

2315.00/WP6350

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# FRAP BASIN-WIDE RESIDENT FISH CONDITION ASSESSMENT

## *Fish Sampling Component*

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*Prepared for:*

**Environment Canada**  
224 West Esplanade  
North Vancouver, B.C.  
V7M 3H7

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*Prepared by:*



**TRITON**

Environmental Consultants Ltd.  
120-13511 Commerce Parkway  
Richmond, B.C. V6V 2L1  
(604) 279-2093 Fax: (604) 279-2047

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## 1.0 INTRODUCTION

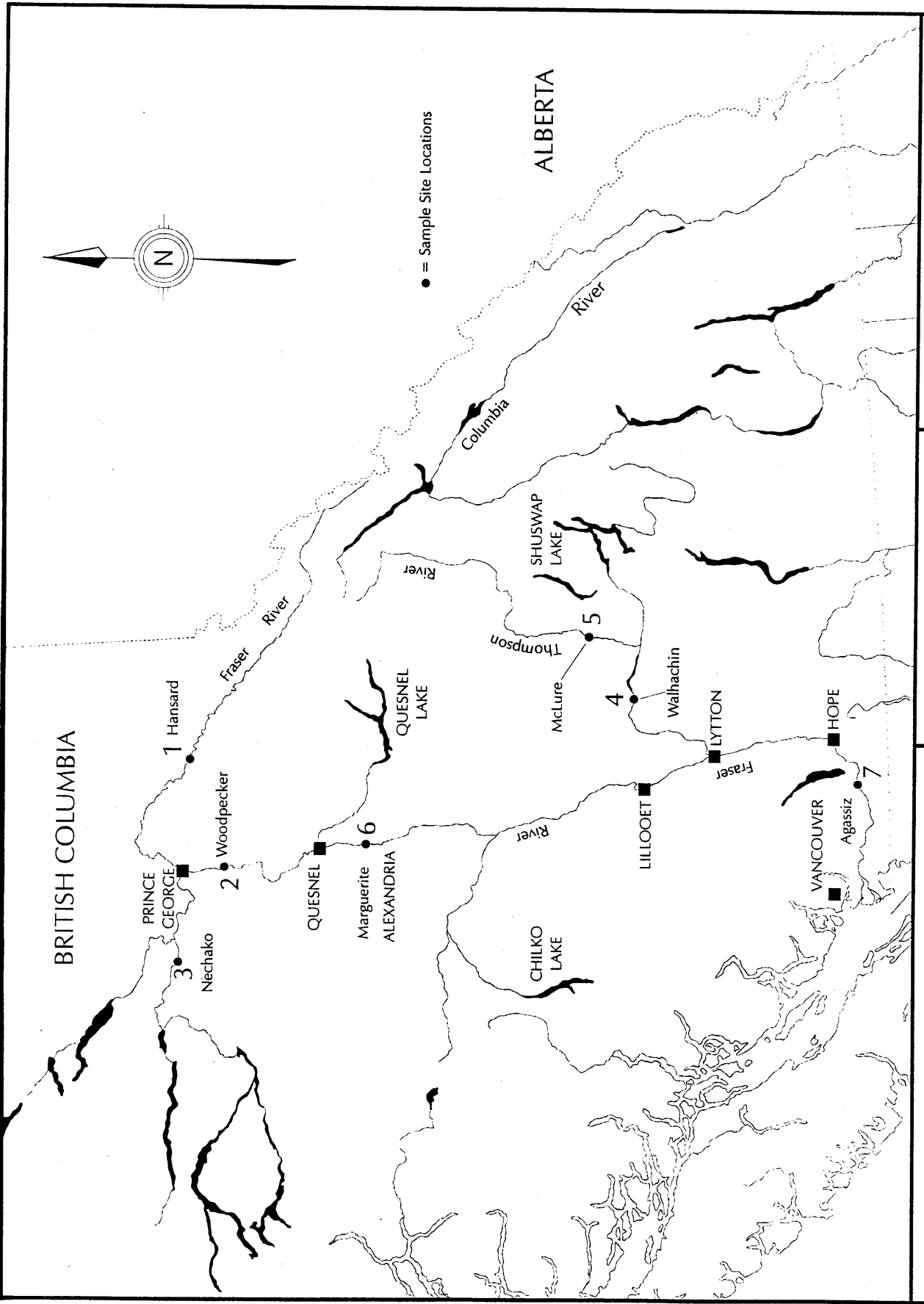
Triton Environmental Consultants Ltd. (Triton) was retained by Environment Canada in September of 1994 to perform the fish sampling component of the Fraser River Action Plan (FRAP) Basin-Wide Resident Fish Condition Assessment. FRAP is a federal government Green Plan initiative designed to assess the river and to establish a management program that will promote the health of the ecosystem. Specifically, the three main objectives of FRAP are:

- to reduce pollution in the Fraser River basin;
- to restore the natural environment of the basin and to return salmon populations to historic levels of abundance; and
- to build partnerships with provincial and local governments and other stakeholders.

This project is part of FRAP's environmental quality component, a goal of which is to determine and to monitor the condition of the Fraser basin. Fish typically constitute good indicators of the health of aquatic ecosystems, and the FRAP's Fish Condition Assessment proposes to monitor some health characteristics and the contaminants levels of two resident species, peamouth chub (*Mylocheilus caurimus*) and the mountain whitefish (*Prosopium williamsoni*). These two species were selected because of the quantity of baseline information on their health and abundance, and their potential as indicator species, i.e. their ability to reflect impacts on the ecosystem. Fish were collected from seven reaches spanning the geographical range of the Fraser basin. Analysis of data collected during the FRAP fish sampling program is to be undertaken by the Scientific Authority. Triton Environmental Consultants mandate was to collect the samples and compile the catch data.

## 2.0 STUDY AREA

A total of eight sample locations were selected along the Fraser River drainage basin- Hansard, Nechako River, Woodpecker, Marguerite, McLure, South Thompson River, Walhachin, and Agassiz (Figure 1). The sample locations were selected by the Scientific Authority based on previous comparable studies, contaminant sources, accessibility,



Basin Wide Resident Fish Condition Assessment

Map # 2315-ara

0 250 km

**FIGURE 1. MAP OF THE LOCATIONS SAMPLED WITHIN THE STUDY AREA. NUMBERS REFER TO THE ORDER OF LOCATIONS SAMPLED.**

and river morphology. However, the South Thompson site was not sampled because the period of sampling conflicted with the Adams River sockeye salmon spawner migration.

### 3.0 METHODS

Physical and biological data were collected from each sample site within the seven sample locations. Each site was identified by the name of the sample location, an alpha-numeric code representing the site, as well as the co-ordinates of the sample location obtained from a Global Positioning unit (GPS). The sites were then identified on a 1:50,000 scale topographical map.

The Scientific Authority determined a sample size of 60 adult mountain whitefish (>23cm) and 60 adult peamouth chub (> 18cm) was sufficient to generate a significant Health Assessment Index for each sample location. Therefore each sample location was sampled until the target number of each species was reached or extenuating circumstances prevented its completion.

Fish captures were achieved though three methods; beach seining, gee traps and boat electroshocking. Each method was performed day and night.

#### *Seining*

Seining was typically performed in habitat types such as shallow gravel bars and shear zones of scalloped shorelines and side channels free of Large Organic Debris (LOD). A 30m long, 4.0m deep variable mesh (7 mm mesh wings and a 3.5 mm mesh bunt) juvenile seine net was set from the stern of an 18 foot aluminum jet boat. This seine net proved to be very efficient in catching the target species although large numbers of juvenile fish were also caught. A larger seine net, 50m long, 5m deep with variable mesh (127mm mesh wings and a 95mm mesh bunt) was built specifically for this project and was used for the last half of the project. This larger meshed net eliminated the juvenile bycatch and enabled fish to be apprehended in faster flowing water. The following protocol was used: *i)* one crew member held the shore end of the net at the upstream designated end of the site, *ii)* another crew member operated the boat while a third ensured that the net was played out properly as the boat moved away from shore and downstream, *iii)* once the net was out, the boat crew tightened the line on a harness attached to the stern of the boat, which allowed the net to be dragged onto the shore at the downstream designated end of

the site. During the period while the boat was bringing the net into shore, the crew member on the upstream end of the net walked his end downstream to ensure that the downstream end of the net could be brought to shore at the designated downstream end of the site.

Once the two ends of the net were brought to shore it was important to purse and beach the net quickly and efficiently. The lead lines were brought in ahead of the floats to prevent fish swimming under the net. Dragging the net too quickly will cause the leads to ride up and allow fish to escape. Dragging the net too slowly or bringing in the floats prematurely will cause the net to bunch up, which can also create openings for fish to escape. All fish species captured were enumerated and life history phase was noted as adult or juvenile. In order to simplify data, target species of retainable size were recorded as adults and anything smaller were considered juvenile. Target species of approximate required size were placed in buckets then transported to the boat for measurement, small fish were released unharmed. Care was taken to ensure that all fish were neither temperature nor oxygen stressed while they were being held in the buckets. Target species collected for contaminant sampling were transferred to the on-board holding tank and delivered to the on-site mobile lab.

### *Electroshocking*

A Smith Root GPI 5.0 boat shocker was used in areas where seining was impossible, particularly shallow areas of LOD and large irregular substrate. The boat operator would navigate the vessel upstream along the river margin around boulders and LOD while the shocker operator placed the probe in any potential fish holding areas. Electrofishing involves the use of a D.C. current that attracts fish towards the anode. As they approach the electric field a forced swimming reaction takes place. As the field gets stronger the fish become temporarily stunned allowing for their capture. For these reasons the probe was placed in potential fish holding areas then drawn slowly out to an open area while the current was applied. In this way by the time fish became stunned they were in an open area where they could be dipnetted. During electroshocking, fish were collected in buckets and sampled as above for seining. Target species were transferred into the on-board holding tank and then delivered to the on site mobile lab

### *Gee Trapping.*

Large vexas gee traps were constructed and placed in probable target species habitats and checked periodically. Captured fish were enumerated and life history phase noted; if the trap was empty it was moved to a new location. These traps were sometimes attended by Environment Canada personnel during these times target species captured were not recorded by Triton's field crew.

Physical data collected at each sample site included water temperature, water velocity, substrate type, shore gradient, bank slope, hydraulic characteristics, and which margin of the river was sampled. In addition incidental observations regarding weather conditions were recorded at various sites. Water temperature was measured with a precalibrated hand held thermometer. Dominant substrate was visually estimated in order of abundance as fines, gravel, cobble, boulder or bedrock. Water velocity was estimated as slow (0-.5 m/s), moderate (.5-1.0 m/s), or fast (1.0-1.5 m/s) and shore gradient and bank slope were either steep, moderate or low.

## **4.0 RESULTS**

All sample locations were successfully accessed by truck and jet boat. The sample number of 60 adults for each of the target species was attained at 5 of 7 locations; for the other 2 locations, only the peamouth chub sample size was reached (Table 1). Extra numbers of target species were sometimes required in order to balance the sex ratios of sampled fish or to increase sample site diversity within a site location. Other fish were recorded as incidental catch.

### *Hansard*

Hansard was the first sample location; the required number of both whitefish and peamouth chub was obtained. It required 6 days of sampling and a large area of the Fraser River, from Dome Creek to Averil Creek was surveyed in order to catch the fish (Figure 2). The whitefish were located in greatest abundance at the mouths of major tributaries, namely Dome Creek and Slim Creek and the majority were caught within one day. The peamouth chub were not concentrated in schools and required more time and effort to capture.

Table 1: The number of days, sites and seine sets needed to capture the required sample size for each species at each sample location of the FRAP Fraser River fish sampling project during September 14 to November 6, 1994.

| Sample Location | Days Sampled | No. of Sites | No. of Seine Sets | No. of RMWF | No. of PMC |
|-----------------|--------------|--------------|-------------------|-------------|------------|
| Hansard         | 6            | 23s, 6e, 3en | 59                | 65          | 94         |
| Woodpecker      | 3            | 20s          | 54                | 71          | 64         |
| Nechako River   | 4            | 16s          | 34                | 119         | 142        |
| Walhachin       | 8            | 36s          | 93                | 179         | 65         |
| McLure          | 5            | 16s          | 48                | 681         | 68         |
| Marguerite      | 7            | 19s, 1en     | 83                | 39          | 59         |
| Agassiz         | 5            | 19s          | 48                | 25          | 305        |

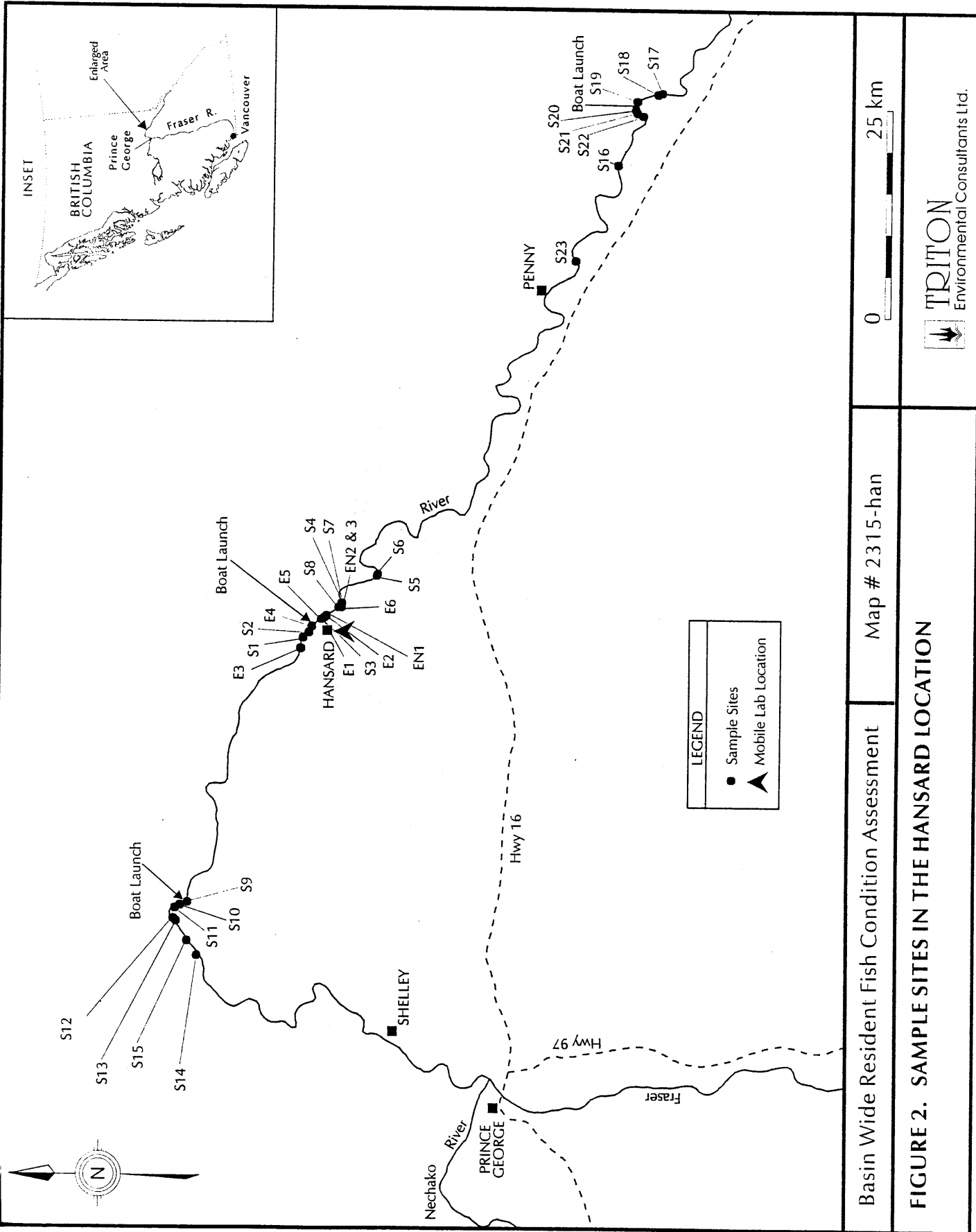
s = seine

e = boat electroshocking

en = boat electroshocking at night

RMWF = rocky mountain whitefish

PMC = peamouth chub



Seining was the most efficient sampling method. One seine set contained 67 adult peamouths. Unfortunately we already had the required sample size. The large vexar gee traps were quite successful at capturing peamouth chub, 15 of the 60 prescribed fish were caught with this method. Day and night electroshocking proved to be least successful

#### *Woodpecker*

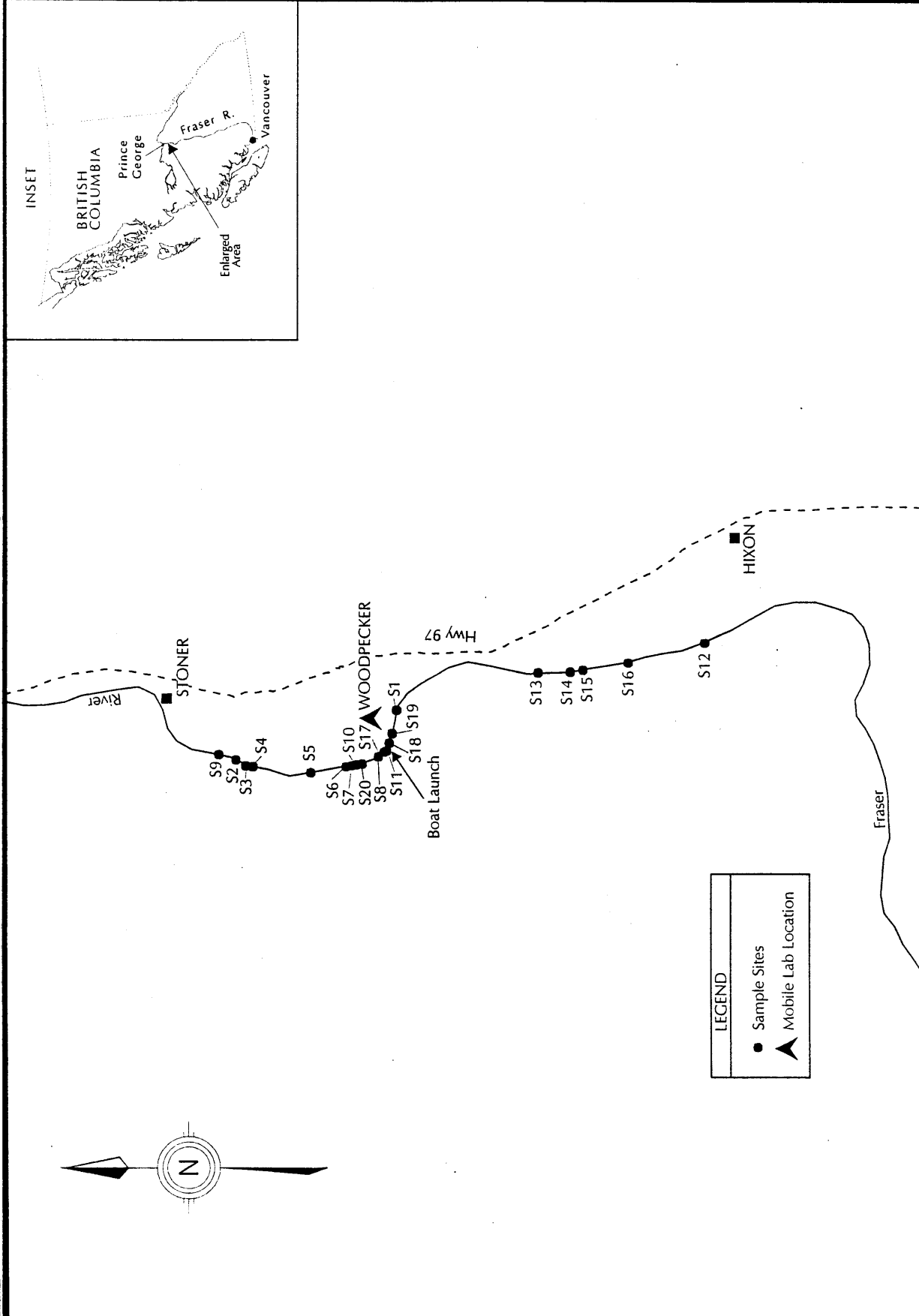
Woodpecker was the most successful location where 3 days were required to meet the target numbers (Figure 3). The whitefish were concentrated at the confluence of Naver Creek and the Fraser River; 66 whitefish were captured in 3 seine sets. All of the peamouth chub were caught in the immediate area of the boat launch. The largest seine set targeting peamouth chub contained 10 peamouth of ample size. The vexar gee traps proved unsuccessful here and captured only 1 adult peamouth.

#### *Nechako River*

The Nechako River location required 4 days of sampling (Figure 4). This location contained the fewest number of sites and required the fewest number of seine sets to accomplish our sampling goal. The adult whitefish were now nearing spawning maturity and they were congregating in tributary mouths. Knowing the Nechako River and its tributaries we seined for whitefish in its upper reaches. Targe Creek provided 72 adult whitefish within 5 daytime seine sets. In order to catch adult peamouth chub we had to relocate downstream of Vanderhoof. The adult peamouth chub seemed to be concentrated in scattered schools. Two seine sets produced 36 and 103 adult peamouth respectively; and the rest of the sets in this location contained no more than one adult peamouth chub. The vexar gee traps were unproductive in the Nechako River.

#### *Walhachin*

The Thompson River location, Walhachin, proved to be the most difficult location to sample, and 8 days were required for sampling (Figure 5). The Thompson River water level was very low, and discharge in the main river channel resulted in steep shore drop-offs, fast flowing water and exposure of the gravel bars. A large area of the mainstem, from Spences Bridge to Savona, had to be surveyed in order to find fishable sites and



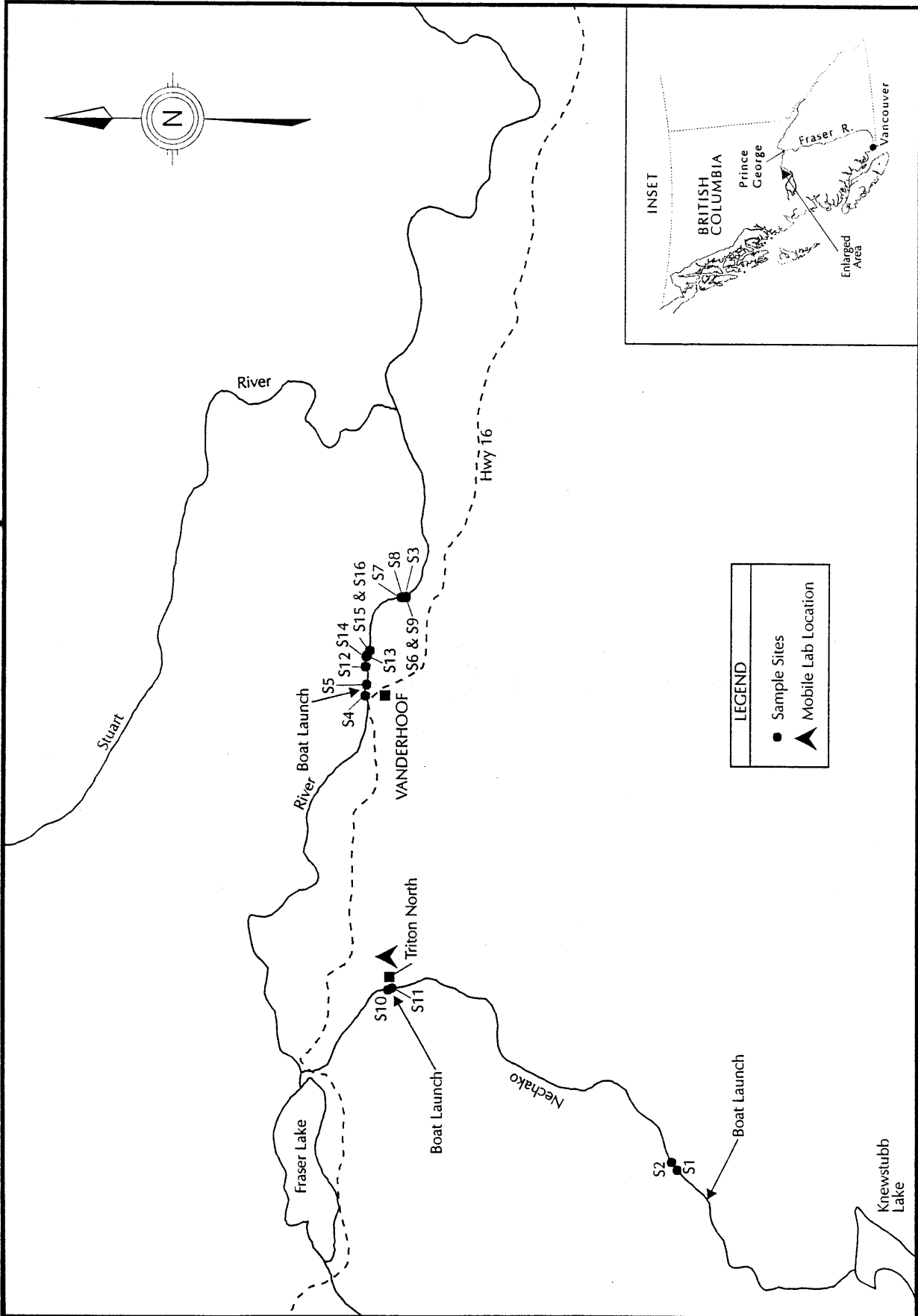
Basin Wide Resident Fish Condition Assessment

Map # 2315-woo

0 5 km

**FIGURE 3. SAMPLE SITES IN THE WOODPECKER LOCATION**



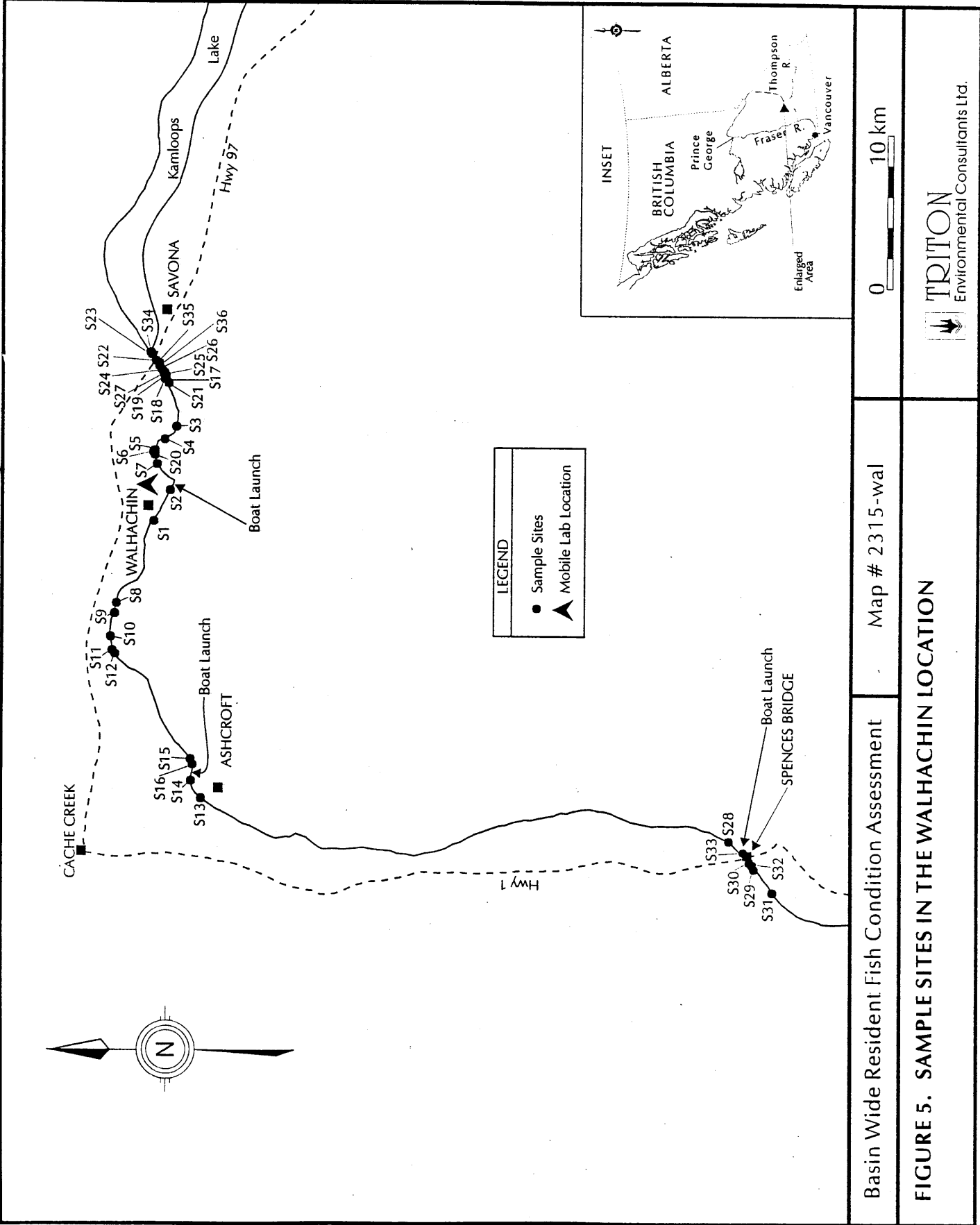


Basin Wide Resident Fish Condition Assessment

Map # 2315-nec

0 25 km

**FIGURE 4. SAMPLE SITES LOCATED ON THE NECHAKO RIVER**



Basin Wide Resident Fish Condition Assessment

Map # 2315-wal

FIGURE 5. SAMPLE SITES IN THE WALHACHIN LOCATION

locate fish. The Savona area proved to be the most productive part of the river. Day time seining in the Savona area produced 95 adult whitefish but no peamouth. Seining at night was required in the Savona area and the west end of Kamloops Lake to attain the 60 adult peamouth chub. Gee traps proved to be futile.

### *McLure*

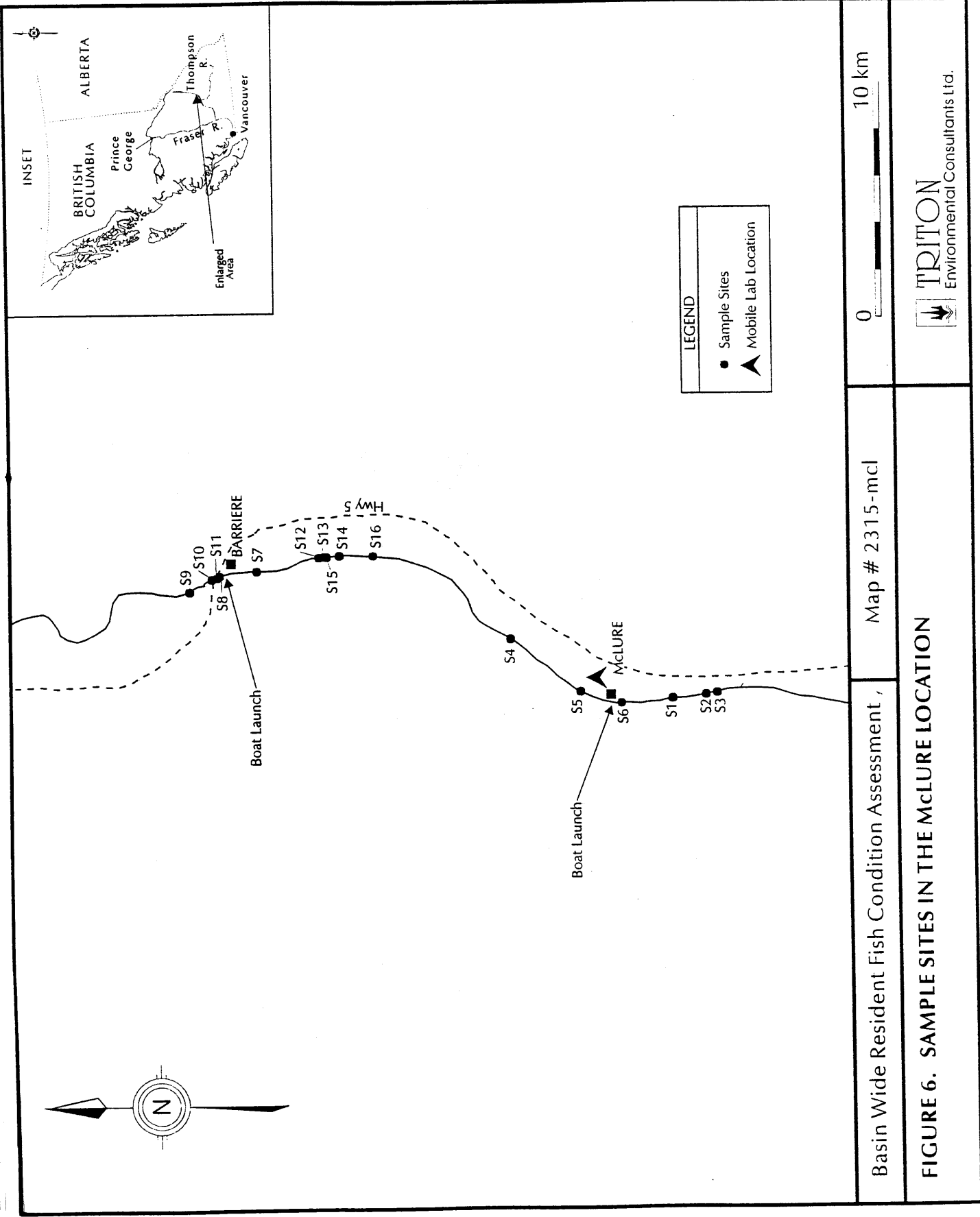
The McLure reach of the Thompson River widens and meanders, where low water velocities appear to provide abundant fish habitat. This location was sampled in 5 days (Figure 6). The largest single seine set containing target species was produced at the mouth of the Barriere River, where 550 adult whitefish were captured. Peamouth chub sampling efforts were concentrated in the Louis Creek area where 48 peamouth were captured in 2 nights of seining. One adult peamouth was caught in a gee trap beside the McLure ferry.

### *Marguerite*

Marguerite was the second most difficult location to sample, due to the extremely low water level where most of the side channels were dry, gravel bars were large, and shallow water extended well out into the river from the edges of the bars. Hawk Creek to Australia Creek was sampled; the northern portion of the reach around Australia Creek provided all but 13 of the adult whitefish samples required (Figure 7). The adult whitefish were difficult to locate and most of the 39 we captured were spawned-out females. The majority of the acceptable whitefish and peamouth were seined at night. The spawned out condition of the adult whitefish and the onset of sub zero temperatures required that sampling stop and that the project continue on to Agassiz.

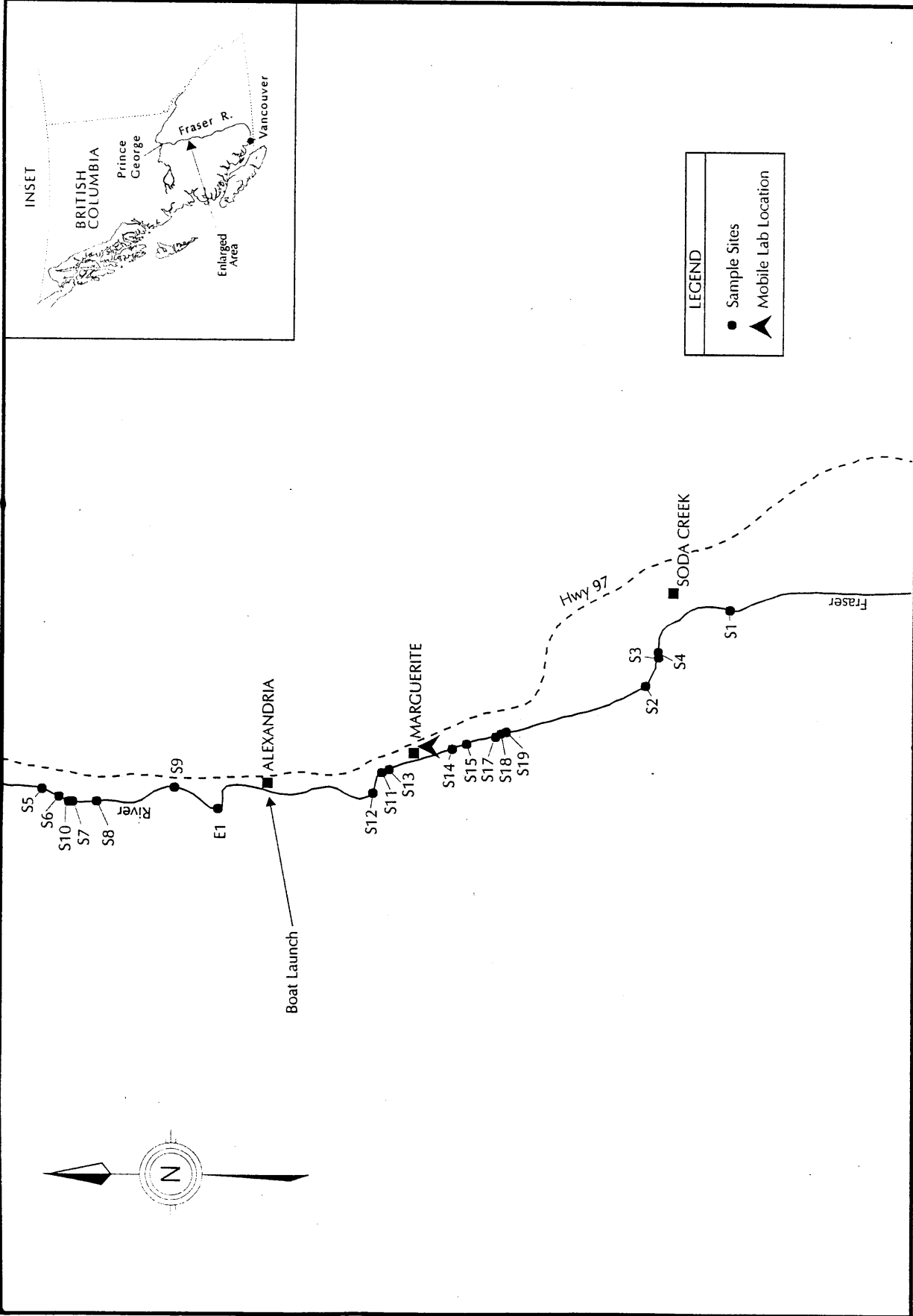
### *Agassiz*

There is an abundant amount of whitefish and peamouth chub habitat sites available in the Agassiz sample location (Figure 8). More adult peamouth were captured in this location than any other. Adult whitefish were illusive, only 25 adult whitefish were caught seining day and night. Seine sets in the mouths of Ruby Creek and Jones Creek produced only one adult whitefish; it is suspected the whitefish had already migrated up the creeks to spawn. Gee traps were unproductive in this reach. Environment Canada's



Basin Wide Resident Fish Condition Assessment, Map # 2315-mcl

FIGURE 6. SAMPLE SITES IN THE McLURE LOCATION

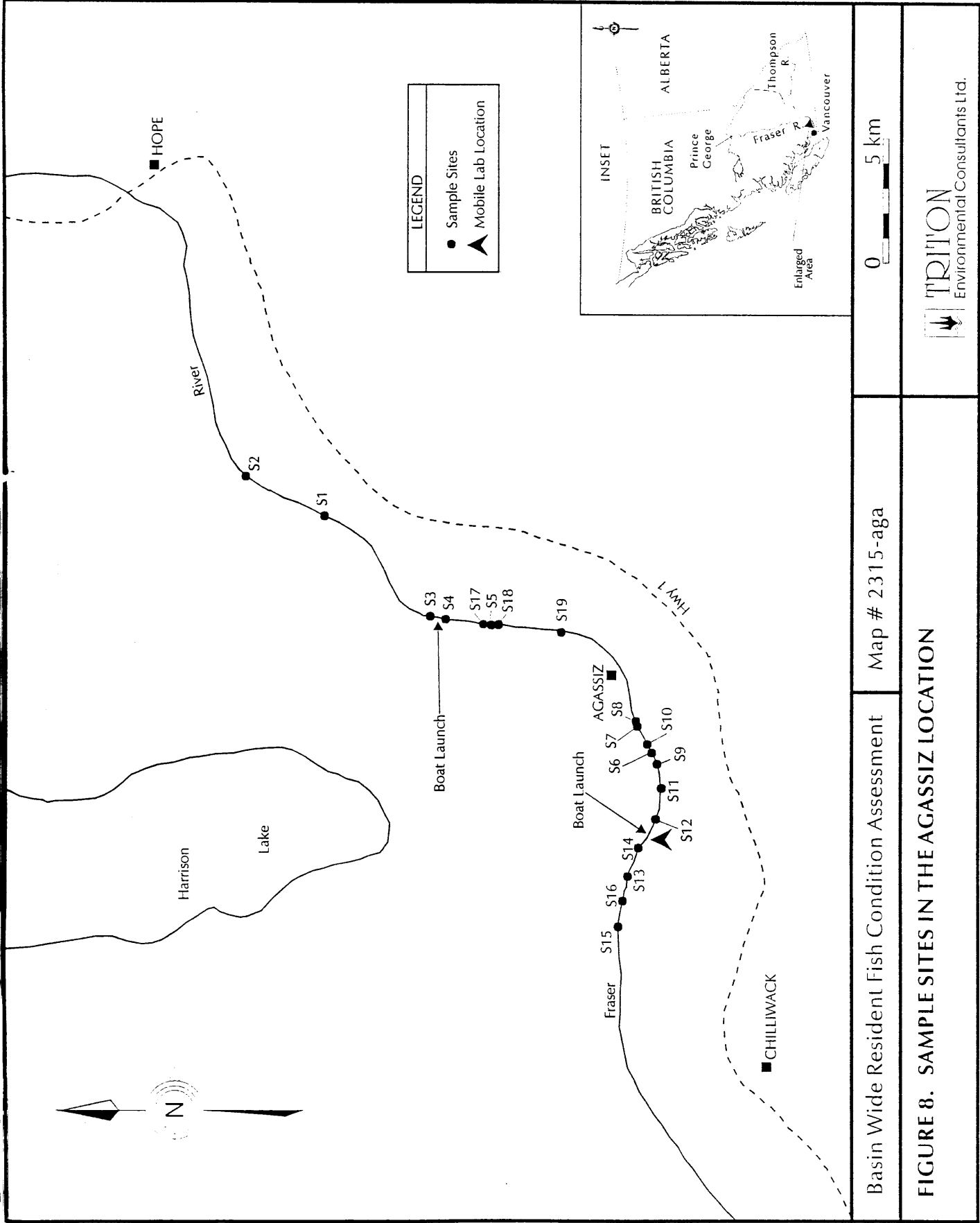


Basin Wide Resident Fish Condition Assessment

Map # 2315-mar

0 10 km

FIGURE 7. SAMPLE SITES IN THE MARGUERITE LOCATION



Basin Wide Resident Fish Condition Assessment

Map # 2315-aga

0 5 km

**FIGURE 8. SAMPLE SITES IN THE AGASSIZ LOCATION**

mobile lab was required for another project therefore the sample size for whitefish was terminated at 25.

## 5.0 DISCUSSION

Analysis of data collected during the FRAP fish sampling program is to be undertaken by the Scientific Authority. Triton Environmental Consultant's mandate was to collect the samples and compile the catch data. This report highlights some trends observed in data collected during field work, however the primary focus of the text is to introduce the project, describe sample locations and outline sampling procedures.

Beach seining with a jet boat was by far the most efficient means of sampling adult whitefish and peamouth chub. Seine sample sites have to be selected very carefully to avoid snags especially when setting the seine net with a boat. Hansard was the worst area for debris along the river margin and Agassiz for submerged rootwads. Seining for whitefish is convenient in the fall, when they are congregating in creek mouths, as long as the sampling period is timed properly and not left too late in the season, when the whitefish migrate up tributaries to spawn. The longer seine net with the larger mesh was easier to handle than the juvenile seine and could be fished in faster flowing water where adult whitefish were holding. The longer seine also reached further out from shore on low gradient gravel bars allowing it to fish in deep water where adult fish were holding.

Boat shocking was not very successful; 10 sites were electroshocked-6 during the day and 4 at night. The sites consisted of large boulders and LOD and had to be boat shocked in order to be sampled. One adult whitefish was shocked and captured but died in transit. No adult peamouth chub were observed during boat shocking.

Large vexar gee traps were useful in turbid upper Fraser River waters, but proved to be unsuccessful in catching fish in clear flowing rivers.