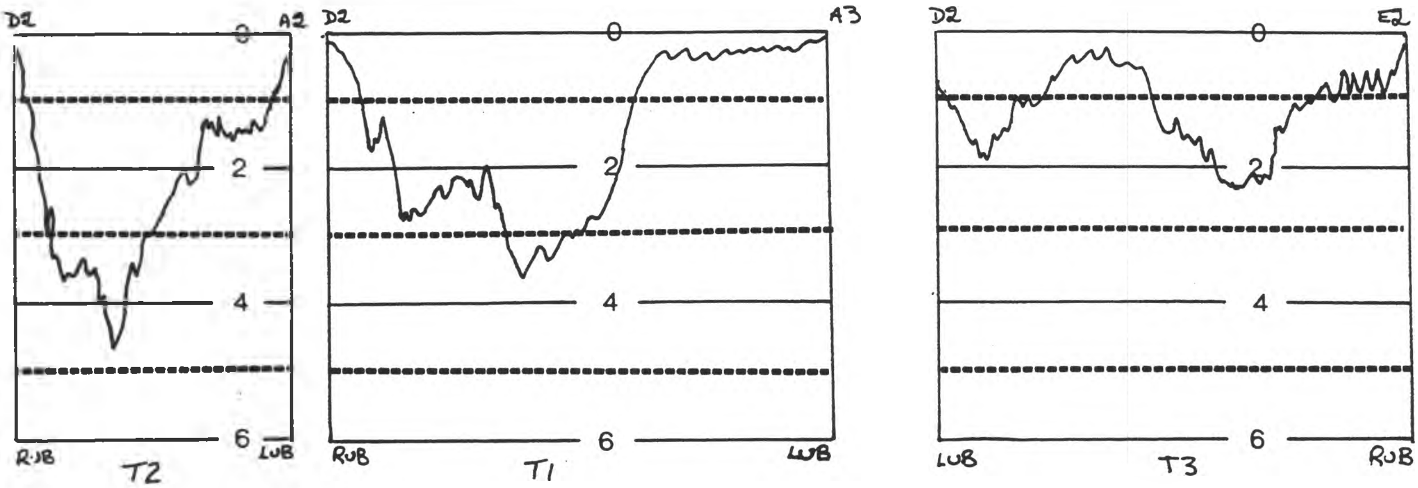

10/05/92

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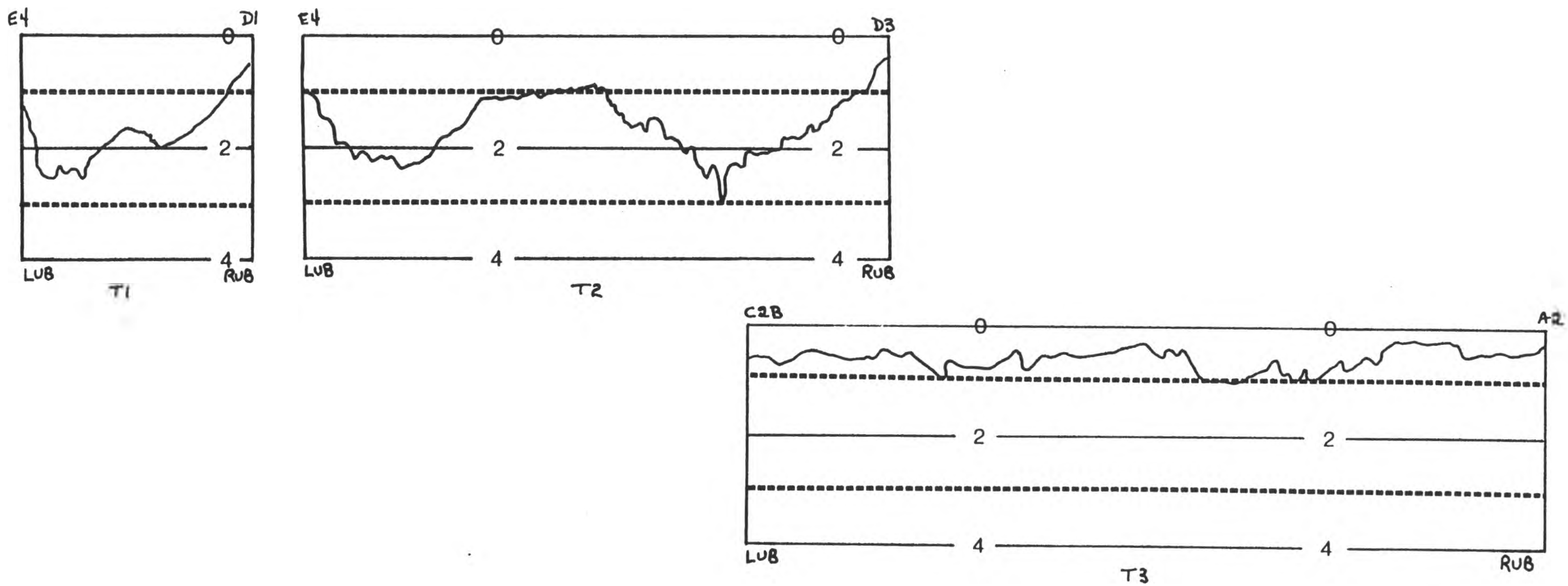
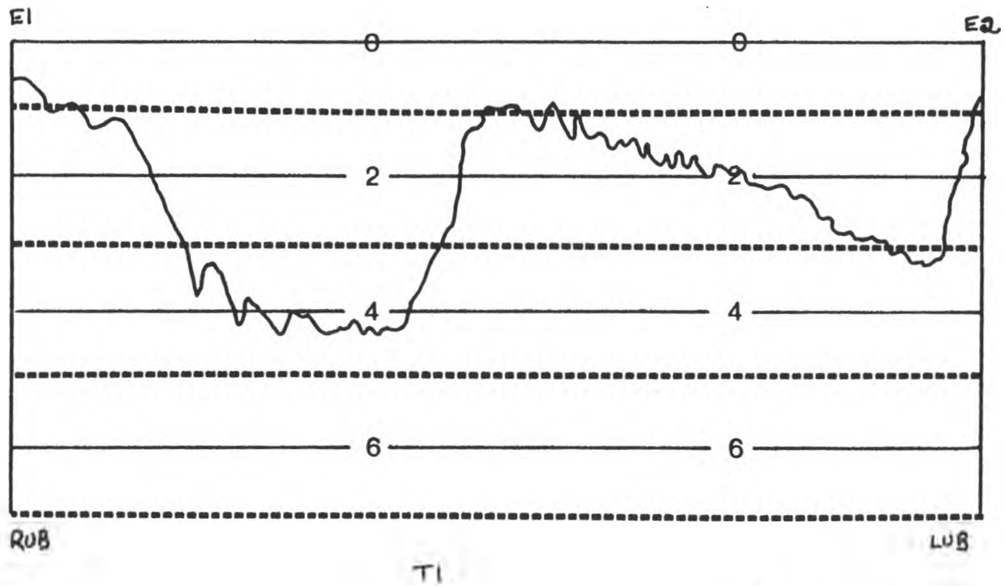
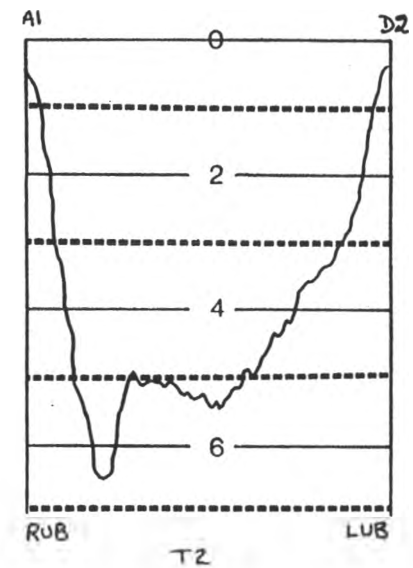


14/05/92

SITE 8





17/05/92

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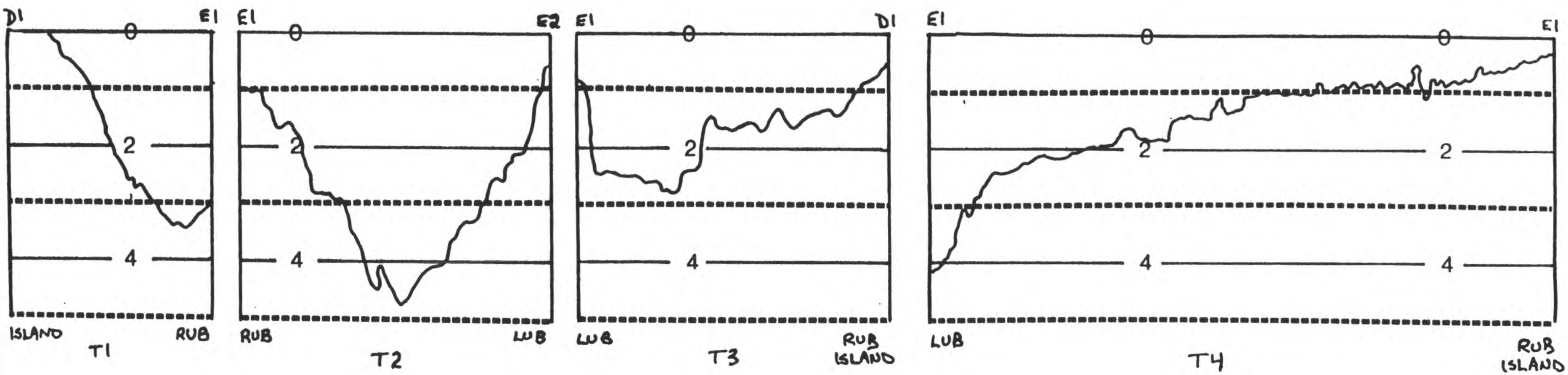

20/05/92

SITE 10

APPENDIX D

FISHERIES DATA

Table D1 Boat electrofishing summary for spring survey period, Athabasca River, 1992.

SITE	STATION	DATE	EFF.[b]	SAMPLE EFFORT Distance (km)	SAMPLE EFFORT Time (s)	CATCH (OBSERVED)[a] MNWH	LKWH	RNTR	BLTR	ARGR	NPRK	WALL	BURB	GOLD	LNSC	WHSC	Sucker spp.	FLCH	LNDC	EMSH	SPSH	TRPR	LKCH	FTMN	Cyprinid Unid.	Scul. spp.
1	ES1	26 April	2	1.2	794	12(6)									4(2)											
	ES2	26 Arpil	2	2.2	1476	22(7)		2							15(6)											
	ES3	26 April	2	1.4	828	30(15)									8(3)											
COMBINED				4.8		64 (28)		2							27(11)											
2	ES1	22 April	1	0.4	463	1																1(1)				
	ES2	22 April	1	1.0	646	8(3)					1				4	1	(2)									
	ES3	22 April	1	3.7	2090	35(21)				5(2)			(1)		7		(3)									
	ES4	22 April	1	1.7	849	4(1)				(2)					1(1)											
	ES5	22 April	1	1.6	509	3(4)				3(1)			(1)		5		(4)									
	ES6	22 April	1	1.0	-	2(1)																				
	ES7	23 April	1	1.1	582	13(10)				2							(1)									
	ES8	23 April	1	1.7	737	7(7)		2		1	(1)						(1)						1(5)			
	ES9	23 April	1	2.4	683	17(12)				3(1)					1		(5)									
	ES10	23 April	1	1.8	886	12(10)				1							(3)									
	ES11	23 April	1	0.9	1037	25			1	5					3											
COMBINED				17.3		127(69)		2	1	20(6)	1(1)		(2)		21(1)	1	(19)					1(1)	1(5)			
3	ES1	25 April	1	0.5	373	6(4)						1(1)			(1)											
	ES2	25 April	2	0.2	582	16(12)									1(5)	3										(1)
	ES3	25 April	3	0.2	859	(5)					(3)					4(5)						1				
	ES4	25 April	2	1.0	516	2(3)							(1)		1(5)	1	(14)									
	ES5	25 April	2	0.2	105	1(7)									4(5)								2			
	ES6	25 April	1	0.7	346	8(7)									4(8)	1(18)			1							
	ES7	25 April	2	0.2	749						2											1				
	ES8	25 April	2	2.5	938	15(22)									6	1	(17)									
	ES9	25 April	2	0.4	293	5(9)									2		(2)									
	ES10	25 April	2	1.9	1051	11(21)						2	1		2(8)	2(2)										
	ES11	26 April	2	0.9	560	7(5)					1		(1)		2	1	(3)									
	ES12	26 April	2	0.5	372	11(8)									1	3										
	ES13	26 April	1	1.3	531	16(12)							(1)		3		(3)									
COMBINED				10.5		98(115)					3(3)	3(1)	1(3)		26(32)	16(25)	(39)		1			2	2			(1)

Table D1 continued on next page ...

SITE	STATION	DATE	EFF.[b]	SAMPLE EFFORT Distance (km)	Time (s)	CATCH (OBSERVED)[a] MNWH	LKWH	RNTR	BLTR	ARGR	NPRK	WALL	BURB	GOLD	LNSC	WHSC	Sucker spp.	FLCH	LNDC	EMSH	SPSH	TRPR	LKCH	FTMN	Cyprinid Unid.	Scul. spp.
4	ES1	28 April	1	1.1	638							1(1)	1		6	3	3(4)	4(4)		1(1)						
	ES2	28 Arpil	1	0.6	173										2	1	(1)									
	ES3	28 April	2	5.1	2701	15(15)					1(1)	2	3(11)	1(1)	36	8	3(18)	19(25)		3		(3)	4			
	ES4	28 April	1	3.0	1324	6(6)	1					2(1)	(1)		25(7)	3	1	9(6)	1							
	ES5	29 April	1	5.3	3119	16(18)					(1)	1(1)	(8)	6(12)	16	7	(20)	20(30)					1			
	ES6	29 April	1	2.3	1464	8(7)					1	3	1(5)	(4)	8	5		20(8)		8(25)		6				1
	ES7	29 April	1	2.4	1178	6(5)						7(1)	(4)	2(2)	7	2	(7)	12(7)		1		12(30)	2			
COMBINED				19.8		51(51)	1				2(2)	16(4)	5(29)	9(19)	100(7)	29	7(50)	84(80)	1	13(26)		18(33)	7			1
5	ES1	2 May	1	2.0	884	14(6)					1	1(1)	1(3)		8(5)	7(4)		3(7)		1		2(6)	1			
	ES2	2 May	2	0.3	367	4(4)									2(4)	1(2)										
	ES3	2 May	1	1.4	141	4(4)							1		(9)	(8)										
	ES4	2 May	1	2.4	1263	8(10)						2(3)	1	2	7(9)	12(27)		3(2)								
	ES5	2 May	1	2.9	1664	2(7)					1	(1)	(2)		4(12)	9(24)	2	1		1		(42)		1		
	ES6	2 May	1	0.8	299						1				1	1	1(4)	6								
	ES7	2 May	1	0.4	164							(1)	1	(7)	(2)	1	(2)	4(3)								
	ES8	2 May	2	1.3	827	2(6)						2	(1)	(4)	2	2	(10)	17(15)		1						
	ES9	2 May	2	4.0	2002	8(22)						1(2)	(3)	2(10)	5	6	(38)	16(27)				(12)			(10)	
	ES10	3 May	1	0.4	641	6(8)								1	8	1	1(12)	(14)								
	ES11	3 May	2	0.2	595	15						1		1	11	2	2	9								
COMBINED				16.1		63(67)					3	7(8)	4(9)	6(21)	48(41)	42(65)	6(66)	59(68)		3		2(60)	1	1	(10)	
6	ES1	5 May	1	0.3	296							2		2(1)												
	ES2	5 May	1	1.3	734	(2)						1			2	1		(2)								
	ES3	5 May	1	5.5	2873						1	7(1)	(2)	2	2(1)	1		31(6)								
	ES4	5 May	1	4.0	2013	2					2(1)	4(1)	1(1)	2	10	3	(6)	40(17)			14	2	4			
	ES5	6 May	1	1.1	923							2				3		11(23)		3(12)			1			
	ES6	6 May	1	3.4	1355	(1)					(1)	1		1(1)	1	1	(4)	24(12)								
COMBINED				15.6		2(3)					3(2)	17(2)	1(3)	7(2)	15(1)	9	(10)	106(60)		3(12)	14	2	5			

Table D1 continued on next page ...

Table D1 Concluded

SITE	STATION	DATE	EFF[b]	SAMPLE EFFORT Distance (km)	Time (s)	CATCH (OBSERVED)[a] MNWH	LKWH	RNTR	BLTR	ARGR	NRPK	WALL	BURB	GOLD	LNSC	WHSC	Sucker spp.	FLCH	LNDC	EMSH	SPSH	TRPR	LKCH	FTMN	Cyprinid Unid.	Scul. spp.
7	ES1	9 May	3	5.2	1263	3(3)						(2)					(3)	6								
	ES2	9 May	2	3.9	1396							1			1(1)	(1)		5(3)		1						
	ES3	9 May	2	1.4	1000	5									2(4)			8(6)								
	ES4	9 May	2	2.5	1005	1(2)					(1)				11(6)			3								
	ES5	9 May	2	1.9	805	4									2(8)			2(3)								
	ES6	9 May	2	1.3	980	1(4)									5		(9)	8(6)								
	ES7	9 May	2	2.8	1006										2(4)			3(2)								
COMBINED				19.0		14(9)					(1)	1(2)			23(23)	(1)	(12)	35(20)		1						
8	ES1	13 May	2	0.9	664										7	1	(3)	11								
	ES2	13 May	1	2.0	788													17(12)								
	ES3	13 May	1	1.2	902						2	14(6)		7(4)				(6)				(2)				
	ES4	13 May	1	0.5	454						(1)	1		(1)												
	ES5	14 May	1	1.0	969						2(2)	20(8)		5(10)				14(12)				1(2)				
	ES6	14 May	1	2.3	1191							8(15)		13(15)				8(12)								
COMBINED				7.9							4(3)	43(29)		25(30)	7	1	(3)	50(42)				1(4)				
9	ES1	16 May	1	3.2	1484							(1)		(3)				(12)				(24)				
	ES2	16 May	2	0.8	2570		1				1	3(2)		7	(1)	2(4)		28(18)		2		16(51)				
	ES3	17 May	1	6.3	3548						1	(1)		1		3(3)		8(9)		2		20(200)				
	ES4	' May	1	1.3	664											(1)		(3)								
COMBINED				11.6			1				2	3(4)		8(3)	(1)	5(8)		36(42)		4		36(275)				
10	ES1	19 May	2	7.6	5290						(4)	(2)		2(1)				1(1)								
	ES2	19 May	2	6.0	4107						3(2)	(1)		1	1	2(1)						3(2)				
	ES3	20 May	1	1.3	571													2(3)								
	ES4	20 May	2	0.2	473											1		6(2)			1	1				
COMBINED				15.1							3(6)	(3)		3(1)	1	3(1)		9(6)			1	4(2)				

[a] For species code explanation, see Table 3.4

[b] 1 = high; 4= low

Table D2. Gill net summary, Athabasca River, spring 1992.

SITE	STN	DATE/TIME		SET DURATION (h)	SAMPLE AREA (m^2)	MESH SIZE (cm)	MAJOR CHANNEL TYPE (Habitat type)	WATER TEMP. (°C)		WATER CLARITY (cm)	EFF.[a]	CATCH[b]				TOTAL
		SET	PULL					SET	PULL			WHSC	LNSC	NRPK	MNWH	
1	GN1	26-04 @ 1730h	27-04 @ 1130h	18.0	109.44	3.8/8.9/11.4	S (BW)		6.5	46	4		7		1	8
TOTAL				18.0	109.44								7		1	8
2	GN1	22-04 @ 1830h	23-04 @ 1120h	16.8	36.48	6.4	U (BW)	6.5	6.0	80	1					
TOTAL				16.8	36.48											
3	GN1	25-04 @ 1035h	26-04 @ 1100h	24.4	109.44	3.8/8.9/11.4	M (SN[D2/E4])	7.0	9.0		2	2	2			4
	GN2	25-04 @ 1950h	26-04 @ 0938h	13.8	36.48	6.4	S (D2)	7.0	9.0	44	2	2		1		3
TOTAL				38.2	145.92							4	2	1		7
5	GN1	02-04 @ 1530h	03-04 @ 0948h	18.3	36.48	6.4	M (BW)	9.0	9.0	25	2					
TOTAL				18.3	36.48											
GRAND TOTAL				91.3	36.48							4	9	1	1	

[a] Efficiency (1 = high, 4 = very low)
[b] For speci\ code explanation see Table 3.4

Table D3. Beach seine summary, Athabasca River, spring 1992.

SITE	STATION	SAMPLED AREA (m^2)	CATCH[a]																TOTAL
			MNWH	WALL	BURB	LNSC	WHSC	SPSH	TRPR	LKCH	SCUL	LNDC	EMSH	FLCH	BRST	FTMN	Sucker spp.	Cyprinid unid.	
1	BS1	660	22			2													24
	BS2	660	42			1													43
	BS3	660	49			8				1	1							16	75
	BS4	450																	
	BS5	460				1													1
	BS6	450																	
	BS7	500																	
	BS8	380	1			1													2
	COMBINED	4220	114			13				1	1							16	145
2	BS1	474	8														4		12
	BS2	139	1																1
	BS3	229						2	1										3
	BS4	396															1		1
	BS5	360				3			2	2							14		21
	COMBINED	1598	9			3		2	3	2							19		38
3	BS1	436	1														2		3
	BS2	436	2		1												4		7
	BS3	436									1						1		2
	BS4	436	1								1	1					1		4
	BS5	436								5							1	3	9
	COMBINED	2180	4		1					5	2	1					9	3	25
4	BS1	396	2				1		4	20		4					21	1	53
	BS2	396						98	8	26			48				18	2	200
	BS3	436							1	1		1	31				19	4	57
	BS4	436							4								1		5
	BS5	436	1						6			4	11				1		23
	COMBINED	2100	3				1	98	23	47		9	90				60	7	338

Table D3 Continued on next page ...

SITE	STATION	SAMPLED AREA (m^2)	CATCH[a]																TOTAL
			MNWH	WALL	BURB	LNSC	WHSC	SPSH	TRPR	LKCH	SCUL	LNDC	EMSH	FLCH	BRST	FTMN	Sucker spp.	Cyprinid unid.	
5	BS1	396	3					2	1	3	1		5	1			6	1	23
	BS2	396				1	1	11	12			1	1					7	34
	BS3	396				1			5			13		7			2	6	34
	BS4	396							8		1	10	5	10				5	39
	BS5	396							1		1	8	1	5			4		20
	COMBINED	1980	3			2	1	13	27	3	3	32	12	23			12	19	150
6	BS1	396							16	22			9	2			1		50
	BS2	396							4	7		2	7	2				1	23
	BS3	396						5		58		2	11				2		78
	BS4	396						2	10	8		6	27				2	2	57
	BS5	396		5		1			15	26		3	19						69
	COMBINED	1980		5		1		7	45	121		13	73	4			5	3	277
7	BS1	396							4	1	1	1	1	9					17
	BS2	396							25				35	14				3	77
	BS3	396							31			2	4	56				5	98
	BS4	396							8			1	2	15					26
	BS5	396							1	1		2	1	9			1		15
	COMBINED	1980							69	2	1	6	43	103			1	8	233
8	BS1	396											2	7	1				10
	BS2	396									1			6			1		8
	BS3	396				1			16	2		2	2	10		10	3		46
	BS4	396							23		1	5	3	20		1	3		56
	BS5	396				1			3				1	28	1		4	2	40
	COMBINED	1980				2			42	2	2	7	8	71	2	11	11	2	160

Table D3 Continued on next page ...

Table D3 Concluded.

SITE	STATION	SAMPLED AREA (m^2)	CATCH[a]																TOTAL
			MNWH	WALL	BURB	LNSC	WHSC	SPSH	TRPR	LKCH	SCUL	LNDC	EMSH	FLCH	BRST	FTMN	Sucker spp.	Cyprinid unid.	
9	BS1	396							39			2					1		42
	BS2	396							1					98					99
	BS3	396							12	14		5		2		2			35
	BS4	396							21	16		1		1			1		40
	BS5	396							53	2	2	1	22						80
	COMBINED	1980							126	32	2	9	22	101		2	2		296
10	BS1	396							25					170					195
	BS2	396							8					76					84
	BS3	396							2					25					27
	BS4	396										1		129					130
	BS5	396							2					20					22
	COMBINED	1980							37			1		420					458
GRAND TOTAL		21978	133	5	1	21	2	120	372	215	11	78	248	722	2	13	119	58	2120

[a] For species code explanation, see Table 3.4

Table D4. Set line summary, Athabasca River, spring 1992.

SITE	STN	MAJOR CHANNEL TYPE (Habitat Type)	DATE/TIME		SET DURATION (h)	NO. HOOKS	HOOK HOURS	CATCH[a]				TOTAL
			SET	PULL				BURB	BLTR	NRPK	WALL	
1	SL 1	U (A2)	26-04 @ 1700h	27-04 @ 1200h	19.0	12	228.0	3	2			5
	SL 2	U (A2)	26-04 @ 1800h	27-04 @ 1230h	18.5	12	222 .0		1			1
	COMBINED				37.5	54	450 .0	3	3			6
2	SL 1	U (D3)	22-04 @ 1855h	23-04 @ 1040h	15.8	5	78.8	2				2
	SL 2	M (D2)	22-04 @ 1830h	23-04 @ 1000h	15.5	5	77.5	2	1			3
	COMBINED				31.3	10	156.3	4	1			5
3	SL 1	M (SN)	25-04 @ 1755h	26-04 @ 0950h	15.9	20	318.4	1		1	1	3
	SL 2	M (D1)	25-04 @ 1930h	26-04 @ 1030h	15.0	5	75.0	3				3
	SL 3	M (E5)	25-04 @ 2000h	26-04 @ 1110h	15.2	6	91.0	1				1
	COMBINED				46.1	31	484.4	5		1	1	7
4	SL 1	U (BW)	28-04 @ 1835h	29-04 @ 1415h	19.7	24	472.1					
	SL 2	U (D2/D1)	28-04 @ 1530h	29-04 @ 1100h	19.5	6	117.0					
	SL 3	U (D1)	29-04 @ 1113h	30-04 @ 1415h	27.0	6	162.2				1	1
	COMBINED				66.2	36	751.3				1	1
5	SL 1	U (D1)	02-05 @ 1805h	03-05 @ 1012h	16.1	5	80.6				2	2
	COMBINED				16.1	5	80.6				2	2
6	SL 1	S (D2)	05-05 @ 1720h	06-05 @ 1010h	16.8	5	84.2			1	1	2
	SL 2	S (E5)	05-05 @ 1730h	06-05 @ 1100h	17.5	20	350.0				1	1
	COMBINED				34.3	25	434.2			1	2	3
7	SL 1	U (D1)	09-05 @ 1645h	10-05 @ 1214h	19.5	20	389.6	2			2	4
	COMBINED				19.5	20	389.6	2			2	4
8	SL 1	U (B1)	13-05 @ 1830h	14-05 @ 1800h	23.5	20	470.0	2			8	10
	COMBINED				23.5	20	470.0	2			8	10
9	SL 1	S (D1)	16-05 @ 1630 h	17-05 @ 1400h	21.5	20	430.0			1	4	5
	COMBINED				21.5	20	430.0			1	4	5
10	SL 1	M (E5)	19-05 @ 1745h	20-05 @ 1230h	18.85	20	375.0			2	2	4
	SL 2	M (E5)	19-05 @ 1840h	20-05 @ 1115h	16.6	6	99.5				2	2
	COMBINED				35.3	26	474.5			2	4	6
GRAND TOTAL					331.3	217	4120.9	16	4	5	24	49

[a] For species code explanations, see Table 3.4

Table D5. Drift net summary, Athabasca River, spring 1992.

SITE	STATION	MAJOR CHANNEL TYPE (Habitat Type)	DATE/TIME		SET DURATION (h)	CATCH[a]				TOTAL
			SET	PULL		WALL	SPSC	LNSC	UNID	
2	DF 1a	U (100% A2)	22-04 @ 1656h	22-04 @ 2130h	4.7					
	DF 1b	U (100% A2)	23-04 @ 1600h	24-04 @ 0930h	17.5					
	DF 2a	U (100% A2)	22-04 @ 1720h	22-04 @ 2132h	4.2					
	DF 2b	U (100% A2)	22-04 @ 2132h	23-04 @ 0930h	11.9					
	TOTAL				38.3					
3	DF 1	S (100% D2)	25-04 @ 1155h	25-04 @ 1900h	7.1					
	DF 2	M (100% D1)	25-04 @ 1245h	25-04 @ 1920h	6.6					
	TOTAL				13.8					
4	DF 1	S (90% E4, 10% D2)	28-04 @ 1230h	29-04 @ 1030h	22.0					
	DF 2	S (100% D2)	28-04 @ 1550h	29-04 @ 1045h	18.9					
	TOTAL				40.9					
5	DF 1	M (100% D2)	02-05 @ 1215h	03-05 @ 0930h	21.3					
	DF 2	M (100% D2)	02-05 @ 1615h	03-05 @ 0950h	17.6					
	TOTAL				38.9					
6	DF 1	U (100% D2)	05-05 @ 1540h	06-05 @ 1035h	18.9					
	DF 2	S (100% D2)	05-05 @ 1025h	05-05 @ 1900h	8.6					
	TOTAL				27.5					
7	DF 1	U (100% A2)	09-05 @ 0830h	10-05 @ 1030h	26.0					
	DF 2	U (100% D4)	09-05 @ 1700h	10-05 @ 1035h	17.6					
	TOTAL				43.6					
8	DF 1	U (60% D2, 40% D1)	13-05 @ 1305h	lost						
	DF 2	U (100% D2)	13-05 @ 1620h	14-05 @ 1800h	25.7					
	TOTAL				25.7					
9	DF 1	M (100% E5)	16-05 @ 1620h	17-05 @ 1200h	19.7	4	6	4	3	17
	DF2	S (100% D1)	16-05 @ 1800h	17-05 @ 1608h	22.1					
	TOTAL				41.8	4	6	4	3	17
10	DF 1	M (100% D1)	19-05 @ 1100h	20-05 @ 1057h	24.0					
	DF2	S (100% D1)	19-05 @ 1520h	20-05 @ 1037h	19.3					
	TOTAL				43.3					
GRAND TOTAL					313.8	4	6	4	3	17

No drift nets were set at Site 1 due to high turbidity

[a] For species code explanations, see Table 3.4

Table D6. Dip net summary, Athabasca River, spring 1992.

SITE	DATE/TIME	STATION	VELOCITY (m/s)		DEPTH (m)		SUBSTRATE (%)[a]						CATCH	LENGTH (m)	ADJACENT BANK TYPE
			MEAN	RANGE	MEAN	RANGE	BO	CO	GR	PE	SI	SA			
1	27-04 @ 1430h	DN 1	0.00	0.00 to 0.00	0.40	0.30 to 0.50		60			40			45	A1
		DN 2	0.08	0.05 to 0.10	0.20	0.20 to 0.20		80			20			46	A2
		DN 3	0.13	0.10 to 0.20	0.20	0.20 to 0.20					100			45	D1
		DN 4	0.08	0.05 to 0.10	0.20	0.20 to 0.20		80			20			50	A2
		DN 5	0.08	0.05 to 0.10	0.30	0.30 to 0.30		80			20			35	A1

[a] For substrate code classification, see Table 2.2
Data for Site 1 only

Table D7. Backpack electrofishing summary, Athabasca River, spring 1992.

SITE	STATION	DATE	SAMPLE EFFORT		CATCH (OBSERVED)[a]							
			Time (s)	Length (m)	TRPR	LKCH	LNSC	FLCH	SPSH	LNDC	FTMN	Sucker spp.
2	EF 1	23 April	329	120	(1)							
	EF 2	23 April	648	120								
COMBINED			977	240	(1)							
3	EF 1	26 April	463	120	1(3)	3						
	EF 2	26 April	419	65		2	8					2
COMBINED			882	185	1(3)	5	8					2
5	EF 1	3 May	339	100		2		7	4	2	5	
COMBINED			339	100		2		7	4	2	5	
GRAND TOTAL			2198	525	2(4)	7	8	7	4	2	5	2

[a] For species code explanation, see Table 3.4

Table D8. Summary of habitat characteristics at seine haul sites, Athabasca River, spring 1992.

SITE	DATE	STATION	VELOCITY (m/s)		DEPTH (m)		SUBSTRATE COMPOSITION[a] (%)						ADJACENT BANK TYPE
			MEAN	RANGE	MEAN	RANGE	BO	CO	GR	PE	SI	SA	
1	16 May	BS 1	0.03	0.00 to 0.08	0.58	0.28 to 0.87			20		80		A1/D2
		BS 2	0.32	0.10 to 0.42	0.33	0.14 to 0.48		50	20	30			A1
		BS 3	0.21	0.00 to 0.44	0.78	0.48 to 1.04				20	80		A2
	27 April	BS 4	0.00	0.00 to 0.00	0.43	0.30 to 0.56		60			40		A1
		BS 5	0.32	0.05 to 0.70	0.34	0.02 to 0.60		80			20		A2
		BS 6	0.13	0.08 to 0.20	0.24	0.02 to 0.40					100		D1
		BS 7	0.17	0.10 to 0.30	0.27	0.02 to 0.50		80			20		A2
		BS 8	0.23	0.10 to 0.40	0.27	0.02 to 0.50		80			20		A1
2	22 April	BS 1	0.46	0.20 to 0.66	0.44	0.23 to 0.57		50	50				D2
		BS 2	0.55	0.00 to 1.25	0.33	0.18 to 0.55		20	80				D2
		BS 3	0.18	0.00 to 0.83	0.67	0.43 to 1.00	30	70					A1
		BS ‹	0.23	0.00 to 1.00	0.50	0.24 to 0.75	60	40					D2
		BS 5	0.32	0.14 to 0.67	0.63	0.40 to 0.82	55	45					A2
3	25 April	BS 1	0.49	0.25 to 0.76	0.35	0.21 to 0.48		70	15	10	5		D2
		BS 2	0.41	0.26 to 0.55	0.34	0.23 to 0.43	20	50		5	25		D2
		BS 3	0.18	0.00 to 0.56	0.49	0.16 to 0.80	40	40	5	10	5		A2
		BS 4	0.42	0.23 to 0.66	0.35	0.16 to 0.68	5	60	10	10	15		D2
		BS 5	0.29	0.13 to 0.50	0.48	0.07 to 0.67					50	50	D1
4	28 April	BS 1	0.30	0.05 to 0.47	0.22	0.13 to 0.36	5	70	5	5	15		D2
		BS 2	0.00	0.00 to 0.00	2.61	0.15 to 0.42					50	50	D1
		BS 3	0.09	0.00 to 0.23	0.30	0.16 to 0.45		30	25	30	15		A1
		BS 4	0.07	0.00 to 0.20	0.54	0.23 to 0.95	20	60	5	5	10		A2
		BS 5	0.31	0.00 to 0.51	0.49	0.21 to 0.80	20	60	5	5	10		D2
5	02 May	BS 1	0.48	0.00 to 0.77	0.23	0.14 to 0.33		30	20	20	30		D2
		BS 2	0.01	0.00 to 0.04	0.48	0.16 to 0.76					50	50	E5
		BS 3	0.29	0.00 to 0.69	0.39	0.19 to 0.65	10	40	15	20	15		E5
		BS 4	0.46	0.00 to 1.26	0.28	0.12 to 0.72		40	20	20	20		D2
		BS 5	0.38	0.00 to 0.72	0.40	0.25 to 0.57	10	30	20	20	20		D2
6	16 May	BS 1	0.20	0.00 to 0.70	0.42	0.17 to 0.65	15	40	20	20	5		A2
		BS 2	0.14	0.13 to 0.25	0.35	0.21 to 0.52					50	50	E5
		BS 3	0.23	0.17 to 0.31	0.31	0.15 to 0.45					50	50	D1
		BS 4	0.28	0.07 to 0.39	0.24	0.12 to 0.39	10	25	5	10	50		E5
		BS 5	0.23	0.00 to 0.34	0.33	0.12 to 0.63		30	30	30	10		E5b

Table D8 Continued on next page ...

Table D8 Concluded.

SITE	DATE	STATION	VELOCITY (m/s)		DEPTH (m)		SUBSTRATE COMPOSITION[a] (%)						ADJACENT BANK TYPE
			MEAN	RANGE	MEAN	RANGE	BO	CO	GR	PE	SI	SA	
7	09 May	BS 1	0.29	0.00 to 0.94	0.39	0.16 to 0.72	40	30	10	10	10		A2
		BS 2	0.06	0.00 to 0.19	0.32	0.08 to 0.63	5	5			90		D3
		BS 3	0.11	0.00 to 0.25	0.34	0.13 to 0.75	5		5	10	80		D4
		BS 4	0.13	0.00 to 0.44	0.33	0.14 to 0.58	15	50	10	15	10		A2
		BS 5	0.21	0.16 to 0.33	0.20	0.08 to 0.35	10	20	20	25	12.5	12.5	D2
8	13 May	BS 1	0.12	0.00 to 0.33	0.31	0.13 to 0.62		20	10	20	50		A2
		BS 2	0.26	0.00 to 0.61	0.24	0.07 to 0.46	20	20	10	10	40		A2
		BS 3	0.26	0.01 to 0.44	0.23	0.10 to 0.43	20	20	15	15	30		D1/D3
		BS 4	0.16	0.00 to 0.25	0.20	0.10 to 0.36	10	30	15	15	30		D1/D3
		BS 5	0.29	0.15 to 0.55	0.32	0.14 to 0.46	10	10			80		D1
9	15 May	BS 1	0.07	0.00 to 0.17	0.41	0.20 to 0.66		5	80		15		D2
		BS 2	0.17	0.04 to 0.33	0.21	0.11 to 0.29						100	D1
		BS 3	0.22	0.05 to 0.34	0.41	0.16 to 0.66		80		5	15		E5b
		BS 4	0.20	0.01 to 0.40	0.19	0.12 to 0.31		20	60		5	15	D2
		BS 5	0.26	0.17 to 0.35	0.47	0.15 to 0.75			80		20		A1
10	19 May	BS 1	0.26	0.09 to 0.40	0.41	0.19 to 0.87					100		D1
		BS 2	0.16	0.06 to 0.26	0.32	0.11 to 0.56						100	D1
		BS 3	0.11	0.02 to 0.23	0.36	0.13 to 0.72						100	D1
		BS 4	0.07	0.00 to 0.18	0.15	0.07 to 0.24						100	D1
		BS 5	0.01	0.00 to 0.04	0.32	0.12to 0.51						100	D1

[a] For substrate code classifications, see Table 2.2.

Table D9. Summary of habitat characteristics at drift net sites, Athabasca River, spring 1992.

SITE	DATE	STATION	VELOCITY (m/s)	DEPTH (m)	SUBSTRATE COMPOSITION[a] (%)						ADJACENT BANK TYPE
					BO	CO	GR	PE	SI	SA	
2	22 April	DF 1a	0.24	0.34	20	40	20	10	10		A2
		DF 1b	0.24	0.34	20	40	20	10	10		A2
		DF 2a	0.99	0.22		5	50	40	5		D3
		DF 2b	0.99	0.22		5	50	40	5		D3
3	25 April	DF 1	0.68	0.25		70	15	5	10		D2
		DF 2	0.53	0.50	20	50		5	25		D2
4	28 April	DF 1	0.39	0.41		85	5	5	5		D2
		DF 2	0.47	0.26		50	20	25	5		D1
5	02 May	DF 1	0.05	0.23		10		20	70		D2
		DF 2	0.31	0.16		40	20	20	20		D2
6	05 May	DF 1	0.52	0.27	20	30	20	25	5		A2
		DF 2	0.17	0.13	10	25	5	10	20		E5
7	09 May	DF 1	0.11	0.26	10	40	10	20	20		A2
		DF 2	0.25	0.25	15	30	20	30	5		D4
8	13 May	DF 1	1.41	0.10	20	20	10	10	40		A2
		DF 2	0.03	0.26	10	30	15	15	30		D2
9	16 May	DF 1	0.14	0.32		75		5	20		E5b
		DF 2	0.16	0.10						100	D1
10	19 May	DF 1	0.28	0.35						100	D1
		DF 2	0.02	0.19						100	D1

[a] For substrate code descriptions, see Table 2.2

No drift nets were set at Site 1 due to high turbidity

Table D10. Summary of CPUE (Catch-per-unit-effort) for the major sampling methods at Site 1, Athabasca River, spring 1992.

Sample Method[a]	CPUE	Fish Species[b]								All Species
		MNWH	BLTR	RNTR	BURB	LNSC	LKCH	Sculp. spp.	Cyprinid Unid.	
ES	No. fish/km	13.33		0.42		5.63				19.38
GN	No. fish/net unit[c]	0.61				4.26				4.87
BS	No. fish/100 m^2	2.70				0.31	0.02	0.02	0.38	3.44
SL	No. fish/100 hook hours		0.67		0.67					1.33

[a] ES = boat electrofishing, GN = gillnet, BS = beach seine, SL = set line
[b] For species code explanation, see Table 3.4
[c] One net unit = 100 m^2 of gill net fished for the equivalent of 12 hours

Table D11. Summary of CPUE (Catch-per-unit-effort) for the major sampling methods at Site 2, Athabasca River, spring 1992.

Sample Method[a]	CPUE		Fish Species[b]											All Species
		ARGR	MNWH	BLTR	RNTR	NRPK	BURB	LNSC	WHSC	Sucker spp.	LKCH	SPSH	TRPR	
ES	No. fish/km	1.16	7.34	0.06	0.12	0.06		1.21	0.06		0.06		0.06	10.12
GN	No. fish/net unit[c]													
BS	No. fish/100 m^2		0.56					0.19		1.19	0.13	0.13	0.19	2.38
SL	No. fish/100 hook hours			0.64			2.56							3.20
DF	No. fish/hour													
EF	No. fish/s													

[a] ES = boat electrofishing, GN = gillnet, BS = beach seine, SL = set line, DF = drift net, EF = backpack electrofisher
[b] For species code explanation, see Table 3.4
[c] One net unit = 100 m^2 of gill net fished for the equivalent of 12 hours

Table D12. Summary of CPUE (Catch-per-unit-effort) for the major sampling methods at Site 3, Athabasca River, spring 1992.

Sample Method[a]	CPUE	Fish Species[b]												All Species
		MNWH	NRPK	WALL	BURB	LNSC	WHSC	Sucker spp.	LKCH	LNDC	TRPR	Sculp. spp.	Cyprinid Unid.	
ES	No. fish/km	9.33	0.29	0.29	0.10	2.48	1.52		0.19	0.10	0.19			14.48
GN	No. fish/net unit[c]		0.22			0.43	0.86							1.51
BS	No. fish/100 m^2	0.18			0.05			0.41	0.23	0.05		0.09	0.14	1.15
SL	No. fish/100 hook hours		0.21	0.21	1.03									1.45
DF	No. fish/hour													
EF	No. fish/s							<0.01	<0.01	<0.01	<0.01			0.02

[a] ES = boat electrofishing, GN = gillnet, BS = beach seine, SL = set line, DF = drift net, EF = backpack electrofisher
[b] For species code explanation, see Table 3.4
[c] One net unit = 100 m^2 of gill net fished for the equivalent of 12 hours

Table D13. Summary of CPUE (Catch-per-unit-effort) for the major sampling methods at Site 4, Athabasca River, spring 1992.

Sample Method[a]	CPUE	Fish Species[b]																	All Species
		MNWH	LKWH	NRPK	WALL	GOLD	BURB	LNSC	WHSC	Sucker spp.	FLCH	LKCH	LNDC	EMSH	SPSH	TRPR	Sculp. spp	Cyprinid Unid.	
ES	No. fish/km	2.58	0.05	0.10	0.81	0.45	0.25	5.05	1.46	0.35	4.24	0.35	0.05	0.66		0.91	0.05		17.37
BS	No. fish/100 m^2	0.14							0.05	2.86		2.24	0.43	4.29	4.67	1.10		0.33	16.10
SL	No. fish/100 hook hours				0.13														0.13
DF	No. fish/hour																		

[a] ES = boat electrofishing, BS = beach seine, SL = set line, DF = drift net,
[b] For species code explanation, see Table 3.4

Table D14. Summary of CPUE (Catch-per-unit-effort) for the major sampling methods at Site 5, Athabasca River, spring 1992.

Sample Method[a]	CPUE	Fish Species[b]																	All Species
		MNWH	NRPK	WALL	GOLD	BURB	LNSC	WHSC	Sucker spp.	FLCH	LKCH	LNDC	EMSH	SPSH	FTMN	TRPR	Sculp. spp.	Cyprinid Unid.	
ES	No. fish/km	3.91	0.19	0.43	0.37	0.25	2.98	2.61	0.37	3.66	0.06		0.19		0.06	0.12			15.22
GN	No. fish/net unit[c]																		
BS	No. fish/100 m^2	0.15					0.10	0.05	0.61	1.16	0.15	1.62	0.61	0.66		1.36	0.15	0.96	7.58
SL	No. fish/100 hook hours			2.48															4.96
DF	No. fish/hour																		
EF	No. fish/s									0.02	<0.01	<0.01		0.01	0.01				0.06

[a] ES = boat electrofishing, GN = gillnet, BS = beach seine, SL = set line, DF = drift net, EF = backpack electrofisher
[b] For species code explanation, see Table 3.4
[c] One net unit = 100 m^2 of gill net fished for the equivalent of 12 hours

Table D15. Summary of CPUE (Catch-per-unit-effort) for the major sampling methods at Site 6, Athabasca River, spring 1992.

Sample Method[a]	CPUE	Fish Species[b]															All Species
		MNWH	NRPK	WALL	GOLD	BURB	LNSC	WHSC	Sucker spp.	FLCH	LKCH	LNDC	EMSH	SPSH	TRPR	Cyprinid Unid.	
ES	No. fish/km	0.13	0.19	1.09	0.45	0.06	0.96	0.58		6.79	0.32		0.19	0.90	0.13		11.79
BS	No. fish/100 m^2			0.25			0.05		0.25	0.20	6.11	0.66	3.69	0.35	2.27	0.15	14.00
SL	No. fish/100 hook hours		0.23	0.46													0.69
DF	No. fish/hour																

[a] ES = boat electrofishing, BS = beach seine, SL = set line, DF = drift net,
[b] For species code explanation, see Table 3.4

Table D16. Summary of CPUE (Catch-per-unit-effort) for the major sampling methods at Site 7, Athabasca River, spring 1992.

Sample Method[a]	CPUE	Fish Species[b]												All Species
		MNWH	WALL	BURB	LNSC	Sucker spp.	FLCH	LKCH	LNDC	EMSH	TRPR	Sculp. spp.	Cyprinid Unid.	
ES	No. fish/km	0.74	0.05		1.21		1.84			0.05				3.89
BS	No. fish/100 m^2					0.05	5.20	0.10	0.30	2.17	3.48	0.05	0.40	11.77
SL	No. fish/100 hook hours		0.51	0.51										1.03
DF	No. fish/hour													

[a] ES = boat electrofishing, BS = beach seine, SL = set line, DF = drift net
[b] For species code explanation, see Table 3.4

Table D17. Summary of CPUE (Catch-per-unit-effort) for the major sampling methods at Site 8, Athabasca River, spring 1992.

Sample Method[a]	CPUE	NRPK	WALL	GOLD	BURB	LNSC	WHSC	Sucker spp.	FLCH	LKCH	LNDC	EMSH	FTMN	TRPR	BRST	Sculp. spp.	Cyprinid Unid.	All Species
ES	No. fish/km	0.51	5.44	3.16		0.89	0.13		6.33					0.13				16.58
BS	No. fish/100 m^2					0.10		0.56	3.59	0.10	0.35	0.40	0.56	2.12	0.10	0.10	0.10	8.08
SL	No. fish/100 hook hours		1.70		0.43													2.13
DF	No. fish/hour																	

[a] ES = boat electrofishing, BS = beach seine, SL = set line, DF = drift net,
[b] For species code explanation, see Table 3.4

Table D18. Summary of CPUE (Catch-per-unit-effort) for the major sampling methods at Site 9, Athabasca River, spring 1992.

Sample Method[a]	CPUE	Fish Species[b]																All Species
		LKWH	NRPK	WALL	GOLD	LNSC	WHSC	Sucker spp.	FLCH	LKCH	LNDC	EMSH	FTMN	TRPR	SPSH	Sculp. spp.	Cyprinid Unid.	
ES	No. fish/km	0.09	0.17	0.26	0.69		0.43		3.10			0.34		3.10		3.10		8.19
BS	No. fish/100 m^2							0.10	5.10	1.62	0.45	1.11	0.10	6.36		0.10		14.95
SL	No. fish/100 hook hours		0.23	0.93														1.16
DF	No. fish/hour			0.10		0.10									0.14		0.07	0.41

[a] ES = boat electrofishing, BS = beach seine, SL = set line, DF = drift net
[b] For species code explanation, see Table 3.4

Table D19. Summary of CPUE (Catch-per-unit-effort) for the major sampling methods at Site 10, Athabasca River, spring 1992.

Sample Method[a]	CPUE	NRPK	WALL	GOLD	LNSC	WHSC	FLCH	LNDC	EMSH	SPSH	TRPR	All Species
ES	No. fish/km	0.20		0.20	0.07	0.20	0.60			0.07	0.26	1.59
BS	No. fish/100 m^2						21.21	0.05			1.87	23.13
SL	No. fish/100 hook hours	0.42	0.84									1.26
DF	No. fish/hour											

[a] ES = boat electrofishing, BS = beach seine, SL = set line, DF = drift net,
[b] For species code explanation, see Table 3.4

LENGTH FREQUENCY SUMMARIES FOR INDIVIDUAL SPECIES

Hard copy provided for sites and all sampling methods combined.

Disk copy provided for individual sites by sampling methods.

Boat Electrofisher
- 334biges.asc
- 334 medes.asc
- 334smes.asc

Gillnet
- 334biggn.asc
- 334medgn.asc

Setline
- 334bigsl.asc
- 334medsl.asc

Beach Seine
- 334bigbs.asc
- 334medbs.asc
- 334smlbs.asc

Backpack electrofisher
- 334medef.asc
- 334smlef.asc

LENGTH FREQUENCY SUMMARY FOR SMALL-SIZED FISH SITES AND ALL SAMPLING METHODS COMBINED

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = BRST

LOCATION= ATHAB   SITE(S)=   0.8

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED =   1

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
50- 54	1	100.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	1	100.0	-	0	0	.0	-	0	0	.0	-	0	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	.0000	.0000	.0000	.0000
STDDEV =	.0000	.0000	.0000	.0000
COEVAR =	.0000	.0000	.0000	.0000
STDERR =	.0000	.0000	.0000	.0000
N =	0	0	0	0
MEDIAN SIZE	53 MM	0 MM	0 MM	0 MM

****

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

****

SPECIES = EMSH

LOCATION= ATHAB SITE(S)= 0.4 0.5 0.6 0.7 0.8 0.9 1.0

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 270

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
20- 24	4	1.5	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
25- 29	22	8.1	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
30- 34	40	14.8	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
35- 39	55	20.4	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 44	40	14.8	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
45- 49	14	5.2	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
50- 54	9	3.3	1.01	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
55- 59	14	5.2	1.06	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 64	30	11.1	.76	15	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
65- 69	16	5.9	.84	9	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 74	12	4.4	.82	8	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
75- 79	6	2.2	.81	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 84	3	1.1	.84	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
85- 89	4	1.5	.86	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
90- 94	1	.4	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	270	100.0	-	49	0	.0	-	0	0	.0	-	0	0	.0	-	0

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = .8490	MEAN = .0000	MEAN = .0000	MEAN = .0000
	STDDEV = .2424	STDDEV = .0000	STDDEV = .0000	STDDEV = .0000
	COEVAR = 28.5515	COEVAR = .0000	COEVAR = .0000	COEVAR = .0000
	STDERR = .0148	STDERR = .0000	STDERR = .0000	STDERR = .0000
	N = 49	N = 0	N = 0	N = 0
MEDIAN SIZE	42 MM	0 MM	0 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
0- 1	7	14.3	.53	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2- 3	34	69.4	.90	34	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4- 5	7	14.3	.89	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6- 7	1	2.0	1.14	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	49	100.0	-	49	0	.0	-	0	0	.0	-	0	0	.0	-	0

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = .8490	MEAN = .0000	MEAN = .0000	MEAN = .0000
	STDDEV = .2424	STDDEV = .0000	STDDEV = .0000	STDDEV = .0000
	COEVAR = 28.5515	COEVAR = .0000	COEVAR = .0000	COEVAR = .0000
	STDERR = .0148	STDERR = .0000	STDERR = .0000	STDERR = .0000
	N = 49	N = 0	N = 0	N = 0
MEDIAN SIZE	4 G	0 G	0 G	0 G

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = LNDC

LOCATION= ATHAB   SITE(S)= 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 85

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
20- 24	12	14.1	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
25- 29	16	18.8	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
30- 34	28	32.9	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
35- 39	15	17.6	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 44	9	10.6	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
45- 49	2	2.4	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
50- 54	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
55- 59	2	2.4	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 64	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
65- 69	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 74	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
75- 79	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 84	1	1.2	.36	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	85	100.0	-	1	0	.0	-	0	0	.0	-	0	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	.3627	.0000	.0000	.0000
STDDEV =	.0000	.0000	.0000	.0000
COEVAR =	.0000	.0000	.0000	.0000
STDERR =	.0000	.0000	.0000	.0000
N =	1	0	0	0
MEDIAN SIZE	33 MM	0 MM	0 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
CLASS INTERVAL UNITS = G	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
2- 3	1	100.0	.36	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	1	100.0	-	1	0	.0	-	0	0	.0	-	0	0	.0	-	0

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = .3627	MEAN = .0000	MEAN = .0000	MEAN = .0000
	STDDEV = .0000	STDDEV = .0000	STDDEV = .0000	STDDEV = .0000
	COEVAR = .0000	COEVAR = .0000	COEVAR = .0000	COEVAR = .0000
	STDERR = .0000	STDERR = .0000	STDERR = .0000	STDERR = .0000
	N = 1	N = 0	N = 0	N = 0
MEDIAN SIZE	4 G	0 G	0 G	0 G

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = SCUL

LOCATION= ATHAB SITE(S)= 0.1 0.3 0.4 0.5 0.7 0.8 0.9

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 10

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
40- 44	1	10.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
45- 49	1	10.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
50- 54	2	20.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
55- 59	1	10.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 64	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
65- 69	2	20.0	.73	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 74	2	20.0	.84	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
75- 79	1	10.0	.81	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	10	100.0	-	4	0	.0	-	0	0	.0	-	0	0	.0	-	0
COND. FACTORS SUMMARY	MEAN = .8045 STDDEV = .0599 COEVAR = 7.4504 STDERR = .0190 N = 4				MEAN = .0000 STDDEV = .0000 COEVAR = .0000 STDERR = .0000 N = 0				MEAN = .0000 STDDEV = .0000 COEVAR = .0000 STDERR = .0000 N = 0				MEAN = .0000 STDDEV = .0000 COEVAR = .000C STDERR = .0000 N = 0			
MEDIAN SIZE	66 MM				0 MM				0 MM				0 MM			

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
2- 3	3	75.0	.80	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4- 5	1	25.0	.81	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	4	100.0	-	4	0	.0	-	0	0	.0	-	0	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	.8045	.0000	.0000	.0000
STDDEV =	.0599	.0000	.0000	.0000
COEVAR =	7.4504	.0000	.0000	.0000
STDERR =	.0190	.0000	.0000	.0000
N =	4	0	0	0
MEDIAN SIZE	4 G	0 G	0 G	0 G

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = SPSH

LOCATION= ATHAB SITE(S)= 0.2 0.4 0.5 0.6 1.0

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 43

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
20- 24	1	2.3	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
25- 29	1	2.3	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
30- 34	4	9.3	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
35- 39	16	37.2	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 44	9	20.9	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
45- 49	4	9.3	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
50- 54	4	9.3	1.05	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
55- 59	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 64	1	2.3	.84	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
65- 69	1	2.3	.64	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 74	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
75- 79	1	2.3	2.32	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 84	1	2.3	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	43	100.0	-	5	0	.0	-	0	0	.0	-	0	0	.0	-	C

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = 1.1781	MEAN = .0000	MEAN = .0000	MEAN = .0000
	STDDEV = .6920	STDDEV = .0000	STDDEV = .0000	STDDEV = .0000
	COEVAR = 58.7363	COEVAR = .0000	COEVAR = .0000	COEVAR = .0000
	STDERR = .1055	STDERR = .0000	STDERR = .0000	STDERR = .0000
	N = 5	N = 0	N = 0	N = 0
MEDIAN SIZE	40 MM	0 MM	0 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
0- 1	1	20.0	.75	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2- 3	3	60.0	.94	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4- 5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6- 7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
8- 9	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
10- 11	1	20.0	2.32	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	5	100.0	-	5	0	.0	-	0	0	.0	-	0	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	1.1781	.0000	.0000	.0000
STDDEV =	.6920	.0000	.0000	.0000
COEVAR =	58.7363	.0000	.0000	.0000
STDERR =	.1055	.0000	.0000	.0000
N =	5	0	0	0
MEDIAN SIZE	4 G	0 G	0 G	0 G

****

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

****

SPECIES = TRPR

LOCATION= ATHAB SITE(S)= 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 391

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
20- 24	3	.8	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
25- 29	16	4.1	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
30- 34	27	6.9	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
35- 39	57	14.6	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 44	83	21.2	1.17	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
45- 49	87	22.3	1.29	13	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
50- 54	47	12.0	1.06	18	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
55- 59	26	6.6	1.33	18	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 64	9	2.3	1.43	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
65- 69	11	2.8	1.15	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 74	7	1.8	.96	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
75- 79	8	2.0	1.44	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 84	8	2.0	1.47	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
85- 89	2	.5	1.47	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	391	100.0	-	79	0	.0	-	0	0	.0	-	0	0	.0	-	0

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = 1.2529	MEAN = .0000	MEAN = .0000	MEAN = .0000
	STDDEV = .3650	STDDEV = .0000	STDDEV = .0000	STDDEV = .0000
	COEVAR = 29.1325	COEVAR = .0000	COEVAR = .0000	COEVAR = .0000
	STDERR = .0185	STDERR = .0000	STDERR = .0000	STDERR = .0000
	N = 79	N = 0	N = 0	N = 0
MEDIAN SIZE	46 MM	0 MM	0 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
0- 1	19	24.1	.88	19	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2- 3	40	50.6	1.32	40	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4- 5	9	11.4	1.37	9	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6- 7	2	2.5	1.37	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
8- 9	7	8.9	1.58	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
10- 11	2	2.5	1.74	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	79	100.0	-	79	0	.0	-	0	0	.0	-	0	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	1.2529	.0000	.0000	.0000
STDDEV =	.3650	.0000	.0000	.0000
COEVAR =	29.1325	.0000	.0000	.0000
STDERR =	.0185	.0000	.0000	.0000
N =	79	0	0	0
MEDIAN SIZE	4 G	0 G	0 G	0 G

LENGTH FREQUENCY SUMMARY FOR MEDIUM-SIZED FISH
SITES AND ALL SAMPLING METHODS COMBINED

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = ARGR

LOCATION= ATHAB   SITE(S)=   0.2

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 19

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
UNITS = MM	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
200- 209	3	15.0	1.17	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
210- 219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 229	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
230- 239	2	10.0	1.26	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 249	1	5.0	1.22	1	0	.0	.00	0	1	100.0	1.22	1	0	.0	.00	0
250- 259	3	15.0	1.23	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 269	1	5.0	1.34	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
270- 279	2	10.0	1.24	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 289	3	15.0	1.33	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
290- 299	2	10.0	1.38	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 309	1	5.0	1.37	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
310- 319	1	5.0	1.28	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 329	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
330- 339	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
340- 349	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
350- 359	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
360- 369	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
370- 379	1	5.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	20	100.0	-	19	0	.0	-	0	1	100.0	-	1	0	.0	-	0

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = 1.2719	MEAN = .0000	MEAN = 1.2240	MEAN = .0000
	STDDEV = .0936	STDDEV = .0000	STDDEV = .0000	STDDEV = .0000
	COEVAR = 7.3602	COEVAR = .0000	COEVAR = .0000	COEVAR = .0000
	STDERR = .0209	STDERR = .0000	STDERR = .0000	STDERR = .0000
	N = 19	N = 0	N = 1	N = 0
MEDIAN SIZE	271 MM	0 MM	246 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	ALL GROUPED %	ALL GROUPED MEAN CF	ALL GROUPED N	MALES # FISH	MALES %	MALES MEAN CF	MALES N	FEMALES # FISH	FEMALES %	FEMALES MEAN CF	FEMALES N	SEX INDETERMINABLE # FISH	SEX INDETERMINABLE %	SEX INDETERMINABLE MEAN CF	SEX INDETERMINABLE N
80- 99	2	10.5	1.19	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 119	1	5.3	1.13	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 159	1	5.3	1.23	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 179	2	10.5	1.19	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 199	1	5.3	1.22	1	0	.0	.00	0	1	100.0	1.22	1	0	.0	.00	0
200- 219	2	10.5	1.30	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 259	2	10.5	1.26	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 279	2	10.5	1.23	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 319	1	5.3	1.41	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 339	2	10.5	1.39	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
340- 359	1	5.3	1.39	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
360- 379	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
380- 399	1	5.3	1.37	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 419	1	5.3	1.28	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	19	100.0	-	19	0	.0	-	0	1	100.0	-	1	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	1.2719	.0000	1.2240	.0000
STDDEV =	.0936	.0000	.0000	.0000
COEVAR =	7.3602	.0000	.0000	.0000
STDERR =	.0209	.0000	.0000	.0000
N =	19	0	1	0
MEDIAN SIZE	246 G	0 G	191 G	0 G

****

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

****

SPECIES = BLTR

LOCATION= ATHAB SITE(S)= 0.1 0.2

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 4

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
310- 319	1	20.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 329	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
330- 339	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
340- 349	1	20.0	1.18	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
350- 359	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
360- 369	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
370- 379	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
380- 389	2	40.0	1.07	1	0	.0	.00	0	1	100.0	1.07	1	0	.0	.00	0
390- 399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 409	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
410- 419	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
420- 429	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
430- 439	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
440- 449	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
450- 459	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	C
460- 469	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
470- 479	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
480- 489	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
490- 499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 509	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
510- 519	1	20.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	5	100.0	-	2	0	.0	-	0	1	100.0	-	1	0	.0	-	0

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = 1.1250	MEAN = .0000	MEAN = 1.0700	MEAN = .0000
	STDDEV = .0777	STDDEV = .0000	STDDEV = .0000	STDDEV = .0000
	COEVAR = 6.9109	COEVAR = .0000	COEVAR = .0000	COEVAR = .0000
	STDERR = .0348	STDERR = .0000	STDERR = .0000	STDERR = .0000
	N = 2	N = 0	N = 1	N = 0
MEDIAN SIZE	383 MM	0 MM	386 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
460- 479	1	50.0	1.18	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
480- 499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 519	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
520- 539	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
540- 559	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
560- 579	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
580- 599	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
600- 619	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
620- 639	1	50.0	1.07	1	0	.0	.00	0	1	100.0	1.07	1	0	.0	.00	0
TOTALS	2	100.0	-	2	0	.0	-	0	1	100.0	-	1	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	1.1250	.0000	1.0700	.0000
STDDEV =	.0777	.0000	.0000	.0000
COEVAR =	6.9109	.0000	.0000	.0000
STDERR =	.0348	.0000	.0000	.0000
N =	2	0	1	0
MEDIAN SIZE	621 G	0 G	631 G	0 G

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = FLCH

LOCATION= ATHAB SITE(S)= 0.4 0.5 0.6 0.7 0.8 0.9 1.0

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 844

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
0- 9	1	.1	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
10- 19	2	.2	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
20- 29	105	12.4	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
30- 39	142	16.8	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 49	28	3.3	1.26	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
50- 59	56	6.6	1.00	19	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 69	69	8.2	.82	40	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 79	46	5.5	.92	28	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 89	31	3.7	.97	25	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
90- 99	13	1.5	.92	8	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 109	11	1.3	1.01	9	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
110- 119	17	2.0	1.10	12	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 129	16	1.9	1.03	11	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
130- 139	11	1.3	1.14	10	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 149	12	1.4	1.05	11	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
150- 159	17	2.0	1.12	11	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 169	10	1.2	1.11	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
170- 179	18	2.1	1.12	11	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 189	18	2.1	1.12	11	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
190- 199	24	2.8	1.15	15	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 209	31	3.7	1.15	18	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
210- 219	28	3.3	1.15	19	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 229	43	5.1	1.20	31	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
230- 239	32	3.8	1.20	19	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 249	29	3.4	1.17	23	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
250- 259	18	2.1	1.21	13	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 269	8	.9	1.27	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
270- 279	3	.4	1.12	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 289	2	.2	1.25	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
290- 299	3	.4	1.18	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	844	100.0	-	363	0	.0	-	0	0	.0	-	0	0	.0	-	0

COND. FACTORS SUMMARY	MEAN = 1.0685 STDDEV = .2112 COEVAR = 19.7610 STDERR = .0073 N = 363	MEAN = .0000 STDDEV = .0000 COEVAR = .0000 STDERR = .0000 N = 0	MEAN = .0000 STDDEV = .0000 COEVAR = .0000 STDERR = .0000 N = 0	MEAN = .0000 STDDEV = .0000 COEVAR = .0000 STDERR = .0000 N = 0
MEDIAN SIZE	75 MM	0 MM	0 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	ALL GROUPED %	ALL GROUPED MEAN CF	ALL GROUPED N	MALES # FISH	MALES %	MALES MEAN CF	MALES N	FEMALES # FISH	FEMALES %	FEMALES MEAN CF	FEMALES N	SEX INDETERMINABLE # FISH	SEX INDETERMINABLE %	SEX INDETERMINABLE MEAN CF	SEX INDETERMINABLE N
0- 19	150	41.3	.94	150	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
20- 39	30	8.3	1.06	30	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 59	23	6.3	1.17	23	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 79	14	3.9	1.14	14	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 99	24	6.6	1.12	24	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 119	21	5.8	1.17	21	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 139	32	8.8	1.17	32	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 159	21	5.8	1.20	21	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 179	23	6.3	1.18	23	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 199	10	2.8	1.21	10	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 219	7	1.9	1.27	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 239	2	.6	1.17	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 259	2	.6	1.38	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 279	2	.6	1.24	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 299	1	.3	1.25	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 319	1	.3	1.25	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	363	100.0	-	363	0	.0	-	0	0	.0	-	0	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	1.0685	.0000	.0000	.0000
STDDEV =	.2112	.0000	.0000	.0000
COEVAR =	19.7610	.0000	.0000	.0000
STDERR =	.0073	.0000	.0000	.0000
N =	363	0	0	0
MEDIAN SIZE	42 G	0 G	0 G	0 G

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NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

****

SPECIES = GOLD

LOCATION= ATHAB SITE(S)= 0.4 0.5 0.6 0.8 0.9 1.0

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 13

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
200- 209	2	3.3	.95	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
210- 219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 229	2	3.3	.97	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
230- 239	1	1.7	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 249	2	3.3	.92	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
250- 259	3	5.0	.86	2	0	.0	.00	0	1	5.0	.68	1	0	.0	.00	0
260- 269	1	1.7	.00	0	1	3.7	.00	0	0	.0	.00	0	0	.0	.00	0
270- 279	2	3.3	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 289	3	5.0	.00	0	2	7.4	.00	0	0	.0	.00	0	0	.0	.00	0
290- 299	2	3.3	1.07	1	0	.0	.00	0	2	10.0	1.07	1	0	.0	.00	0
300- 309	2	3.3	1.16	1	2	7.4	1.16	1	0	.0	.00	0	0	.0	.00	0
310- 319	9	15.0	1.06	4	7	25.9	1.02	3	1	5.0	1.15	1	0	.0	.00	0
320- 329	4	6.7	1.10	3	3	11.1	1.07	2	1	5.0	1.18	1	0	.0	.00	0
330- 339	4	6.7	1.13	3	4	14.8	1.13	3	0	.0	.00	0	0	.0	.00	0
340- 349	2	3.3	1.11	2	1	3.7	1.12	1	1	5.0	1.11	1	0	.0	.00	0
350- 359	4	6.7	1.12	4	4	14.8	1.12	4	0	.0	.00	0	0	.0	.00	0
360- 369	5	8.3	1.14	3	2	7.4	1.00	1	3	15.0	1.21	2	0	.0	.00	0
370- 379	6	10.0	1.23	5	1	3.7	1.16	1	5	25.0	1.25	4	0	.0	.00	0
380- 389	1	1.7	1.17	1	0	.0	.00	0	1	5.0	1.17	1	0	.0	.00	0
390- 399	5	8.3	1.20	4	0	.0	.00	0	5	25.0	1.20	4	0	.0	.00	0
TOTALS	60	100.0	-	37	27	100.0	-	16	20	100.0	-	16	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	1.1063	1.0963	1.1619	.0000
STDDEV =	.1290	.0773	.1511	.0000
COEVAR =	11.6620	7.0482	13.0037	.0000
STDERR =	.0167	.0149	.0338	.0000
N =	37	16	16	0
MEDIAN SIZE	323 MM	326 MM	373 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
80- 99	1	2.7	.95	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 119	2	5.4	.83	2	0	.0	.00	0	1	6.3	.68	1	0	.0	.00	0
120- 139	2	5.4	.92	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 179	1	2.7	1.04	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 259	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 279	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 299	1	2.7	1.07	1	0	.0	.00	0	1	6.3	1.07	1	0	.0	.00	0
300- 319	2	5.4	1.00	2	2	12.5	1.00	2	0	.0	.00	0	0	.0	.00	0
320- 339	1	2.7	1.16	1	1	6.3	1.16	1	0	.0	.00	0	0	.0	.00	0
340- 359	2	5.4	1.08	2	2	12.5	1.08	2	0	.0	.00	0	0	.0	.00	0
360- 379	3	8.1	1.07	3	2	12.5	1.02	2	1	6.3	1.15	1	0	.0	.00	0
380- 399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 419	1	2.7	1.18	1	0	.0	.00	0	1	6.3	1.18	1	0	.0	.00	0
420- 439	1	2.7	1.12	1	1	6.3	1.12	1	0	.0	.00	0	0	.0	.00	0
440- 459	1	2.7	1.11	1	0	.0	.00	0	1	6.3	1.11	1	0	.0	.00	0
460- 479	5	13.5	1.11	5	5	31.3	1.11	5	0	.0	.00	0	0	.0	.00	0
480- 499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 519	1	2.7	1.18	1	1	6.3	1.18	1	0	.0	.00	0	0	.0	.00	0
520- 539	1	2.7	1.16	1	1	6.3	1.16	1	0	.0	.00	0	0	.0	.00	0
540- 559	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
560- 579	3	8.1	1.17	3	0	.0	.00	0	3	18.8	1.17	3	0	.0	.00	0
580- 599	1	2.7	1.16	1	1	6.3	1.16	1	0	.0	.00	0	0	.0	.00	0
600- 619	1	2.7	1.20	1	0	.0	.00	0	1	6.3	1.20	1	0	.0	.00	0
620- 639	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
640- 659	1	2.7	1.17	1	0	.0	.00	0	1	6.3	1.17	1	0	.0	.00	0
660- 679	1	2.7	1.14	1	0	.0	.00	0	1	6.3	1.14	1	0	.0	.00	C
680- 699	1	2.7	1.32	1	0	.0	.00	0	1	6.3	1.32	1	0	.0	.00	0
700- 719	1	2.7	1.38	1	0	.0	.00	0	1	6.3	1.38	1	0	.0	.00	0
720- 739	1	2.7	1.19	1	0	.0	.00	0	1	6.3	1.19	1	0	.0	.00	0
740- 759	1	2.7	1.27	1	0	.0	.00	0	1	6.3	1.27	1	0	.0	.00	0
760- 779	1	2.7	1.22	1	0	.0	.00	0	1	6.3	1.22	1	0	.0	.00	0
TOTALS	37	100.0	-	37	16	100.0	-	16	16	100.0	-	16	0	.0	-	0

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = 1.1063	MEAN = 1.0963	MEAN = 1.1619	MEAN = .0000
	STDDEV = .1290	STDDEV = .0773	STDDEV = .1511	STDDEV = .0000
	COEVAR = 11.6620	COEVAR = 7.0482	COEVAR = 13.0037	COEVAR = .0000
	STDERR = .0167	STDERR = .0149	STDERR = .0338	STDERR = .0000
	N = 37	N = 16	N = 16	N = 0
MEDIAN SIZE	463 G	461 G	601 G	0 G

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NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

****

SPECIES = LKCH

LOCATION= ATHAB SITE(S)= 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 158

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
20- 29	11	7.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
30- 39	14	8.9	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 49	28	17.7	2.22	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
50- 59	40	25.3	.93	27	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 69	32	20.3	.97	29	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 79	14	8.9	1.11	12	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 89	16	10.1	1.05	14	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
90- 99	1	.6	1.05	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 109	1	.6	1.04	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
110- 119	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 129	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
130- 139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 149	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
150- 159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 169	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	C
170- 179	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 189	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
190- 199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 209	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
210- 219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 229	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
230- 239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 249	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
250- 259	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 269	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
270- 279	1	.6	1.26	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	158	100.0	-	90	0	.0	-	0	0	.0	-	0	0	.0	-	0
COND. FACTORS SUMMARY	MEAN = 1.0620 STDDEV = .6928				MEAN = .0000 STDDEV = .0000				MEAN = .0000 STDDEV = .0000				MEAN = .0000 STDDEV = .0000			

	COEVAR = 65.2336 STDERR = .0551 N = 90	COEVAR = .0000 STDERR = .0000 N = 0	COEVAR = .0000 STDERR = .0000 N = 0	COEVAR = .0000 STDERR = .0000 N = 0
MEDIAN SIZE	57 MM	0 MM	0 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
0- 19	89	98.9	1.06	89	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
20- 39	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 59	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 79	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 99	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 119	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 179	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 259	1	1.1	1.26	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	90	100.0	-	90	0	.0	-	0	0	.0	-	0	0	.0	-	0

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = 1.0620	MEAN = .0000	MEAN = .0000	MEAN = .0000
	STDDEV = .6928	STDDEV = .0000	STDDEV = .0000	STDDEV = .0000
	COEVAR = 65.2336	COEVAR = .0000	COEVAR = .0000	COEVAR = .0000
	STDERR = .0551	STDERR = .0000	STDERR = .0000	STDERR = .0000
	N = 90	N = 0	N = 0	N = 0
MEDIAN SIZE	11 G	0 G	0 G	0 G

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = LKWH

LOCATION= ATHAB   SITE(S)= 0.4   0.9

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 2

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
350- 359	1	50.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
360- 369	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
370- 379	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
380- 389	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
390- 399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 409	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
410- 419	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
420- 429	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
430- 439	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
440- 449	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
450- 459	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
460- 469	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
470- 479	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
480- 489	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
490- 499	1	50.0	1.05	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	2	100.0	-	1	0	.0	-	0	0	.0	-	0	0	.0	-	0
COND. FACTORS SUMMARY	MEAN = 1.0476 STDDEV = .0000 COEVAR = .0000 STDERR = .0000 N = 1				MEAN = .0000 STDDEV = .0000 COEVAR = .0000 STDERR = .0000 N = 0				MEAN = .0000 STDDEV = .0000 COEVAR = .0000 STDERR = .0000 N = 0				MEAN = .0000 STDDEV = .0000 COEVAR = .0000 STDERR = .0000 N = 0			
MEDIAN SIZE	491 MM				0 MM				0 MM				0 MM			

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
1240-1259	1	100.0	1.05	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	1	100.0	-	1	0	.0	-	0	0	.0	-	0	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	1.0476	.0000	.0000	.0000
STDDEV =	.0000	.0000	.0000	.0000
COEVAR =	.0000	.0000	.0000	.0000
STDERR =	.0000	.0000	.0000	.0000
N =	1	0	0	0
MEDIAN SIZE	1251 G	0 G	0 G	0 G

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = LNSC

LOCATION= ATHAB   SITE(S)= 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 1.0

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 257

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
UNITS = MM	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
30- 39	2	.7	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 49	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
50- 59	4	1.4	.95	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 69	3	1.0	.89	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 79	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 89	4	1.4	1.04	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
90- 99	4	1.4	1.28	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 109	6	2.0	1.17	6	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
110- 119	5	1.7	1.15	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 129	1	.3	1.46	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
130- 139	3	1.0	1.29	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 149	2	.7	1.12	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
150- 159	1	.3	1.31	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 169	5	1.7	1.28	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
170- 179	2	.7	1.21	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 189	4	1.4	1.29	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
190- 199	5	1.7	1.26	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 209	8	2.7	1.27	8	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
210- 219	7	2.4	1.31	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 229	6	2.0	1.24	6	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
230- 239	5	1.7	1.13	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 249	6	2.0	1.28	6	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
250- 259	6	2.0	1.21	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 269	10	3.4	1.28	8	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
270- 279	6	2.0	1.10	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 289	8	2.7	1.27	8	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
290- 299	5	1.7	1.17	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 309	9	3.1	1.28	8	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
310- 319	10	3.4	1.25	8	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 329	8	2.7	1.30	8	1	4.5	1.17	1	0	.0	.00	0	0	.0	.00	0
330- 339	12	4.1	1.27	9	1	4.5	1.22	1	0	.0	.00	0	0	.0	.00	0
340- 349	14	4.8	1.22	13	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0

350- 359	16	5.4	1.26	12	4	18.2	1.24	3	0	.0	.00	0	0	.0	.00	0
360- 369	19	6.5	1.25	15	5	22.7	1.27	4	2	13.3	1.21	2	0	.0	.00	0
370- 379	25	8.5	1.24	18	5	22.7	1.16	4	3	20.0	1.36	2	0	.0	.00	0
380- 389	24	8.2	1.31	19	2	9.1	1.33	1	5	33.3	1.38	4	0	.0	.00	0
390- 399	10	3.4	1.30	6	1	4.5	.00	0	3	20.0	1.42	2	0	.0	.00	0
400- 409	12	4.1	1.23	10	1	4.5	1.01	1	1	6.7	.00	0	0	.0	.00	0
410- 419	8	2.7	1.27	6	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
420- 429	1	.3	1.27	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
430- 439	4	1.4	1.37	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
440- 449	3	1.0	1.37	1	1	4.5	.00	0	1	6.7	1.37	1	0	.0	.00	0
450- 459	1	.3	.00	0	1	4.5	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	294	100.0	-	239	22	100.0	-	15	15	100.0	-	11	0	.0	-	0

COND. FACTORS SUMMARY	MEAN = 1.2464	MEAN = 1.2106	MEAN = 1.3518	MEAN = .0000
	STDDEV = .1445	STDDEV = .0972	STDDEV = .1039	STDDEV = .0000
	COEVAR = 11.5957	COEVAR = 8.0332	COEVAR = 7.6871	COEVAR = .0000
	STDERR = .0084	STDERR = .0207	STDERR = .0268	STDERR = .0000
	N = 239	N = 15	N = 11	N = 0
MEDIAN SIZE	332 MM	371 MM	386 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	ALL GROUPED %	ALL GROUPED MEAN CF	ALL GROUPED N	MALES # FISH	MALES %	MALES MEAN CF	MALES N	FEMALES # FISH	FEMALES %	FEMALES MEAN CF	FEMALES N	SEX INDETERMINABLE # FISH	SEX INDETERMINABLE %	SEX INDETERMINABLE MEAN CF	SEX INDETERMINABLE N
0- 19	23	9.6	1.10	23	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
20- 39	4	1.7	1.29	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 59	3	1.3	1.25	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 79	8	3.3	1.27	8	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 99	6	2.5	1.29	6	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 119	10	4.2	1.23	10	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 139	7	2.9	1.24	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 159	10	4.2	1.23	10	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 179	1	.4	1.04	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 199	4	1.7	1.27	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 219	4	1.7	1.13	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 239	4	1.7	1.28	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 259	5	2.1	1.24	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 279	4	1.7	1.32	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 299	4	1.7	1.27	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 319	2	.8	1.27	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 339	4	1.7	1.21	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
340- 359	6	2.5	1.24	6	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
360- 379	3	1.3	1.05	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
380- 399	1	.4	1.33	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 419	8	3.3	1.29	8	1	6.7	1.17	1	0	.0	.00	0	0	.0	.00	0
420- 439	4	1.7	1.26	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
440- 459	4	1.7	1.20	4	1	6.7	1.22	1	0	.0	.00	0	0	.0	.00	0
460- 479	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
480- 499	6	2.5	1.30	6	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 519	8	3.3	1.26	8	1	6.7	1.14	1	0	.0	.00	0	0	.0	.00	0
520- 539	10	4.2	1.22	10	1	6.7	1.21	1	0	.0	.00	0	0	.0	.00	0
540- 559	5	2.1	1.24	5	0	.0	.00	0	1	9.1	1.13	1	0	.0	.00	0
560- 579	3	1.3	1.21	3	1	6.7	1.13	1	0	.0	.00	0	0	.0	.00	0
580- 599	4	1.7	1.22	4	1	6.7	1.08	1	0	.0	.00	0	0	.0	.00	0
600- 619	7	2.9	1.29	7	3	20.0	1.30	3	1	9.1	1.29	1	0	.0	.00	0
620- 639	9	3.8	1.22	9	3	20.0	1.24	3	0	.0	.00	0	0	.0	.00	0
640- 659	2	.8	1.09	2	1	6.7	1.01	1	0	.0	.00	0	0	.0	.00	0
660- 679	9	3.8	1.29	9	1	6.7	1.26	1	0	.0	.00	0	0	.0	.00	0
680- 699	2	.8	1.29	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
700- 719	3	1.3	1.36	3	0	.0	.00	0	1	9.1	1.38	1	0	.0	.00	0
720- 739	4	1.7	1.30	4	0	.0	.00	0	1	9.1	1.35	1	0	.0	.00	0
740- 759	8	3.3	1.29	8	1	6.7	1.33	1	1	9.1	1.35	1	0	.0	.00	0
760- 779	7	2.9	1.33	7	0	.0	.00	0	3	27.3	1.33	3	0	.0	.00	0
780- 799	2	.8	1.31	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
800- 819	3	1.3	1.40	3	0	.0	.00	0	1	9.1	1.46	1	0	.0	.00	0
820- 839	2	.8	1.25	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
840- 859	5	2.1	1.24	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
860- 879	1	.4	1.27	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
880- 899	1	.4	1.26	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
900- 919	1	.4	1.38	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
920- 939	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0

940- 959	1	.4	1.34	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
960- 979	3	1.3	1.34	3	0	.0	.00	0	1	9.1	1.55	1	0	.0	.00	0
980- 999	1	.4	1.43	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1000-1019	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1020-1039	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1040-1059	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1060-1079	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1080-1099	1	.4	1.35	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1100-1119	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1120-1139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1140-1159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1160-1179	1	.4	1.37	1	0	.0	.00	0	1	9.1	1.37	1	0	.0	.00	0
1180-1199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1200-1219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1220-1239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1240-1259	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1260-1279	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1280-1299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1300-1319	1	.4	1.55	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	239	100.0	-	239	15	100.0	-	15	11	100.0	-	11	0	.0	-	0

COND. FACTORS SUMMARY	MEAN = 1.2464 STDDEV = .1445 COEVAR = 11.5957 STDERR = .0084 N = 239	MEAN = 1.2106 STDDEV = .0972 COEVAR = 8.0332 STDERR = .0207 N = 15	MEAN = 1.3518 STDDEV = .1039 COEVAR = 7.6871 STDERR = .0268 N = 11	MEAN = .0000 STDDEV = .0000 COEVAR = .0000 STDERR = .0000 N = 0
MEDIAN SIZE	417 G	611 G	764 G	0 G

****
NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***
****

SPECIES = MNWH

LOCATION= ATHAB   SITE(S)=   0.1   0.2   0.3   0.4   0.5   0.6   0.7

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 415

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
50- 59	1	.2	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 69	1	.2	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 79	4	.9	.84	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 89	9	2.1	.83	9	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
90- 99	2	.5	.95	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 109	9	2.1	1.06	9	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
110- 119	19	4.4	1.07	18	0	.0	.00	0	0	.0	.00	0	2	25.0	1.18	2
120- 129	21	4.9	1.09	18	0	.0	.00	0	0	.0	.00	0	1	12.5	1.04	1
130- 139	12	2.8	1.01	12	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 149	5	1.2	1.01	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
150- 159	14	3.2	1.14	13	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 169	17	3.9	1.09	17	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
170- 179	23	5.3	1.10	23	0	.0	.00	0	2	22.2	1.27	2	0	.0	.00	0
180- 189	39	9.0	1.14	39	0	.0	.00	0	0	.0	.00	0	2	25.0	1.19	2
190- 199	26	6.0	1.14	26	0	.0	.00	0	1	11.1	1.14	1	0	.0	.00	0
200- 209	24	5.6	1.13	24	0	.0	.00	0	1	11.1	1.07	1	1	12.5	1.28	1
210- 219	11	2.5	1.17	11	0	.0	.00	0	0	.0	.00	0	1	12.5	1.28	1
220- 229	27	6.3	1.15	27	0	.0	.00	0	1	11.1	1.15	1	1	12.5	1.31	1
230- 239	15	3.5	1.14	14	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 249	16	3.7	1.20	16	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
250- 259	14	3.2	1.20	14	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 269	13	3.0	1.23	12	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
270- 279	3	.7	1.20	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 289	9	2.1	1.24	9	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
290- 299	7	1.6	1.28	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 309	10	2.3	1.21	9	0	.0	.00	0	1	11.1	1.36	1	0	.0	.00	0
310- 319	2	.5	1.20	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 329	4	.9	1.27	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
330- 339	7	1.6	1.23	7	0	.0	.00	0	1	11.1	.97	1	0	.0	.00	0
340- 349	3	.7	1.10	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
350- 359	7	1.6	1.25	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
360- 369	7	1.6	1.33	6	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0

370- 379	11	2.5	1.34	11	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
380- 389	7	1.6	1.30	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
390- 399	7	1.6	1.28	6	0	.0	.00	0	1	11.1	1.37	1	0	.0	.00	0
400- 409	4	.9	1.25	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
410- 419	9	2.1	1.32	8	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
420- 429	2	.5	1.12	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
430- 439	4	.9	1.23	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
440- 449	3	.7	1.29	3	0	.0	.00	0	1	11.1	1.11	1	0	.0	.00	0
450- 459	3	.7	1.46	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
460- 469	1	.2	1.46	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	432	100.0	-	417	0	.0	-	0	9	100.0	-	9	8	100.0	-	8
COND. FACTORS SUMMARY		MEAN =	1.1527			MEAN =	.0000			MEAN =	1.1903			MEAN =	1.2075	
		STDDEV =	.1589			STDDEV =	.0000			STDDEV =	.1430			STDDEV =	.1083	
		COEVAR =	13.7830			COEVAR =	.0000			COEVAR =	12.0096			COEVAR =	8.9692	
		STDERR =	.0076			STDERR =	.0000			STDERR =	.0477			STDERR =	.0383	
		N =	417			N =	0			N =	9			N =	8	
MEDIAN SIZE		206 MM				0 MM				226 MM				186 MM		

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
0- 19	50	11.9	.96	50	0	.0	.00	0	0	.0	.00	0	3	37.5	1.13	3
20- 39	32	7.6	1.09	32	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 59	41	9.8	1.07	41	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 79	48	11.5	1.14	48	0	.0	.00	0	2	18.2	1.27	2	1	12.5	1.07	1
80- 99	37	8.8	1.15	37	0	.0	.00	0	2	18.2	1.11	2	1	12.5	1.32	1
100- 119	26	6.2	1.13	26	0	.0	.00	0	0	.0	.00	0	2	25.0	1.28	2
120- 139	20	4.8	1.17	20	0	.0	.00	0	1	9.1	1.15	1	0	.0	.00	0
140- 159	22	5.3	1.17	21	0	.0	.00	0	1	9.1	.00	0	1	12.5	1.31	1
160- 179	8	1.9	1.16	7	0	.0	.00	0	1	9.1	.00	0	0	.0	.00	0
180- 199	10	2.4	1.17	10	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 219	13	3.1	1.27	13	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 239	6	1.4	1.24	6	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 259	4	1.0	1.15	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 279	7	1.7	1.25	7	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 299	5	1.2	1.28	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 319	4	1.0	1.18	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 339	2	.5	1.26	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
340- 359	6	1.4	1.27	6	0	.0	.00	0	1	9.1	.97	1	0	.0	.00	0
360- 379	3	.7	1.17	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
380- 399	4	1.0	1.29	4	0	.0	.00	0	1	9.1	1.36	1	0	.0	.00	0
400- 419	2	.5	1.07	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
420- 439	1	.2	1.06	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
440- 459	4	1.0	1.20	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
460- 479	1	.2	1.23	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
480- 499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 519	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
520- 539	4	1.0	1.37	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
540- 559	2	.5	1.25	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
560- 579	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
580- 599	3	.7	1.23	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
600- 619	4	1.0	1.27	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
620- 639	3	.7	1.26	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
640- 659	1	.2	1.30	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
660- 679	2	.5	1.26	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
680- 699	3	.7	1.30	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
700- 719	4	1.0	1.23	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
720- 739	3	.7	1.39	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
740- 759	4	1.0	1.32	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
760- 779	3	.7	1.30	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
780- 799	3	.7	1.34	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
800- 819	3	.7	1.24	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
820- 839	2	.5	1.36	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
840- 859	1	.2	1.37	1	0	.0	.00	0	1	9.1	1.37	1	0	.0	.00	0
860- 879	1	.2	1.05	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
880- 899	1	.2	1.39	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
900- 919	1	.2	1.14	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
920- 939	1	.2	1.25	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0

940- 959	1	.2	1.33	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
960- 979	3	.7	1.26	3	0	.0	.00	0	1	9.1	1.11	1	0	.0	.00	0
980- 999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1000-1019	1	.2	1.32	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1020-1039	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1040-1059	2	.5	1.38	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1060-1079	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1080-1099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1100-1119	2	.5	1.30	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1120-1139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1140-1159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1160-1179	1	.2	1.38	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1180-1199	1	.2	1.62	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1200-1219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1220-1239	1	.2	1.39	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1240-1259	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1260-1279	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1280-1299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1300-1319	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1320-1339	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1340-1359	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1360-1379	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1380-1399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1400-1419	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1420-1439	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1440-1459	1	.2	1.46	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1460-1479	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1480-1499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1500-1519	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1520-1539	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1540-1559	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1560-1579	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1580-1599	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1600-1619	1	.2	1.72	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	419	100.0	-	417	0	.0	-	0	11	100.0	-	9	8	100.0	-	8

COND. FACTORS SUMMARY	MEAN = 1.1527	MEAN = .0000	MEAN = 1.1903	MEAN = 1.2075
	STDDEV = .1589	STDDEV = .0000	STDDEV = .1430	STDDEV = .1083
	COEVAR = 13.7830	COEVAR = .0000	COEVAR = 12.0096	COEVAR = 8.9692
	STDERR = .0076	STDERR = .0000	STDERR = .0477	STDERR = .0383
	N = 417	N = 0	N = 9	N = 8
MEDIAN SIZE	102 G	0 G	151 G	81 G

****

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

****

SPECIES = RNTR

LOCATION= ATHAB SITE(S)= 0.1 0.2

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 4

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
180- 189	1	25.0	1.06	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
190- 199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 209	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
210- 219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 229	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
230- 239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 249	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
250- 259	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 269	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
270- 279	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 289	2	50.0	1.23	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
290- 299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 309	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
310- 319	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 329	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	C
330- 339	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
340- 349	1	25.0	1.23	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	4	100.0	-	4	0	.0	-	0	0	.0	-	0	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN	1.1863	.0000	.0000	.0000
STDDEV	.0840	.0000	.0000	.0000
COEVAR	7.0803	.0000	.0000	.0000
STDERR	.0420	.0000	.0000	.0000
N	4	0	0	0
MEDIAN SIZE	286 MM	0 MM	0 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	ALL GROUPED %	ALL GROUPED MEAN CF	ALL GROUPED N	MALES # FISH	MALES %	MALES MEAN CF	MALES N	FEMALES # FISH	FEMALES %	FEMALES MEAN CF	FEMALES N	SEX INDETERMINABLE # FISH	SEX INDETERMINABLE %	SEX INDETERMINABLE MEAN CF	SEX INDETERMINABLE N
60- 79	1	25.0	1.06	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 99	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 119	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 179	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 259	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 279	1	25.0	1.22	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 299	1	25.0	1.24	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 319	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 339	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
340- 359	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
360- 379	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
380- 399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 419	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
420- 439	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
440- 459	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
460- 479	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
480- 499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 519	1	25.0	1.23	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	4	100.0	-	4	0	.0	-	0	0	.0	-	0	0	.0	-	0

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = 1.1863	MEAN = .0000	MEAN = .0000	MEAN = .0000
	STDDEV = .0840	STDDEV = .0000	STDDEV = .0000	STDDEV = .0000
	COEVAR = 7.0803	COEVAR = .0000	COEVAR = .0000	COEVAR = .0000
	STDERR = .0420	STDERR = .0000	STDERR = .0000	STDERR = .0000
	N = 4	N = 0	N = 0	N = 0
MEDIAN SIZE	281 G	0 G	0 G	0 G

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = WALL

LOCATION= ATHAB SITE(S)= 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 74

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
20- 29	1	.8	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
30- 39	2	1.7	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 49	1	.8	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
50- 59	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 69	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 79	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 89	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
90- 99	1	.8	.88	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 109	1	.8	1.41	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
110- 119	1	.8	.75	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 129	3	2.5	.79	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
130- 139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 149	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
150- 159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 169	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	C
170- 179	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 189	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
190- 199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 209	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
210- 219	1	.8	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 229	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
230- 239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 249	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
250- 259	2	1.7	1.30	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 269	4	3.3	.97	4	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
270- 279	3	2.5	.87	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 289	1	.8	.97	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
290- 299	6	5.0	.93	5	0	.0	.00	0	0	.0	.00	0	1	33.3	.95	1
300- 309	3	2.5	.94	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
310- 319	7	5.8	.96	6	1	2.6	.92	1	0	.0	.00	0	0	.0	.00	0
320- 329	11	9.2	.98	8	2	5.3	.93	2	1	20.0	.93	1	1	33.3	.93	1
330- 339	9	7.5	.95	7	2	5.3	.99	2	0	.0	.00	0	1	33.3	.95	1

340- 349	8	6.7	.95	7	1	2.6	.91	1	0	.0	.00	0	0	.0	.00	0
350- 359	3	2.5	.86	2	1	2.6	.85	1	1	20.0	.00	0	0	.0	.00	0
360- 369	3	2.5	.99	3	1	2.6	1.04	1	0	.0	.00	0	0	.0	.00	0
370- 379	5	4.2	.96	3	2	5.3	.90	1	0	.0	.00	0	0	.0	.00	0
380- 389	7	5.8	.98	3	2	5.3	.99	1	0	.0	.00	0	0	.0	.00	0
390- 399	3	2.5	1.01	1	3	7.9	1.01	1	0	.0	.00	0	0	.0	.00	0
400- 409	7	5.8	1.00	5	3	7.9	.98	2	1	20.0	.00	0	0	.0	.00	0
410- 419	5	4.2	.96	4	5	13.2	.96	4	0	.0	.00	0	0	.0	.00	0
420- 429	4	3.3	.95	4	4	10.5	.95	4	0	.0	.00	0	0	.0	.00	0
430- 439	4	3.3	1.02	3	3	7.9	1.02	3	0	.0	.00	0	0	.0	.00	0
440- 449	2	1.7	1.05	2	2	5.3	1.05	2	0	.0	.00	0	0	.0	.00	0
450- 459	3	2.5	.99	2	2	5.3	.99	2	0	.0	.00	0	0	.0	.00	0
460- 469	1	.8	.94	1	1	2.6	.94	1	0	.0	.00	0	0	.0	.00	0
470- 479	3	2.5	.99	3	1	2.6	1.09	1	0	.0	.00	0	0	.0	.00	0
480- 489	1	.8	1.09	1	1	2.6	1.09	1	0	.0	.00	0	0	.0	.00	0
490- 499	1	.8	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 509	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
510- 519	2	1.7	1.00	2	0	.0	.00	0	2	40.0	1.00	2	0	.0	.00	0
520- 529	1	.8	.93	1	1	2.6	.93	1	0	.0	.00	0	0	.0	.00	0
TOTALS	120	100.0	-	88	38	100.0	-	32	5	100.0	-	3	3	100.0	-	3
COND. FACTORS SUMMARY	MEAN = .9728 STDDEV = .1286 COEVAR = 13.2199 STDERR = .0117 N = 88				MEAN = .9772 STDDEV = .0757 COEVAR = 7.7469 STDERR = .0123 N = 32				MEAN = .9767 STDDEV = .0391 COEVAR = 4.0019 STDERR = .0175 N = 3				MEAN = .9440 STDDEV = .0086 COEVAR = .9068 STDERR = .0049 N = 3			
MEDIAN SIZE	344 MM				413 MM				406 MM				326 MM			

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	ALL GROUPED %	ALL GROUPED MEAN CF	ALL GROUPED N	MALES # FISH	MALES %	MALES MEAN CF	MALES N	FEMALES # FISH	FEMALES %	FEMALES MEAN CF	FEMALES N	SEX INDETERMINABLE # FISH	SEX INDETERMINABLE %	SEX INDETERMINABLE MEAN CF	SEX INDETERMINABLE N
0- 19	5	5.7	.92	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
20- 39	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 59	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 79	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 99	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 119	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 139	1	1.1	.83	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 179	2	2.3	.91	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 199	3	3.4	.97	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 239	5	5.7	.93	5	0	.0	.00	0	0	.0	.00	0	1	33.3	.95	1
240- 259	1	1.1	.97	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 279	4	4.5	.92	4	1	3.1	.92	1	0	.0	.00	0	0	.0	.00	0
280- 299	3	3.4	1.22	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 319	7	8.0	.94	7	1	3.1	.93	1	1	33.3	.93	1	1	33.3	.93	1
320- 339	5	5.7	.87	5	2	6.3	.90	2	0	.0	.00	0	0	.0	.00	0
340- 359	4	4.5	1.00	4	0	.0	.00	0	0	.0	.00	0	1	33.3	.95	1
360- 379	1	1.1	.91	1	1	3.1	.91	1	0	.0	.00	0	0	.0	.00	0
380- 399	4	4.5	.92	4	1	3.1	.85	1	0	.0	.00	0	0	.0	.00	0
400- 419	3	3.4	1.00	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
420- 439	2	2.3	1.21	2	1	3.1	1.11	1	0	.0	.00	0	0	.0	.00	0
440- 459	1	1.1	.95	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
460- 479	2	2.3	.93	2	1	3.1	.90	1	0	.0	.00	0	0	.0	.00	0
480- 499	1	1.1	.91	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 519	1	1.1	1.04	1	1	3.1	1.04	1	0	.0	.00	0	0	.0	.00	0
520- 539	1	1.1	.93	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
540- 559	1	1.1	1.08	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
560- 579	1	1.1	.99	1	1	3.1	.99	1	0	.0	.00	0	0	.0	.00	0
580- 599	1	1.1	1.02	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
600- 619	2	2.3	.90	2	2	6.3	.90	2	0	.0	.00	0	0	.0	.00	0
620- 639	2	2.3	.99	2	1	3.1	1.01	1	0	.0	.00	0	0	.0	.00	0
640- 659	1	1.1	.93	1	1	3.1	.93	1	0	.0	.00	0	0	.0	.00	0
660- 679	2	2.3	.93	2	1	3.1	.86	1	0	.0	.00	0	0	.0	.00	0
680- 699	2	2.3	1.05	2	1	3.1	1.04	1	0	.0	.00	0	0	.0	.00	0
700- 719	1	1.1	.97	1	1	3.1	.97	1	0	.0	.00	0	0	.0	.00	0
720- 739	1	1.1	.96	1	1	3.1	.96	1	0	.0	.00	0	0	.0	.00	0
740- 759	1	1.1	.99	1	1	3.1	.99	1	0	.0	.00	0	0	.0	.00	0
760- 779	1	1.1	1.00	1	1	3.1	1.00	1	0	.0	.00	0	0	.0	.00	0
780- 799	1	1.1	1.07	1	1	3.1	1.07	1	0	.0	.00	0	0	.0	.00	0
800- 819	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
820- 839	2	2.3	.95	2	2	6.3	.95	2	0	.0	.00	0	0	.0	.00	0
840- 859	2	2.3	1.04	2	2	6.3	1.04	2	0	.0	.00	0	0	.0	.00	0
860- 879	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
880- 899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
900- 919	1	1.1	1.02	1	1	3.1	1.02	1	0	.0	.00	0	0	.0	.00	0
920- 939	1	1.1	.94	1	1	3.1	.94	1	0	.0	.00	0	0	.0	.00	0

940- 959	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
960- 979	1	1.1	1.08	1	1	3.1	1.08	1	0	.0	.00	0	0	.0	.00	0
980- 999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1000-1019	2	2.3	.99	2	1	3.1	1.07	1	0	.0	.00	0	0	.0	.00	0
1020-1039	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1040-1059	1	1.1	.96	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1060-1079	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1080-1099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1100-1119	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1120-1139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1140-1159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1160-1179	1	1.1	1.09	1	1	3.1	1.09	1	0	.0	.00	0	0	.0	.00	0
1180-1199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1200-1219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1220-1239	1	1.1	1.09	1	1	3.1	1.09	1	0	.0	.00	0	0	.0	.00	0
1240-1259	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1260-1279	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1280-1299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1300-1319	1	1.1	.98	1	0	.0	.00	0	1	33.3	.98	1	0	.0	.00	0
1320-1339	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1340-1359	1	1.1	1.01	1	0	.0	.00	0	1	33.3	1.01	1	0	.0	.00	0
1360-1379	1	1.1	.93	1	1	3.1	.93	1	0	.0	.00	0	0	.0	.00	0
TOTALS	88	100.0	-	88	32	100.0	-	32	3	100.0	-	3	3	100.0	-	3
COND. FACTORS SUMMARY		MEAN =	.9728			MEAN =	.9772			MEAN =	.9767			MEAN =	.9440	
		STDDEV =	.1286			STDDEV =	.0757			STDDEV =	.0391			STDDEV =	.0086	
		COEVAR =	13.2199			COEVAR =	7.7469			COEVAR =	4.0019			COEVAR =	.9068	
		STDERR =	.0117			STDERR =	.0123			STDERR =	.0175			STDERR =	.0049	
		N =	88			N =	32			N =	3			N =	3	
MEDIAN SIZE	396 G				701 G				1311 G				311 G			

****

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

****

SPECIES = WHSC

LOCATION= ATHAB SITE(S)= 0.2 0.3 0.4 0.5 0.6 0.8 0.9 1.0

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 83

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
UNITS = MM	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
50- 59	1	.9	.97	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 69	1	.9	1.26	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
70- 79	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 89	2	1.9	1.28	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
90- 99	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 109	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
110- 119	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 129	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
130- 139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 149	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
150- 159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 169	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
170- 179	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 189	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
190- 199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	C
200- 209	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
210- 219	1	.9	1.16	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 229	1	.9	1.12	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
230- 239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 249	1	.9	1.23	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
250- 259	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 269	1	.9	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
270- 279	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 289	3	2.8	1.38	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
290- 299	10	9.3	1.32	9	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 309	7	6.5	1.32	6	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
310- 319	3	2.8	1.37	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 329	3	2.8	1.31	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
330- 339	3	2.8	1.29	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
340- 349	3	2.8	1.32	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
350- 359	5	4.6	1.20	5	1	5.3	1.23	1	1	16.7	1.22	1	0	.0	.00	0
360- 369	1	.9	1.21	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0

370- 379	2	1.9	1.51	2	1	5.3	1.64	1	0	.0	.00	0	0	.0	.00	0
380- 389	2	1.9	1.61	1	0	.0	.00	0	1	16.7	1.61	1	0	.0	.00	0
390- 399	3	2.8	1.33	3	1	5.3	1.33	1	0	.0	.00	0	0	.0	.00	0
400- 409	4	3.7	1.41	3	3	15.8	1.39	2	0	.0	.00	0	0	.0	.00	0
410- 419	2	1.9	1.50	2	1	5.3	1.49	1	0	.0	.00	0	0	.0	.00	0
420- 429	8	7.4	1.51	8	2	10.5	1.47	2	1	16.7	1.58	1	0	.0	.00	0
430- 439	3	2.8	1.53	3	3	15.8	1.53	3	0	.0	.00	0	0	.0	.00	0
440- 449	6	5.6	1.51	6	2	10.5	1.44	2	1	16.7	1.37	1	0	.0	.00	0
450- 459	11	10.2	1.52	11	5	26.3	1.47	5	0	.0	.00	0	0	.0	.00	0
460- 469	2	1.9	1.46	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
470- 479	6	5.6	1.60	5	0	.0	.00	0	1	16.7	1.46	1	0	.0	.00	0
480- 489	4	3.7	1.50	4	0	.0	.00	0	1	16.7	1.48	1	0	.0	.00	0
490- 499	3	2.8	1.69	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 509	1	.9	1.89	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
510- 519	3	2.8	1.61	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
520- 529	1	.9	1.39	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
530- 539	1	.9	2.09	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	108	100.0	-	95	19	100.0	-	18	6	100.0	-	6	0	.0	-	0
COND. FACTORS SUMMARY	MEAN =	1.4327			MEAN =	1.4585			MEAN =	1.4541			MEAN =	.0000		
	STDDEV =	.1846			STDDEV =	.1135			STDDEV =	.1448			STDDEV =	.0000		
	COEVAR =	12.8880			COEVAR =	7.7851			COEVAR =	9.9571			COEVAR =	.0000		
	STDERR =	.0178			STDERR =	.0260			STDERR =	.0591			STDERR =	.0000		
	N =	95			N =	18			N =	6			N =	0		
MEDIAN SIZE	403 MM				432 MM				441 MM				0 MM			

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
UNITS = G	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N	# FISH	%	MEAN CF	N
0- 19	3	3.2	1.17	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
20- 39	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
40- 59	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
60- 79	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
80- 99	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 119	1	1.1	1.16	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
120- 139	1	1.1	1.12	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
140- 159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
160- 179	1	1.1	1.23	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
180- 199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
220- 239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
240- 259	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
260- 279	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
280- 299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 319	2	2.1	1.28	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
320- 339	5	5.3	1.26	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
340- 359	2	2.1	1.24	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
360- 379	5	5.3	1.38	5	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
380- 399	2	2.1	1.45	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 419	2	2.1	1.15	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
420- 439	1	1.1	1.27	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
440- 459	3	3.2	1.30	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
460- 479	1	1.1	1.22	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
480- 499	1	1.1	1.36	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 519	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
520- 539	2	2.1	1.37	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
540- 559	2	2.1	1.22	2	1	5.6	1.23	1	1	16.7	1.22	1	0	.0	.00	0
560- 579	1	1.1	1.32	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
580- 599	2	2.1	1.26	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	C
600- 619	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
620- 639	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
640- 659	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
660- 679	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
680- 699	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
700- 719	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
720- 739	1	1.1	1.39	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
740- 759	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
760- 779	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
780- 799	2	2.1	1.32	2	1	5.6	1.33	1	0	.0	.00	0	0	.0	.00	0
800- 819	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
820- 839	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
840- 859	1	1.1	1.35	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
860- 879	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
880- 899	2	2.1	1.62	2	1	5.6	1.64	1	1	16.7	1.61	1	0	.0	.00	0
900- 919	1	1.1	1.40	1	1	5.6	1.40	1	0	.0	.00	0	0	.0	.00	0
920- 939	1	1.1	1.39	1	1	5.6	1.39	1	0	.0	.00	0	0	.0	.00	0

*	940- 959	1	1.1	1.45	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	960- 979	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	980- 999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1000-1019	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1020-1039	1	1.1	1.39	1	1	5.6	1.39	1	0	.0	.00	0	0	.0	.00	0	*
*	1040-1059	2	2.1	1.43	2	1	5.6	1.49	1	0	.0	.00	0	0	.0	.00	0	*
*	1060-1079	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1080-1099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1100-1119	3	3.2	1.44	3	1	5.6	1.37	1	0	.0	.00	0	0	.0	.00	0	*
*	1120-1139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1140-1159	1	1.1	1.55	1	1	5.6	1.55	1	0	.0	.00	0	0	.0	.00	0	*
*	1160-1179	1	1.1	1.37	1	0	.0	.00	0	1	16.7	1.37	1	0	.0	.00	0	*
*	1180-1199	1	1.1	1.54	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1200-1219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1220-1239	2	2.1	1.61	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1240-1259	2	2.1	1.46	2	0	.0	.00	0	1	16.7	1.58	1	0	.0	.00	0	*
*	1260-1279	1	1.1	1.40	1	1	5.6	1.40	1	0	.0	.00	0	0	.0	.00	0	*
*	1280-1299	1	1.1	1.63	1	1	5.6	1.63	1	0	.0	.00	0	0	.0	.00	0	*
*	1300-1319	3	3.2	1.45	3	2	11.1	1.46	2	0	.0	.00	0	0	.0	.00	0	*
*	1320-1339	2	2.1	1.56	2	1	5.6	1.58	1	0	.0	.00	0	0	.0	.00	0	*
*	1340-1359	4	4.2	1.44	4	3	16.7	1.43	3	0	.0	.00	0	0	.0	.00	0	*
*	1360-1379	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1380-1399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1400-1419	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1420-1439	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1440-1459	3	3.2	1.56	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1460-1479	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1480-1499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1500-1519	1	1.1	1.49	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1520-1539	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1540-1559	1	1.1	1.65	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1560-1579	1	1.1	1.64	1	1	5.6	1.64	1	0	.0	.00	0	0	.0	.00	0	*
*	1580-1599	2	2.1	1.58	2	0	.0	.00	0	1	16.7	1.46	1	0	.0	.00	0	*
*	1600-1619	1	1.1	1.54	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1620-1639	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1640-1659	1	1.1	1.57	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1660-1679	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1680-1699	1	1.1	1.47	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1700-1719	1	1.1	1.76	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1720-1739	1	1.1	1.48	1	0	.0	.00	0	1	16.7	1.48	1	0	.0	.00	0	*
*	1740-1759	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1760-1779	1	1.1	1.53	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1780-1799	1	1.1	1.53	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	C	*
*	1800-1819	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1820-1839	1	1.1	1.71	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1840-1859	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1860-1879	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1880-1899	1	1.1	1.75	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1900-1919	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1920-1939	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1940-1959	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1960-1979	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	1980-1999	2	2.1	1.52	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	2000-2019	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	2020-2039	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	2040-2059	2	2.1	1.60	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	2060-2079	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	2080-2099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	2100-2119	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*
*	2120-2139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	*

2140-2159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2160-2179	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2180-2199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2200-2219	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2220-2239	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2240-2259	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2260-2279	1	1.1	1.63	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2280-2299	1	1.1	1.73	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2300-2319	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2320-2339	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2340-2359	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2360-2379	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2380-2399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2400-2419	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2420-2439	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2440-2459	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2460-2479	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2480-2499	1	1.1	1.89	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2500-2519	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2520-2539	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2540-2559	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2560-2579	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2580-2599	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2600-2619	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2620-2639	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2640-2659	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2660-2679	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2680-2699	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2700-2719	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2720-2739	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2740-2759	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2760-2779	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2780-2799	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2800-2819	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2820-2839	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2840-2859	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2860-2879	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2880-2899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2900-2919	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2920-2939	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2940-2959	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2960-2979	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2980-2999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3000-3019	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3020-3039	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3040-3059	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3060-3079	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3080-3099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3100-3119	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3120-3139	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3140-3159	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3160-3179	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3180-3199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3200-3219	1	1.1	2.09	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	95	100.0	-	95	18	100.0	-	18	6	100.0	-	6	0	.0	-	0
COND. FACTORS		MEAN =	1.4327			MEAN =	1.4585			MEAN =	1.4541			MEAN =	.0000	
SUMMARY		STDDEV =	.1846			STDDEV =	.1135			STDDEV =	.1448			STDDEV =	.0000	

	COEVAR = 12.8880 STDERR = .0178 N = 95	COEVAR = 7.7851 STDERR = .0260 N = 18	COEVAR = 9.9571 STDERR = .0591 N = 6	COEVAR = .0000 STDERR = .0000 N = 0
MEDIAN SIZE	1046 G	1261 G	1241 G	0 G

LENGTH FREQUENCY SUMMARY FOR LARGE-SIZED FISH SITES AND ALL SAMPLING METHODS COMBINED

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = BURB

LOCATION= ATHAB SITE(S)= 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 18

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
100- 149	1	3.6	.60	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
150- 199	1	3.6	.58	1	0	.0	.00	0	0	.0	.00	0	1	100.0	.58	1
200- 249	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
250- 299	1	3.6	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 349	2	7.1	.61	2	1	16.7	.65	1	1	33.3	.56	1	0	.0	.00	0
350- 399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 449	6	21.4	.51	6	1	16.7	.52	1	0	.0	.00	0	0	.0	.00	0
450- 499	4	14.3	.56	4	3	50.0	.55	3	0	.0	.00	0	0	.0	.00	0
500- 549	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
550- 599	7	25.0	.51	6	0	.0	.00	0	2	66.7	.44	2	0	.0	.00	0
600- 649	1	3.6	.56	1	1	16.7	.56	1	0	.0	.00	0	0	.0	.00	0
650- 699	3	10.7	.55	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
700- 749	1	3.6	.59	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
750- 799	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
800- 849	1	3.6	.54	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	C
TOTALS	28	100.0	-	26	6	100.0	-	6	3	100.0	-	3	1	100.0	-	1

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = .5405	MEAN = .5616	MEAN = .4782	MEAN = .5800
	STDDEV = .0681	STDDEV = .0542	STDDEV = .0736	STDDEV = .0000
	COEVAR = 12.5900	COEVAR = 9.6460	COEVAR = 15.3898	COEVAR = .0000
	STDERR = .0129	STDERR = .0221	STDERR = .0425	STDERR = .0000
	N = 26	N = 6	N = 3	N = 1
MEDIAN SIZE	488 MM	467 MM	563 MM	176 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = G	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
0- 99	2	7.7	.59	2	0	.0	.00	0	0	.0	.00	0	1	100.0	.58	1
100- 199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 299	2	7.7	.61	2	1	16.7	.65	1	1	33.3	.56	1	0	.0	.00	0
300- 399	3	11.5	.46	3	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 499	3	11.5	.55	3	1	16.7	.52	1	0	.0	.00	0	0	.0	.00	0
500- 599	2	7.7	.55	2	2	33.3	.55	2	0	.0	.00	0	0	.0	.00	0
600- 699	1	3.8	.55	1	1	16.7	.55	1	0	.0	.00	0	0	.0	.00	0
700- 799	3	11.5	.49	3	0	.0	.00	0	2	66.7	.44	2	0	.0	.00	0
800- 899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
900- 999	1	3.8	.51	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1000-1099	2	7.7	.51	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1100-1199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1200-1299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1300-1399	1	3.8	.63	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1400-1499	1	3.8	.56	1	1	16.7	.56	1	0	.0	.00	0	0	.0	.00	0
1500-1599	1	3.8	.49	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1600-1699	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1700-1799	1	3.8	.52	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1800-1899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1900-1999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2000-2099	1	3.8	.63	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2100-2199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2200-2299	1	3.8	.59	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2300-2399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2400-2499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2500-2599	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2600-2699	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2700-2799	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2800-2899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2900-2999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	C
3000-3099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3100-3199	1	3.8	.54	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	26	100.0	-	26	6	100.0	-	6	3	100.0	-	3	1	100.0	-	1

	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
COND. FACTORS SUMMARY	MEAN = .5405	MEAN = .5616	MEAN = .4782	MEAN = .5800
	STDDEV = .0681	STDDEV = .0542	STDDEV = .0736	STDDEV = .0000
	COEVAR = 12.5900	COEVAR = 9.6460	COEVAR = 15.3898	COEVAR = .0000
	STDERR = .0129	STDERR = .0221	STDERR = .0425	STDERR = .0000
	N = 26	N = 6	N = 3	N = 1
MEDIAN SIZE	701 G	551 G	726 G	51 G

NOTE SEPARATE ANALYSIS FOR EACH SPECIES ONLY (ALL LOCATIONS AND SITES GROUPED)***NOTE***

SPECIES = NRPK

LOCATION= ATHAB SITE(S)= 0.2 0.3 0.4 0.5 0.6 0.8 0.9 1.0

LENGTH - WEIGHT ANALYSIS

NO. FISH NOT SEXED = 15

LENGTH FREQUENCY DISTRIBUTION

CLASS INTERVAL UNITS = MM	ALL GROUPED # FISH	%	MEAN CF	N	MALES # FISH	%	MEAN CF	N	FEMALES # FISH	%	MEAN CF	N	SEX INDETERMINABLE # FISH	%	MEAN CF	N
150- 199	1	4.2	.59	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 249	1	4.2	.63	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
250- 299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 349	1	4.2	.60	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
350- 399	2	8.3	.67	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 449	2	8.3	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
450- 499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 549	3	12.5	.70	2	0	.0	.00	0	2	28.6	.80	1	0	.0	.00	0
550- 599	4	16.7	.68	3	2	100.0	.71	2	1	14.3	.00	0	0	.0	.00	0
600- 649	1	4.2	.62	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
650- 699	1	4.2	.84	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
700- 749	3	12.5	.71	3	0	.0	.00	0	1	14.3	.57	1	0	.0	.00	0
750- 799	2	8.3	.83	2	0	.0	.00	0	1	14.3	.77	1	0	.0	.00	0
800- 849	1	4.2	.64	1	0	.0	.00	0	1	14.3	.64	1	0	.0	.00	0
850- 899	1	4.2	.75	1	0	.0	.00	0	1	14.3	.75	1	0	.0	.00	0
900- 949	1	4.2	.88	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	24	100.0	-	19	2	100.0	-	2	7	100.0	-	5	0	.0	-	0

COND. FACTORS SUMMARY	ALL GROUPED	MALES	FEMALES	SEX INDETERMINABLE
MEAN =	.7093	.7138	.7034	.0000
STDDEV =	.1099	.0694	.0967	.0000
COEVAR =	15.4896	9.7171	13.7447	.0000
STDERR =	.0224	.0490	.0365	.0000
N =	19	2	5	0
MEDIAN SIZE	576 MM	576 MM	726 MM	0 MM

WEIGHT FREQUENCY DISTRIBUTION

CLASS INTERVAL	ALL GROUPED				MALES				FEMALES				SEX INDETERMINABLE			
	#		MEAN		#		MEAN		#		MEAN		#		MEAN	
UNITS = G	FISH	%	CF	N	FISH	%	CF	N	FISH	%	CF	N	FISH	%	CF	N
0- 99	2	10.5	.61	2	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
100- 199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
200- 299	1	5.3	.60	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
300- 399	1	5.3	.67	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
400- 499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
500- 599	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
600- 699	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
700- 799	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
800- 899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
900- 999	1	5.3	.60	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1000-1099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1100-1199	2	10.5	.71	2	0	.0	.00	0	1	20.0	.80	1	0	.0	.00	0
1200-1299	2	10.5	.71	2	2	100.0	.71	2	0	.0	.00	0	0	.0	.00	0
1300-1399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1400-1499	1	5.3	.62	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1500-1599	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1600-1699	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1700-1799	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1800-1899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
1900-1999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2000-2099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2100-2199	1	5.3	.57	1	0	.0	.00	0	1	20.0	.57	1	0	.0	.00	0
2200-2299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2300-2399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2400-2499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2500-2599	1	5.3	.69	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2600-2699	1	5.3	.84	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2700-2799	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2800-2899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
2900-2999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3000-3099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3100-3199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3200-3299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3300-3399	2	10.5	.70	2	0	.0	.00	0	2	40.0	.70	2	0	.0	.00	0
3400-3499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3500-3599	1	5.3	.88	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3600-3699	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3700-3799	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3800-3899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
3900-3999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4000-4099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4100-4199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4200-4299	1	5.3	.90	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4300-4399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4400-4499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4500-4599	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4600-4699	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0

4700-4799	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4800-4899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
4900-4999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
5000-5099	1	5.3	.75	1	0	.0	.00	0	1	20.0	.75	1	0	.0	.00	0
5100-5199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
5200-5299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
5300-5399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
5400-5499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
5500-5599	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
5600-5699	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
5700-5799	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
5800-5899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
5900-5999	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6000-6099	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6100-6199	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6200-6299	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6300-6399	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6400-6499	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6500-6599	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6600-6699	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6700-6799	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6800-6899	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
6900-6999	1	5.3	.88	1	0	.0	.00	0	0	.0	.00	0	0	.0	.00	0
TOTALS	19	100.0	-	19	2	100.0	-	2	5	100.0	-	5	0	.0	-	0

COND. FACTORS SUMMARY				
MEAN =	.7093	.7138	.7034	.0000
STDDEV =	.1099	.0694	.0967	.0000
COEVAR =	15.4896	9.7171	13.7447	.0000
STDERR =	.0224	.0490	.0365	.0000
N =	19	2	5	0
MEDIAN SIZE	1451 G	1251 G	3326 G	0 G

APPENDIX E

TRIBUTARY DATA

DRAINAGE - ATHABASCA RIVER

ROCKY RIVER
Date: 28 April 1992
Location: 11 434212
U 5888234

Confluence type: Passable
Width at Mouth (m): 5-15
Site Length (m): 150
Sampling Location (m): 230
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	40	0.2		40	20	40		
RF/BG	10	0.3	10	40	20	30		
R2	10	0.6		60	40			
R3	40	0.3		60	40			

Stream stage: Low
Visibility (m): 0.09
Maximum depth (m): 0.7
Velocity: High

Bank erosion (%): 20
Siltation (%): 5
Bank cover (%): 5
Type: Grass, Shrub
Instream cover (%): 10
Type: Depth, Boulder

WATER QUALITY

Conductivity (µS):
Water temperature (°C): 4.0

FISHERIES INVENTORY

Electrofisher Type: Type XII
Distance electrofished (m): 150
Effort (s): 499

SPECIES	NUMBER
MNWH	3

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Poor	Poor	Poor	Poor
MNWH	Fair	Good	Fair	Fair	Fair
BLTR	Fair	Good	Fair	Fair	Fair
RNTR	Fair	Good	Good	Fair	Good
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Fair	Fair	Fair	Fair

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

SNAKE INDIAN RIVER
Date: 28 April 1992
Location: 11 434170
U 5893425

Confluence type: Passable
Width at Mouth (m): 5-30
Site Length (m): 120
Sampling Location (m): 320
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	20	0.2		20		70	10	
R2	30	0.4		20		70	10	
R3	40	0.3		20		70	10	
F2	10	0.4		20		70	10	

Stream stage: Low
Visibility (m): 0.25
Maximum depth (m): >1.5
Velocity: Moderate

Bank erosion (%): 40
Siltation (%): 20
Bank cover (%): 20
Type: Grass, Shrub, Tree
Instream cover (%): 15
Type: Depth, Debris

WATER QUALITY

Conductivity (μS):
Water temperature (°C): 5.0

FISHERIES INVENTORY

Electrofisher Type: Type XII
Distance electrofished (m): 120
Effort (s): 421

SPECIES	NUMBER
LKCH	1
MNWH	5

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Poor	Poor	Poor	Poor
MNWH	Good	Good	Good	Good	Good
BLTR	Good	Good	Good	Good	Good
RNTR	Good	Good	Good	Good	Good
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Fair	Good	Good	Good	Good

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

MOOSEHORN CREEK
Date: 28 April 1992
Location: 11 438617
U 5897074

Confluence type: Impassable
Width at Mouth (m): <5
Site Length (m): 150
Sampling Location (m): 175
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	5	0.1			20	80		
R3	20	0.4					100	
F1	5	1.5					100	
F3	70	0.5					100	

Stream stage: Low
Visibility (m): >1.0
Maximum depth (m): 1.8
Velocity: Slow

Bank erosion (%): 5
Siltation (%): 50
Bank cover (%): 80
Type: Shrub, Tree
Instream cover (%): 50
Type: Debris

WATER QUALITY

Conductivity (µS):
Water temperature (°C): 3.0

FISHERIES INVENTORY

Electrofisher Type: Type XII
Distance electrofished (m): 150
Effort (s): 283

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Good	Poor	Fair	Fair
MNWH	Poor	Good	Poor	Fair	Fair
BLTR	Poor	Good	Poor	Fair	Fair
RNTR	Poor	Good	Poor	Fair	Fair
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Good	Poor	Fair	Fair

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

FIDDLE RIVER
Date: 28 April 1992
Location: 11 442500
U 5897925

Confluence type: Impassable
Width at Mouth (m): 15-30
Site Length (m): 140
Sampling Location (m): 450
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	20	0.1	10	60		30		
RF/BG	30	0.2	10	60		30		
RA/BG	30	0.3	10	60		30		
R3	20	0.3	10	60		30		

Stream stage: Low
Visibility (m): 0.71
Maximum depth (m): 0.50
Velocity: High

Bank erosion (%): 10
Siltation (%): 0
Bank cover (%): 0
Type:
Instream cover (%): 10
Type: Boulder

WATER QUALITY

Conductivity (µS):
Water temperature (°C): 5.0

FISHERIES INVENTORY

Electrofisher Type: Type XII
Distance electrofished (m): 150
Effort (s): 410

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Poor	Poor	Poor	Poor
MNWH	Good	Good	Good	Poor	Fair
BLTR	Poor	Good	Good	Poor	Fair
RNTR	Poor	Good	Good	Poor	Fair
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Good	Poor	Poor	Fair

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

SOLOMON CREEK
Date: 28 April 1992
Location: 11 444457
U 5910638

Confluence type: Passable
Width at Mouth (m): 10-15
Site Length (m): 40
Sampling Location (m): 200
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	20	0.1		10		90		
R3	30	0.3				50	50	
P1	5	0.7					100	
P2	25	0.4					100	
F3	20	0.4				50	50	

Stream stage: Low
Visibility (m): >1.0
Maximum depth (m): 1.2
Velocity: Moderate

Bank erosion (%): 50
Siltation (%): 70
Bank cover (%): 30
Type: Tree
Instream cover (%): 40
Type: Debris

WATER QUALITY

Conductivity (µS):
Water temperature (°C): 6.0

FISHERIES INVENTORY

Electrofisher Type: Type XII
Distance electrofished (m): 40
Effort (s): 242

SPECIES	NUMBER
BKTR	2

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Good	Good	Good	Poor	Good
MNWH	Poor	Good	Poor	Poor	Poor
BLTR	Fair	Good	Poor	Poor	Poor
RNTR	Good	Good	Good	Good	Good
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Good	Good	Good	Poor	Good
BKTR	Good	Good	Good	Good	Good

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

MASKUTA CREEK
Date: 27 April 1992
Location: 11 456680
U 5914585

Confluence type: Passable
Width at Mouth (m): <5.0
Site Length (m): 100
Sampling Location (m): 165
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	10			100				
RF/BG	10		20	80				
RA/BG	10		20	80				
R3	70			80		20		

Stream stage: High
Visibility (m): 1.0
Maximum depth (m): 0.6
Velocity: High

Bank erosion (%): 30
Siltation (%): 5
Bank cover (%): 20
Type: Shrub
Instream cover (%): 20
Type: Depth, Boulder, Debris, Turbulence

WATER QUALITY

Conductivity (µS):
Water temperature (°C): 6.0

FISHERIES INVENTORY

Electrofisher Type: Type XII
Distance electrofished (m): 100
Effort (s): 338

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Good	Good	Good	Good	Good
MNWH	Poor	Good	Poor	Good	Fair
BLTR	Poor	Good	Poor	Good	Fair
RNTR	Good	Good	Good	Good	Good
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Good	Good	Good	Good

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

OLDMAN CREEK
Date: 11 June 1992
Location: 11 489542
U 5955202

Confluence type: Impassable
Width at Mouth (m): <5.0
Site Length (m): 100
Sampling Location (m): 100
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF/BG	20	1.0	50	50				
RA/BG	80	0.4	50	50				

Stream stage:	Medium	Bank erosion (%):	45
Visibility (m):	2.0	Siltation (%):	5
Maximum depth (m):	>1.5	Bank cover (%):	0
Velocity:	High	Type:	
		Instream cover (%):	90
		Type:	Boulder, Turbulence

WATER QUALITY

Conductivity (µS): 280
Water temperature (°C): 12.0

FISHERIES INVENTORY

Electrofisher Type: Type XII/SR-18
Distance electrofished (m): 75
Effort (s): 1380

SPECIES	NUMBER
MNWH	8
RNTR	1
BKTR	3
LNDC	2
LNSC	11

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Fair	Good	Fair	Poor	Fair
MNWH	Fair	Good	Poor	Poor	Fair
BLTR	Fair	Good	Poor	Poor	Fair
RNTR	Good	Good	Good	Poor	Fair
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Fair	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor
BKTR	Good	Good	Good	Fair	Good ✓

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

NOSEHILL CREEK
Date: 29 May 1992
Location: 11 504527
U 5981203

Confluence type: Passable
Width at Mouth (m): 5-15
Site Length (m): 100
Sampling Location (m): 220
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF/BG	100	0.39	30	40	15	10	5	

Stream stage: Medium
Visibility (m): >0.39
Maximum depth (m): 0.45
Velocity: Moderate

Bank erosion (%): 30
Siltation (%): 15
Bank cover (%): 10
Type: Shrub
Instream cover (%): 15
Type: Boulder

WATER QUALITY

Conductivity (µS): 212
Water temperature (°C): 10.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 100
Effort (s): 493

SPECIES	NUMBER
LNDC	2

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Fair	Fair	Poor	Fair
MNWH	Poor	Fair	Fair	Poor	Poor
BLTR	Poor	Fair	Fair	Poor	Fair
RNTR	Poor	Fair	Fair	Poor	Fair
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

BERLAND RIVER
Date: 29 May 1992
Location: 11 510324
U 5983518

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 400
Sampling Location (m): 400
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R2	50	0.90	5	40	35	10	10	
R3	50	0.55	5	40	35	10	10	

Stream stage: High
Visibility (m): 0.18
Maximum depth (m): >1.0
Velocity: Moderate

Bank erosion (%): 5
Siltation (%): 35
Bank cover (%): 0
Type:
Instream cover (%): 10
Type: Boulder, Turbidity

WATER QUALITY

Conductivity (µS): 332
Water temperature (°C): 11.0

FISHERIES INVENTORY

Electrofisher Type: SR-18
Distance electrofished (m): 400
Effort (s): 540

SPECIES	NUMBER
MNWH	29
ARGR	1
BURB	1
LNDC	1

PRELIMINARY EVALUATION*

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Fair	Good	Good	Good	Good
MNWH	Fair	Good	Good	Good	Good
BLTR	Fair	Good	Good	Good	Good
RNTR	Fair	Good	Good	Good	Good
NRPK	Poor	Good	Good	Good	Good
WALL	Fair	Good	Good	Good	Good
BURB	Fair	Fair	Good	Good	Good

* Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

MARSH HEAD CREEK
Date: 23 April 1992
Location: 11 526436
U 6000202

Confluence type: Passable
Width at Mouth (m): 5-15
Site Length (m): 120
Sampling Location (m): 209
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R3/BG	100	0.40	15	60	10	15		

Stream stage: High
Visibility (m): 0.15
Maximum depth (m): n/a
Velocity: High

Bank erosion (%): 40
Siltation (%): 90
Bank cover (%): 20
Type: Tree
Instream cover (%): 45
Type: Boulder, Turbulence, Turbidity

WATER QUALITY

Conductivity (μS): 228
Water temperature (°C): 2.5

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 120
Effort (s): 300

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Poor	Fair	Poor	Poor
MNWH	Poor	Poor	Fair	Poor	Poor
BLTR	Poor	Poor	Fair	Poor	Poor
RNTR	Poor	Poor	Fair	Poor	Poor
NRPK	Poor	Poor	Fair	Poor	Poor
WALL	Poor	Poor	Fair	Poor	Poor
BURB	Poor	Poor	Fair	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

PINE CREEK
Date: 23 April 1992
Location: 11 526648
U 6000244

Confluence type: Passable
Width at Mouth (m): 5-15
Site Length (m): 120
Sampling Location (m): 285
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	10	0.15			65	35		
R3/BG	50	0.35	15	75	10			
R3	35	0.56	5	55	25	15		
P3	5	0.77	100					

Stream stage: Low
Visibility (m): 0.56
Maximum depth (m): 0.77
Velocity: Moderate

Bank erosion (%): 10
Siltation (%): 5
Bank cover (%): 5
Type: Tree
Instream cover (%): 10
Type: Boulder, Debris

WATER QUALITY

Conductivity (µS): 198
Water temperature (°C): 3.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 120
Effort (s): 249

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Fair	Fair	Fair	Poor	Fair
MNWH	Fair	Fair	Fair	Poor	Fair
BLTR	Poor	Fair	Fair	Poor	Poor
RNTR	Poor	Fair	Fair	Poor	Poor
NRPK	Poor	Fair	Poor	Poor	Poor
WALL	Poor	Fair	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

PASS CREEK
Date: 24 April 1992
Location: 11 547414
U 6011574

Confluence type: Passable
Width at Mouth (m): 15-30
Site Length (m): 120
Sampling Location (m): 210
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF/BG	30	0.25	25	45	15	10	5	
R3	70	0.30	20	40	20	10	5	5

Stream stage: Low
Visibility (m): 0.45
Maximum depth (m): 0.60
Velocity: Moderate

Bank erosion (%): 40
Siltation (%): 10
Bank cover (%): 30
Type: Grass, Shrub, Logs, Undercut
Instream cover (%): 30
Type: Boulder

WATER QUALITY

Conductivity (µS): 341
Water temperature (°C): 6.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 120
Effort (s): 1014

SPECIES	NUMBER
SCUL. SPP.	1

PRELIMINARY EVALUATION*

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Fair	Fair	Poor	Fair
MNWH	Poor	Fair	Fair	Poor	Fair
BLTR	Poor	Fair	Fair	Poor	Fair
RNTR	Poor	Fair	Fair	Poor	Fair
NRPK	Poor	Fair	Fair	Poor	Fair
WALL	Poor	Fair	Fair	Poor	Fair
BURB	Poor	Fair	Fair	Poor	Fair

* Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

TWO CREEKS
Date: 24 April 1992
Location: 11 548234
U 6011925

Confluence type: Passable
Width at Mouth (m): 15-30
Site Length (m): 130
Sampling Location (m): 280
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF/BG	10	0.21	10	50	15	20	5	
RA/BG	10	0.50	70	30				
R2	30	0.94	10	60	10	10	10	
R3	50	0.65	10	45	15	20	10	

Stream stage: Low
Visibility (m): 0.41
Maximum depth (m): 0.85
Velocity: High

Bank erosion (%): 20
Siltation (%): 30
Bank cover (%): 10
Type: Shrub, Tree
Instream cover (%): 45
Type: Depth, Boulder, Turbulence, Turbidity

WATER QUALITY

Conductivity (µS): 184
Water temperature (°C): 4.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 130
Effort (s): 326

SPECIES	NUMBER
SCUL. SPP.	1
TRPR	3
SUCKER SPP.	2

PRELIMINARY EVALUATION*

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Fair	Good	Good	Fair
MNWH	Poor	Fair	Good	Good	Fair
BLTR	Poor	Fair	Good	Good	Fair
RNTR	Poor	Fair	Good	Good	Fair
NRPK	Poor	Fair	Good	Good	Fair
WALL	Fair	Fair	Good	Good	Fair
BURB	Poor	Fair	Good	Good	Fair

* Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

OLDMAN CREEK
Date: 24 April 1992
Location: 11 563053
U 6004531

Confluence type: Possible
Width at Mouth (m): 15-30
Site Length (m): 150
Sampling Location (m): 397
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	20	0.12		5	35	40	20	
R3/BG	30	0.35		20	35	25	20	
R3	50	0.40		15	35	30	20	

Stream stage: Low
Visibility (m): 0.25
Maximum depth (m): 0.45
Velocity: Moderate

Bank erosion (%): 0
Siltation (%): 50
Bank cover (%): 0
Type:
Instream cover (%): 10
Type: Turbidity

WATER QUALITY

Conductivity (µS): 276
Water temperature (°C): 7.5

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 150
Effort (s): 1007

SPECIES	NUMBER
SUCKER SPP.	14
LKCH	5
LNDC	2

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Poor	Poor	Poor	Poor
MNWH	Poor	Poor	Poor	Poor	Poor
BLTR	Poor	Poor	Poor	Poor	Poor
RNTR	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

SAKWATAMAU RIVER
Date: 24 April 1992
Location: 11 584000
U 6001212

Confluence type: Passable
Width at Mouth (m): 15-30
Site Length (m): 130
Sampling Location (m): 380
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	15	0.13		10	25	45	20	
R2	85	>1.0		5	5	10	80	

Stream stage: Low
Visibility (m): 0.35
Maximum depth (m): >1.0
Velocity: Moderate

Bank erosion (%): 15
Siltation (%): 80
Bank cover (%): 10
Type: Grass, Log
Instream cover (%): 10
Type: Turbidity

WATER QUALITY

Conductivity (µS): 253
Water temperature (°C): 7.5

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 130
Effort (s): 445

SPECIES	NUMBER
LNDC	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Poor	Fair	Fair	Fair
MNWH	Poor	Poor	Fair	Fair	Fair
BLTR	Poor	Poor	Fair	Fair	Fair
RNTR	Poor	Poor	Fair	Fair	Fair
NRPK	Poor	Fair	Fair	Fair	Fair
WALL	Poor	Fair	Fair	Fair	Fair
BURB	Poor	Fair	Fair	Fair	Fair

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

MCLEOD RIVER

Date: 24 April 1992
Location: 11 585000
U 6000851

Confluence type: Passable
Width at Mouth (m): >60
Site Length (m): 1500
Sampling Location (m): 1500
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	20	0.20	5	40	30	5	20	
R1	80	3.0	5	40	30	5	20	

Stream stage:	Medium	Bank erosion (%):	60
Visibility (m):	0.90	Siltation (%):	70
Maximum depth (m):	>3.0	Bank cover (%):	40
Velocity:	Moderate	Type:	Grass, Shrub, Log
		Instream cover (%):	40
		Type:	Depth, Boulder, Turbulence, Turbidity

WATER QUALITY

Conductivity (µS): 301
Water temperature (°C): 9.0

FISHERIES INVENTORY

Electrofisher Type: SR-18
Distance electrofished (m): 1500
Effort (s): 750

SPECIES	NUMBER
MNWH	17
LNSC	8
WHSC	3

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Fair	Good	Good	Good
MNWH	Poor	Fair	Good	Good	Good
BLTR	Poor	Fair	Good	Good	Good
RNTR	Poor	Fair	Good	Good	Good
NRPK	Poor	Fair	Good	Good	Good
WALL	Poor	Fair	Good	Good	Good
BURB	Poor	Good	Good	Good	Good

[a]Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

CHRISTMAS CREEK
Date: 27 April 1992
Location: 11 607231
U 6003172

Confluence type: Passable
Width at Mouth (m): 5-15
Site Length (m): 100
Sampling Location (m): 200
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
F3	100	0.65					100	

Stream stage: Low
Visibility (m): 0.30
Maximum depth (m): >1.0
Velocity: Slow

Bank erosion (%): 90
Siltation (%): 100
Bank cover (%): 15
Type: Grass, Branches
Instream cover (%): 20
Type: Depth, Turbidity

WATER QUALITY

Conductivity (µS): 347
Water temperature (°C): 8.0

FISHERIES INVENTORY

Electrofisher Type: n/a
Distance electrofished (m):
Effort (s):

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Poor	Poor	Poor	Poor
MNWH	Poor	Poor	Poor	Poor	Poor
BLTR	Poor	Poor	Poor	Poor	Poor
RNTR	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

CORBETT CREEK
Date: 27 April 1992
Location: 11 629569
U 6014035

Confluence type: Impassable
Width at Mouth (m): <5
Site Length (m): 200
Sampling Location (m): 350
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
F1	20	0.75					100	
F3	80	0.37					100	

Stream stage:	Low	Bank erosion (%):	80
Visibility (m):	0.25	Siltation (%):	75
Maximum depth (m):	>0.75	Bank cover (%):	30
Velocity:	Slow	Type:	Grass, Shrub, Tree
		Instream cover (%):	65
		Type:	Depth, Debris, Turbidity

WATER QUALITY

Conductivity (μS):	435
Water temperature (°C):	11.0

FISHERIES INVENTORY

Electrofisher Type: n/a
Distance electrofished (m):
Effort (s):

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Poor	Poor	Poor	Poor
MNWH	Poor	Poor	Poor	Poor	Poor
BLTR	Poor	Poor	Poor	Poor	Poor
RNTR	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

GOOSE CREEK
Date: 27 April 1992
Location: 11 639088
U 6021340

Confluence type: Passable
Width at Mouth (m): <5.0
Site Length (m): 100
Sampling Location (m): 300
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
F2	100	0.75					100	

Stream stage: Low
Visibility (m): 0.38
Maximum depth (m): >1.0
Velocity: Slow

Bank erosion (%): 60
Siltation (%): 100
Bank cover (%): 15
Type: Shrub, Log
Instream cover (%): 40
Type: Depth, Debris, Turbidity

WATER QUALITY

Conductivity (µS): 411
Water temperature (°C): 12.0

FISHERIES INVENTORY

Electrofisher Type: n/a
Distance electrofished (m):
Effort (s):

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Poor	Poor	Poor	Poor
MNWH	Poor	Poor	Poor	Poor	Poor
BLTR	Poor	Poor	Poor	Poor	Poor
RNTR	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

FREEMAN RIVER
Date: 27 April 1992
Location: 11 644010
U 6021257

Confluence type: Passable
Width at Mouth (m): <5.0
Site Length (m): 142
Sampling Location (m): 354
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
F3	100	0.60					100	

Stream stage: Low
Visibility (m): 0.25
Maximum depth (m): >1.0
Velocity: nil

Bank erosion (%): 20
Siltation (%): 100
Bank cover (%): 0
Type:
Instream cover (%): 15
Type: Turbidity

WATER QUALITY

Conductivity (µS): 528
Water temperature (°C): 16.5

FISHERIES INVENTORY

Electrofisher Type: n/a
Distance electrofished (m):
Effort (s):

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Poor	Poor	Poor	Poor
MNWH	Poor	Poor	Poor	Poor	Poor
BLTR	Poor	Poor	Poor	Poor	Poor
RNTR	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

HORSE CREEK
Date: 27 April 1992
Location: 11 650874
U 6022307

Confluence type: Passable
Width at Mouth (m): <5.0
Site Length (m): 100
Sampling Location (m): 180
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	20	0.12		40	25	30	5	
RF/BG	70	0.19	45	20	10	15	5	5
R3	10	0.30		40	25	30	5	

Stream stage: Low
Visibility (m): 0.35
Maximum depth (m): 0.35
Velocity: Moderate

Bank erosion (%): 10
Siltation (%): 25
Bank cover (%): 60
Type: Shrub, Tree
Instream cover (%): 80
Type: Boulder, Debris,

WATER QUALITY

Conductivity (µS): 369
Water temperature (°C): 11.5

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 100
Effort (s): 710

SPECIES	NUMBER
SUCKER SPP.	12
WHSC	1
LKCH	5

PRELIMINARY EVALUATION*

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Fair	Good	Poor	Poor	Fair
MNWH	Fair	Good	Poor	Poor	Fair
BLTR	Fair	Good	Poor	Poor	Fair
RNTR	Fair	Good	Poor	Poor	Fair
NRPK	Poor	Fair	Poor	Poor	Poor
WALL	Poor	Fair	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

* Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

CLEARWATER CREEK
Date: 27 April 1992
Location: 11 660366
U 6034178

Confluence type: Passable
Width at Mouth (m): <5.0
Site Length (m): 120
Sampling Location (m): 270
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	60	0.13	5	20	15	40	20	
R3	35	0.50		10			50	40
P3	5	0.40		10			50	40

Stream stage: Low
Visibility (m): 0.26
Maximum depth (m): 0.69
Velocity: Slow

Bank erosion (%): 35
Siltation (%): 25
Bank cover (%): 45
Type: Shrub, Tree
Instream cover (%): 60
Type: Debris

WATER QUALITY

Conductivity (µS): 430
Water temperature (°C): 11.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 120
Effort (s): 511

SPECIES	NUMBER
SCUL. SPP.	1
CYPRINID SPP.	2

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
ARGR	Poor	Good	Fair	Poor	Fair
MNWH	Poor	Good	Fair	Poor	Fair
BLTR	Poor	Good	Fair	Poor	Fair
RNTR	Poor	Good	Fair	Poor	Fair
NRPK	Poor	Good	Poor	Poor	Fair
WALL	Poor	Good	Poor	Poor	Fair
BURB	Poor	Good	Poor	Poor	Fair

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

TIMEU CREEK
Date: 29 April 1992
Location: 11 665665
U 6038386

Confluence type: Possible
Width at Mouth (m): <5
Site Length (m): 120
Sampling Location (m): 420
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	60	0.18		10	25	45	20	
R3	30	0.45		10	25	45	20	
BW	10	0.10			15	65	20	

Stream stage: Low
Visibility (m): 0.37
Maximum depth (m): 0.54
Velocity: High

Bank erosion (%): 15
Siltation (%): 20
Bank cover (%): 20
Type: Grass
Instream cover (%): 25
Type: Depth, Turbulence

WATER QUALITY

Conductivity (µS): 209
Water temperature (°C): 11.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 120
Effort (s): 731

SPECIES	NUMBER
SCUL. SPP.	1
SUCKER SPP.	8
TRPR	1
LKCH	22

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Fair	Fair	Poor	Fair
LKWH	Poor	Fair	Fair	Poor	Fair
NRPK	Poor	Fair	Fair	Poor	Fair
WALL	Poor	Fair	Fair	Poor	Fair
GOLD	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

PEMBINA RIVER
Date: 28 April 1992
Location: 11 674812
U 6069467

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 800
Sampling Location (m): 1700
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R1	50	1.5					50	50
R3	50	0.55		15		10	40	35

Stream stage: Medium
Visibility (m): 0.43
Maximum depth (m): >1.0
Velocity: Moderate

Bank erosion (%): 45
Siltation (%): 35
Bank cover (%): 20
Type: Shrub, Tree
Instream cover (%): 20
Type: Depth, Debris, Turbidity

WATER QUALITY

Conductivity (µS): 310
Water temperature (°C): 10.0

FISHERIES INVENTORY

Electrofisher Type: SR-18
Distance electrofished (m): 1600
Effort (s): 896

SPECIES	NUMBER
WALL	2
BURB	2
GOLD	2
FLCH	7
EMSH	5
LNSC	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Poor	Good	Good	Good
LKWH	Poor	Poor	Fair	Fair	Fair
NRPK	Poor	Good	Good	Good	Good
WALL	Poor	Good	Good	Good	Good
GOLD	Poor	Good	Good	Good	Good
BURB	Poor	Good	Good	Good	Good

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

CHISHOLM CREEK

Date: 28 April 1992
Location: 11 680295
U 6088669

Confluence type: Passable
Width at Mouth (m): 5-15
Site Length (m): 120
Sampling Location (m): 420
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	40	0.15		20	30	35	15	
R3	60	0.40		10	20	30	20	20

Stream stage: Low
Visibility (m): 0.40
Maximum depth (m): 0.75
Velocity: n/a

Bank erosion (%): 10
Siltation (%): 15
Bank cover (%): 5
Type: Grass, Shrub
Instream cover (%): 15
Type: Depth, Debris

WATER QUALITY

Conductivity (µS): 284
Water temperature (°C): 11.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 120
Effort (s): 541

SPECIES	NUMBER
LNSC	1

PRELIMINARY EVALUATION*

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Poor	Fair	Poor	Poor
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Fair	Fair	Fair	Poor	Fair
WALL	Poor	Poor	Poor	Poor	Poor
GOLD	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

* Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

ROURKE CREEK
Date: 01 May 1992
Location: 11 684620
U 6102961

Confluence type: Passable
Width at Mouth (m): 5-15
Site Length (m): 110
Sampling Location (m): 340
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	10	0.21		35	25	25	15	
RF/BG	10	0.23	10	40	20	15	15	
R3/BG	30	0.50	15	40	10	10	25	
R3	50	0.68	10	40	15	10	25	

Stream stage: Low
Visibility (m): 0.29
Maximum depth (m): 0.84
Velocity: Moderate

Bank erosion (%): 40
Siltation (%): 70
Bank cover (%): 10
Type: Shrub
Instream cover (%): 60
Type: Depth, Boulder, Debris, Turbidity

WATER QUALITY

Conductivity (µS): 256
Water temperature (°C): 9.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 110
Effort (s): 747

SPECIES	NUMBER
SUCKER SPP.	6
LNSC	2
BRST	3
CYPRINID SPP.	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Poor	Poor	Poor	Poor
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Fair	Fair	Fair	Fair
WALL	Poor	Fair	Fair	Fair	Fair
GOLD	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

UNNAMED CREEK (8-72-25)
Date: 01 May 1992
Location: 12 320824
U 6122296

Confluence type: Passable
Width at Mouth (m): <5.0
Site Length (m): 120
Sampling Location (m): 298
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R3	100	0.39		5			95	

Stream stage: Low
Visibility (m): 0.06
Maximum depth (m): 0.47
Velocity:

Bank erosion (%): 75
Siltation (%): 90
Bank cover (%): 0
Type:
Instream cover (%): 40
Type: Debris, Turbidity

WATER QUALITY

Conductivity (μS): 378
Water temperature (°C): 9.5

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 120
Effort (s): 584

SPECIES	NUMBER
LNSC	2
BRST	1
SUCKER SPP.	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Poor	Poor	Poor	Poor
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
GOLD	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

BAPTISTE CREEK
Date: 04 May 1992
Location: 12 342085
U 6071340

Confluence type: Ephemeral
Width at Mouth (m): <5.0
Site Length (m): 130
Sampling Location (m): 198
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	15	0.08					100	
RF/BG	75	0.11	15	50	15	20		
R3	10	0.21	10	30		20	40	

Stream stage: Low
Visibility (m): 0.28
Maximum depth (m): 0.28
Velocity: Moderate

Bank erosion (%): 30
Siltation (%): 85
Bank cover (%): 10
Type: Grass
Instream cover (%): 50
Type: Boulder

WATER QUALITY

Conductivity (µS): 980
Water temperature (°C): 12.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 130
Effort (s): 701

SPECIES	NUMBER
SUCKER SPP.	3
LKCH	1
LNSC	33
WHSC	3
FTMN	20
SPSH	2

PRELIMINARY EVALUATION*

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Poor	Poor	Poor	Poor
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Poor	Poor	Poor	Poor	Poor
GOLD	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

* Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

TAWATINAU RIVER
Date: 04 May 1992
Location: 12 353361
U 6066063

Confluence type: Passable
Width at Mouth (m): 5-15
Site Length (m): 115
Sampling Location (m): 305
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R3/BG	100	0.35	35				65	

Stream stage: Low
Visibility (m): 0.15
Maximum depth (m): 0.60
Velocity: Moderate

Bank erosion (%): 45
Siltation (%): 90
Bank cover (%): 5
Type: Shrub
Instream cover (%): 45
Type: Boulder, Turbidity

WATER QUALITY

Conductivity (µS): 558
Water temperature (°C): 13.5

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 115
Effort (s): 747

SPECIES	NUMBER
NRPK	1
BURB	1
FTMN	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Poor	Poor	Poor	Poor
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Good	Fair	Fair	Fair
WALL	Poor	Good	Fair	Fair	Fair
GOLD	Poor	Fair	Fair	Fair	Fair
BURB	Poor	Good	Good	Good	Good

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

LA BICHE RIVER
Date: 06 May 1992
Location: 12 389308
U 6097458

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 120
Sampling Location (m): 520
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF/BG	15	0.31	25	40	15	5	15	
R1	30	>1.5						
R3	55	0.57	5	30	20	20	25	

Stream stage: Low
Visibility (m): 0.33
Maximum depth (m): >1.5
Velocity: Moderate

Bank erosion (%): 40
Siltation (%): 80
Bank cover (%): 0
Type:
Instream cover (%): 60
Type: Depth, Boulder

WATER QUALITY

Conductivity (µS):
Water temperature (°C): 14.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 120
Effort (s): 604

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Fair	Fair	Good	Good
LKWH	Poor	Fair	Fair	Good	Good
NRPK	Poor	Fair	Good	Good	Good
WALL	Poor	Fair	Good	Good	Good
GOLD	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Fair	Good	Good	Good

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

CALLING RIVER
Date: 07 May 1992
Location: 12 379915
U 6106230

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 100
Sampling Location (m): 210
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	40	0.19		40	25	25	10	
R3	60	0.37	10	40		30	20	

Stream stage: Low
Visibility (m): 0.48
Maximum depth (m): 0.66
Velocity: Moderate

Bank erosion (%): 45
Siltation (%): 50
Bank cover (%): 20
Type: Shrub, Tree
Instream cover (%): 30
Type: Depth, Boulder, Debris

WATER QUALITY

Conductivity (µS): 310
Water temperature (°C): 16.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 100
Effort (s): 859

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Fair	Good	Fair	Good
LKWH	Poor	Fair	Good	Fair	Fair
NRPK	Poor	Fair	Good	Fair	Good
WALL	Poor	Fair	Good	Fair	Good
GOLD	Poor	Poor	Good	Fair	Fair
BURB	Poor	Fair	Good	Fair	Good

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

LA PETITE RIVIERE JAILLANTE
Date: 07 May 1992
Location: 12 384175
U 6117001

Confluence type: Possible
Width at Mouth (m): <5
Site Length (m): 110
Sampling Location (m): 270
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	30	0.12		40	20	25	15	
RF/BG	15	0.14	20	30	25	10	15	
R3	40	0.18	5	30	5	25	35	
F3	15	0.20		30	20	15	35	

Stream stage: Low
Visibility (m): 0.39
Maximum depth (m): 0.39
Velocity: Moderate

Bank erosion (%): 45
Siltation (%): 85
Bank cover (%): 45
Type: Shrub, Tree
Instream cover (%): 75
Type: Boulder, Debris

WATER QUALITY

Conductivity (µS): 965
Water temperature (°C): 13.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 110
Effort (s): 959

SPECIES	NUMBER
SUCKER SPP.	5
LNSC	2
WHSC	9
LKCH	10

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Fair	Poor	Poor	Poor
LKWH	Poor	Fair	Poor	Poor	Poor
NRPK	Poor	Fair	Poor	Poor	Poor
WALL	Poor	Fair	Poor	Poor	Poor
GOLD	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

DUNCAN CREEK
Date: 07 May 1992
Location: 12 392973
U 6131504

Confluence type: Possible
Width at Mouth (m): 5-10
Site Length (m): 100
Sampling Location (m): 220
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	10	0.10		25		20	55	
R3	90	0.40		10		10	80	

Stream stage:	Low	Bank erosion (%):	25
Visibility (m):	0.55	Siltation (%):	80
Maximum depth (m):	1.0	Bank cover (%):	10
Velocity:	Moderate	Type:	Logs
		Instream cover (%):	25
		Type:	Debris

WATER QUALITY

Conductivity (µS): 175
Water temperature (°C): 15.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 100
Effort (s): 756

SPECIES	NUMBER
LNDC	2
LKCH	12
LNSC	1
SUCKER SPP.	2
WHSC	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Poor	Poor	Poor	Poor
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Fair	Fair	Fair	Fair
WALL	Poor	Fair	Fair	Fair	Fair
GOLD	Poor	Poor	Poor	Poor	Poor
BURB	Fair	Poor	Fair	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

PARALLEL CREEK
Date: 08 May 1992
Location: 12 397720
U 6181740

Confluence type: Passable
Width at Mouth (m): 5-15
Site Length (m): 100
Sampling Location (m): 210
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF/BG	35	0.26	25	40	15	10	10	
R3/BG	65	0.41	35	30	10	10	15	

Stream stage: Low
Visibility (m): 0.21
Maximum depth (m): 0.78
Velocity: High

Bank erosion (%): 0
Siltation (%): 25
Bank cover (%): 10
Type: Boulder
Instream cover (%): 45
Type: Boulder

WATER QUALITY

Conductivity (µS): 119
Water temperature (°C): 13.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 100
Effort (s): 1037

SPECIES	NUMBER
LKCH	13
SUCKER SPP.	14
FTMN	14
LNSC	4
LNDC	3
BRST	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Fair	Poor	Poor	Poor
LKWH	Poor	Fair	Poor	Poor	Poor
NRPK	Poor	Poor	Poor	Poor	Poor
WALL	Good	Fair	Poor	Poor	Fair
GOLD	Poor	Poor	Poor	Poor	Poor
BURB	Poor	Fair	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

PELICAN RIVER
Date: 08 May 1992
Location: 12 397051
U 6188959

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 100
Sampling Location (m): 400
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RA	100	1.0*	75*	25*				

Stream stage:	High	Bank erosion (%):	40
Visibility (m):	0.26	Siltation (%):	45
Maximum depth (m):	>1.0	Bank cover (%):	15
Velocity:	High	Type:	Shrub, Tree
		Instream cover (%):	20
		Type:	Depth, Boulder, Debris

WATER QUALITY

Conductivity (μS): 80
Water temperature (°C): 14.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 100
Effort (s): 450

SPECIES	NUMBER
LKCH	4
FLCH	1
LNDC	2
BRST	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Poor	Fair	Fair	Poor
LKWH	Poor	Poor	Fair	Fair	Poor
NRPK	Poor	Poor	Fair	Fair	Poor
WALL	Poor	Poor	Fair	Fair	Poor
GOLD	Poor	Poor	Fair	Fair	Poor
BURB	Poor	Poor	Fair	Fair	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.
* Estimated due to high stream stage.

DRAINAGE - ATHABASCA RIVER

HOUSE RIVER
Date: 09 May 1992
Location: 12 406508
V 6228996

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 700
Sampling Location (m): 700
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R3	100	0.50					50	50

Stream stage:	Low	Bank erosion (%):	20
Visibility (m):	0.17	Siltation (%):	80
Maximum depth (m):	0.75	Bank cover (%):	15
Velocity:	Moderate	Type:	Shrub, Tree
		Instream cover (%):	40
		Type:	Boulder, Turbidity

WATER QUALITY

Conductivity (µS):	184
Water temperature (°C):	12.0

FISHERIES INVENTORY

Electrofisher Type: SR-18E
Distance electrofished (m): 700
Effort (s): 443

SPECIES	NUMBER
LNSC	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
MNWH	Poor	Fair	Fair	Fair	Fair
LKWH	Poor	Fair	Fair	Fair	Fair
NRPK	Poor	Fair	Fair	Fair	Fair
WALL	Poor	Fair	Fair	Fair	Fair
GOLD	Poor	Fair	Fair	Fair	Fair
BURB	Fair	Fair	Fair	Fair	Fair

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

HANGINGSTONE RIVER
Date: 12 May 1992
Location: 12 479295
U 6284418

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 105
Sampling Location (m): 388
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	15	0.19		25	20	25	30	
R3	85	0.50		10	35	25	30	

Stream stage: Low
Visibility (m): 0.10
Maximum depth (m): 1.0
Velocity: Moderate

Bank erosion (%): 70
Siltation (%): 80
Bank cover (%): 20
Type: Shrub, Tree
Instream cover (%): 40
Type: Debris, Turbidity

WATER QUALITY

Conductivity (µS): 276
Water temperature (°C): 7.5

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 105
Effort (s): 518

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
LKWH	Poor	Fair	Fair	Poor	Poor
NRPK	Poor	Fair	Fair	Poor	Fair
WALL	Poor	Fair	Fair	Poor	Fair
GOLD	Poor	Fair	Fair	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

LITTLE FISHERY RIVER
Date: 12 May 1992
Location: 12 473222
V 6285423

Confluence type: Passable
Width at Mouth (m): 5-10
Site Length (m): 110
Sampling Location (m): 220
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	5	0.10		20	35	30	15	
R3/BG	95	0.35	30	35		15	20	

Stream stage: Medium
Visibility (m): 0.10
Maximum depth (m): 0.55
Velocity: Moderate

Bank erosion (%): 45
Siltation (%): 50
Bank cover (%): 25
Type: Grass, Shrub
Instream cover (%): 35
Type: Boulder, Turbidity

WATER QUALITY

Conductivity (µS): 282
Water temperature (°C): 8.5

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 110
Effort (s): 763

SPECIES	NUMBER
FTMN	13
SUCKER SPP.	3
LKCH	2

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Fair	Poor	Poor	Poor
WALL	Poor	Fair	Poor	Poor	Poor
GOLD	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

CLEARWATER RIVER
Date: 12 May 1992
Location: 12 476446
V 6289219

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 2000
Sampling Location (m): 2000
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R2	35	0.90					50	50
R3	65	0.50					50	50

Stream stage: Medium
Visibility (m): 0.27
Maximum depth (m): >1.0
Velocity: Moderate

Bank erosion (%): 70
Siltation (%): 50
Bank cover (%): 50
Type: Shrub
Instream cover (%): 20
Type: Turbidity, Debris

WATER QUALITY

Conductivity (µS): 168
Water temperature (°C): 8.5

FISHERIES INVENTORY

Electrofisher Type: Type VIA
Distance electrofished (m): 2000
Effort (s): 1244

SPECIES	NUMBER
WHSC	4
WALL	1
NRPK	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
LKWH	Poor	Poor	Fair	Fair	Fair
NRPK	Poor	Fair	Fair	Fair	Fair
WALL	Poor	Fair	Fair	Fair	Fair
GOLD	Poor	Fair	Fair	Fair	Fair

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

STEEPBANK RIVER
Date: 15 May 1992
Location: 12 470917
V 6319443

Confluence type: Passable
Width at Mouth (m): 15-30
Site Length (m): 650
Sampling Location (m): 650
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R2	80	>1.3	5				50	45
R3	20	0.60	5				50	45

Stream stage: Medium
Visibility (m): 0.46
Maximum depth (m): >1.3
Velocity: High

Bank erosion (%): 75
Siltation (%): 40
Bank cover (%): 25
Type: Shrub
Instream cover (%): 30
Type: Depth, Debris

WATER QUALITY

Conductivity (µS): 137
Water temperature (°C): 7.0

FISHERIES INVENTORY

Electrofisher Type: Type VIA
Distance electrofished (m): 650
Effort (s): 275

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
LKWH	Poor	Poor	Good	Fair	Fair
NRPK	Poor	Fair	Good	Good	Good
WALL	Poor	Fair	Good	Good	Good
GOLD	Poor	Poor	Fair	Fair	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

MUSKEG RIVER
Date: 15 May 1992
Location: 12 453337
V 6332191

Confluence type: Passable
Width at Mouth (m): 15-30
Site Length (m): 500
Sampling Location (m): 500
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R3	100	0.55			35	45	10	10

Stream stage:	Medium	Bank erosion (%):	80
Visibility (m):	>0.82	Siltation (%):	30
Maximum depth (m):	1.0	Bank cover (%):	40
Velocity:	High	Type:	Shrub, Tree
		Instream cover (%):	30
		Type:	Depth, Debris, Color

WATER QUALITY

Conductivity (µS):	212
Water temperature (°C):	8.0

FISHERIES INVENTORY

Electrofisher Type: Type VIA
Distance electrofished (m): 500
Effort (s): 225

SPECIES	NUMBER
WHSC	5

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Fair	Fair	Fair	Fair
WALL	Poor	Fair	Fair	Fair	Fair
GOLD	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

MACKAY RIVER

Date: 16 May 1992
Location: 12 461877
V 6335785

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 1500
Sampling Location (m): 1500
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R2	45	0.80		20	10	10	30	30
R3	55	0.65		20	10	10	30	30

Stream stage:	Medium	Bank erosion (%):	40
Visibility (m):	>0.38	Siltation (%):	45
Maximum depth (m):	>1.5	Bank cover (%):	20
Velocity:	Moderate	Type:	Shrub, Tree
		Instream cover (%):	20
		Type:	Debris

WATER QUALITY

Conductivity (µS): 209
Water temperature (°C): 9.5

FISHERIES INVENTORY

Electrofisher Type: Type VIA
Distance electrofished (m): 1500
Effort (s): 766

SPECIES	NUMBER
TRPR	56
FLCH	1
WALL	1
WHSC	3

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
LKWH	Poor	Poor	Fair	Fair	Fair
NRPK	Poor	Poor	Good	Good	Good
WALL	Poor	Poor	Good	Good	Good
GOLD	Poor	Poor	Fair	Fair	Fair

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

ELLS RIVER
Date: 17 May 1992
Location: 12 459570
V 6351551

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 800
Sampling Location (m): 800
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R2	30	0.85		10			45	45
R3	60	0.40		10			45	45
BW	10	0.45		10			45	45

Stream stage: Medium
Visibility (m): 0.22
Maximum depth (m): 1.0
Velocity: Moderate

Bank erosion (%): 70
Siltation (%): 70
Bank cover (%): 40
Type: Shrub, Tree
Instream cover (%): 55
Type: Debris, Turbidity

WATER QUALITY

Conductivity (µS): 186
Water temperature (°C): 10.0

FISHERIES INVENTORY

Electrofisher Type: Type VIA
Distance electrofished (m): 800
Effort (s): 390

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Fair	Fair	Fair	Fair
WALL	Poor	Fair	Fair	Fair	Fair
GOLD	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

TAR RIVER
Date: 17 May 1992
Location: 12 459029
V 6353298

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 800
Sampling Location (m): 800
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R2	100	0.80		5			50	45

Stream stage: Medium
Visibility (m): 0.35
Maximum depth (m): 1.0
Velocity: Slow

Bank erosion (%): 80
Siltation (%): 75
Bank cover (%): 40
Type: Shrub, Tree
Instream cover (%): 65
Type: Debris, Turbidity

WATER QUALITY

Conductivity (µS): 264
Water temperature (°C): 8.0

FISHERIES INVENTORY

Electrofisher Type: Type VIA
Distance electrofished (m): 800
Effort (s): 329

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION*

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVFRALL RATING
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Fair	Good	Good	Fair
WALL	Poor	Fair	Good	Good	Fair
GOLD	Poor	Poor	Poor	Poor	Poor

* Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

PIERRE RIVER
Date: 18 May 1992
Location: 12 462340
V 6367223

Confluence type: Passable
Width at Mouth (m): 10-15
Site Length (m): 60
Sampling Location (m): 120
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
RF	10	0.10			20	60	20	
R3	75	0.50					50	50
P2	15	1.0					50	50

Stream stage: Medium
Visibility (m): 0.19
Maximum depth (m): >2.0
Velocity: Moderate

Bank erosion (%): 85
Siltation (%): 75
Bank cover (%): 15
Type: Shrub
Instream cover (%): 20
Type: Debris

WATER QUALITY

Conductivity (µS): 471
Water temperature (°C): 6.0

FISHERIES INVENTORY

Electrofisher Type: Type XI
Distance electrofished (m): 60
Effort (s): 473

SPECIES	NUMBER
SCUL. SPP.	1

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Poor	Fair	Poor	Fair
WALL	Poor	Poor	Fair	Poor	Fair
GOLD	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

DRAINAGE - ATHABASCA RIVER

FIREBAG RIVER
Date: 18 May 1992
Location: 12 479268
V 6400630

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 1000
Sampling Location (m): 1000
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R3	20	0.30		10	10		40	40
R2	80	0.80		10	10		40	40

Stream stage: Medium
Visibility (m): 0.73
Maximum depth (m): >1.0[+]
Velocity: Moderate

Bank erosion (%): 45
Siltation (%): 45
Bank cover (%): 50
Type: Shrub
Instream cover (%): 40
Type: Depth, Debris

WATER QUALITY

Conductivity (µS): 174
Water temperature (°C): 8.0

FISHERIES INVENTORY

Electrofisher Type: Type VIA
Distance electrofished (m): 1000
Effort (s): 798

SPECIES	NUMBER
NRPK	2

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
LKWH	Poor	Fair	Fair	Fair	Fair
NRPK	Poor	Good	Good	Good	Good
WALL	Poor	Good	Good	Good	Good
GOLD	Poor	Fair	Fair	Fair	Fair

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.
[+] Estimate

DRAINAGE - ATHABASCA RIVER

GRAYLING CREEK
Date: 20 May 1992
Location: 12 479513
V 6430043

Confluence type: Passable
Width at Mouth (m): 30-60
Site Length (m): 2000
Sampling Location (m): 2000
(upstream end from mouth)

CHANNEL CHARACTERISTICS

HABITAT TYPE	AREA (%)	MEAN DEPTH (m)	SUBSTRATE TYPE (%)					
			BO	CO	PE	GR	SI	SA
R2	100	1.0					100	

Stream stage:	Medium	Bank erosion (%):	70
Visibility (m):	>1.37	Siltation (%):	15
Maximum depth (m):	>1.5	Bank cover (%):	20
Velocity:	Slow	Type:	Shrub, Tree
		Instream cover (%):	50
		Type:	Depth, Debris

WATER QUALITY

Conductivity (μS): 194
Water temperature (°C): 4.0

FISHERIES INVENTORY

Electrofisher Type: Type VIA
Distance electrofished (m): 2000
Effort (s): 433

SPECIES	NUMBER
n/a	

PRELIMINARY EVALUATION[a]

SPECIES	SPAWNING POTENTIAL	REARING POTENTIAL	ADULT FEEDING POTENTIAL	OVERWINTERING POTENTIAL	OVERALL RATING
LKWH	Poor	Poor	Poor	Poor	Poor
NRPK	Poor	Fair	Good	Good	Fair
WALL	Poor	Fair	Fair	Fair	Fair
GOLD	Poor	Poor	Poor	Poor	Poor

[a] Evaluation conducted from confluence with Athabasca to upstream end of sampling location noted above.

APPENDIX F

CONTAMINANT SAMPLING

APPENDIX F

FISH SAMPLING PROCEDURE FOR CONTAMINANT ANALYSIS

Fish for contaminant analyses were collected utilizing one or more techniques (i.e., electroshocking, beach seines). At the Lake Athabasca Delta sites, fish were collected directly from commercial nets. RL&L personnel hand-picked the fish out of the gill nets and immediately placed each fish into contaminant-free plastic bags of the type recommended by the Department of Fisheries and Oceans. In total, nine sites were sampled.

- Weldwood Mill, Hinton, zone of influence from effluent;
- Alberta Newsprint, Whitecourt, zone of influence from effluent;
- Millar Western, Whitecourt, zone of influence from effluent;
- Alberta Pacific Mill, zone of likely influence from effluent;
- Fort MacKay Indian Reserve area mid-point;
- Athabasca Delta;
- Lake Athabasca;
- Lac La Biche;
- Gregoire Lake,

Fish species collected from various reaches on the Athabasca River were as follows:

- Upper reaches (above Whitecourt): mountain whitefish, bull trout, northern pike and longnose sucker.
- Middle reaches (Whitecourt to Cascade Rapids): goldeye, walleye, northern pike and longnose sucker.
- Lower reaches (below Cascade Rapids): goldeye, walleye, northern pike, longnose sucker and lake whitefish.

Once collected, fish were immediately processed following the protocol outlined in Schedule D of the Terms of Reference. Each fish was measured for fork length, and the intact specimen was placed directly into a contaminant-free plastic bag of the type recommended by the Department of Fisheries and Oceans. Each sample bag was labelled with the following information: species, fork length, date, location, collector's name, and sample number. A tag with the same information was tied to the outside of the bag. Except for small forage fish which were bagged in composite groups of at least 10 for each species collected, all fish were bagged individually.

Fish samples were placed immediately on dry ice, and stored in labelled cardboard boxes lined with styrofoam and plastic. Samples were shipped immediately to Edmonton by courier, or picked up by R.L. & L. personnel and delivered to the laboratory.

Table F1. Universal Transverse Mercator Coordinates (UTM) for contaminant fish collections, Athabasca River, 1992.

Site	Upstream	Downstream
1	11 454600 U 5914600	11 458500 U 5916100
6	12 380412 U 5990124	12 390066 U 6093858
8	12 466329 V 6280816	12 470096 V 6282414
9	12 463062 V 6332184	12 462965 V 6340983

Athabasca River at Highway 40 Bridge	11 453760 U 5914250
Athabasca River at Weldwood Mill	11 461050 U 5918300
Athabasca River at Millar Western Mill	11 586615 U 6001205
Athabasca River at Alberta Newsprint Mill	11 579565 U 6001600
Lac La Biche	12 438500 U 6077250
Gregoire Lake	12 459200 V 6257750
Athabasca Delta	12 503750 V 6473750
Lake Athabasca	12 500425 V 6501750

S	SNUM	SPEC	LEN	SE	CA	MESH	DA	MO	YR	LOC	SI	KM	UTM
B	29	GOLD	410		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	9	WALL	337		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	10	LNSC	488		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	11	LNSC	479		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	12	LKWH	453		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	13	LKWH	399		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	14	LKWH	427		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	15	GOLD	341		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	16	GOLD	338		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	17	GOLD	348		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	18	GOLD	343		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	19	WALL	516		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	20	WALL	494		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	21	WALL	479		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	22	WALL	462		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	23	LKWH	429		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	24	LKWH	363		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	25	WALL	536		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	26	WALL	472		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	27	WALL	547		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	28	GOLD	377		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	34	GOLD	344		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	30	LNSC	441		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	7	GOLD	366		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	32	LNSC	466		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	33	WALL	464		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	4	LKWH	451		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	35	GOLD	347		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	1	LKWH	434		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	2	LKWH	449		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	3	LKWH	449		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	5	LNSC	417		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	6	LNSC	451		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	8	GOLD	353		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
B	31	LNSC	427		GN	10.2	10	06	92	ATHABASCA DELTA			12 503750 V 6473750
A	3004	FLCH	193		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3003	FLCH	194		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2999	FLCH	223		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3005	FLCH	200		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3006	FLCH	185		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3007	FLCH	175		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2997	GOLD	236		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3011	TRPR	75		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2994	GOLD	280	10	ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
	3013	TRPR	59		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2991	NRPK	377		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3010	TRPR	71		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2992	GOLD	317	10	ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3012	TRPR	58		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3008	EMSH	81		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983

S	SNUM	SPEC	LEN	SE	CA	MESH	DA	MO	YR	LOC	SI	KM	UTM
A	2988	WALL	458		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2990	WALL	381	07	ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2986	GOLD	282	10	ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2993	GOLD	308	10	ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2989	WALL	319		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2995	GOLD	285		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2996	GOLD	274		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3014	TRPR	60		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2998	FLCH	284		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3009	EMSH	78		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2987	LKWH	357		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3019	TRPR	55		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3015	TRPR	62		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3016	TRPR	52		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3017	TRPR	53		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3018	TRPR	52		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3000	FLCH	261		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3001	FLCH	195		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	3002	FLCH	204		ES		16	05	92	ATHABASCA R.	09	230.4	12 462965 V 6340983
A	2695	FLCH	180		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2693	FLCH	188		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2692	FLCH	203		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2696	FLCH	108		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2702	TRPR	36		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2697	FLCH	126		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2691	FLCH	226		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2673	WALL	408	19	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2667	GOLD	261	10	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2670	WALL	393	08	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2669	NRPK	535	19	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2672	WALL	384		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2705	TRPR	39		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2706	TRPR	58		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2694	FLCH	189		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2703	TRPR	71		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2666	GOLD	317	10	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2688	FLCH	240		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2683	LNSC	385		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2690	FLCH	236		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2685	LNSC	261		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2671	WALL	433		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2682	LNSC	350		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2700	TRPR	60		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2674	WALL	382		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2675	WALL	385		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2676	WALL	375		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2699	TRPR	81		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2662	GOLD	332	10	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2701	TRPR	52		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2707	TRPR	47		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2698	TRPR	60		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414

S	SNUM	SPEC	LEN	SE	CA	MESH	DA	MO	YR	LOC	SI	KM	UTM
A	2704	TRPR	44		BS		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2668	NRPK	564	19	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2663	GOLD	310	10	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2664	GOLD	314	10	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2665	GOLD	299	20	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2686	FLCH	244		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2684	LNSC	309		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2687	FLCH	212		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2689	FLCH	223		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	267	WALL	356	19	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2678	WALL	332		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2679	WALL	325		ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2680	LNSC	451	09	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2681	LNSC	444	10	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	2661	GOLD	367	20	ES		13	05	92	ATHABASCA R.	08	299.8	12 470096 V 6282414
A	1725	FLCH	176		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1707	WALL	375	08	ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1721	FLCH	231		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1710	WALL	338		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1713	LNSC	317		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1712	WALL	343		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1708	WALL	271		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1715	GOLD	310		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1716	GOLD	277		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1711	WALL	391	07	ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1724	FLCH	212		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1726	FLCH	156		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	2066	FLCH	190		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1718	FLCH	230		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1723	FLCH	175		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1717	FLCH	251		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1714	LNSC	250		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1719	FLCH	247		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1709	WALL	273		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1720	FLCH	203		ES		05	05	92	ATHABASCA R.	06	627.0	12 390066 U 6093858
A	1798	TRPR	68		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1792	EMSH	69		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1788	GOLD	252		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1795	EMSH	61		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1779	LNSC	334		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1797	LKCH	82		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1782	WALL	408	08	ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1799	TRPR	46		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1796	LKCH	86		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1778	LNSC	436		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1790	EMSH	90		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1783	WALL	328		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1784	NRPK	428		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1777	LNSC	375		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1789	EMSH	89		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1793	EMSH	72		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858

S	SNUM	SPEC	LEN	SE	CA	MESH	DA	MO	YR	LOC	SI	KM	UTM
A	1794	EMSH	61		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1780	LNSC	277		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1785	GOLD	220		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1791	EMSH	66		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1781	LNSC	271		ES		05	05	92	ATHABASCA R.	06	630.0	12 390066 U 6093858
A	1706	LNSC	341		ES		05	05	92	ATHABASCA R.	06	632.5	12 390066 U 6093858
A	1705	LNSC	415		ES		05	05	92	ATHABASCA R.	06	632.5	12 390066 U 6093858
A	1702	GOLD	364	10	ES		05	05	92	ATHABASCA R.	06	633.8	12 390066 U 6093858
A	1704	GOLD	373	20	ES		05	05	92	ATHABASCA R.	06	633.8	12 390066 U 6093858
A	1703	WALL	325		ES		05	05	92	ATHABASCA R.	06	633.8	12 390066 U 6093858
A	4789	MNWH	372		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4788	MNWH	363		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4783	MNWH	346		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4775	LNSC	430		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4780	LNSC	343		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4779	LNSC	336		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4786	MNWH	386		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4777	LNSC	377		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4791	MNWH	438		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4785	MNWH	334		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4792	BURB	870		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4787	MNWH	352		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4774	LNSC	381		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4782	MNWH	296		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4778	LNSC	407		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4781	LNSC	350		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4776	LNSC	417		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4784	MNWH	309		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4790	MNWH	418		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4772	LNSC	347		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4773	LNSC	400		ES		20	05	92	ATHABASCA R.		1024.0	11 586615 U 6001205
A	4752	LNSC	391		ES		20	05	92	ATHABASCA R.		1032.0	11 579565 U 6001600
A	4734	MNWH	323		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4762	MNWH	334		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4754	LNSC	413		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4742	LNSC	332		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4747	LNSC	382		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4770	MNWH	350		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4743	LNSC	365		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4769	MNWH	354		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4750	LNSC	401		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4748	LNSC	353		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4771	MNWH	356		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4746	LNSC	372		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4760	LNSC	420		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4744	LNSC	354		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4739	MNWH	371		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4737	MNWH	347		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4763	MNWH	422		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4749	LNSC	404		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4733	MNWH	370		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300

S	SNUM	SPEC	LEN	SE	CA	MESH	DA	MO	YR	LOC	SI	KM	UTM
A	4735	MNWH	323		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4751	LNSC	385		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4766	MNWH	303		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4732	MNWH	283		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4759	LNSC	408		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4768	MNWH	283		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4758	LNSC	409		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4761	LNSC	477		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4765	MNWH	332		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4767	MNWH	310		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4764	MNWH	388		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4736	MNWH	462		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4757	LNSC	397		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4738	MNWH	401		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4753	LNSC	377		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4756	LNSC	373		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4745	LNSC	387		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4741	MNWH	350		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4740	MNWH	494		ES		19	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	4755	LNSC	399		ES		20	05	92	ATHABASCA R.		1229.0	11 461050 U 5918300
A	3702	BLTR	517		SL		27	04	92	ATHABASCA R.	01	1234.3	11 526509 U 6000800
A	3701	BLTR	388		SL		27	04	92	ATHABASCA R.	01	1235.6	11 526509 U 6000800
A	3700	BLTR	312		SL		27	04	92	ATHABASCA R.	01	1235.6	11 526509 U 6000800
A	4730	LNSC	323		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4726	LNSC	380		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4720	MNWH	236		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4718	MNWH	262		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4731	LNSC	334		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4716	MNWH	266		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4719	MNWH	255		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4725	LNSC	366		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4714	MNWH	270		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4713	MNWH	322		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4724	LNSC	375		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4721	MNWH	279		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4728	LNSC	357		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4712	MNWH	319		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4715	MNWH	287		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4723	LNSC	363		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4727	LNSC	397		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4729	LNSC	376		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4717	MNWH	272		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	4722	LNSC	410		ES		13	05	92	ATHABASCA R.		1238.0	11 453760 U 5914250
A	3322	SPSH	84		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3323	SPSH	79		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3324	SPSH	84		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3357	WALL	392	08	GN	11.4	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3321	SPSH	83		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3351	NRPK	782		GN	8.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3328	SPSH	83		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3329	SPSH	80		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750

S	SNUM	SPEC	LEN	SE	CA	MESH	DA	MO	YR	LOC	SI	KM	UTM
A	3325	SPSH	82		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3350	NRPK	795		GN	8.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3359	WALL	485	08	GN	11.4	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3360	WALL	489	08	GN	11.4	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3361	WALL	444	08	GN	11.4	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3349	NRPK	486		GN	8.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3358	WALL	466	08	GN	11.4	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3342	WALL	502		GN	8.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3343	NRPK	733		GN	8.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3344	NRPK	548		GN	8.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3345	NRPK	520		GN	8.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3346	NRPK	581		GN	6.4	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3326	SPSH	86		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3327	SPSH	91		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3348	WHSC	407		GN	14.0	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3355	WALL	373	07	GN	14.0	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3330	SPSH	81		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3347	NRPK	464		GN	14.0	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3352	LKWH	450		GN	11.4	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3354	WALL	379	08	GN	14.0	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3339	NRPK	847		GN	3.8	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3356	WALL	408	08	GN	11.4	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3353	YLPR	156		GN	3.8	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3337	LKWH	475		GN	14.0	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3338	WHSC	462		GN	14.0	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3333	NRPK	568		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3340	LKWH	469		GN	3.8	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3341	WALL	509		GN	8.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3331	TRPR	76		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3332	NRPK	454		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3334	NRPK	413		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3335	NRPK	560		GN	1.9	23	05	92	GREGOIRE L.			12 459200 V 6257750
A	3336	LKWH	386		GN	14.0	23	05	92	GREGOIRE L.			12 459200 V 6257750
B	69	NRPK	639		GN	3.8	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	73	NRPK	513		GN	6.4	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	68	LKWH	312		GN	11.4	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	71	NRPK	548		GN	8.9	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	65	LKWH	324		GN	6.4	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	72	NRPK	597		GN	8.9	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	67	LKWH	333		GN	8.9	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	70	NRPK	591		GN	6.4	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	59	LKWH	289		GN	6.4	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	57	NRPK	635		GN	8.9	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	66	LKWH	291		GN	8.9	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	74	NRPK	522		GN	6.4	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	58	LKWH	321		GN	6.4	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	61	LNSC	451		GN	11.4	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	62	LKWH	275		GN	3.8	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	63	LKWH	280		GN	6.4	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	64	LKWH	278		GN	6.4	18	06	92	LAC LA BICHE			12 438500 U 6077250
B	60	LNSC	468		GN	11.4	18	06	92	LAC LA BICHE			12 438500 U 6077250

S	SNUM	SPEC	LEN	SE	CA	MESH	DA	MO	YR	LOC	SI	KM	UTM
B	56	GOLD	336		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	37	NRPK	570		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	38	NRPK	631		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	55	LKWH	329		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	54	LNSC	447		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	36	LKWH	363		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	42	LKWH	420		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	43	LKWH	439		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	39	NRPK	535		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	40	LKWH	393		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	41	LKWH	414		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	47	WALL	460		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	48	WALL	394		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	44	GOLD	365		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	45	GOLD	357		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	46	WALL	442		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	52	LNSC	450		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	53	LNSC	413		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	49	WALL	434		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	50	LNSC	458		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750
B	51	LNSC	457		GN	11.4	11	06	92	LAKE ATHABASCA			12 500425 V 6501750

TOTALS:	SNUM	842,339.00
	LEN	108,568.00
	SEX	356.00
	MESH	1,029.20
	DAY	4,774.00
	MO	1,701.00
	YR	29,992.00
	SITE	961.00
	KM	149,793.10

Printed 326 of the 326 records.

PRIMARY SORT FIELD: LOC

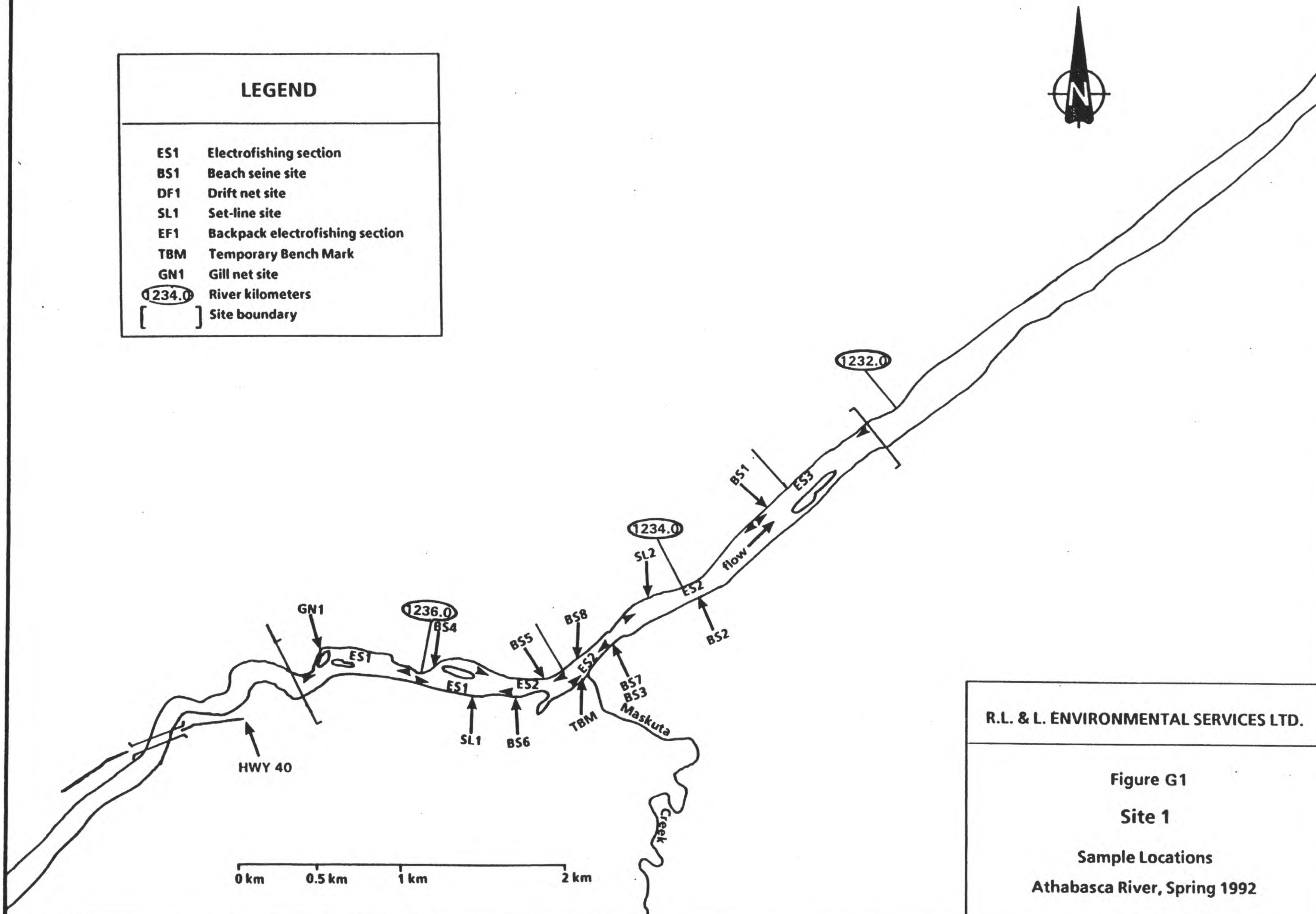
SELECTION CRITERIA:
All records

APPENDIX G

SAMPLING LOCATIONS AT INTENSIVE SURVEY SITES

Table G1. Universal Transverse Mercator Coordinates (UTM) for release areas for Floy-tagged fish, Athabasca River, 1992.

Site	Upstream End	Downstream End
1	11 454600 U 5914600	11 458500 U 5916100
2	11 522654 U 5997451	11 526509 U 6000800
3	11 600466 U 6002393	11 607659 U 6002700
4	11 680256 U 6083805	11 679328 U 6092957
5	12 313499 U 6117442	12 319863 U 6121642
6	12 380412 U 5990124	12 390066 U 6093858
7	12 398920 V 6212331	12 401710 V 6217521
8	12 466329 V 6280816	12 470096 V 6282414
9	12 463062 V 6332184	12 462965 V 6340983
10	12 477130 V 6425723	12 479046 V 6432386



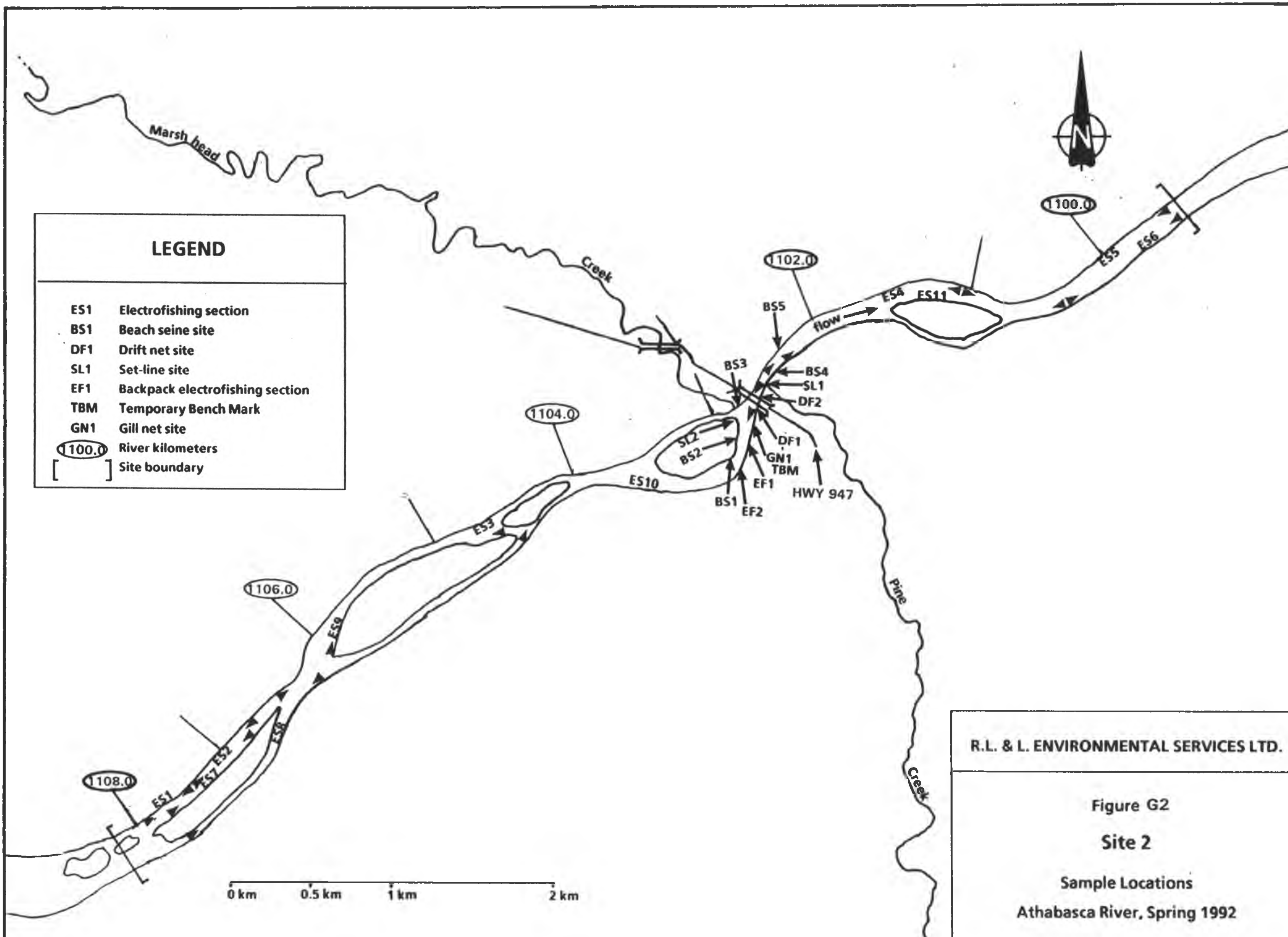
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure G1

Site 1

Sample Locations

Athabasca River, Spring 1992



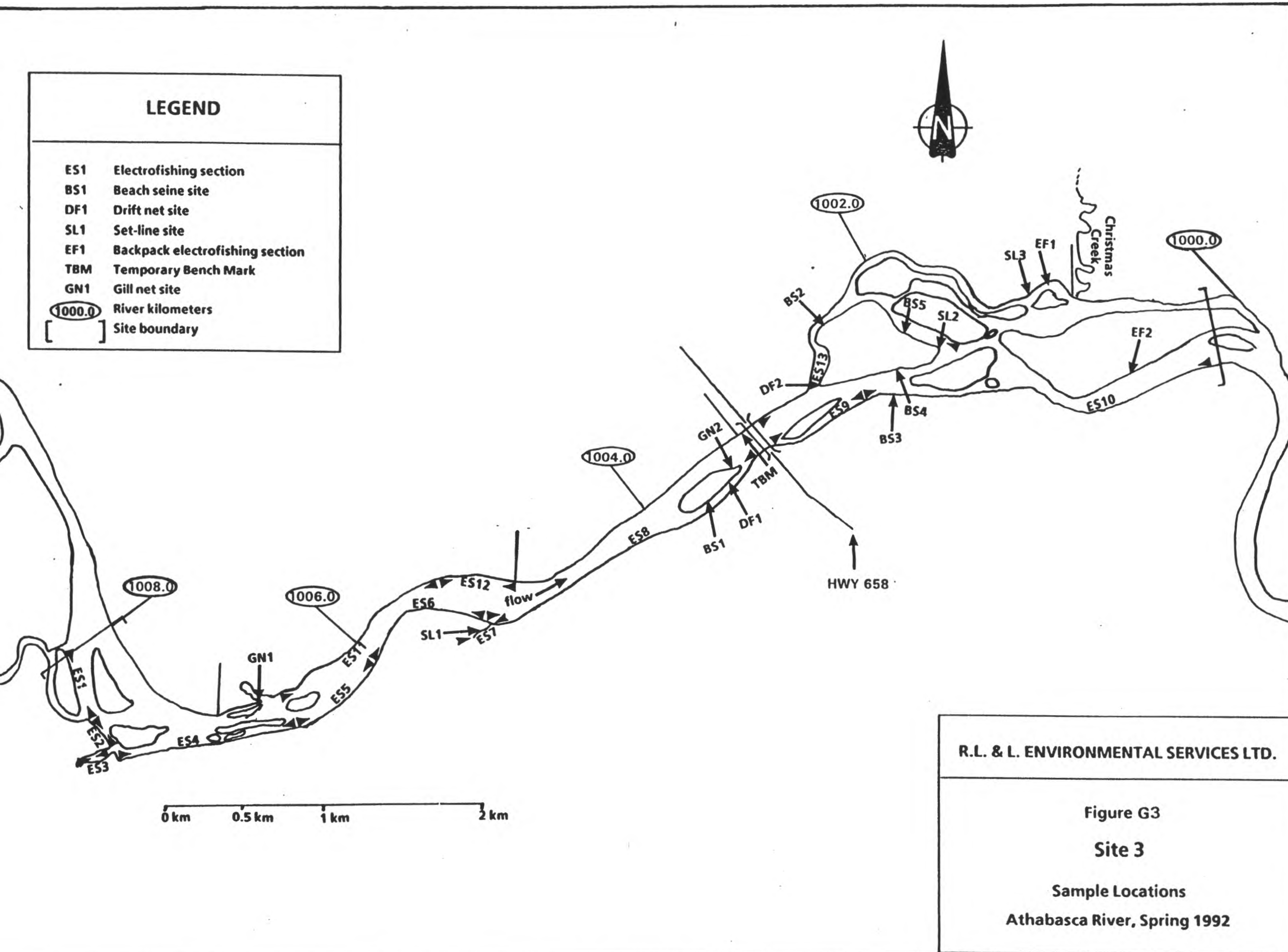
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure G2

Site 2

Sample Locations

Athabasca River, Spring 1992



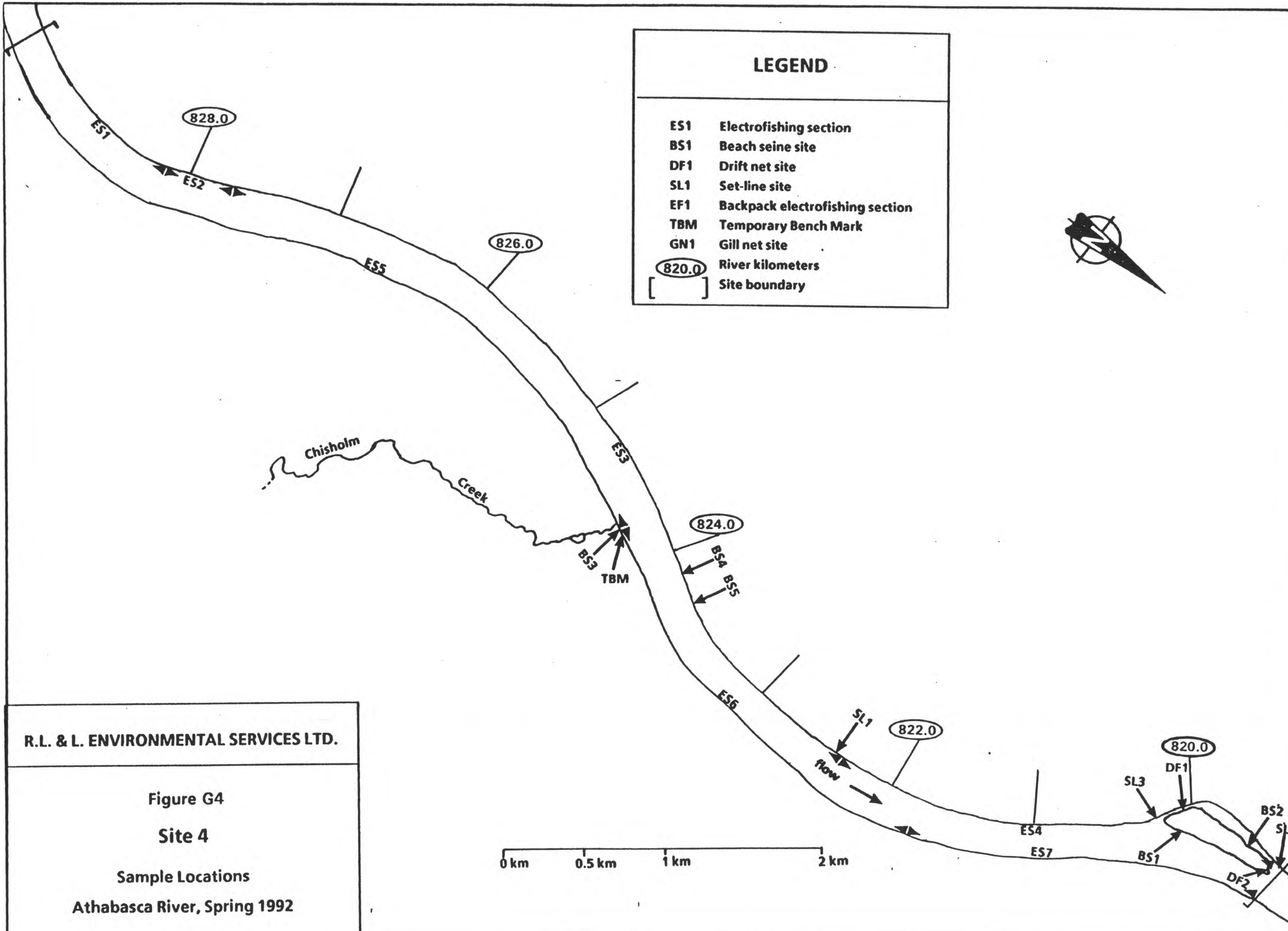
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure G3

Site 3

Sample Locations

Athabasca River, Spring 1992



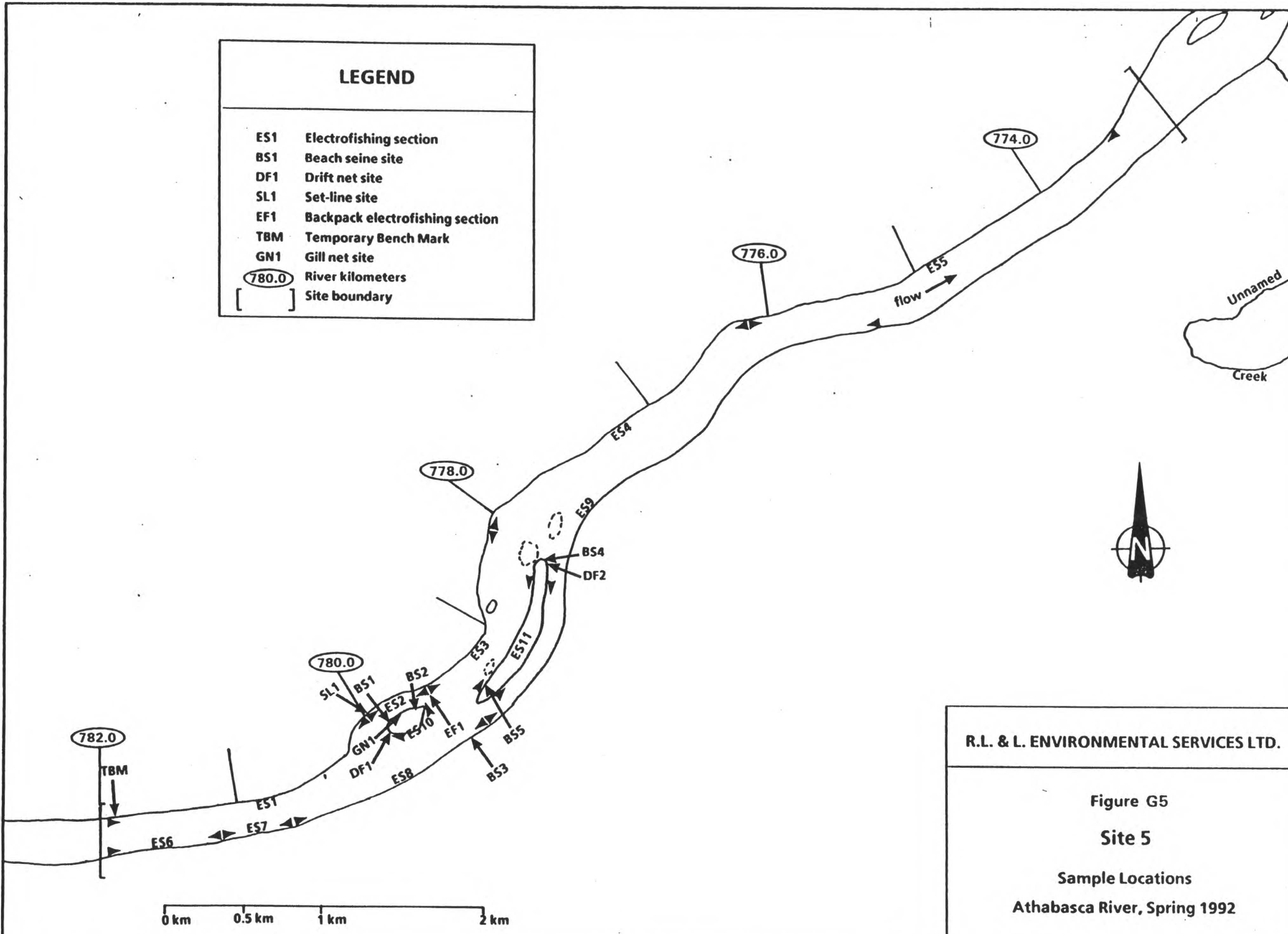
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure G4

Site 4

Sample Locations

Athabasca River, Spring 1992



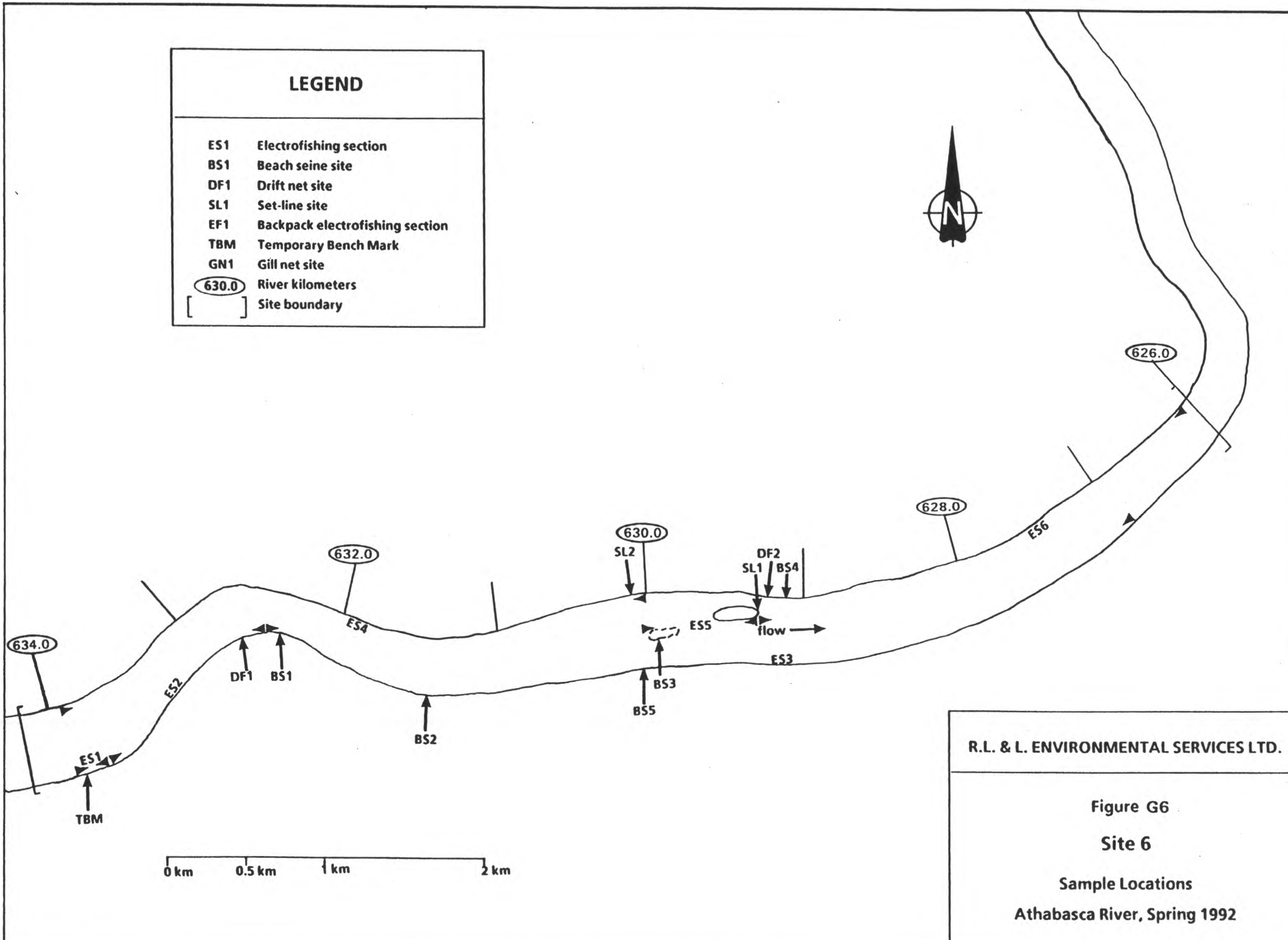
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure G5

Site 5

Sample Locations

Athabasca River, Spring 1992



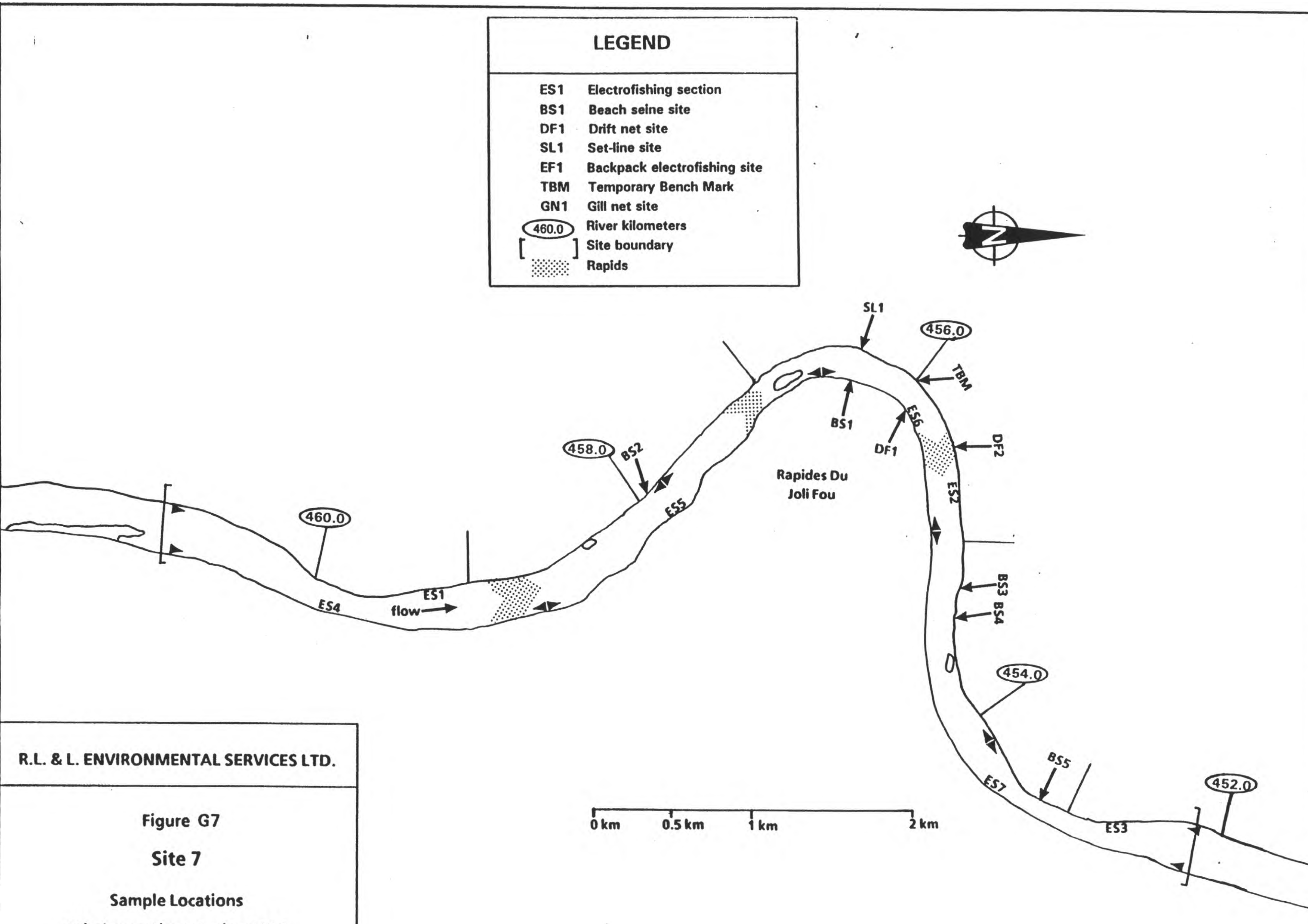
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure G6

Site 6

Sample Locations

Athabasca River, Spring 1992



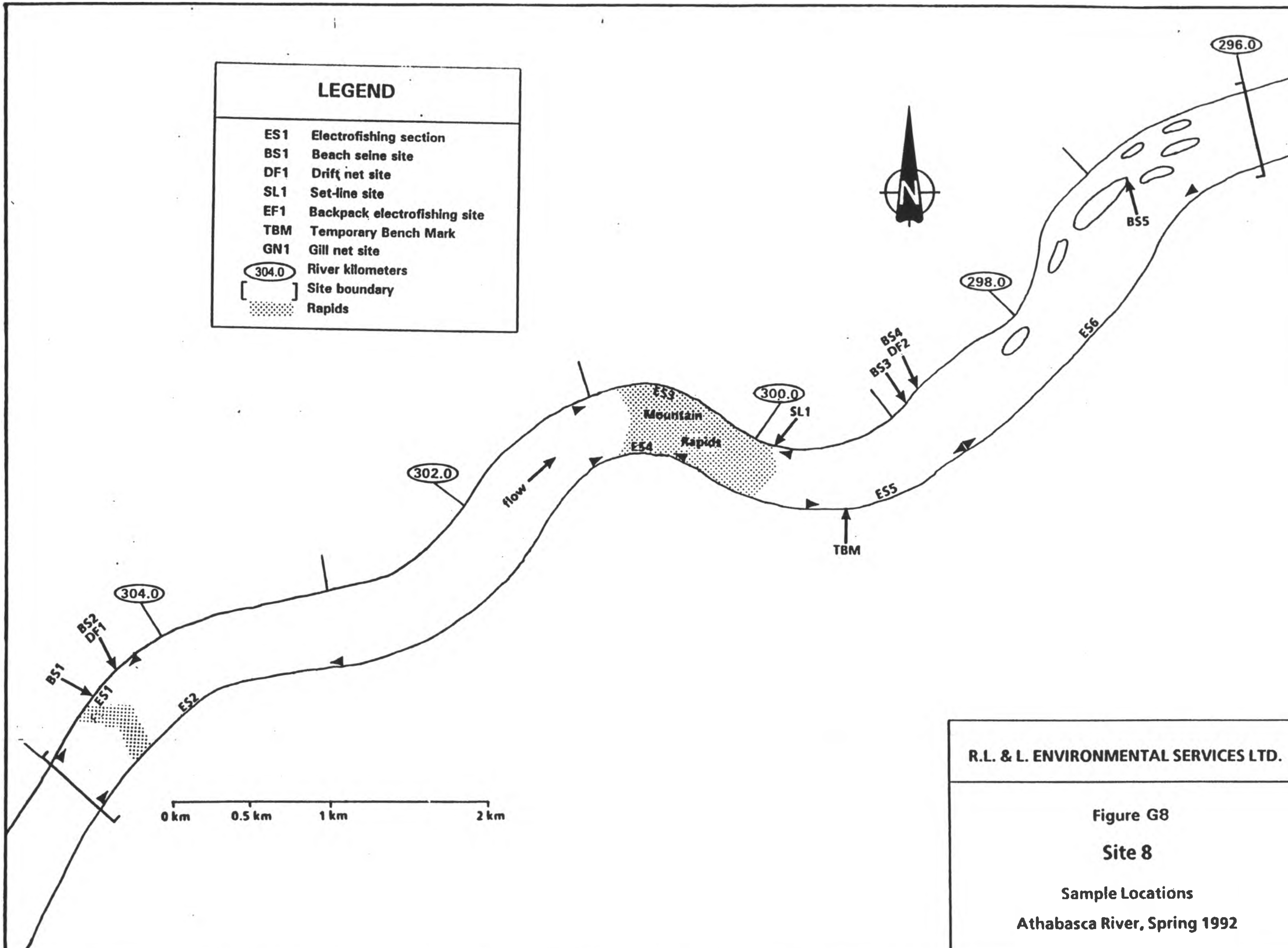
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure G7

Site 7

Sample Locations

Athabasca River, Spring 1992



LEGEND

ES1	Electrofishing section
BS1	Beach seine site
DF1	Drift net site
SL1	Set-line site
EF1	Backpack electrofishing site
TBM	Temporary Bench Mark
GN1	Gill net site
304.0	River kilometers
[ ]	Site boundary
(shading)	Rapids

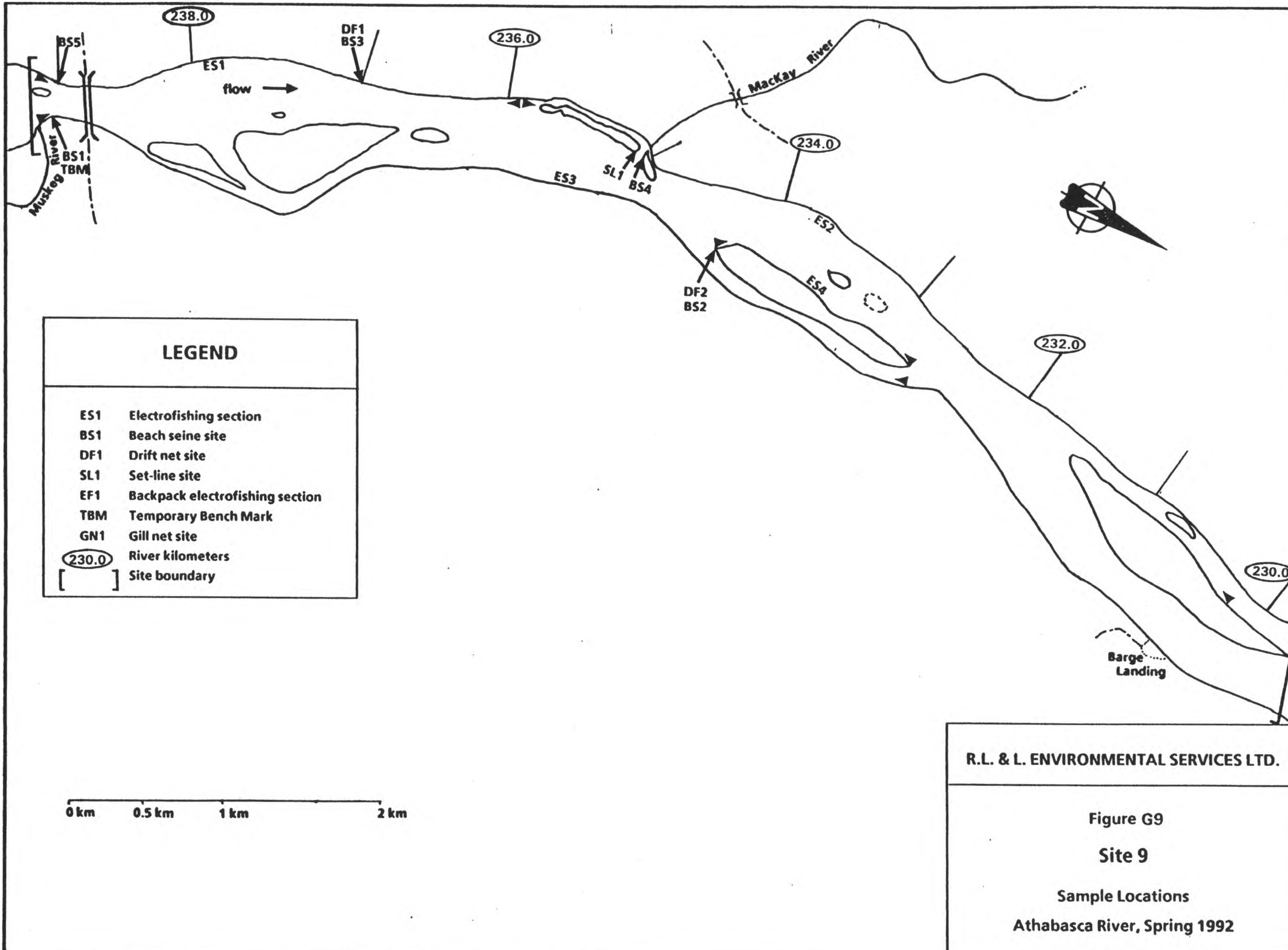
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure G8

Site 8

Sample Locations

Athabasca River, Spring 1992



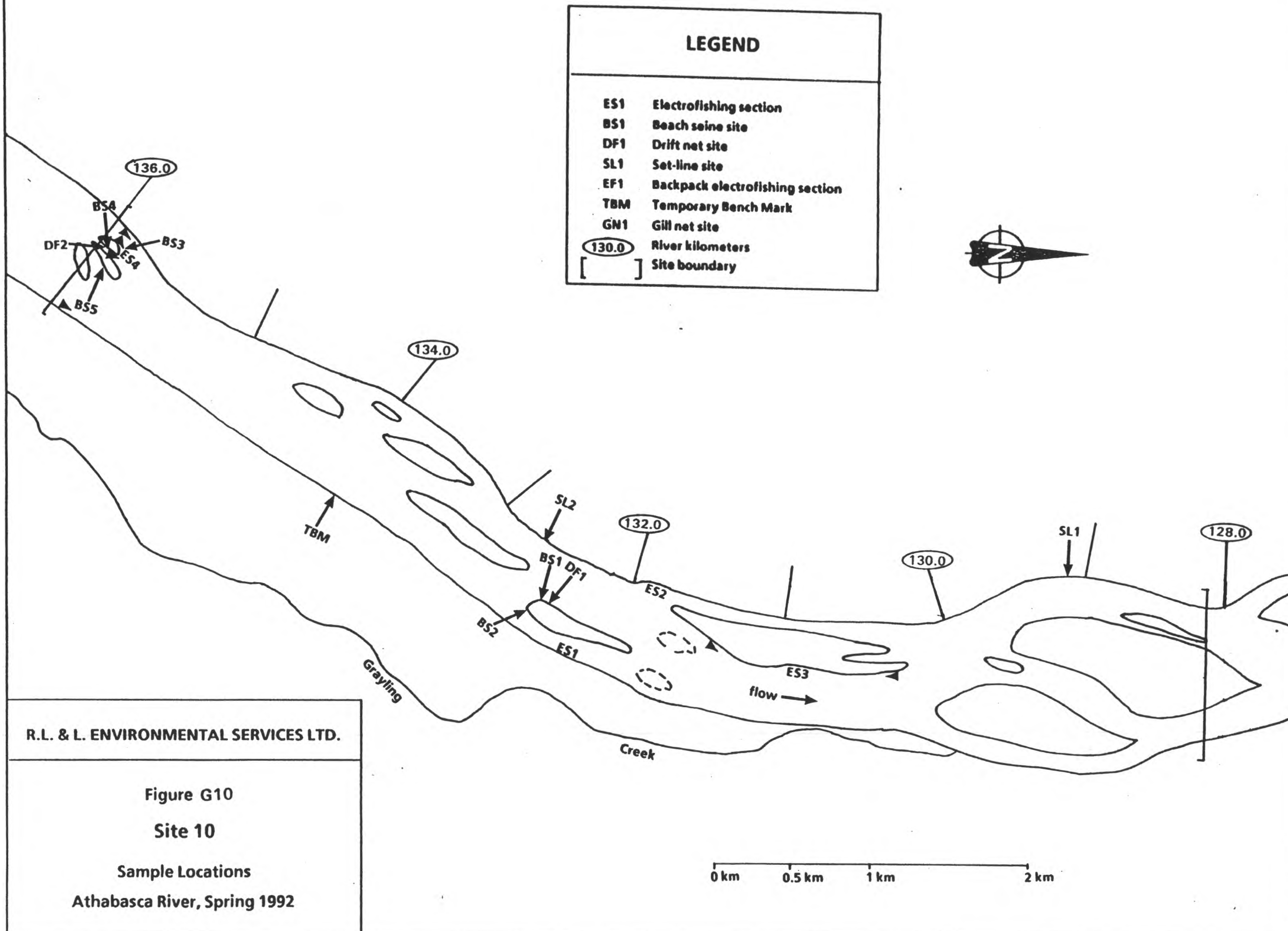
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure G9

Site 9

Sample Locations

Athabasca River, Spring 1992



R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure G10

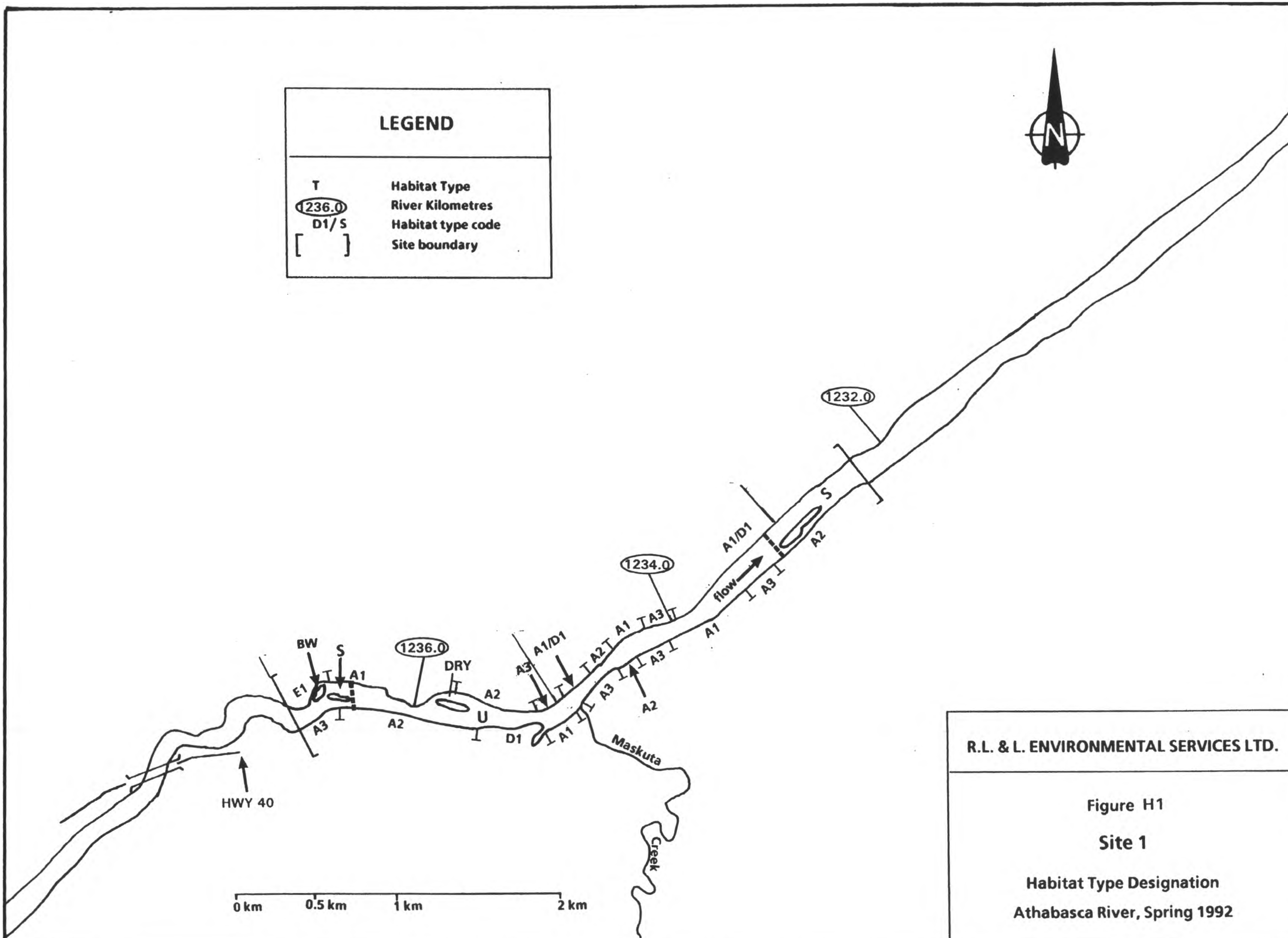
Site 10

Sample Locations

Athabasca River, Spring 1992

APPENDIX H

DISTRIBUTION OF BANK HABITAT TYPES AT INTENSIVE SURVEY SITES

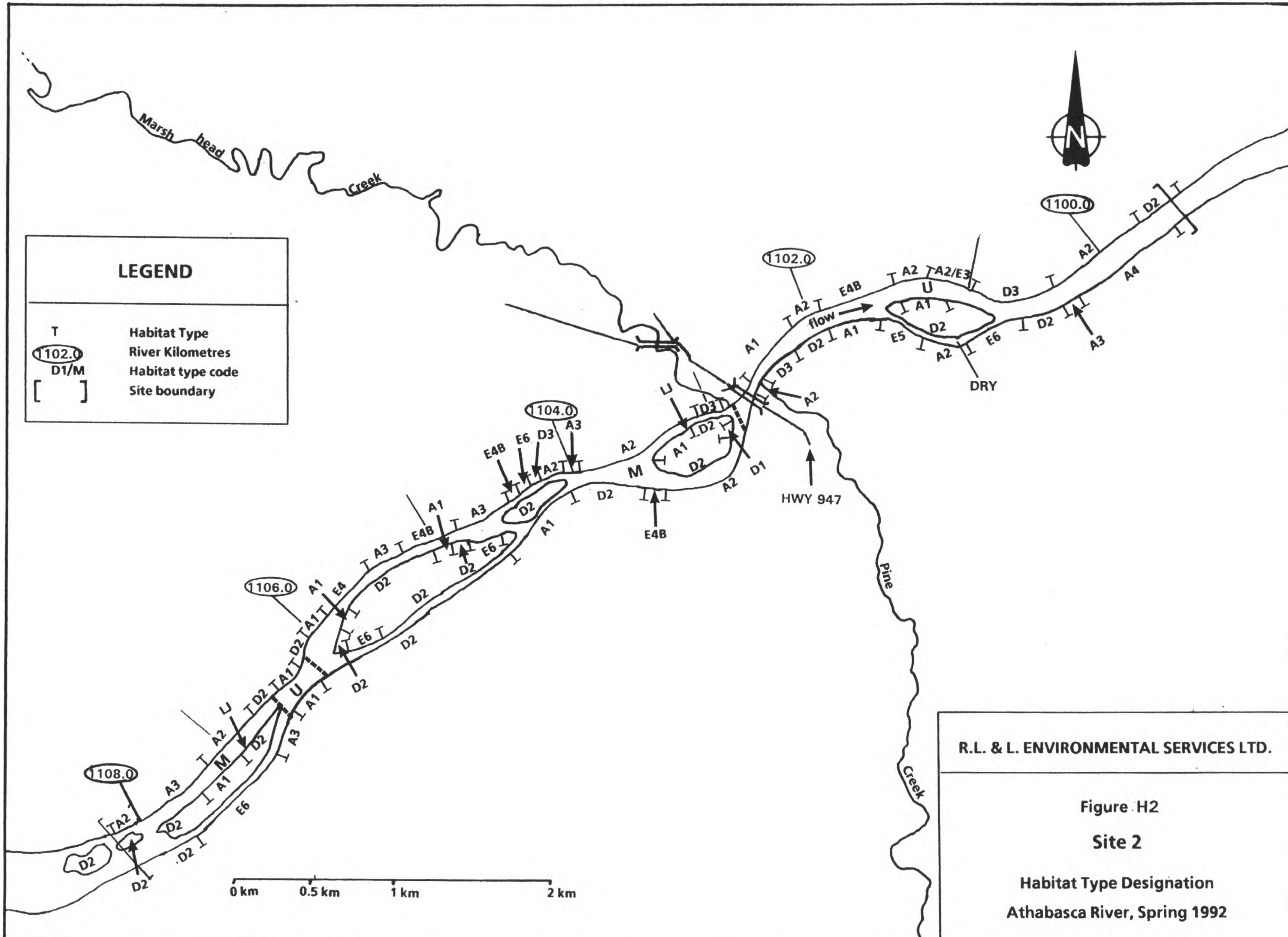


R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure H1

Site 1

Habitat Type Designation
Athabasca River, Spring 1992



R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure H2

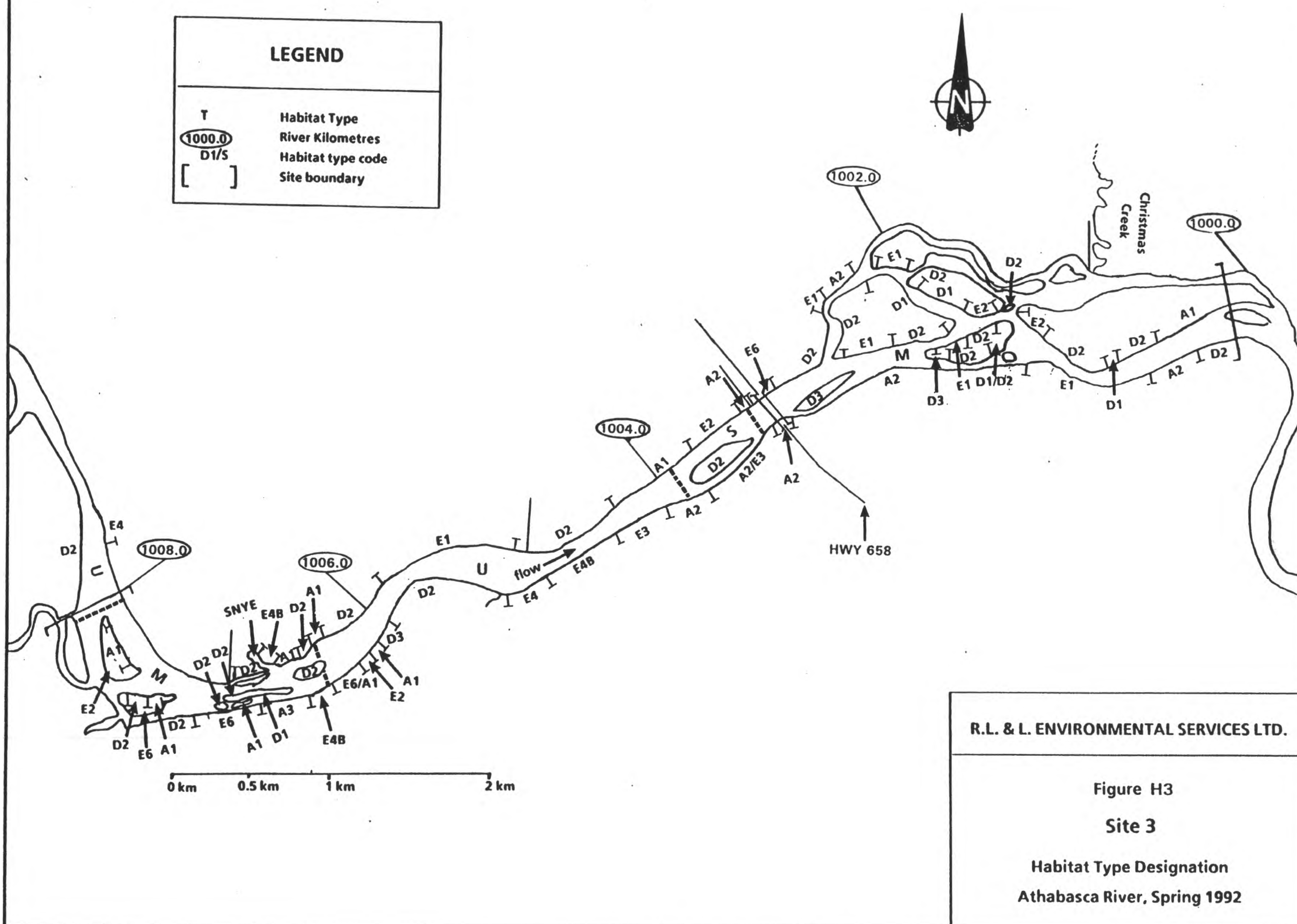
Site 2

Habitat Type Designation

Athabasca River, Spring 1992

LEGEND

T	Habitat Type
(1000.0)	River Kilometres
D1/S	Habitat type code
[ ]	Site boundary



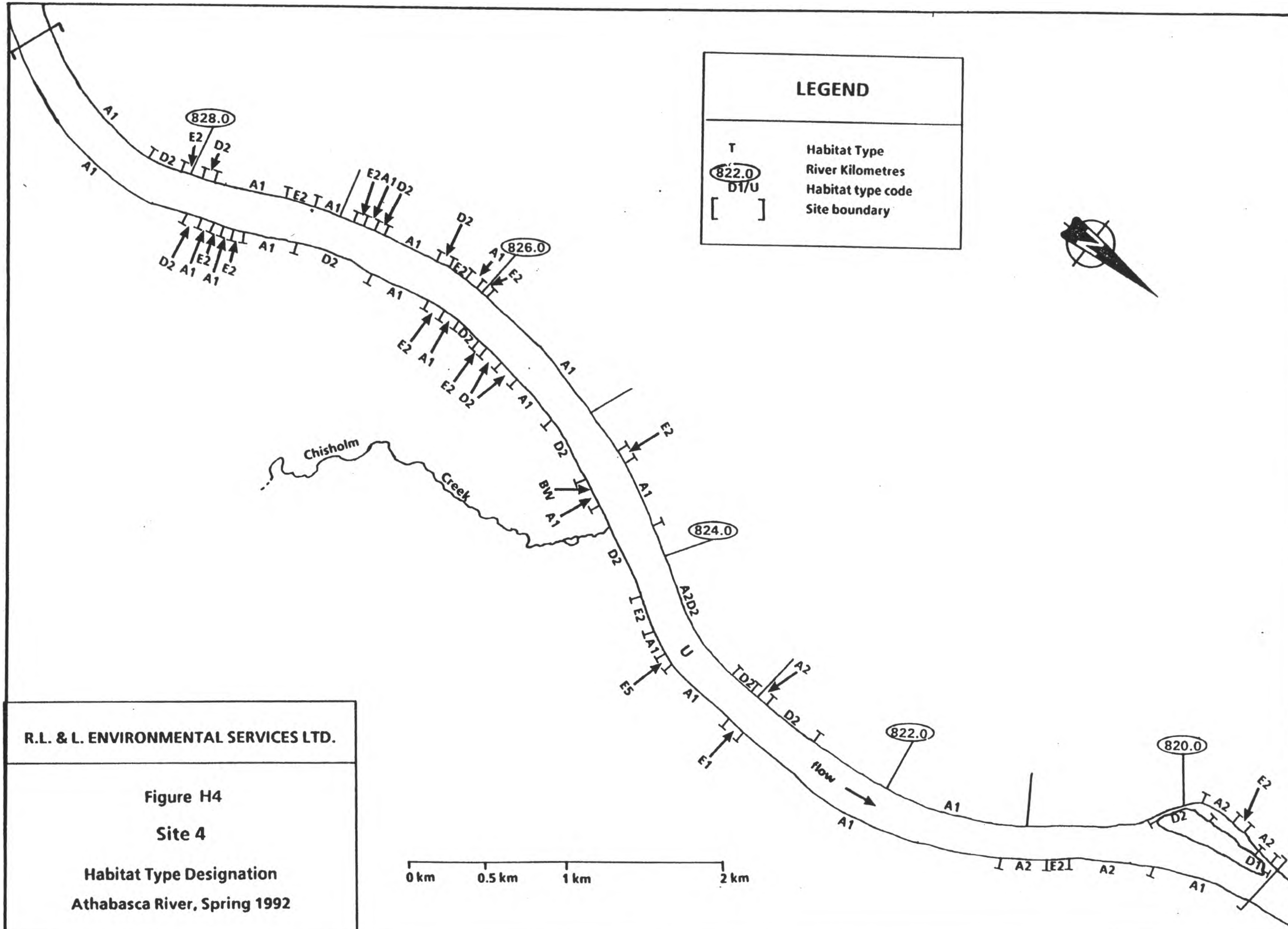
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure H3

Site 3

Habitat Type Designation

Athabasca River, Spring 1992



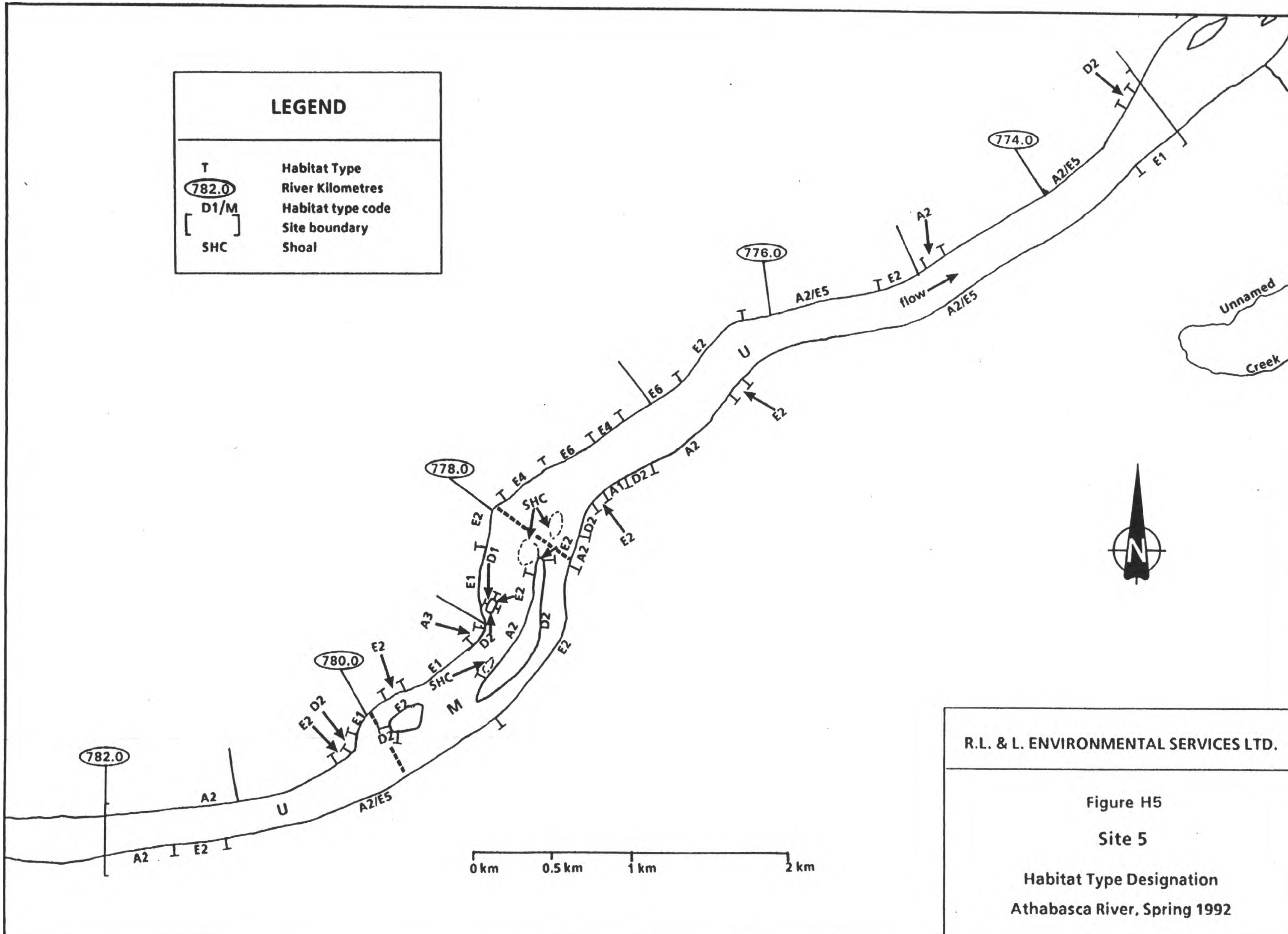
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure H4

Site 4

Habitat Type Designation

Athabasca River, Spring 1992



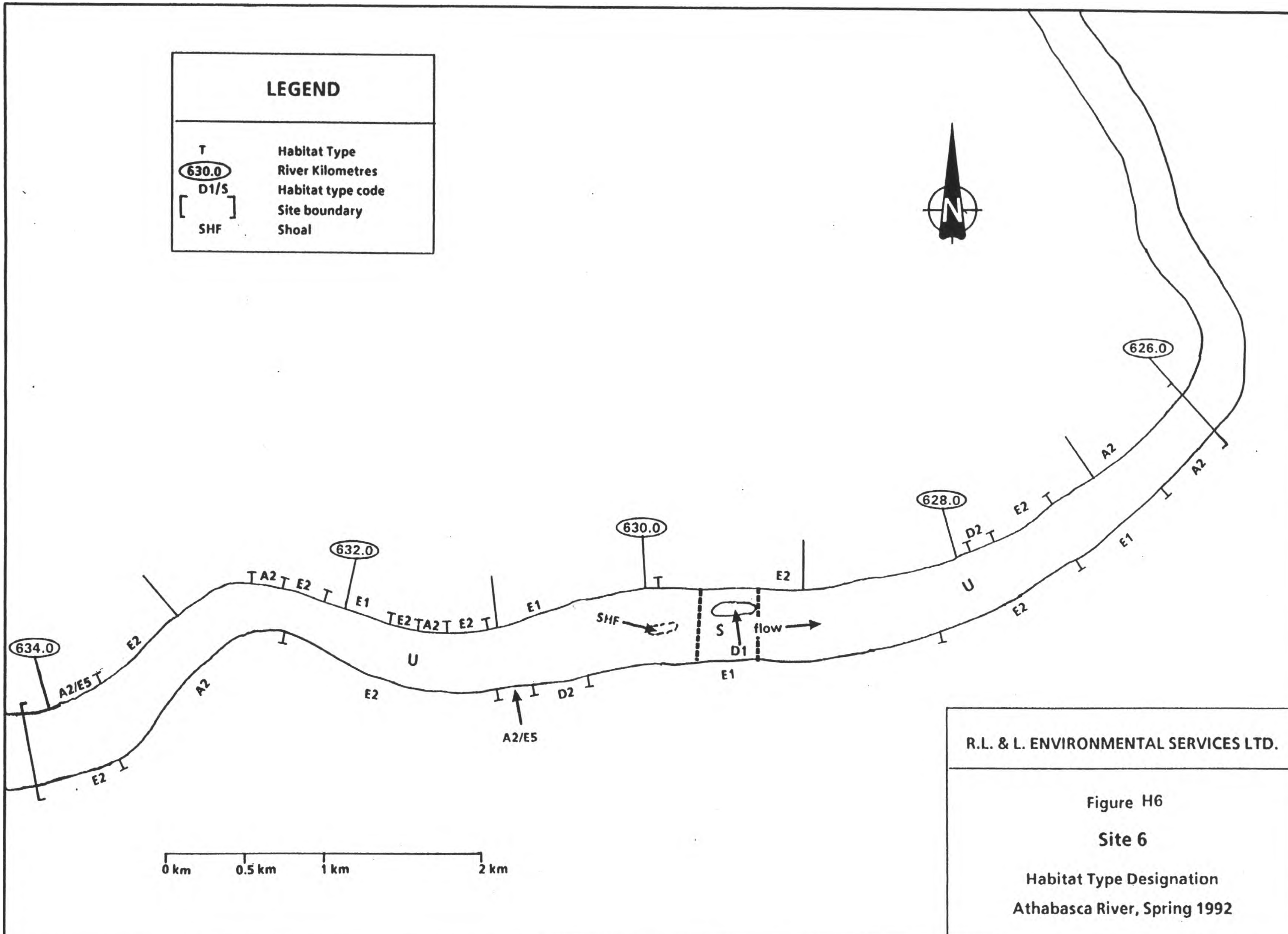
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure H5

Site 5

Habitat Type Designation

Athabasca River, Spring 1992



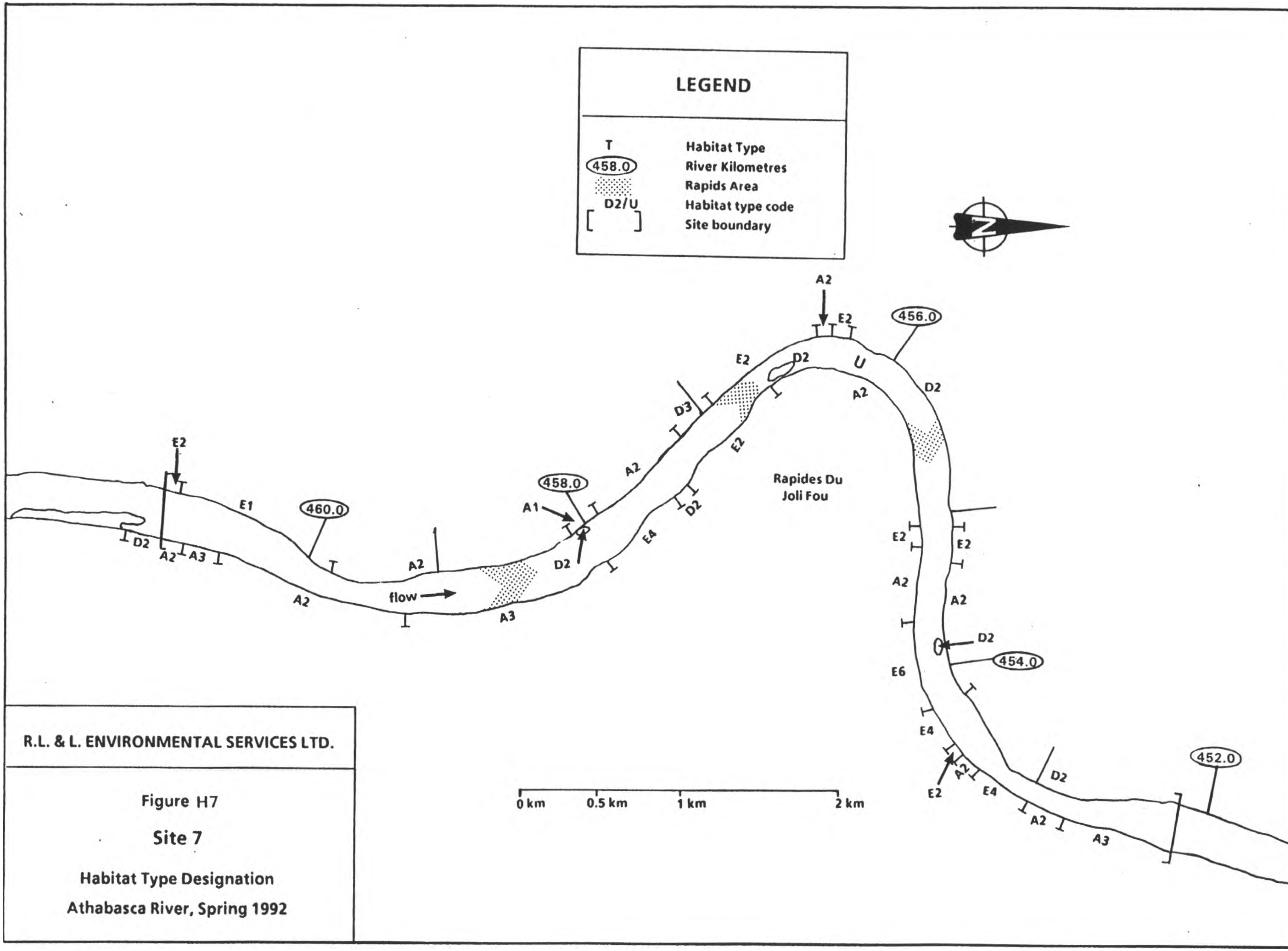
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure H6

Site 6

Habitat Type Designation

Athabasca River, Spring 1992



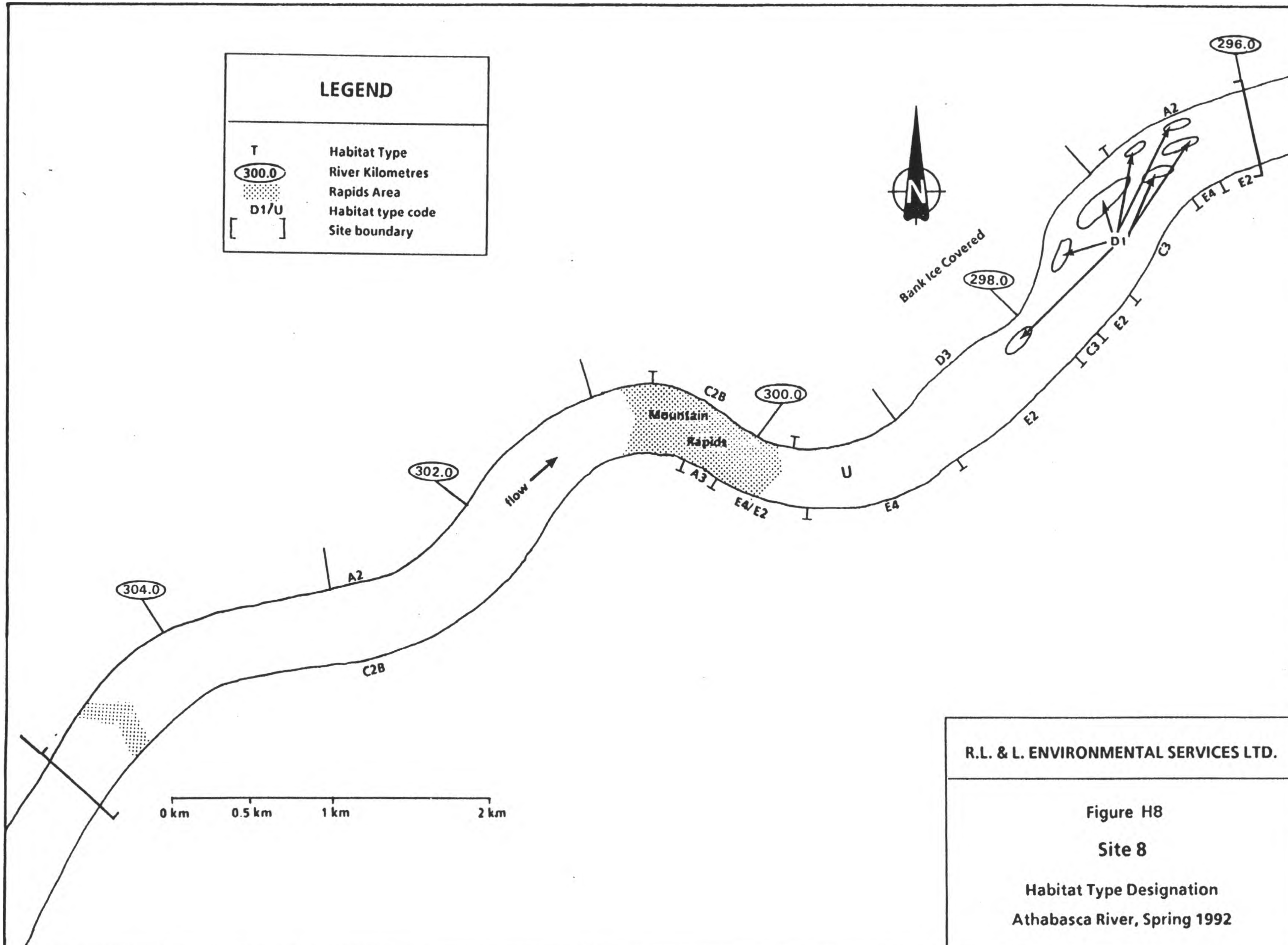
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure H7

Site 7

Habitat Type Designation

Athabasca River, Spring 1992



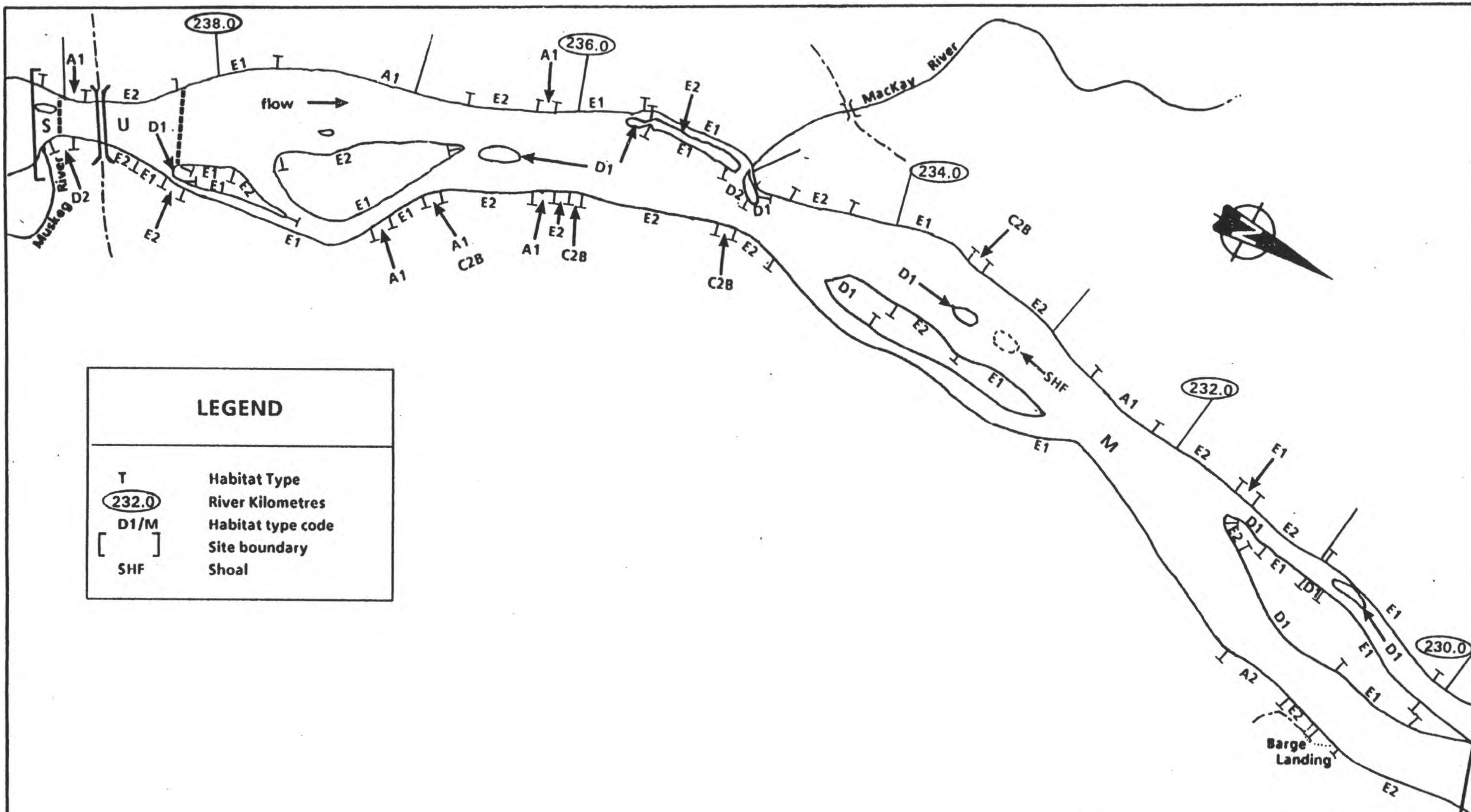
R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure H8

Site 8

Habitat Type Designation

Athabasca River, Spring 1992

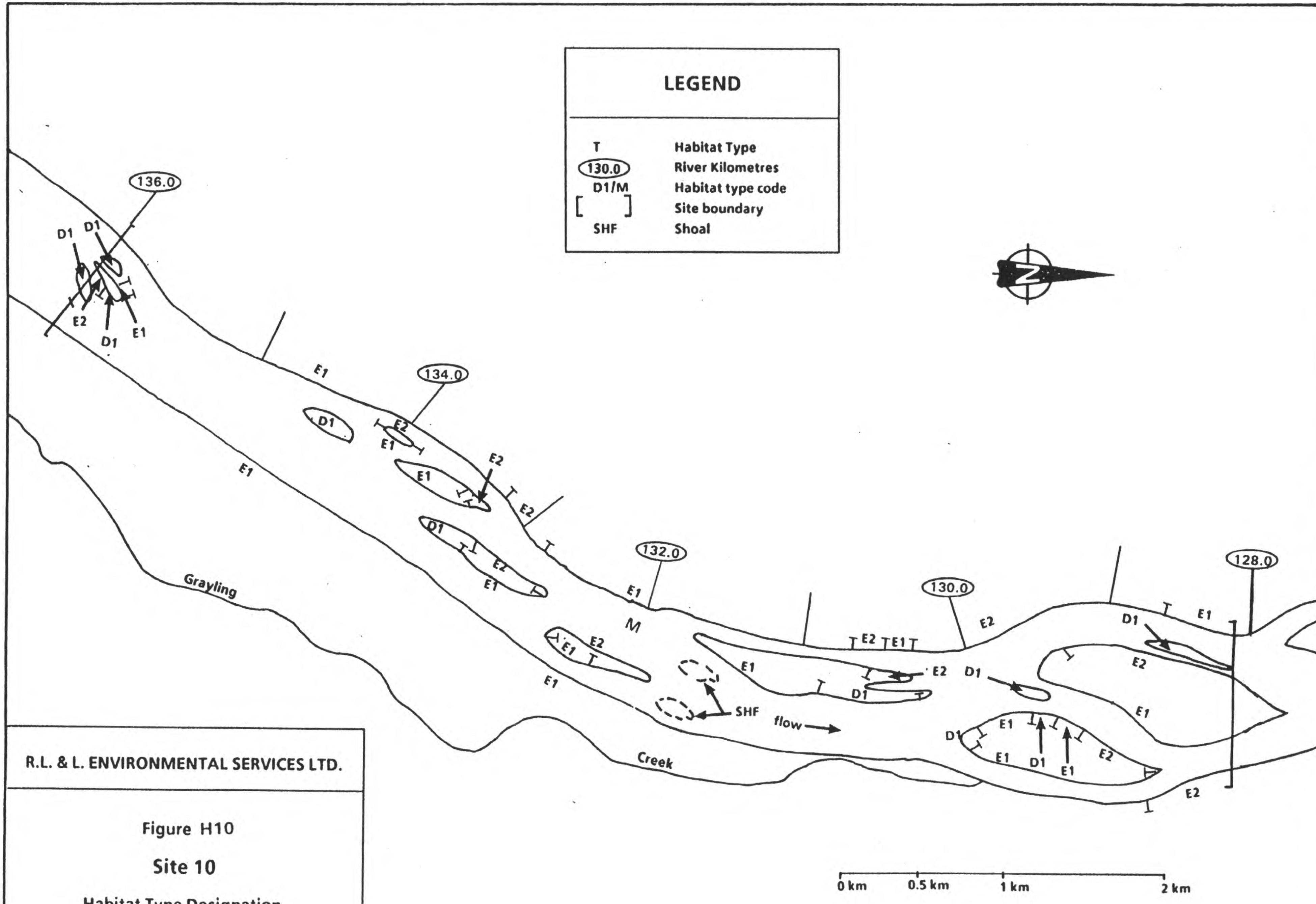


R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure H9

Site 9

Habitat Type Designation
Athabasca River, Spring 1992



R.L. & L. ENVIRONMENTAL SERVICES LTD.

Figure H10

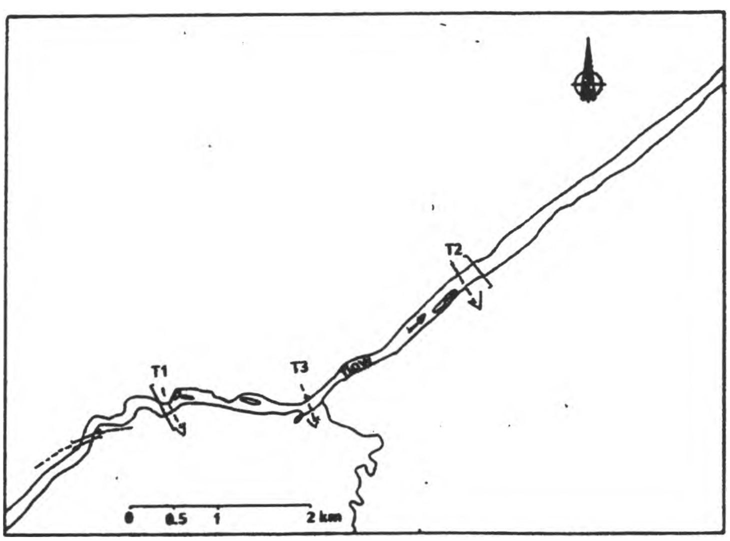
Site 10

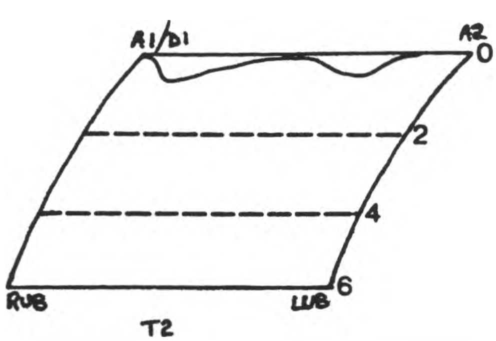
Habitat Type Designation

Athabasca River, Spring 1992

APPENDIX I

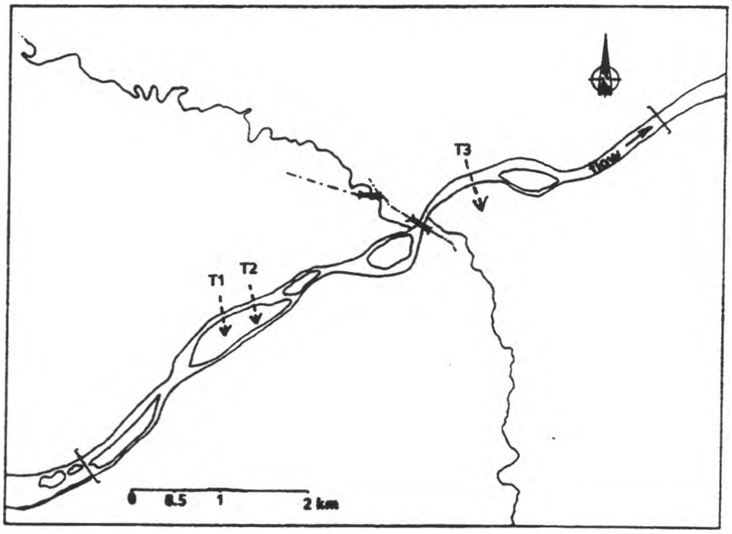
PHOTOGRAPHS AND SITE MAPS AT TRANSECT LOCATIONS

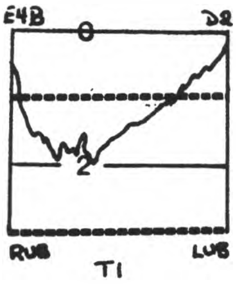




SITE 1

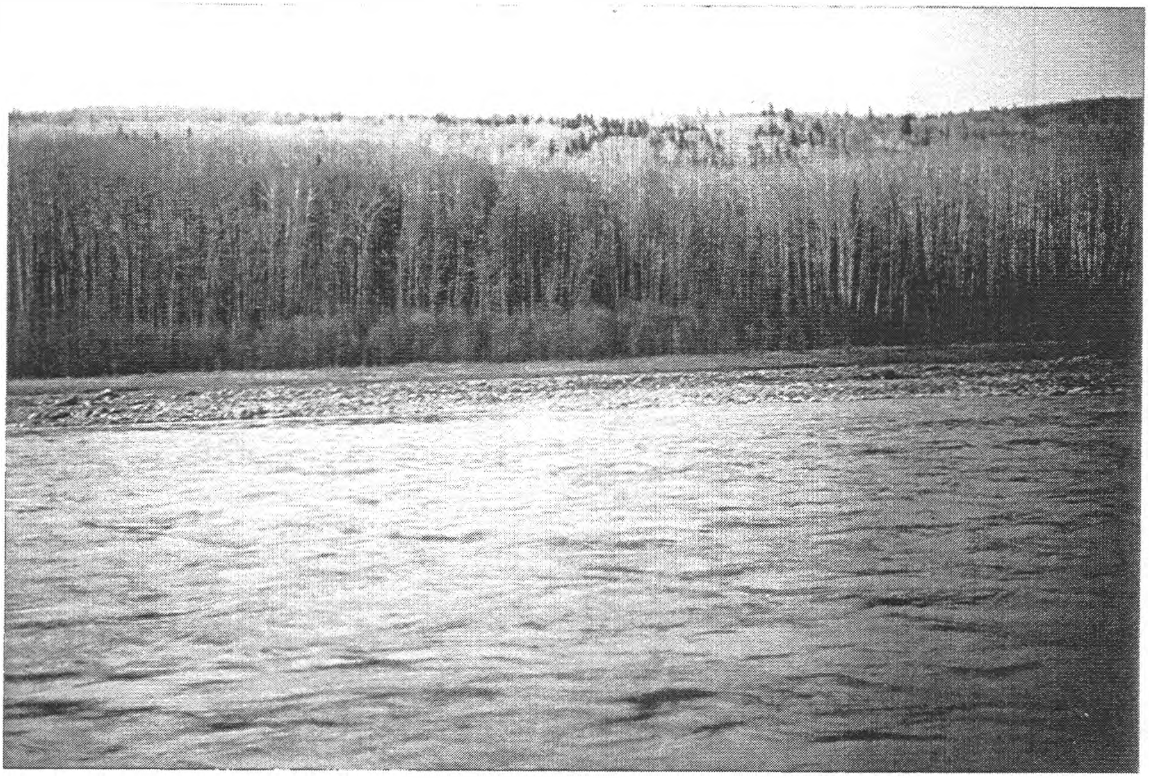
Photograph, site map with transect locations and depth profile of typical habitat.

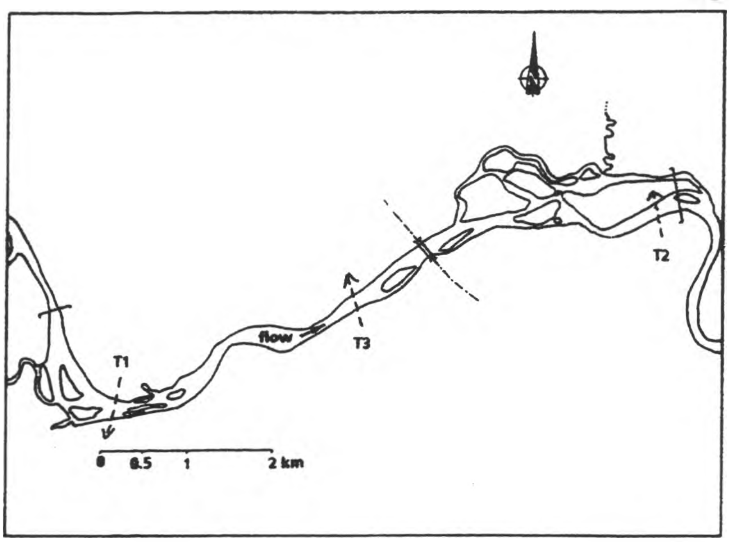


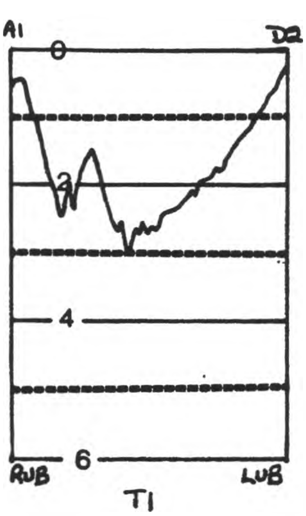


SITE 2

Photograph, site map with transect locations and depth profile of typical habitat.

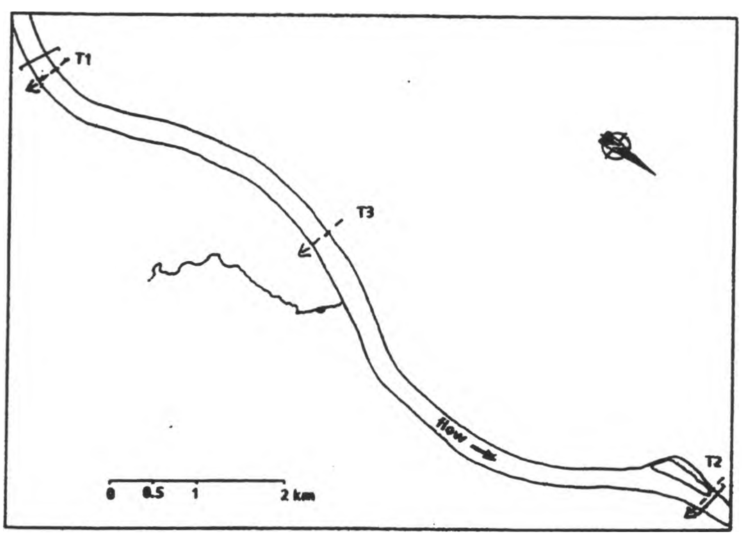


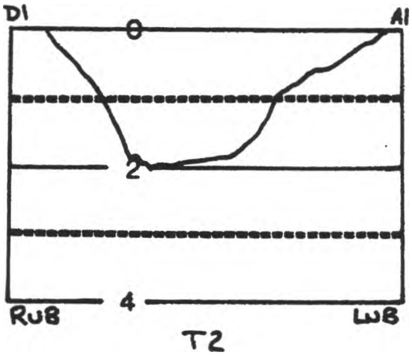




SITE 3

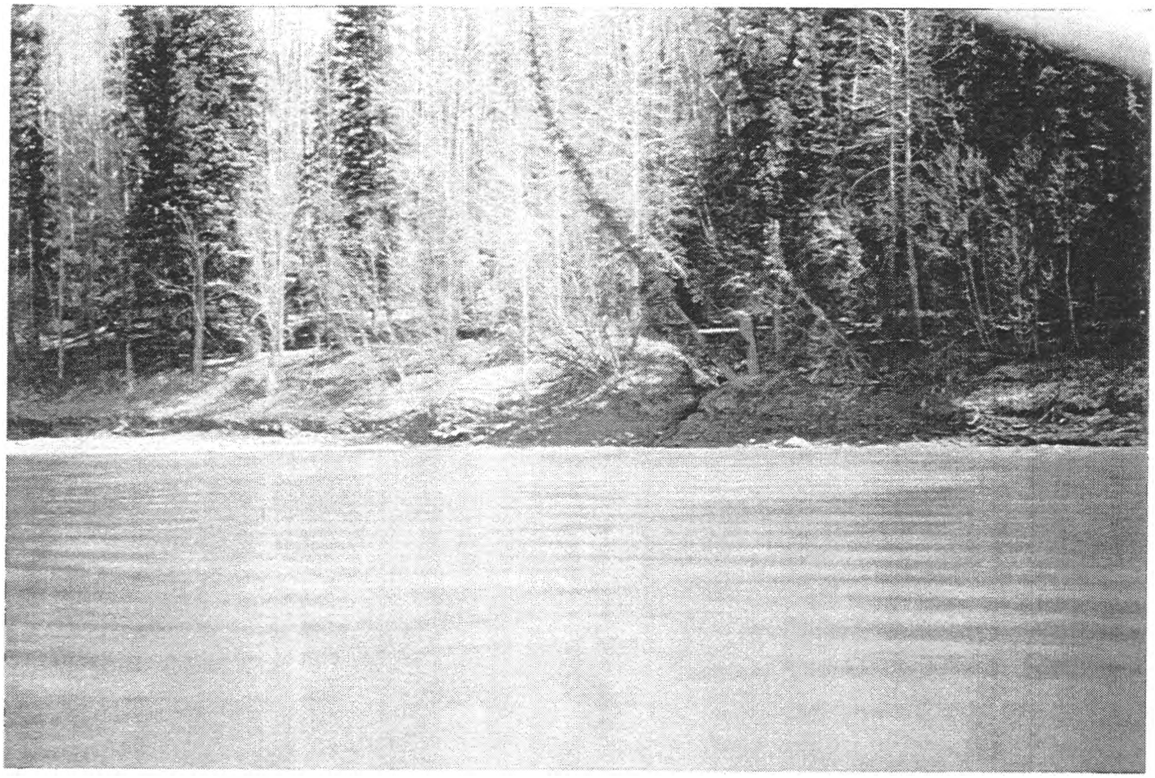
Photograph, site map with transect locations and depth profile of typical habitat.

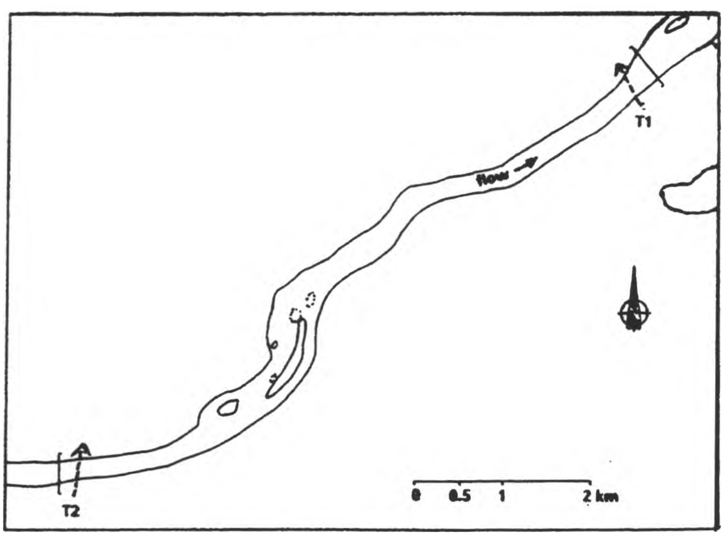




SITE 4

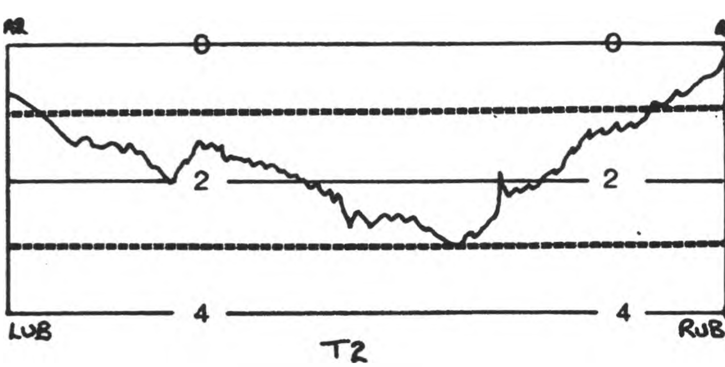
Photograph, site map with transect locations and depth profile of typical habitat.

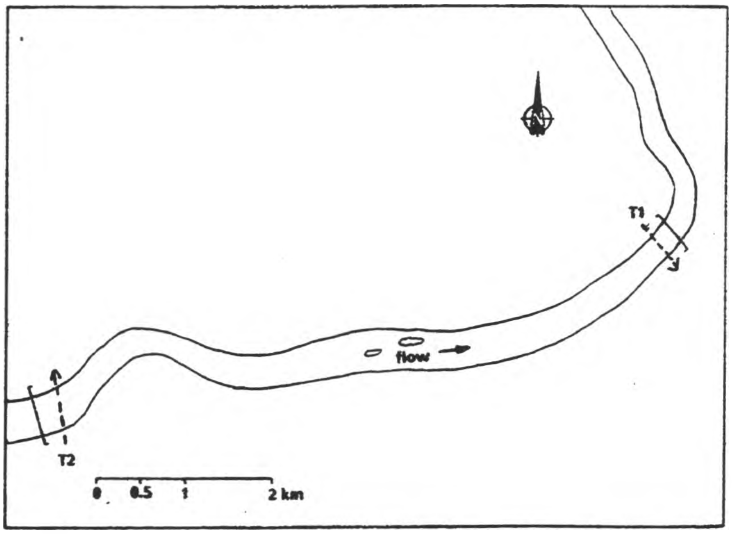




SITE 5

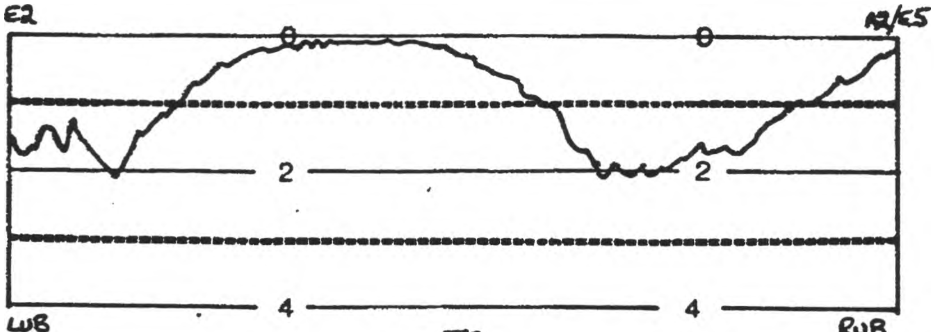
Photograph, site map with transect locations and depth profile of typical habitat.

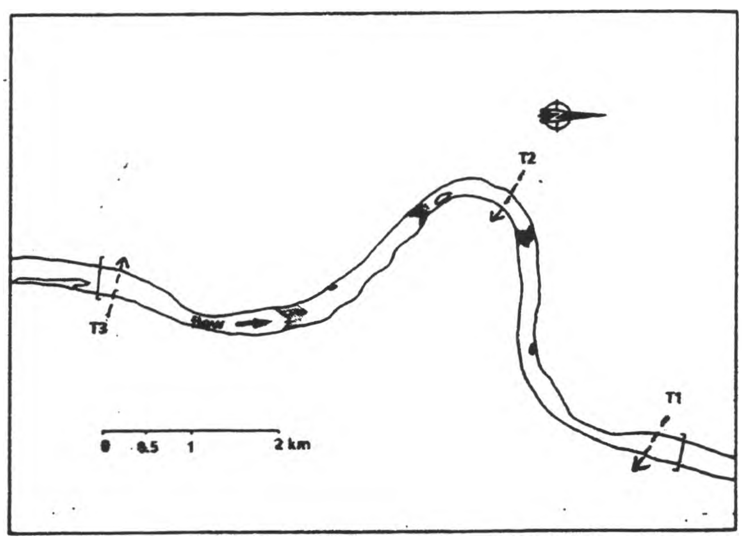


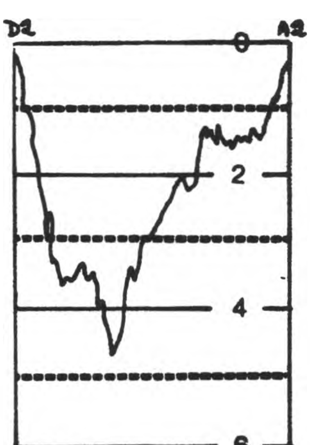


SITE 6

Photograph, site map with transect locations and depth profile of typical habitat.

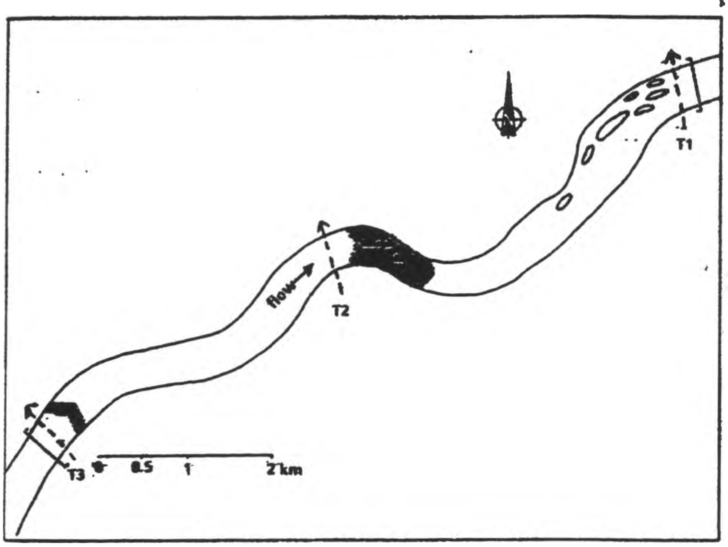






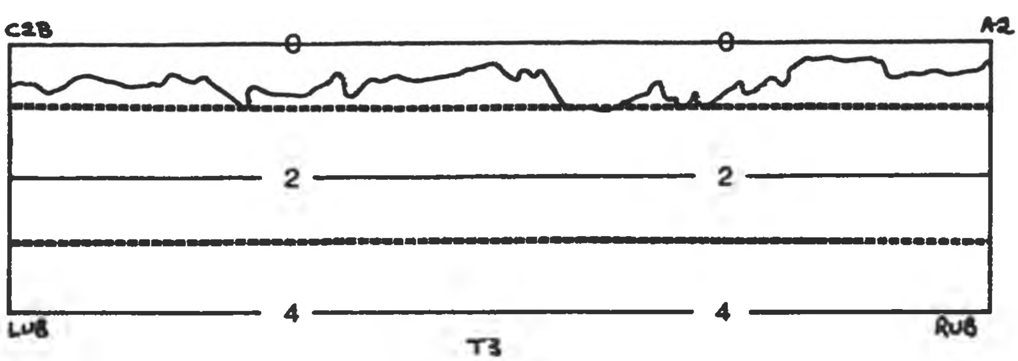
SITE 7

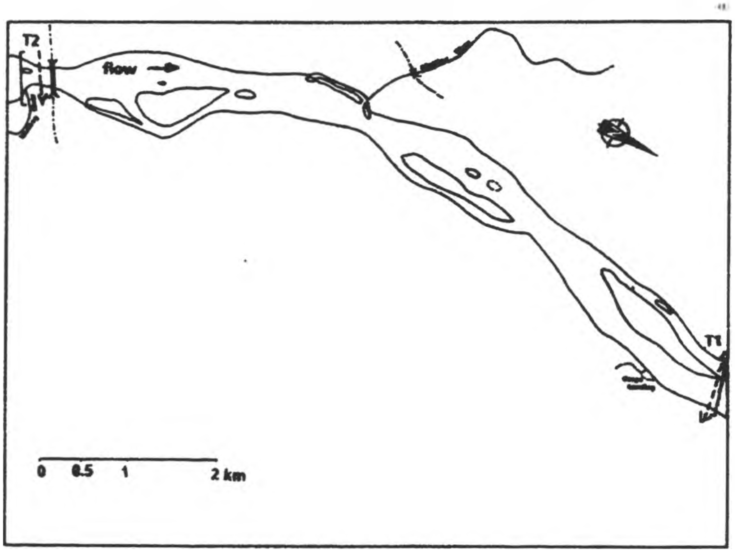
Photograph, site map with transect locations and depth profile of typical habitat.



SITE 8

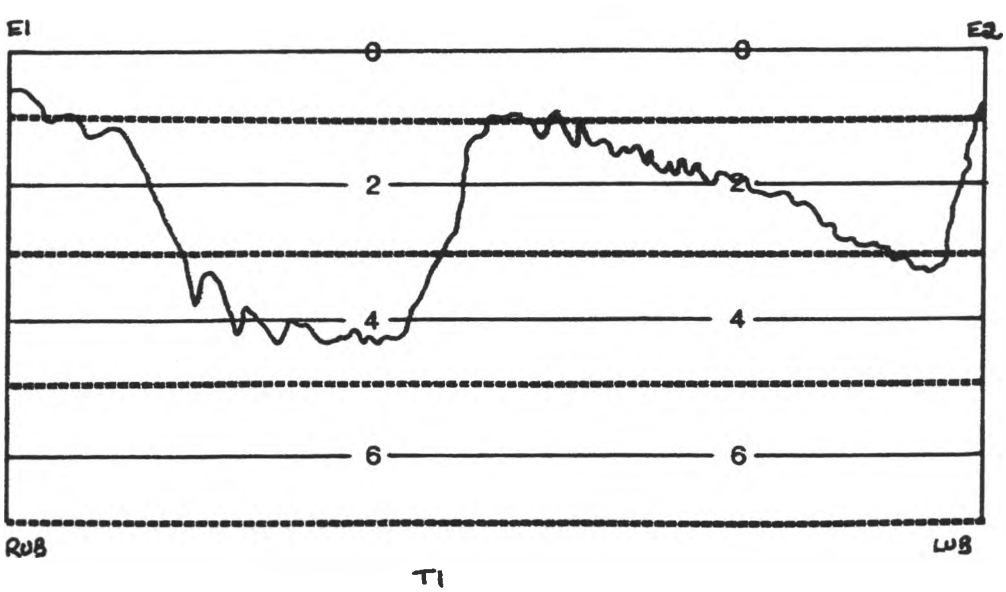
Photograph, site map with transect locations and depth profile of typical habitat.

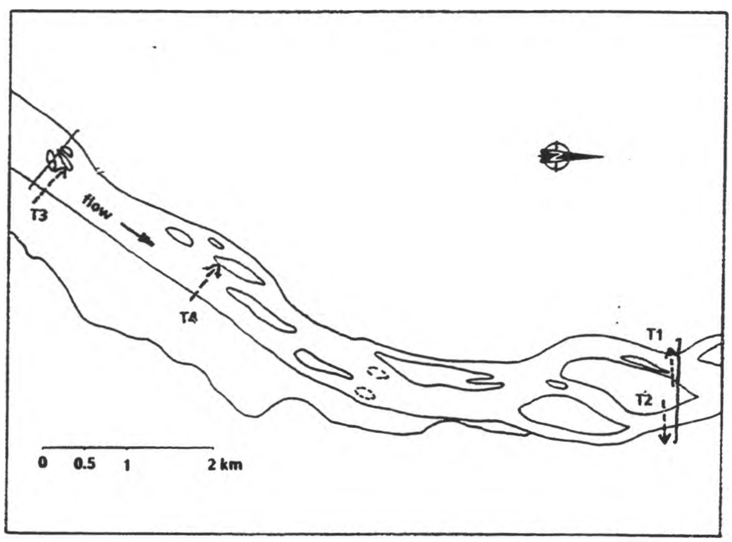


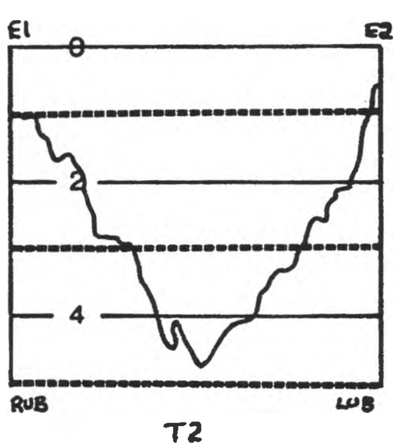


SITE 9

Photograph, site map with transect locations and depth profile of typical habitat.







SITE 10

Photograph, site map with transect locations and depth profile of typical habitat.

APPENDIX J

List of Tagged Fish

NORTHERN RIVER BASINS STUDY - 1992 SPRING

FISH CAPTURED AND TAGGED BY R.L.&L. ENVIRONMENTAL SERVICES LTD. Date Printed was 03/14/94

TAG COLOUR	NUMBER	SPECIES	LENGTH	WEIGHT	SEX	CAPTURE METHOD	DAY	MONTH	YEAR	RIVER	SITE (Km)	CAPT. CODE	SAMPLE NUMBER
ORANGE	1207	NRPK	552	1283	7	ES	22	4	92	ATHAB	1106.7	0	1
ORANGE	1208	MNWH	300	301	0	ES	22	4	92	ATHAB	1106.7	0	7
ORANGE	1209	MNWH	256	211	0	ES	22	4	92	ATHAB	1106.7	0	8
ORANGE	1210	MNWH	275	236	0	ES	22	4	92	ATHAB	1106.7	0	9
ORANGE	1211	MNWH	269	270	0	ES	22	4	92	ATHAB	1106.7	0	10
ORANGE	1212	ARGR	315	400	0	ES	22	4	92	ATHAB	1102.7	0	17
ORANGE	1213	ARGR	274	264	0	ES	22	4	92	ATHAB	1102.7	0	25
ORANGE	1214	ARGR	251	209	0	ES	22	4	92	ATHAB	1102.7	0	27
ORANGE	1215	MNWH	285	269	0	ES	22	4	92	ATHAB	1102.7	0	30
ORANGE	1216	MNWH	347	409	0	ES	22	4	92	ATHAB	1102.7	0	31
ORANGE	1217	MNWH	285	287	0	ES	22	4	92	ATHAB	1102.7	0	32
ORANGE	1218	MNWH	260	206	0	ES	22	4	92	ATHAB	1102.7	0	33
ORANGE	1219	MNWH	261	245	0	ES	22	4	92	ATHAB	1102.7	0	34
ORANGE	1220	MNWH	288	285	0	ES	22	4	92	ATHAB	1102.7	0	36
ORANGE	1221	MNWH	294	274	0	ES	22	4	92	ATHAB	1102.7	0	37
ORANGE	1222	MNWH	255	182	0	ES	22	4	92	ATHAB	1102.7	0	45
ORANGE	1223	ARGR	258	218	0	ES	22	4	92	ATHAB	1102.7	0	57
ORANGE	1224	MNWH	253	173	0	ES	22	4	92	ATHAB	1101	0	66
ORANGE	1225	MNWH	283	276	0	ES	22	4	92	ATHAB	1099.5	0	76
ORANGE	1235	ARGR	374	0	0	ES	22	4	92	ATHAB	1099.5	0	77
ORANGE	1236	ARGR	268	257	0	ES	22	4	92	ATHAB	1099.5	0	78
ORANGE	1237	ARGR	251	175	0	ES	22	4	92	ATHAB	1099.5	0	79
ORANGE	1238	MNWH	255	200	0	ES	22	4	92	ATHAB	1099.5	0	81
ORANGE	1239	MNWH	398	761	0	ES	23	4	92	ATHAB	1106.6	0	123
ORANGE	1240	MNWH	260	196	0	ES	23	4	92	ATHAB	1106.6	0	124
ORANGE	1241	MNWH	280	276	0	ES	23	4	92	ATHAB	1106.6	0	125
ORANGE	1242	MNWH	263	218	0	ES	23	4	92	ATHAB	1106.6	0	126
ORANGE	1243	MNWH	251	198	0	ES	23	4	92	ATHAB	1106.6	0	128
ORANGE	1244	MNWH	385	677	0	ES	23	4	92	ATHAB	1106.1	0	138
ORANGE	1245	MNWH	297	357	0	ES	23	4	92	ATHAB	1106.1	0	139
ORANGE	1246	MNWH	330	416	0	ES	23	4	92	ATHAB	1106.1	0	140
ORANGE	1247	MNWH	258	226	0	ES	23	4	92	ATHAB	1106.1	0	143
ORANGE	1248	ARGR	285	326	0	ES	23	4	92	ATHAB	1106.1	0	145
ORANGE	1249	RNTR	281	271	0	ES	23	4	92	ATHAB	1106.1	0	146
ORANGE	1250	RNTR	347	513	0	ES	23	4	92	ATHAB	1106.1	0	147
ORANGE	3295	LNSC	365	550	17	ES	23	4	92	ATHAB	1104.5	0	149
ORANGE	3296	ARGR	280	260	0	ES	23	4	92	ATHAB	1104.5	0	150
ORANGE	3297	ARGR	281	313	0	ES	23	4	92	ATHAB	1104.5	0	151
ORANGE	3298	MNWH	319	369	0	ES	23	4	92	ATHAB	1104.5	0	153
ORANGE	3299	MNWH	268	237	0	ES	23	4	92	ATHAB	1104.5	0	154
ORANGE	3300	MNWH	261	195	0	ES	23	4	92	ATHAB	1104.5	0	155
ORANGE	3326	MNWH	254	186	0	ES	23	4	92	ATHAB	1104.5	0	160
ORANGE	3327	MNWH	322	373	0	ES	23	4	92	ATHAB	1102.7	0	171
ORANGE	3328	MNWH	259	211	0	ES	23	4	92	ATHAB	1102.7	0	172
ORANGE	3329	MNWH	250	196	0	ES	23	4	92	ATHAB	1102.7	0	173
ORANGE	3330	ARGR	305	389	0	ES	23	4	92	ATHAB	1101.5	0	183
ORANGE	3331	ARGR	279	258	0	ES	23	4	92	ATHAB	1101.5	0	184
ORANGE	3332	ARGR	290	334	0	ES	23	4	92	ATHAB	1101.5	0	185
ORANGE	3333	ARGR	292	346	0	ES	23	4	92	ATHAB	1101.5	0	186
ORANGE	3334	MNWH	344	433	0	ES	23	4	92	ATHAB	1101.5	0	191
ORANGE	3335	MNWH	285	259	0	ES	23	4	92	ATHAB	1101.5	0	192
ORANGE	3336	MNWH	254	213	0	ES	23	4	92	ATHAB	1101.5	0	193
ORANGE	3337	MNWH	305	318	0	ES	23	4	92	ATHAB	1101.5	0	194
ORANGE	3338	MNWH	304	383	0	ES	23	4	92	ATHAB	1101.5	0	195
ORANGE	3339	MNWH	260	224	0	ES	23	4	92	ATHAB	1101.5	0	196
ORANGE	3340	MNWH	258	202	0	ES	23	4	92	ATHAB	1101.5	0	197
ORANGE	3341	BLTR	342	472	0	ES	23	4	92	ATHAB	1101.5	0	216
ORANGE	3342	MNWH	444	1063	0	ES	24	4	92	MCLEO	1026.3	0	260
ORANGE	3343	MNWH	269	233	0	ES	24	4	92	MCLEO	1026.3	0	266
ORANGE	3344	MNWH	419	1190	0	ES	25	4	92	ATHAB	1007.5	0	274
ORANGE	3345	WALL	338	428	8	ES	25	4	92	ATHAB	1007.5	0	275
ORANGE	3346	MNWH	371	693	0	ES	25	4	92	ATHAB	1007.4	0	281
ORANGE	3347	MNWH	376	785	0	ES	25	4	92	ATHAB	1007.4	0	282
ORANGE	3348	MNWH	269	264	0	ES	25	4	92	ATHAB	1007.4	0	283
ORANGE	3349	MNWH	392	772	0	ES	25	4	92	ATHAB	1007.4	0	284
ORANGE	3350	MNWH	379	719	0	ES	25	4	92	ATHAB	1007.4	0	285
ORANGE	3351	MNWH	370	674	0	ES	25	4	92	ATHAB	1007.4	0	287
ORANGE	3352	MNWH	280	294	0	ES	25	4	92	ATHAB	1006.4	0	309
ORANGE	3353	MNWH	381	759	0	ES	25	4	92	ATHAB	1006.4	0	310
ORANGE	3354	MNWH	445	1225	0	ES	25	4	92	ATHAB	1005.5	0	318
ORANGE	3355	MNWH	358	639	0	ES	25	4	92	ATHAB	1005.5	0	319
ORANGE	3356	MNWH	255	189	0	ES	25	4	92	ATHAB	1005.5	0	326
ORANGE	3357	NRPK	714	2523	0	ES	25	4	92	ATHAB	1005.5	0	332
ORANGE	3358	NRPK	736	3507	0	ES	25	4	92	ATHAB	1005.5	0	333
ORANGE	3359	MNWH	406	803	0	ES	25	4	92	ATHAB	1003	0	335
ORANGE	3360	MNWH	388	811	0	ES	25	4	92	ATHAB	1003	0	336
ORANGE	3361	MNWH	419	973	0	ES	25	4	92	ATHAB	1003	0	337
ORANGE	3362	MNWH	463	1452	0	ES	25	4	92	ATHAB	1003	0	338
ORANGE	3363	MNWH	370	743	0	ES	25	4	92	ATHAB	1003	0	339
ORANGE	3364	MNWH	332	449	0	ES	25	4	92	ATHAB	1003	0	340
ORANGE	3364	MNWH	332	449	0	ES	26	4	92	ATHAB	1005	2	427
ORANGE	3365	MNWH	401	894	0	ES	25	4	92	ATHAB	1003	0	342
ORANGE	3366	MNWH	371	739	0	ES	25	4	92	ATHAB	1003	0	343
ORANGE	3367	MNWH	396	820	0	ES	25	4	92	ATHAB	1003	0	354
ORANGE	3368	MNWH	260	227	0	ES	25	4	92	ATHAB	1003	0	353
ORANGE	3369	MNWH	391	839	0	ES	25	4	92	ATHAB	1002.4	0	357
ORANGE	3370	MNWH	286	296	0	ES	25	4	92	ATHAB	1002.4	0	358
ORANGE	3371	MNWH	430	1056	0	ES	25	4	92	ATHAB	1000.5	0	364
ORANGE	3372	MNWH	388	734	0	ES	25	4	92	ATHAB	1000.5	0	365
ORANGE	3373	MNWH	354	545	0	ES	25	4	92	ATHAB	1000.5	0	366
ORANGE	3374	MNWH	294	342	0	ES	25	4	92	ATHAB	1000.5	0	367
ORANGE	3375	MNWH	356	538	0	ES	25	4	92	ATHAB	1000.5	0	368
ORANGE	3376	MNWH	291	303	0	ES	25	4	92	ATHAB	1000.5	0	369
ORANGE	3377	MNWH	303	345	0	ES	25	4	92	ATHAB	1000.5	0	370

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TAG COLOUR	NUMBER	SPECIES	LENGTH	WEIGHT	SEX	CAPTURE METHOD	DAY	MONTH	YEAR	RIVER	SITE (Km)	CAPT. CODE	SAMPLE NUMBER
ORANGE	3378	WALL	424	754	8	ES	25	4	92	ATHAB	1000.5	0	376
ORANGE	3379	WALL	454	1000	8	ES	25	4	92	ATHAB	1000.5	0	377
ORANGE	3380	BURB	491	720	0	SL	26	4	92	ATHAB	1005.6	0	404
ORANGE	3381	NRPK	923	6900	0	SL	26	4	92	ATHAB	1005.6	0	405
ORANGE	3382	NRPK	529	1180	17	ES	26	4	92	ATHAB	1005.5	0	412
ORANGE	3383	MNWH	378	594	0	ES	26	4	92	ATHAB	1005.5	0	416
ORANGE	3384	MNWH	291	346	0	ES	26	4	92	ATHAB	1005.5	0	417
ORANGE	3385	MNWH	303	335	0	ES	26	4	92	ATHAB	1005.5	0	418
ORANGE	3386	MNWH	380	772	0	ES	26	4	92	ATHAB	1005	0	428
ORANGE	3387	MNWH	328	525	0	ES	26	4	92	ATHAB	1005	0	429
ORANGE	3388	MNWH	301	353	0	ES	26	4	92	ATHAB	1005	0	430
ORANGE	3389	MNWH	296	339	0	ES	26	4	92	ATHAB	1005	0	432
ORANGE	3390	MNWH	279	255	0	ES	26	4	92	ATHAB	1001.4	0	435
ORANGE	3391	MNWH	292	308	0	ES	26	4	92	ATHAB	1001.4	0	436
ORANGE	3392	WALL	470	1025	0	ES	28	4	92	PEMBI	845.5	0	498
ORANGE	3393	WALL	479	1148	0	ES	28	4	92	PEMBI	845.5	0	499
ORANGE	3394	BURB	378	236	0	ES	28	4	92	PEMBI	845.5	0	500
ORANGE	3395	BURB	341	220	0	ES	28	4	92	PEMBI	845.5	0	501
ORANGE	3396	GOLD	397	775	20	ES	28	4	92	PEMBI	845.5	0	502
ORANGE	3397	GOLD	374	586	10	ES	28	4	92	PEMBI	845.5	0	503
ORANGE	3398	BURB	731	2291	0	ES	28	4	92	ATHAB	828.4	0	529
ORANGE	3399	WALL	353	384	0	ES	28	4	92	ATHAB	828.4	0	536
ORANGE	3400	NRPK	778	4256	0	ES	28	4	92	ATHAB	822.7	0	559
ORANGE	3401	BURB	697	1745	0	ES	28	4	92	ATHAB	822.7	0	597
ORANGE	3402	WALL	304	265	0	ES	28	4	92	ATHAB	822.7	0	601
ORANGE	3403	WALL	269	199	0	ES	28	4	92	ATHAB	822.7	0	602
ORANGE	3404	BURB	407	306	0	ES	28	4	92	ATHAB	822.7	0	609
ORANGE	3405	LKWH	491	1240	0	ES	28	4	92	ATHAB	819.7	0	635
ORANGE	3406	MNWH	417	813	0	ES	28	4	92	ATHAB	819.7	0	646
ORANGE	3407	MNWH	379	740	0	ES	28	4	92	ATHAB	819.7	0	647
ORANGE	3408	WALL	337	333	8	ES	28	4	92	ATHAB	819.7	0	665
ORANGE	3409	WALL	311	295	0	ES	28	4	92	ATHAB	819.7	0	666
ORANGE	3411	MNWH	409	799	0	ES	29	4	92	ATHAB	824.2	0	868
ORANGE	3412	GOLD	340	439	10	ES	29	4	92	ATHAB	824.2	0	922
ORANGE	3413	GOLD	326	365	10	ES	29	4	92	ATHAB	824.2	0	923
ORANGE	3414	GOLD	339	462	10	ES	29	4	92	ATHAB	824.2	0	924
ORANGE	3415	GOLD	355	465	10	ES	29	4	92	ATHAB	824.2	0	925
ORANGE	3416	GOLD	361	567	20	ES	29	4	92	ATHAB	824.2	0	926
ORANGE	3417	GOLD	319	348	10	ES	29	4	92	ATHAB	824.2	0	927
ORANGE	3418	WALL	290	221	0	ES	29	4	92	ATHAB	824.2	0	928
ORANGE	3419	MNWH	335	462	0	ES	29	4	92	ATHAB	824.2	0	935
ORANGE	3419	NRPK	536	922	0	ES	29	4	92	ATHAB	821.9	0	936
ORANGE	3420	MNWH	357	597	0	ES	29	4	92	ATHAB	821.9	0	937
ORANGE	3421	MNWH	416	956	0	ES	29	4	92	ATHAB	821.9	0	947
ORANGE	3422	MNWH	376	717	0	ES	29	4	92	ATHAB	821.9	0	948
ORANGE	3423	BURB	584	1008	0	ES	29	4	92	ATHAB	821.9	0	957
ORANGE	3424	WALL	308	274	0	ES	29	4	92	ATHAB	821.9	0	994
ORANGE	3426	WALL	342	403	0	ES	29	4	92	ATHAB	821.9	0	995
ORANGE	3427	WALL	401	684	0	ES	29	4	92	ATHAB	821.9	0	996
ORANGE	3428	MNWH	364	688	0	ES	29	4	92	ATHAB	819.5	0	998
ORANGE	3429	MNWH	419	921	0	ES	29	4	92	ATHAB	819.5	0	999
ORANGE	3430	MNWH	378	707	0	ES	29	4	92	ATHAB	819.5	0	1001
ORANGE	3431	GOLD	352	516	10	ES	29	4	92	ATHAB	819.5	0	1024
ORANGE	3432	GOLD	326	408	20	ES	29	4	92	ATHAB	819.5	0	1025
ORANGE	3433	WALL	266	193	0	ES	29	4	92	ATHAB	819.5	0	1027
ORANGE	3434	WALL	279	189	0	ES	29	4	92	ATHAB	819.5	0	1028
ORANGE	3435	WALL	254	439	0	ES	29	4	92	ATHAB	819.5	0	1029
ORANGE	3436	WALL	323	291	0	ES	29	4	92	ATHAB	819.5	0	1030
ORANGE	3437	WALL	376	479	8	ES	29	4	92	ATHAB	819.5	0	1031
ORANGE	3438	WALL	404	638	0	ES	29	4	92	ATHAB	819.5	0	1032
ORANGE	3439	WALL	477	1047	0	ES	29	4	92	ATHAB	819.5	0	1033
ORANGE	3440	WALL	267	164	0	SL	30	4	92	ATHAB	820.4	0	1105
ORANGE	3441	MNWH	338	533	0	ES	2	5	92	ATHAB	780	0	1188
ORANGE	3442	MNWH	394	681	0	ES	2	5	92	ATHAB	780	0	1189
ORANGE	3443	WHSC	420	1027	8	ES	2	5	92	ATHAB	780	0	1192
ORANGE	3444	WHSC	495	1998	0	ES	2	5	92	ATHAB	780	0	1194
ORANGE	3445	NRPK	681	2668	0	ES	2	5	92	ATHAB	780	0	1201
ORANGE	3446	LNSC	403	841	0	ES	2	5	92	ATHAB	780	0	1202
ORANGE	3447	MNWH	324	451	0	ES	2	5	92	ATHAB	780	0	1203
ORANGE	3448	MNWH	430	1106	0	ES	2	5	92	ATHAB	780	0	1204
ORANGE	3449	WHSC	313	419	0	ES	2	5	92	ATHAB	780	0	1205
ORANGE	3450	WHSC	292	390	0	ES	2	5	92	ATHAB	780	0	1206
YELLOW	373	NRPK	600	1479	7	ES	5	5	92	ATHAB	627	2	1678
YELLOW	665	NRPK	528	978	9	ES	5	5	92	ATHAB	630	2	1740
YELLOW	1260	MNWH	350	506	0	ES	5	5	92	ATHAB	630	2	1729
YELLOW	1686	WALL	315	284	0	ES	5	5	92	ATHAB	630	2	1730
YELLOW	2001	LNSC	408	824	0	ES	2	5	92	ATHAB	780	0	1207
YELLOW	2002	BURB	835	3131	0	ES	2	5	92	ATHAB	780	0	1209
YELLOW	2003	WHSC	450	1349	0	ES	2	5	92	ATHAB	780	0	1210
YELLOW	2004	WHSC	295	336	0	ES	2	5	92	ATHAB	780	0	1212
YELLOW	2005	WALL	322	300	0	ES	2	5	92	ATHAB	780	0	1216
YELLOW	2006	WHSC	413	1051	8	ES	2	5	92	ATHAB	780	0	1217
YELLOW	2007	LNSC	326	483	0	ES	2	5	92	ATHAB	780	0	1218
YELLOW	2008	LNSC	339	502	0	ES	2	5	92	ATHAB	780	0	1221
YELLOW	2009	MNWH	430	903	0	ES	2	5	92	ATHAB	780	0	1222
YELLOW	2010	WHSC	487	1769	0	ES	2	5	92	ATHAB	779.7	0	1227
YELLOW	2011	LNSC	305	351	0	ES	2	5	92	ATHAB	779.7	0	1228
YELLOW	2012	BURB	688	2062	0	ES	2	5	92	ATHAB	778.3	0	1234
YELLOW	2013	MNWH	361	615	0	ES	2	5	92	ATHAB	778.3	0	1235
YELLOW	2014	MNWH	366	632	0	ES	2	5	92	ATHAB	778.3	0	1236
YELLOW	2015	WHSC	297	334	0	ES	2	5	92	ATHAB	776.3	0	1239
YELLOW	2016	WHSC	536	3217	0	ES	2	5	92	ATHAB	776.3	0	1240
YELLOW	2017	LNSC	372	688	0	ES	2	5	92	ATHAB	776.3	0	1241
YELLOW	2018	WALL	295	248	0	ES	2	5	92	ATHAB	776.3	0	1242
YELLOW	2019	WHSC	430	1296	8	ES	2	5	92	ATHAB	776.3	0	1243
YELLOW	2020	MNWH	424	1003	0	ES	2	5	92	ATHAB	776.3	0	1244
YELLOW	2021	MNWH	370	609	0	ES	2	5	92	ATHAB	776.3	0	1245
YELLOW	2022	MNWH	349	540	0	ES	2	5	92	ATHAB	776.3	0	1246
YELLOW	2023	MNWH	314	391	0	ES	2	5	92	ATHAB	776.3	0	1248
YELLOW	2024	MNWH	454	1612	0	ES	2	5	92	ATHAB	776.3	0	1249

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TAG COLOUR	NUMBER	SPECIES	LENGTH	WEIGHT	SEX	CAPTURE METHOD	DAY	MONTH	YEAR	RIVER	SITE (Km)	CAPT. CODE	SAMPLE NUMBER
YELLOW	2025	LNSC	346	524	0	ES	2	5	92	ATHAB	776.3	0	1250
YELLOW	2026	WHSC	437	1320	8	ES	2	5	92	ATHAB	776.3	0	1251
YELLOW	2027	WHSC	510	2292	0	ES	2	5	92	ATHAB	776.3	0	1252
YELLOW	2028	WHSC	451	1306	8	ES	2	5	92	ATHAB	776.3	0	1253
YELLOW	2029	MNWH	369	655	0	ES	2	5	92	ATHAB	776.3	0	1254
YELLOW	2030	GOLD	360	569	17	ES	2	5	92	ATHAB	776.3	0	1255
YELLOW	2031	GOLD	299	285	20	ES	2	5	92	ATHAB	776.3	0	1256
YELLOW	2032	LNSC	319	418	0	ES	2	5	92	ATHAB	776.3	0	1258
YELLOW	2033	LNSC	332	480	0	ES	2	5	92	ATHAB	776.3	0	1259
YELLOW	2034	WHSC	323	429	0	ES	2	5	92	ATHAB	776.3	0	1261
YELLOW	2035	LNSC	396	759	0	ES	2	5	92	ATHAB	776.3	0	1262
YELLOW	2036	BURB	411	451	0	ES	2	5	92	ATHAB	776.3	0	1263
YELLOW	2037	WHSC	454	1582	0	ES	2	5	92	ATHAB	776.3	0	1264
YELLOW	2038	LNSC	296	355	0	ES	2	5	92	ATHAB	776.3	0	1265
YELLOW	2039	WHSC	478	1594	17	ES	2	5	92	ATHAB	776.3	0	1268
YELLOW	2040	WHSC	518	2272	0	ES	2	5	92	ATHAB	776.3	0	1269
YELLOW	2041	WALL	318	345	0	ES	2	5	92	ATHAB	776.3	0	1270
YELLOW	2042	WHSC	441	1176	18	ES	2	5	92	ATHAB	776.3	0	1271
YELLOW	2043	LNSC	401	854	0	ES	2	5	92	ATHAB	776.3	0	1272
YELLOW	2044	WHSC	476	1886	0	ES	2	5	92	ATHAB	776.3	0	1273
YELLOW	2045	NRPK	875	5000	18	ES	2	5	92	ATHAB	773.4	0	1274
YELLOW	2046	WHSC	518	2049	0	ES	2	5	92	ATHAB	773.4	0	1275
YELLOW	2047	WHSC	0	1780	0	ES	2	5	92	ATHAB	773.4	0	1276
YELLOW	2048	WHSC	476	1839	0	ES	2	5	92	ATHAB	773.4	0	1278
YELLOW	2049	WHSC	299	320	0	ES	2	5	92	ATHAB	773.4	0	1279
YELLOW	2050	WHSC	427	1196	0	ES	2	5	92	ATHAB	773.4	0	1280
YELLOW	2051	WHSC	465	1503	0	ES	2	5	92	ATHAB	773.4	0	1281
YELLOW	2052	LNSC	353	673	0	ES	2	5	92	ATHAB	773.4	0	1283
YELLOW	2053	WHSC	298	368	0	ES	2	5	92	ATHAB	773.4	0	1284
YELLOW	2054	LNSC	361	576	0	ES	2	5	92	ATHAB	773.4	0	1285
YELLOW	2055	WHSC	454	1546	0	ES	2	5	92	ATHAB	773.4	0	1286
YELLOW	2056	WHSC	425	1231	0	ES	2	5	92	ATHAB	773.4	0	1287
YELLOW	2057	WHSC	282	0	0	ES	2	5	92	ATHAB	781.2	0	1299
YELLOW	2058	LNSC	295	0	0	ES	2	5	92	ATHAB	781.2	0	1301
YELLOW	2059	NRPK	423	0	0	ES	2	5	92	ATHAB	781.2	0	1304
YELLOW	2060	WHSC	387	0	0	ES	2	5	92	ATHAB	780.8	0	1307
YELLOW	2061	BURB	286	0	0	ES	2	5	92	ATHAB	780.8	0	1310
YELLOW	2062	LNSC	380	796	0	ES	2	5	92	ATHAB	779.5	0	1311
YELLOW	2063	MNWH	440	1172	0	ES	2	5	92	ATHAB	779.5	0	1312
YELLOW	2064	WHSC	472	1653	0	ES	2	5	92	ATHAB	779.5	0	1313
YELLOW	2065	MNWH	306	0	0	ES	2	5	92	ATHAB	779.5	0	1315
YELLOW	2066	WHSC	312	0	0	ES	2	5	92	ATHAB	779.5	0	1318
YELLOW	2067	LNSC	363	0	0	ES	2	5	92	ATHAB	779.5	0	1319
YELLOW	2068	FLCH	260	0	0	ES	2	5	92	ATHAB	779.5	0	1323
YELLOW	2069	FLCH	271	0	0	ES	2	5	92	ATHAB	779.5	0	1324
YELLOW	2070	WALL	498	0	0	ES	2	5	92	ATHAB	779.5	0	1325
YELLOW	2071	WALL	293	0	0	ES	2	5	92	ATHAB	779.5	0	1330
YELLOW	2072	LNSC	391	0	0	ES	2	5	92	ATHAB	775.5	0	1337
YELLOW	2073	WHSC	477	0	0	ES	2	5	92	ATHAB	775.5	0	1338
YELLOW	2074	LNSC	375	0	0	ES	2	5	92	ATHAB	775.5	0	1339
YELLOW	2075	LNSC	361	0	0	ES	2	5	92	ATHAB	775.5	0	1340
YELLOW	2076	WHSC	400	0	8	ES	2	5	92	ATHAB	775.5	0	1341
YELLOW	2077	WHSC	341	0	0	ES	2	5	92	ATHAB	775.5	0	1342
YELLOW	2078	WHSC	492	0	0	ES	2	5	92	ATHAB	775.5	0	1343
YELLOW	2079	MNWH	414	0	0	ES	2	5	92	ATHAB	775.5	0	1344
YELLOW	2080	MNWH	404	0	0	ES	2	5	92	ATHAB	775.5	0	1345
YELLOW	2081	MNWH	451	0	0	ES	2	5	92	ATHAB	775.5	0	1346
YELLOW	2082	GOLD	393	0	20	ES	2	5	92	ATHAB	775.5	0	1347
YELLOW	2083	GOLD	320	0	10	ES	2	5	92	ATHAB	775.5	0	1348
YELLOW	2084	FLCH	271	0	0	ES	2	5	92	ATHAB	775.5	0	1349
YELLOW	2085	FLCH	253	0	0	ES	2	5	92	ATHAB	775.5	0	1356
YELLOW	2086	LNSC	351	0	0	ES	2	5	92	ATHAB	775.5	0	1361
YELLOW	2087	WHSC	289	0	0	ES	2	5	92	ATHAB	775.5	0	1362
YELLOW	2088	WHSC	293	0	0	ES	2	5	92	ATHAB	775.5	0	1363
YELLOW	2089	FLCH	252	0	0	ES	2	5	92	ATHAB	775.5	0	1364
YELLOW	2090	MNWH	267	0	0	ES	2	5	92	ATHAB	775.5	0	1365
YELLOW	2091	GOLD	343	449	20	ES	3	5	92	ATHAB	779.8	0	1525
YELLOW	2092	MNWH	386	786	0	ES	3	5	92	ATHAB	779.8	0	1526
YELLOW	2093	LNSC	368	620	0	ES	3	5	92	ATHAB	779.8	0	1528
YELLOW	2094	LNSC	385	633	0	ES	3	5	92	ATHAB	779.8	0	1529
YELLOW	2095	WHSC	294	364	0	ES	3	5	92	ATHAB	779.8	0	1530
YELLOW	2096	LNSC	265	251	0	ES	3	5	92	ATHAB	779.8	0	1539
YELLOW	2097	MNWH	451	1100	0	ES	3	5	92	ATHAB	778.5	0	1542
YELLOW	2098	MNWH	410	755	0	ES	3	5	92	ATHAB	778.5	0	1551
YELLOW	2099	MNWH	368	604	0	ES	3	5	92	ATHAB	778.5	0	1555
YELLOW	2100	GOLD	350	477	10	ES	3	5	92	ATHAB	778.5	0	1557
YELLOW	2101	LNSC	375	759	0	ES	3	5	92	ATHAB	778.5	0	1564
YELLOW	2102	LNSC	307	374	0	ES	3	5	92	ATHAB	778.5	0	1565
YELLOW	2103	LNSC	344	509	0	ES	3	5	92	ATHAB	778.5	0	1566
YELLOW	2104	LNSC	315	410	0	ES	3	5	92	ATHAB	778.5	0	1567
YELLOW	2105	LNSC	327	501	0	ES	3	5	92	ATHAB	778.5	0	1568
YELLOW	2106	WALL	255	138	0	ES	3	5	92	ATHAB	778.5	0	1569
YELLOW	2107	WHSC	295	321	0	ES	3	5	92	ATHAB	778.5	0	1570
YELLOW	2108	WHSC	298	313	0	ES	3	5	92	ATHAB	778.5	0	1571
YELLOW	2109	LNSC	260	201	0	ES	3	5	92	ATHAB	778.5	0	1574
YELLOW	2110	NRPK	369	338	0	EF	4	5	92	TAWTI	683.5	0	1672
YELLOW	2111	BURB	385	347	0	EF	4	5	92	TAWTI	683.5	0	1673
YELLOW	2112	WHSC	329	485	0	ES	5	5	92	ATHAB	625	0	1677
YELLOW	2113	FLCH	270	221	0	ES	5	5	92	ATHAB	627	0	1681
YELLOW	2114	FLCH	257	204	0	ES	5	5	92	ATHAB	627	0	1698
YELLOW	2115	WHSC	0	0	0	ES	5	5	92	ATHAB	627	0	1699
YELLOW	2116	FLCH	292	277	0	ES	5	5	92	ATHAB	630	0	1739
YELLOW	2117	FLCH	262	177	0	ES	5	5	92	ATHAB	630	0	1765
YELLOW	2118	WHSC	300	379	0	ES	5	5	92	ATHAB	630	0	1766
YELLOW	2119	WHSC	296	334	0	ES	5	5	92	ATHAB	630	0	1767
YELLOW	2120	BURB	417	377	0	ES	5	5	92	ATHAB	630	0	1768
YELLOW	2121	WHSC	301	378	0	ES	5	5	92	ATHAB	630	0	1769
YELLOW	2122	WHSC	262	0	0	ES	6	5	92	ATHAB	626	0	2084
YELLOW	2123	WALL	416	0	8	ES	6	5	92	ATHAB	626	0	2085
YELLOW	2124	WHSC	308	0	0	ES	6	5	92	ATHAB	626	0	2087

NORTHERN RIVER BASINS STUDY - 1992 SPRING

FISH CAPTURED AND TAGGED BY R.L.&L. ENVIRONMENTAL SERVICES LTD.   Date Printed was 03/14/94

TAG COLOUR	NUMBER	SPECIES	LENGTH	WEIGHT	SEX	CAPTURE METHOD	DAY	MONTH	YEAR	RIVER	SITE (Km)	CAPT. CODE	SAMPLE NUMBER
YELLOW	2125	WHSC	343	0	0	ES	6	5	92	ATHAB	626	0	2088
YELLOW	2126	FLCH	262	0	0	ES	6	5	92	ATHAB	626	0	2096
YELLOW	2127	LNSC	331	0	0	ES	6	5	92	ATHAB	626	0	2118
YELLOW	2128	WALL	301	0	0	ES	6	5	92	ATHAB	626	0	2122
YELLOW	2129	MNWH	391	0	0	ES	9	5	92	ATHAB	457.7	0	2254
YELLOW	2130	LNSC	330	425	0	ES	9	5	92	ATHAB	453.8	0	2260
YELLOW	2131	WALL	378	491	0	ES	9	5	92	ATHAB	453.8	0	2262
YELLOW	2132	LNSC	346	444	0	ES	9	5	92	ATHAB	452.4	0	2263
YELLOW	2133	LNSC	341	369	0	ES	9	5	92	ATHAB	458.5	0	2279
YELLOW	2134	LNSC	371	537	0	ES	9	5	92	ATHAB	458.5	0	2280
YELLOW	2135	LNSC	375	0	0	ES	9	5	92	ATHAB	458.5	0	2281
YELLOW	2136	LNSC	325	441	0	ES	9	5	92	ATHAB	458.5	0	2282
YELLOW	2137	LNSC	275	215	0	ES	9	5	92	ATHAB	458.5	0	2283
YELLOW	2138	LNSC	254	194	0	ES	9	5	92	ATHAB	458.5	0	2286
YELLOW	2139	LNSC	358	520	0	ES	9	5	92	ATHAB	458.5	0	2287
YELLOW	2140	LNSC	251	165	0	ES	9	5	92	ATHAB	458.5	0	2288
YELLOW	2141	LNSC	355	540	0	ES	9	5	92	ATHAB	458.5	0	2289
YELLOW	2142	LNSC	319	427	0	ES	9	5	92	ATHAB	458.5	0	2290
YELLOW	2143	LNSC	360	502	0	ES	9	5	92	ATHAB	458.5	0	2291
YELLOW	2144	LNSC	400	811	0	ES	9	5	92	ATHAB	456.6	0	2293
YELLOW	2145	LNSC	319	356	0	ES	9	5	92	ATHAB	456.6	0	2294
YELLOW	2146	LNSC	360	525	0	ES	9	5	92	ATHAB	455.3	0	2309
YELLOW	2147	LNSC	270	201	0	ES	9	5	92	ATHAB	455.3	0	2311
YELLOW	2148	LNSC	316	323	0	ES	9	5	92	ATHAB	455.3	0	2314
YELLOW	2149	LNSC	402	653	10	ES	9	5	92	ATHAB	452.5	0	2316
YELLOW	2150	LNSC	291	280	0	ES	9	5	92	ATHAB	452.5	0	2317
YELLOW	2151	BURB	438	420	0	SL	10	5	92	ATHAB	456.4	0	2321
YELLOW	2152	BURB	583	1012	0	SL	10	5	92	ATHAB	456.4	0	2322
YELLOW	2153	WALL	346	339	0	ES	13	5	92	ATHAB	299.8	0	2740
YELLOW	2154	WALL	317	287	0	ES	13	5	92	ATHAB	299.8	0	2741
YELLOW	2155	WALL	413	652	7	ES	13	5	92	ATHAB	299.8	0	2742
YELLOW	2156	WALL	438	847	8	ES	14	5	92	ATHAB	298.7	0	2763
YELLOW	2157	WALL	484	1234	8	ES	14	5	92	ATHAB	298.7	0	2764
YELLOW	2158	WALL	438	828	8	ES	14	5	92	ATHAB	298.7	0	2765
YELLOW	2159	WALL	404	663	0	ES	14	5	92	ATHAB	298.7	0	2766
YELLOW	2160	WALL	388	597	0	ES	14	5	92	ATHAB	298.7	0	2767
YELLOW	2161	WALL	385	533	0	ES	14	5	92	ATHAB	298.7	0	2768
YELLOW	2162	WALL	342	384	0	ES	14	5	92	ATHAB	298.7	0	2769
YELLOW	2163	WALL	292	237	0	ES	14	5	92	ATHAB	298.7	0	2770
YELLOW	2164	WALL	331	359	0	ES	14	5	92	ATHAB	298.7	0	2771
YELLOW	2165	WALL	478	1003	0	ES	14	5	92	ATHAB	298.7	0	2772
YELLOW	2166	WALL	425	767	8	ES	14	5	92	ATHAB	298.7	0	2773
YELLOW	2167	WALL	405	694	8	ES	14	5	92	ATHAB	298.7	0	2774
YELLOW	2168	WALL	365	471	0	ES	14	5	92	ATHAB	298.7	0	2775
YELLOW	2169	WALL	338	336	0	ES	14	5	92	ATHAB	298.7	0	2776
YELLOW	2170	WALL	402	601	8	ES	14	5	92	ATHAB	298.7	0	2777
YELLOW	2171	WALL	446	905	9	ES	14	5	92	ATHAB	298.7	0	2778
YELLOW	2172	WALL	343	394	0	ES	14	5	92	ATHAB	298.7	0	2779
YELLOW	2173	WALL	388	578	8	ES	14	5	92	ATHAB	298.7	0	2780
YELLOW	2174	WALL	313	304	0	ES	14	5	92	ATHAB	298.7	0	2781
YELLOW	2175	WALL	320	314	0	ES	14	5	92	ATHAB	298.7	0	2782
YELLOW	2176	GOLD	396	739	18	ES	14	5	92	ATHAB	298.7	0	2784
YELLOW	2177	GOLD	399	772	18	ES	14	5	92	ATHAB	298.7	0	2785
YELLOW	2178	GOLD	362	476	10	ES	14	5	92	ATHAB	298.7	0	2786
YELLOW	2179	GOLD	321	357	9	ES	14	5	92	ATHAB	298.7	0	2787
YELLOW	2180	NRPK	570	1231	7	ES	14	5	92	ATHAB	298.7	0	2788
YELLOW	2181	NRPK	571	1158	0	ES	14	5	92	ATHAB	298.7	0	2789
YELLOW	2182	GOLD	390	677	20	ES	14	5	92	ATHAB	296.4	0	2805
YELLOW	2183	GOLD	375	695	18	ES	14	5	92	ATHAB	296.4	0	2806
YELLOW	2184	WALL	264	176	0	ES	14	5	92	ATHAB	296.4	0	2807
YELLOW	2185	WALL	363	455	0	ES	14	5	92	ATHAB	296.4	0	2808
YELLOW	2186	WALL	446	961	9	ES	14	5	92	ATHAB	296.4	0	2809
YELLOW	2187	WALL	461	925	8	ES	14	5	92	ATHAB	296.4	0	2810
YELLOW	2188	WALL	285	225	0	ES	14	5	92	ATHAB	296.4	0	2811
YELLOW	2189	WALL	425	738	8	ES	14	5	92	ATHAB	296.4	0	2812
YELLOW	2190	WALL	310	264	0	ES	14	5	92	ATHAB	296.4	0	2813
YELLOW	2191	WALL	373	558	0	ES	14	5	92	ATHAB	296.4	0	2814
YELLOW	2192	GOLD	390	753	20	ES	14	5	92	ATHAB	296.4	0	2815
YELLOW	2193	GOLD	338	473	10	ES	14	5	92	ATHAB	296.4	0	2816
YELLOW	2194	GOLD	382	652	20	ES	14	5	92	ATHAB	296.4	0	2818
YELLOW	2195	GOLD	370	609	20	ES	14	5	92	ATHAB	296.4	0	2819
YELLOW	2196	GOLD	358	532	10	ES	14	5	92	ATHAB	296.4	0	2820
YELLOW	2197	GOLD	257	116	20	ES	14	5	92	ATHAB	296.4	0	2823
YELLOW	2198	GOLD	332	363	10	ES	14	5	92	ATHAB	296.4	0	2824
YELLOW	2199	GOLD	370	700	20	ES	14	5	92	ATHAB	296.4	0	2828
YELLOW	2200	GOLD	315	361	18	ES	14	5	92	ATHAB	296.4	0	2829
YELLOW	2201	GOLD	375	571	18	ES	14	5	92	ATHAB	296.4	0	2830
YELLOW	2202	WALL	418	712	8	SL	14	5	92	ATHAB	299.9	0	2834
YELLOW	2203	WALL	475	1173	8	SL	14	5	92	ATHAB	299.9	0	2835
YELLOW	2205	WALL	330	349	0	SL	14	5	92	ATHAB	299.9	0	2840
YELLOW	2206	BURB	675	1520	0	SL	14	5	92	ATHAB	299.9	0	2842
YELLOW	2207	BURB	430	320	0	SL	14	5	92	ATHAB	299.9	0	2843
YELLOW	2208	WALL	401	574	8	ES	15	5	92	CLEAR	286.5	0	2948
YELLOW	2209	NRPK	340	253	0	ES	15	5	92	CLEAR	286.5	0	2949
YELLOW	2210	WHSC	283	268	0	ES	15	5	92	CLEAR	286.5	0	2950
YELLOW	2211	WHSC	416	1040	9	ES	15	5	92	MUSKE	239.2	0	2955
YELLOW	2212	WHSC	447	1612	0	ES	15	5	92	MUSKE	239.2	0	2956
YELLOW	2213	WHSC	450	1463	9	ES	15	5	92	MUSKE	239.2	0	2957
YELLOW	2214	WHSC	444	1365	9	ES	15	5	92	MUSKE	239.2	0	2958
YELLOW	2215	WHSC	448	1352	9	ES	15	5	92	MUSKE	239.2	0	2959
YELLOW	2216	WHSC	391	798	9	ES	16	5	92	ATHAB	230.4	0	2984
YELLOW	2217	WHSC	523	1985	0	ES	16	5	92	ATHAB	230.4	0	2985
YELLOW	2218	WALL	403	637	0	ES	16	5	92	MACKA	235.3	0	3044
YELLOW	2219	GOLD	313	302	10	ES	17	5	92	ATHAB	231.5	0	3114
YELLOW	2220	WHSC	419	1109	0	ES	17	5	92	ATHAB	231.5	0	3137
YELLOW	2221	NRPK	368	332	0	ES	19	5	92	ATHAB	128	0	3292
YELLOW	2222	NRPK	331	219	0	ES	19	5	92	ATHAB	128	0	3293
YELLOW	2223	GOLD	302	320	10	ES	19	5	92	ATHAB	128	0	3295
YELLOW	2224	GOLD	310	302	10	ES	19	5	92	ATHAB	128	0	3296
YELLOW	2225	NRPK	608	1400	0	SL	20	5	92	ATHAB	129	0	3309

NORTHERN RIVER BASINS STUDY - 1992 SPRING

FISH CAPTURED AND TAGGED BY R.L.&L. ENVIRONMENTAL SERVICES LTD. Date Printed was 03/14/94

TAG COLOUR	NUMBER	SPECIES	LENGTH	WEIGHT	SEX	CAPTURE METHOD	DAY	MONTH	YEAR	RIVER	SITE (Km)	CAPT. CODE	SAMPLE NUMBER
YELLOW	2226	NRPK	805	3350	18	SL	17	5	92	ATHAB	235.2	0	3181
YELLOW	2227	WALL	412	607	8	SL	17	5	92	ATHAB	235.2	0	3182
YELLOW	2251	NRPK	729	2190	18	SL	20	5	92	ATHAB	129	0	3308
YELLOW	3089	MNWH	260	205	0	ES	29	5	92	BERLA	1129.2	0	4519
YELLOW	3090	MNWH	301	364	0	EF	29	5	92	BERLA	1129.2	0	4520
YELLOW	3091	MNWH	272	247	0	ES	29	5	92	BERLA	1129.2	0	4521
YELLOW	3092	MNWH	255	205	0	ES	29	5	92	BERLA	1129.2	0	4538
YELLOW	3093	ARGR	252	196	0	ES	29	5	92	BERLA	1129.2	0	4549
YELLOW	3094	BURB	453	661	0	ES	29	5	92	BERLA	1129.2	0	4550
YELLOW	4820	MNWH	275	270	0	ES	26	4	92	ATHAB	1235.9	0	3599
YELLOW	4821	MNWH	266	221	0	ES	26	4	92	ATHAB	1235.9	0	3611
YELLOW	4822	MNWH	355	449	0	ES	26	4	92	ATHAB	1233.3	0	3622
YELLOW	4823	MNWH	281	298	0	ES	26	4	92	ATHAB	1233.3	0	3625
YELLOW	4824	MNWH	256	207	0	ES	26	4	92	ATHAB	1233.3	0	3627
YELLOW	4825	RNTR	285	286	0	ES	26	4	92	ATHAB	1233.3	0	3638
YELLOW	4826	MNWH	254	183	0	ES	26	4	92	ATHAB	1233.3	0	3641
YELLOW	4828	MNWH	269	207	0	ES	26	4	92	ATHAB	1232.3	0	3673
YELLOW	4830	MNWH	300	247	0	ES	26	4	92	ATHAB	1232.3	0	3674
YELLOW	4831	MNWH	435	865	0	ES	26	4	92	ATHAB	1232.3	0	3686

Capture Code: 0 is initial capture and release
2 is recapture and release

Capture Method: ES is boat electroshocking
EF is backpack electroshocking
SL is set line

Site: Distance upsteam from Lake Athabasca

Species:
- ARGR Arctic grayling
- BLTR Bull trout
- FLCH Flathead chub
- GOLD Goldeye
- BURB Burbot
- LNSC Longnose sucker
- MNWH Mountain whitefish
- NRPK Northem pike
- RNTR Rainbow trout
- WHSC White sucker
- WALL Walleye

Reference file: 334\tagdata.wk3