

1999/2000 Assessment of Upper Fraser River White Sturgeon

Prepared For:

**Upper Fraser Nechako
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and
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1.0 Executive Summary

With the exception of the Nechako and Stuart river populations, relatively little is known of the presence, distribution, life history and biology of white sturgeon within the Omineca Peace Region of the upper Fraser River basin. During the winter of 1999, the Lheidli T'enneh Band and the B.C. Ministry of Environment, Lands and Parks (MELP) collaborated on the development of a study design and proposal in an effort to collect information on the white sturgeon populations within the upper Fraser River. In the spring of 1999, funding to undertake this initiative was received from Fisheries Renewal British Columbia (FsRBC) and delivered through the Upper Fraser Nechako Fisheries Council (UFNFC). The study area for this project was designated to be the mainstem of the Fraser River from the confluence of the Blackwater River upstream to the confluence of the Morkill River, including the lower portions of these and other major tributaries to the Fraser River. Captured sturgeon were to be sampled for morphological parameters, aging structures, tissue samples and tagged with T-anchor tags and PIT tags prior to being released. Through the period of August 17th-October 5th 1999, approximately 35,509 hours of set line hook effort, 29.8 hours of angling effort, 2.5 hours of gillnetting effort and 315 hours of trapping effort were applied to the study area. This sampling effort resulted in the capture of 44 sturgeon, all of which were captured on set lines (CPUE= 0.12/100 hook hours). Of the 44 sturgeon captured, 2 had been previously captured and tagged, 1 during the course of this study, and an additional fish which had been captured by RL&L Environmental Services Ltd. in 1996. Age of fish captured ranged from 6 to 54 years. The age class composition of the catch was 29%, 33%, 12%, 21%, 0% and 5% for the age classes of 0-10, 11-20, 21-30, 31-40, 41-50, 51-60 years respectively. Total lengths of the fish captured ranged from 59cm to 254cm. The size (total length) composition of sturgeon captured was 52%, 31%, 17% for the size classes <100cm, >100cm<150cm, and >150cm respectively. Utilizing classifications developed on similar sturgeon studies on the Fraser River, this total length size composition indicated that 52%, 31%, and 17% of the fish captured were within the categories of juvenile, sub-adult and adult, respectively. Catch success relative to effort appeared to decrease with increased distance up the mainstem of the Fraser River, and also decreased considerably as the Fraser River mainstem temperatures approached 5 °C.

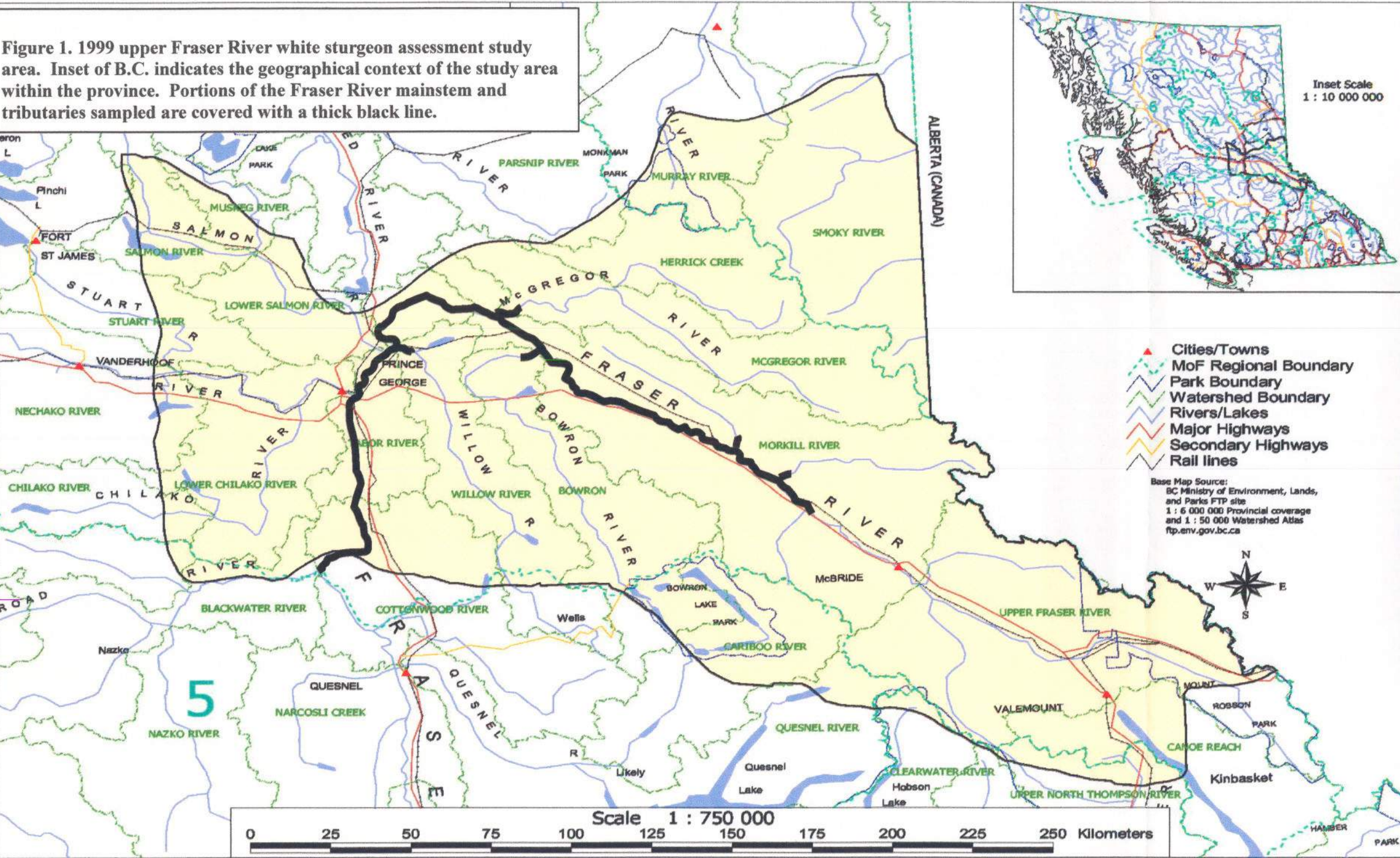
2.0 Introduction and Background

The Fraser River is the largest river system contained entirely within British Columbia, draining an area of 220,000 km² (Fig. 1). The headwaters of the river occur within the central eastern portion of the province and flow northwest to Prince George, where it begins to flow in a southward direction that is maintained until it drains into the Strait of Georgia at Vancouver. The Fraser River watershed contains 52 species of fish, including the full compliment of anadramous Pacific fishes plus numerous other resident, fluvial and adfluvial coarse and game fish species that utilize the mainstem of the Fraser and its many tributary watersheds (McPhail and Carveth 1993). Included within this assemblage of fish species that inhabit the Fraser River watershed is the white sturgeon (*Acipenser transmontanus*) (Scott and Crossman 1973). White sturgeon populations within the Fraser River have been impacted by direct commercial harvesting and bycatch within commercial salmon fisheries (Semakula and Larkin 1968), sport-kill fisheries (Dixon 1986) and anthropogenic alterations to habitat (Rochard et. al 1990).

In response to concerns regarding the status of the Fraser River white sturgeon populations, the B.C. Ministry of Environment, Lands and Parks (MELP), the agency responsible for the maintenance of biological diversity within the province, instituted no-kill regulations on this species within the watershed in 1994. This action was initiated in response to the lack of knowledge regarding the status of this population and their habitat requirements, as well as concerns regarding the unexplained death of several large adult fish within the lower Fraser. In order to address these concerns, MELP committed to a monitoring/inventory program for white sturgeon in 1995. This program involved juvenile and adult sampling and tagging programs within MELP Regions 2, 3, 5 and 7. This program resulted in evaluations of sturgeon populations within portions of the majority of the mainstem of the Fraser River downstream of the confluence of the Blackwater River, which serves as the MELP boundary between Region 5 and 7. The work undertaken in Region 7 involved the assessment of sturgeon populations and movements within the Nechako River mainstem and the Stuart River (Nechako River tributary) (Zimmerman pers. Comm. 1999). Work within these portions of the Fraser watershed continued into 1999, with only minimal sampling effort directed at the upper portions of the mainstem of the Fraser River.

The Nechako River, a major tributary to the Fraser River, enters the Fraser at Prince George. The Fraser River watershed upstream of this confluence is known as the upper Fraser Basin. The upper Fraser watershed, which is within the MELP Region 7: Omineca-Peace, is the most sparsely populated and least developed portion of the Fraser River watershed. It is also one of the most poorly inventoried and studied portions of the watershed, which is reflected in the absence of knowledge and literature regarding the white sturgeon populations within this section of the river. Preliminary

Figure 1. 1999 upper Fraser River white sturgeon assessment study area. Inset of B.C. indicates the geographical context of the study area within the province. Portions of the Fraser River mainstem and tributaries sampled are covered with a thick black line.



efforts to improve this knowledge base were commissioned by MELP in 1995-96 (LGL Ltd. 1996), 1997 (RL&L Ltd. 1997) and 1998 (RL&L Ltd. 1998). With the exception of the LGL study undertaken in 1995-96, which was an inventory of the lower Bowron River with emphasis on the use of this area by juvenile sturgeon, these investigations involved mainly a synoptic-level of sampling effort throughout the upper Fraser River. Effort and capture success was low.

This upper portion of the Fraser River watershed falls within the Traditional Territory of the Lheidli T'enneh First Nation. Portions of this area were also traditionally and are presently utilized by the Shuswap First Nation peoples. The Lheidli T'enneh Band historically utilized sturgeon and all other species of fish within the area as a food source. Since the MELP imposed no-kill regulation on white sturgeon harvest within the Fraser watershed in 1994, all Fraser River First Nations have voluntarily complied with this regulation. In recent history, prior to 1994, since the industrialization of the Prince George area and the subsequent development of several milling operations that discharge effluent directly into the river, the practice of harvesting resident species of fish from the river has been severely curtailed.

As First Nations people who have inhabited this area for thousands of years, utilizing and benefiting from the wealth of natural resources that are present within the area, the Lheidli T'enneh people have a strong desire and obligation to contribute to the sustainable management of all resources within their Traditional Territory. The Lheidli T'enneh previously conducted work assessing the health of upper Fraser sturgeon stocks in 1991 (Lheidli T'enneh 1994). This report outlines the activities and results of continued efforts in the assessment of the status of this population undertaken by the Lheidli T'enneh in 1999.

3.0 Methodology

Based on knowledge gained from the previous sturgeon work accomplished within the upper Fraser watershed, and suggestions from the MELP Senior Fisheries Biologist, the Lheidli T'enneh Band proposed to undertake a sampling program designed to begin a preliminary assessment of the status of the white sturgeon population within the upper Fraser River. The areas to be sampled included the Fraser River mainstem from the confluence of the Blackwater River upstream to the confluence of the Morkill River, and the lower portions of all major tributaries that enter the Fraser throughout this length. The objective of this project was to apply sampling effort throughout the areas identified, utilizing set lines, gillnets, minnow type traps and angling, to sample for and capture as wide a variety of size classes of sturgeon as possible. Captured sturgeon were to be sampled for morphological parameters, aging structures, tissue samples and tagged with T-anchor tags and PIT tags prior to being released.

3.1 Discharge

Water Survey of Canada information collected on the discharge of the Fraser River at Shelley in 1999 was obtained from the Data Management and Applications Department of Environment Canada. The period of record for this information in 1999 was from January 1 to November 22.

3.2 Water Temperature

Data collected on the daily water temperature regime of the Fraser River at Shelley was obtained from the Department of Fisheries and Oceans. The period of record for this temperature information was from May 14, 1999 to October 5, 1999.

3.3 Sampling Techniques

Set lines, angling, multi-panel gill nets and G-type traps were utilized in an attempt to capture sturgeon.

3.3.1 Gill Nets and Minnow Traps

A multi-panel small mesh nylon gillnet was deployed on a number of occasions. This sinking gillnet consisted of three 15meter panels, 1 panel of 7.6cm mesh and 2 panels of 5.1cm mesh. These gillnets were targeting juvenile fish and as such were deployed in habitat units such as backwaters, sloughs and blind channels where these fish have been documented in past studies (Lane and Rosenau 1995)). After several deployments it became apparent that the by-catch of coarse fish and other species was too high to continue their use. As an alternative, selective juvenile capture method G-type minnow traps were employed on a number of occasions. These conical traps were 40cm in length by 22cm in diameter, with an opening of 1.5cm - 3cm diameter at each end. This opening variation was to allow for possible capture of different age classes of juvenile sturgeon. The wire mesh on the traps measured 0.75cm corner to corner. Traps were baited with roe and/or sockeye flesh. The specifics of the time of deployment and the time of retrieval were recorded on data forms and total effort was calculated for each sampling period. The habitat characteristics (habitat unit, depth, velocity) at the location of deployments were also recorded.

3.3.2 Angling

Angling was conducted with a variety of tackle that consisted of heavy action 3-4m rods with both large spinning type reels and level-wind reels filled with 30-40 lb test braided Tuff line. Gamagatsu bait hooks ranging in sizes between 6/0 and 9/0 were fished on the bottom with pyramid weights ranging from 8-14 oz. Baits utilized included salmon roe or pieces of salmon flesh.

3.3.3 Set Lines

Set-lines were constructed in a standard length of 40m with the ability to combine these lines to make for an 80m or 120m set. The mainline was a 3/8" double braid nylon of an approximate 5100lb test setting. Caribeaners (3/8" galvanized boat snaps) were attached to each end of the set line. Halibut (circle) hooks in sizes 11/0, 12/0, 14/0, and 16/0 were attached to 1/8" ganging twine (450lb test) using aluminum hammer clamps to form the dropper line. The dropper line was 24" in length and attached to a 2-way swivel, which in turn was attached to a quick release halibut snap. Dropper lines were attached to the set line using the halibut snaps. The droppers were generally placed on the set line with a 5m interval between each hook leader. A 40m set-line would deploy 8 hooks as a standard. Sockeye salmon flesh was the primary bait utilized on these hooks.

Metal anchors weighing 9kg each were placed at each end of the set line to hold the line and hook leaders close to the bottom and prevent drifting. An additional variable length of rope was attached to the upstream end of the set line at the point of anchor attachment. This line was run to shore and attached to a sturdy stationary object, typically a tree or rock. At the downstream end of the set line, an additional 10m length of rope was attached that ran from the anchor to the waters surface, where it was attached to an A-2 type 50cm diameter polyform red floater buoy.

3.3.4 Set Line Deployment and Retrieval

Set lines were normally deployed in an upstream to downstream direction. Alternately, they would also be deployed with the direction of flow, if flow direction was reversed in an eddy situation. After a site was selected for set line deployment, the shoreline rope was attached to an object on the shore nearest to the site selected for deployment. This rope was then attached to the end of the set line at the first anchor point using a caribeaner. As the boat backed through the site, baited hooks were then attached to the line in 5m intervals. An additional anchor and marker bouy line was attached to the caribeaner at the downstream end of the line. This line was used to lower the anchor on the end of the set line to the bottom. A red floater buoy was attached to the end of this line to mark the location of the set line for the crew and other boaters. Buoys were marked with the project name and a contact phone number in case of loss or general inquiry. When lines were retrieved, the floating buoy was picked up from the bow of the boat and the set line was removed in an upstream direction. Hooks were removed as they were encountered, and information pertaining to the size of the hook, its position on the set line, and the state of the bait/hook was recorded.

3.4 Sturgeon Handling and Data Collection

As set lines were retrieved and hooked fish were encountered, they were maneuvered from the bow of the boat to the side using the set line and permitting the fish to stay in

the water. The fish then had a 2m tail noose placed on it that was then tied off to a cleat on the gunnel of the boat. Upon securing the fish, the hook was then removed. The remainder of the set line was retrieved and any other "hooked" fish were dealt with in a similar manner. The boat was then either anchored mid-channel or tied off to the shore for data collection purposes. Depending on the size of the fish captured, it was either processed in a tub of water (TL < 70cm) or in a stretcher designed specifically to hold larger fish (TL > 70cm). Captured sturgeon from 3kg to 55kg were processed in a water-filled stretcher that was suspended in a metal frame mounted on the gunnels of the boat and manufactured specifically for this purpose. The mounts held the stretcher on a 15° angle that maintained the head (anterior) end of the fish sloping downward into a vinyl fabric hood. Fresh water was flooded into the stretcher manually to provide the fish with a constant supply of fresh oxygenated water. Fish larger than 55kg were processed in the stretcher along the shoreline. By processing larger fish suspended in the water, but held in the stretcher, it appeared to be less traumatic and cause a less violent reaction from the fish.

Morphological parameters were collected from all fish sampled. Length and girth measurements were collected using a soft metric sewer's tape. Measurements taken include total length, fork length, post orbital length, post opercular length and girth, and all were recorded to the nearest 0.5cm. The following table lists the measurements that were taken from captured fish and the specific methodologies associated with each.

Table 1. Specific measurements taken from each captured sturgeon sampled in 1999, and the specific techniques for taking measurements.

Measurement	Specific Technique For Measurement
Total Length	From the center of the curvature of the snout, along the lateral line to the posterior terminus of the caudal peduncle, where the tape was held and redirected along the dorsal length of the caudal fin to its tip.
Fork Length	From the center of the curvature of the snout, along the lateral line, to the fork of the tail.
Post Orbital Length	From the center of the curvature of the snout to the back of the eye socket.
Post Opercular Length	From the center of the curvature of the snout to the posterior edge of the opercular plate. In the case of a gap between the operculum and the bony structure located posterior of the opercular plate, the gap was included in this measurement.
Girth	Taken as the circumference of the fish's body on the posterior side of the pectoral fins.

Weights of fish were determined using a 135 ± 2.3 kg capacity spring scale calibrated with known 10 kg weights. Fish were examined for any external anomalies or damage such as missing scutes and scars. They were also assessed visually for a general health. The relative maturity of the fish was estimated based on length and recorded as a code. The codes utilized, and their definitions, are provided in Table 2. Because no

internal/surgical attempt was made to assess gonad state, the sexual status of captured sturgeon was not estimated in this study.

Table 2. Description of "Sexual Maturity Code" applied to sturgeon sampled within the upper Fraser study area in 1999.

Length	Maturity Code	Maturity Code Definition
<100cm	98	Sex unknown, gonad undifferentiated or not visible, juvenile based on size
>100cm	97	Sex unknown, gonad not visible, adult based on size

Fish received a uniquely numbered external spaghetti type tag (FLOY T-anchor 1^{1/8"}) in yellow or blue. A uniquely coded internal tag (PIT TX 1400L Destron 11.5mm x 2.1mm) was also used. The external FLOY tag was applied using a Dennison Mark II tagging gun and was inserted completely through the dorsal fin at an approximate 45° angle to the right anterior of the fish. This would leave the tag trailing to the left posterior of the fish. The internal PIT tag was inserted under the skin approximately half way between the lateral line and dorsal fin on the left side of the fish. PIT tags were injected using a plunge type PIT tag injector. The unique digital PIT tag code was "scanned" and recorded prior to injection, and "scanned" and confirmed post injection. PIT tags were scanned using a "Power Tracker II Reader".

A small piece of tissue for genetic analysis was removed from the tip of the left pectoral fin, except where fin damage or anomalies were present, in which case sampling took place on the right side. Tissue samples were placed in a 2ml sample vial in 70% ethanol. The size of the sample varied between fish, but rarely exceeded a 0.5cm piece of tissue. The labeled sample vial was placed in a labeled scale envelope.

Bone structures for determining fish age were removed from the leading fin ray of the left pectoral fin, except where fin damage or anomalies occurred, in which case the fin ray was removed from the right pectoral. This sample was removed approximately 2cm away from the articulation where the pectoral fin meets the body. Using a small hacksaw with a carbon steel blade, a small piece of the fin ray was removed by cutting at right angles to the pectoral fin. This fin ray section was placed in gauze and then a labeled scale envelope.

The time required for this sampling procedure was normally less than 10 minutes. All instruments used for intrusive procedures were sterilized in a bath of isopropanol prior to each sampling event and storage.

3.5 Data Management

A set of TRIM base maps encompassing the study area were developed at a scale of 1:50,000. These maps highlighted the mainstem of the Fraser River from the mouth of the Blackwater River to the mouth of the Morkill River at Crescent Spur. Features included on these maps were streams, lakes, contours, islands, railways and roads from the TRIM base. A digital program was used to label the thalweg of the mainstem of the Fraser River with kilometer markings from the confluence of the Blackwater River to the mouth of the Morkill River. These kilometer designations started at 700.2 km at the Blackwater River, and continued to 1084 km at the mouth of the Morkill River. The starting point of 700.2 km was utilized to standardize our kilometer markings with those of RL&L, who had previously worked in this section of the river. All locations where sampling effort was applied were described in terms of the kilometer description of that point, with reference to the proximity of the sampling site to the right of left upstream bank. Due to the digital nature of our labeling technique, there was a slight difference between our kilometer designations and those applied by RL&L. The magnitude of this difference increased in magnitude in an upstream direction.

All sampling effort applied was given a site label based on the type of effort applied and the location in the river relative to the kilometer designation (i.e. set line deployment at kilometer 850.0 would be site SL850.0R). In this case, SL refers to set line, 850.0 is the mainstem river kilometer at the site of deployment, and R refers to the proximity of the site in relation to the right upstream bank, as where L would imply left upstream bank. A label of AS or AB indicates angling from shore or a boat, respectively. A label of GN or MT indicates multi-panel gillnet or minnow trap, respectively. All site location effort codes were added to the maps manually in the field and later transcribed to the digital base map of the study area. Information relating to the sampling effort and results for all techniques was placed in forms designed specifically for sturgeon capture and sampling. These forms were created and utilized on similar projects in different locations by RL&L Environmental Services Ltd. All information relating to the specifics of the equipment used, date and time of deployment and retrieval, and the results of the effort applied were entered on a form that was specific to the site label applied to that site. Examples of these forms are provided in Appendix 1.

3.6 Aging Analysis

Age determination of sturgeon captured was determined through an examination of the annuli patterns visible on the fin ray section that was removed from the leading ray of the left pectoral fin. Aging analyses were conducted by staff of RL&L Ltd. Personnel from this company have performed age analysis on sturgeon sampled throughout the Fraser River watershed.

3.7 Genetic Analysis

Two types of DNA analyses were performed on sturgeon tissue samples, which were collected from sturgeon captured throughout various portions of the Fraser and Nechako rivers during the last 5 years of sampling, including this study. This genetic analysis was coordinated by Susan Pollard, Fish Geneticist for the Conservation Section of the British Columbia Ministry of Fisheries, and conducted by Ben Koop and Christian Smith (both from the University of Victoria) and John Nelson (Seastar Biotech Inc.). The first technique used in the DNA analysis involved an examination of the D-loop section of the mitochondrial DNA (mt DNA), a genetic unit that is maternally inherited and does not undergo recombination. Therefore, this is a useful marker to track dispersal patterns of different maternal lines. Because mtDNA has a higher mutation rate than nuclear DNA, it often can provide a higher resolution for discriminating populations than nuclear DNA can. The second method of DNA analysis involved the evaluation of 5 nuclear DNA microsatellite loci, which are biparentally inherited, and do undergo recombination. These independent loci are composed of short repeating units that individually vary in number of repeating units. Variations in the size of these loci were examined to determine if genetic differentiation reflected the geographic relationships among these samples (Pollard pers. comm. 2000).

4.0 Results

4.1 Upper Fraser River Temperature and Discharge

Figure 2 indicates the Fraser River mean daily instantaneous discharge rates and mean daily temperatures measured in 1999 at the townsite of Shelley, approximately 20km upstream of Prince George. Mean daily instantaneous discharge rates (m^3/sec) are indicated for the period of May 15th to October 30th. Mean daily temperatures are shown for the period of May 15th to October 5th. The dates at which sturgeon sampling efforts were initiated and completed are also indicated on this figure for reference.

After falling below 12 °C on August 25th, mean daily temperature within the upper Fraser River was maintained between 10 °C and 12 °C until September 25th. After this point, mean daily temperature decreased on a daily basis to levels slightly below 6 °C on the 5th of October. October 5th was the final day that DFO recorded temperature information for this portion of the Fraser River. Temperature was tightly linked to discharge rates, decreasing with increased discharge, until near base fall flow levels were reached on approximately September 15th. At these discharge levels, the temperature regime of the river became more closely linked to air temperature. As air temperature, which is not shown of this figure, decreased sharply on September 25th, water temperature followed suit and decreased continuously until the end of the period of record.

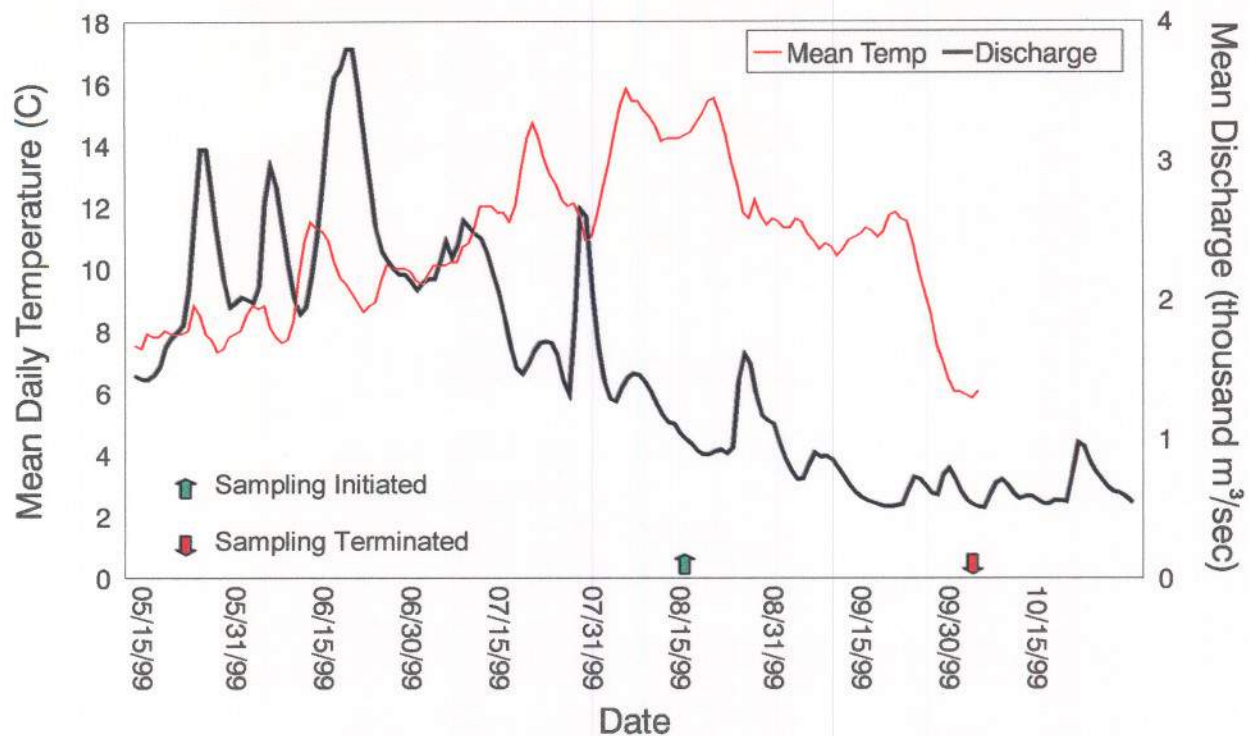


Figure 2. Mean daily instantaneous discharge rates and mean daily temperature measured in the Fraser River in 1999 at the Shelley townsite, approximately 20km upstream of Prince George. Arrows on the X axis indicate the dates sampling efforts were initiated and terminated.

4.2 Effort and Catch Per Unit Effort

A total of 29.8, 315 and 2.5 hours of angling, trapping and gillnetting effort respectively, were applied within the study area in 1999. In addition, a total of 35,509 hook hours of effort were applied throughout the majority of the predetermined study area through the use of set lines from the period of August 18 to October 5, 1999. Table 3 below is a summary of this effort and the number of sturgeon captured. Specific descriptions of the sampling gear utilized is provided in section 3.0.

Table 3. Summary of angling, gillnetting, trapping and set line effort applied to the upper Fraser Study area in 1999.

Method	Effort	Sites/ Deployments	Sturgeon Catch	CPUE
Angling	29.8 hook hours	31	0	0
Gillnetting	2.5 net hours	6	0	0
Trapping	315 trap hours	18	0	0
Set lining	35,509 hook hours	127	44	0.12/100 hook hours

No sturgeon were captured by any of the sampling methods employed during this study, other than set lining. Specifics of sampling effort applied in the upper Fraser study area in 1999 is provided for all methods utilized in Appendices 2 (set line), 3 (gillnetting and trapping), and 4 (angling).

The set line effort resulted in a total of 44 sturgeon captured within the study area. The resulting set line catch per unit effort (CPUE) was 0.12 sturgeon/100 hook hours of effort. Figure 3 indicates the locations within the upper Fraser study area where sampling effort was applied, and where sturgeon were captured in 1999. Figure 4 indicates the set line effort by date of application, and the corresponding CPUE experienced within the upper Fraser study area in 1999.

CPUE fluctuated throughout the period from mid August to September 5th, after which time the CPUE decreased considerably until sampling was completed. This phenomenon is not strictly related to date but is also affected by the fact that the effort was applied in a roving fashion. Differences in habitats fished, and thus the presence and abundance of sturgeon within the areas effort was applied, have a strong influence on the CPUE indicated in Figure 4. Also, the natural variability in the stream temperature and discharge that occurred over the sampling dates, which likely affects the catchability of sturgeon, would also affect the trend shown in Figure 4. Discharge and temperature within the Fraser River both decreased during the final weeks of sampling, and appeared to influence CPUE.

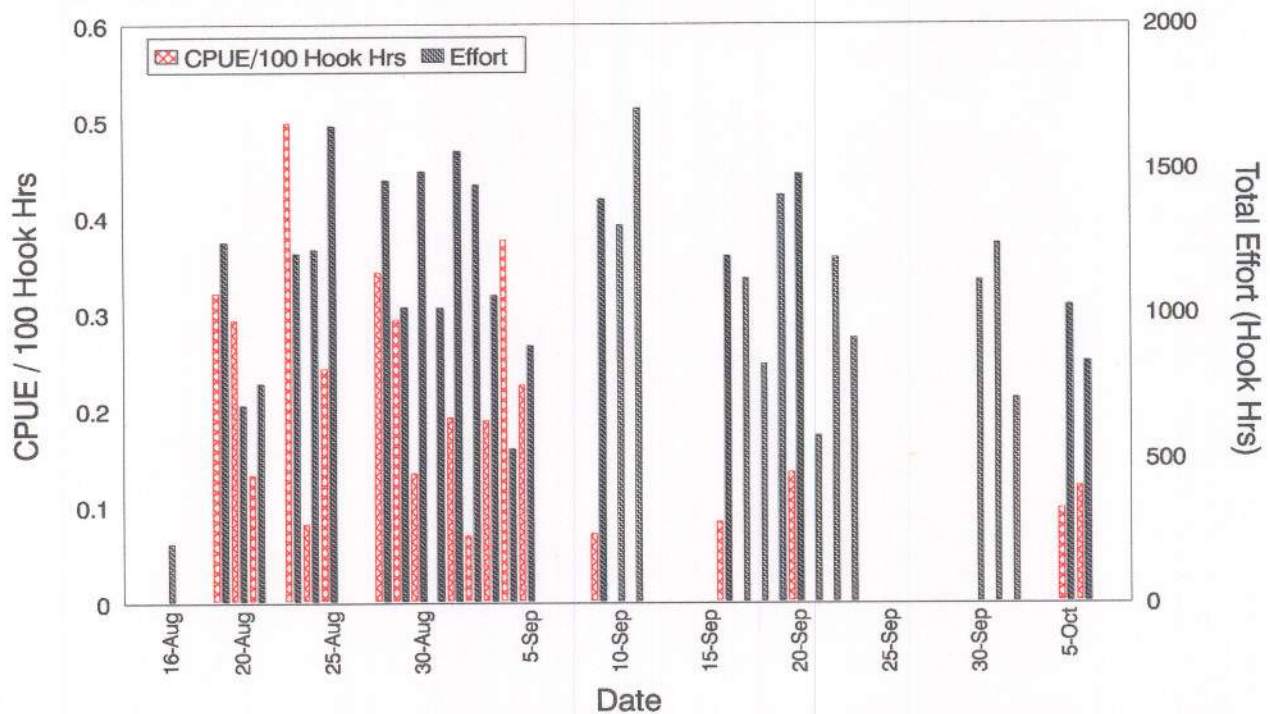


Figure 4. Set line sampling effort applied and the resulting catch per unit effort (CPUE) during sampling activities in 1999. Effort and CPUE are expressed by the date (combined CPUE and Effort/day) they occurred. Where no CPUE units accompany Effort units, no sturgeon were captured for the Effort indicated.

Set line effort in the Nechako River watershed during 1997 and 1998 produced CPUE estimates of 0.07 and 0.19 sturgeon captured/100 hook hours of set line effort (RL&L Ltd. 1997 and 1998). The CPUE of 0.12 Sturgeon captured/100 hook hours of effort

generated through set line sampling within the upper Fraser study area in 1999 is similar to the figures derived from the Nechako work. Comparison of CPUE between these studies is complicated by differences in the physical characteristics of these two streams, as well as timing of the work, and thus differences in discharge, temperature and clarity of these streams. Sampling effort in the Nechako system was concentrated at sites of previous sturgeon capture. Sampling within the upper Fraser in 1999 was conducted relatively independent of previous capture localities. As well, sturgeon densities between these two systems/studies is likely different. These factors likely lead to differences in the catchability of sturgeon within the two areas and studies.

4.2.1 By-Catch

The incidental capture of non-targeted species (by-catch) through the course of sampling activities undertaken in 1999 was managed in an effort to maintain it at relatively minimal levels. Table 4 indicates the numbers and species that were incidentally captured by each of the sampling methods applied during the course of this study.

Table 4. Incidental fish species (all species other than sturgeon) captured by sampling methods applied in the upper Fraser study area in 1999.

Method	Effort	No. Game Fish	Game Fish Fate	No. Coarse Fish
Angling	29.8 hook hours	5 BT	1 mort	5 NSC
Gillnetting	2.5 net hours	3 BT, 2 SK	1 BT mort, 1 SK mort	2 NSC, 48 PCC, 13 SU
Trapping	315 trap hours	1 CH, 1 MW, 1 RB	All lived	5 PCC, 3 CAS
Set line	35,509 hook hours	2 BB, 7 BT	2 BB morts, 1 BT mort	4 NSC

Gillnetting effort was completely curtailed after only a single day of use. Densities of coarse fish species, and other game fish species, within the Fraser River made the use of small mesh gillnet problematic, in terms of the number of non-target species captured. Live release of these fish is difficult due to the nature of their capture within the nylon mesh. Angling by-catch was not high and provided a much more feasible means for live release of fish. Set line sampling resulted in very little by-catch relative to the number hook hours of effort applied. Appendix 5 includes a complete summary of the by-catch related to each of the sampling methods utilized in 1999.

4.3 Population Distribution

Figure 5 indicates effort applied, and the resulting CPUE that was recorded, throughout the study area in 20km increments of river length. Effort and catch statistics resulting

from sampling within the McGregor and Bowron rivers is included in this figure within the 20km Fraser River length increment where these streams meet the Fraser. CPUE generally decreased within the upper portions of the study area. The trend indicated in Figure 5 is likely a result of a decrease in the frequency of suitable habitat (i.e. backwater eddies and low velocity laminar flow depositional type habitat units) which appeared to occur in an upstream ascending direction.

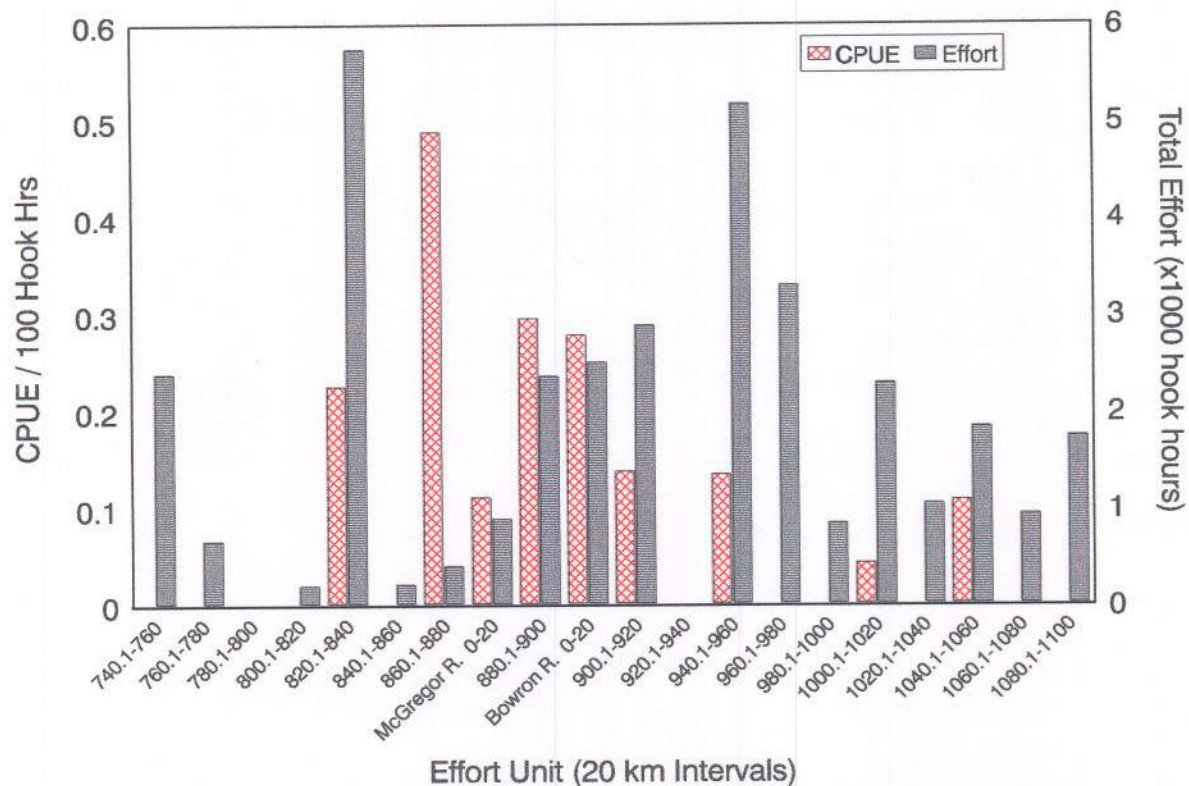


Figure 5. Set line catch per unit effort (CPUE), and total effort applied, calculated for 20km increments of the Fraser River mainstem length. Sampling effort applied and resulting catch figures for sampling in the Bowron and McGregor rivers is also shown. Refer to Figure 3 for spatial descriptions of river km markings.

Approximately 30km upstream of the confluence of the Bowron River (km910), the Fraser River contains a canyonous section known locally as the "Grand Canyon" (Figure 3). Upstream of this location, habitat units that matched those where fish were frequently captured within the lower portions of the study area, occurred relatively infrequently. Eight 20km increments of the Fraser River mainstem received sampling effort upstream of km940 of the study area. Sturgeon were only captured within 3 of these 20km stream length increments.

In general, the highest rates of CPUE that were experienced within the study area occurred within areas sampled from the confluence of the Willow River upstream to the confluence of the Bowron River. No sturgeon were captured within the study area downstream of Prince George. The lowest two 20km stream length increments

upstream of the Blackwater River were not sampled in 1999 due to funding and time constraints.

4.4 Recaptures

During the course of sampling within the upper Fraser Study area in 1999, two sturgeon were captured which had been previously captured and tagged. One of these fish was previously captured by RL&L Ltd. in 1996. This fish was first captured at the confluence of the Nechako and Fraser rivers on June 13, 1996. At the time of capture in 1996, the fish weighed 15.9kg, had a total length of 136cm, and was aged as 18 years old. The fish was recaptured on September 5, 1999, approximately 37km up the Fraser River mainstem from the Nechako confluence. At the time of recapture, the fish was found to weigh 29.3kg and had a total length of 156cm. The additional sturgeon recaptured in 1999 was 83cm (total length) and was initially captured on August 19, 1999. This fish was recaptured 17 days later on September 5, at river km831, approximately 1km upstream from the initial capture site.

4.5 Factors Affecting Catch and CPUE

4.5.1 Temperature/Discharge

The mainstem of the Fraser River downstream of Prince George to the Blackwater River confluence was suspected to contain substantial numbers of sturgeon. The bulk of effort of the Lheidli T'enneh sockeye food fishery takes place within this section of stream. Historically, and recently, sturgeon have been captured in this area in this sockeye gillnet fishery. This section of stream also appears to contain an abundance of good sturgeon habitat and periodically would contain abundant food supplies as it experiences an annual influx of high numbers of sockeye bound for the Nechako River system. Sampling within the study area was initiated on August 17 between Prince George and Shelley, and proceeded in an upstream direction until crews had sampled in the Crescent Spur area on September 23, at the upstream limit of the study area. Sampling effort was then shifted to the mainstem of the Fraser River downstream of Prince George on September 28th. At this point in time the temperature and discharge of the Fraser River had dropped significantly (Figure 2). No fish were captured within the Fraser River downstream of Prince George. By October 3, 1999, the temperature of the Fraser River was approaching 5 °C and CPUE within the Fraser River downstream of Prince George continued to be nil. Reports of two juvenile sturgeon being captured and released in sockeye gillnets that were in close proximity to baited and deployed set lines appeared to indicate that sturgeon were present but not actively feeding, possibly due to the decrease in water temperature. To test this theory, crews deployed set lines at an index site near the Willow River where fish were previously caught on a regular basis. Sturgeon were captured during this deployment, although CPUE dropped from rates of 0.31/100 hook hours experienced during sampling in August, to a CPUE of 0.11/100 hook hours in October.

Sampling within the lower portion of the Bowron River took place August 27-29, 1999. During this time period, there were several days of severe rain that resulted in an increase in discharge in the Fraser River (Figure 2). Turbidity within the Fraser River mainstem was increased considerably, and there was a noticeable difference between the turbidity of the much clearer Bowron River at its confluence. The increased turbidity within the Fraser River was the result of a large hillslope failure that took place near Ptarmigan Creek on approximately August 25. As a result, water clarity within the mainstem of the Fraser River in the area of the confluence of the Bowron River was reduced to 20cm. A total of 7 fish were captured within the lower Bowron River during this time period. The number of sturgeon captured in this location decreased from 4, 2, and 1 fish on the first, second and third day of sampling respectively. During this three day period, discharge within the Fraser River continuously decreased and the clarity of the Fraser mainstem visibly improved. The decrease in the numbers of fish captured may be a reflection of a static number of fish present within the lower Bowron River, and thus a reduction in catch over this three day period. It may also be a reflection of the increase in turbidity and discharge within the Fraser River during this time period, resulting in a temporary movement of fish from the Fraser mainstem into the less turbid conditions of the lower Bowron. As the Fraser River discharge and turbidity decreased through the course of sampling, fish may have been moving back to the Fraser mainstem, resulting in a reduction in catch over this time period.

4.5.2 Gear Selection

The size distribution of the catch also appeared to be potentially influenced by gear type selection. Set lines were initially baited with 4 sizes of hooks ranging in size from 11/0 (smallest) to 16/0 (largest). Figure 6 indicates the mean total length of sturgeon captured on each size of hook utilized on set lines. After a short period of sampling, a number of fish had apparently escaped by straightening the smaller hooks. Thus, the use of 11/0 hooks was severely curtailed, resulting in the relatively limited effort of 809 hours with this hook size. CPUE for this hook size is abnormally high due to its limited use within a portion of the study area where catch success was high. Similarly, the use of 12/0 hooks was also less frequent within the latter sampling dates and the latter areas sampled, where CPUE was low.

Figure 6 appears to indicate that the size of fish captured may be influenced somewhat by the size of the hook utilized. A single factor analysis of variance performed on the total lengths of fish captured on each the 12/0, 14/0 and 16/0 hook sizes confirmed that total lengths of fish captured on each of these hook sizes were significantly different ($F_{0.05(1),2,36} = 5.29$). Of the 34 fish captured on the larger hook sizes (14/0, 16/0), 11 were <1 meter in total length. All 10 fish captured on the smaller hook sizes (11/0, 12/0) were <1 meter in total length, suggesting the size selectivity of hook size likely works in both directions. This may make an estimation of the size and/or age structure of the

population based on the catch from set line effort difficult. The catchability of sturgeon may also vary by size and/or age class.

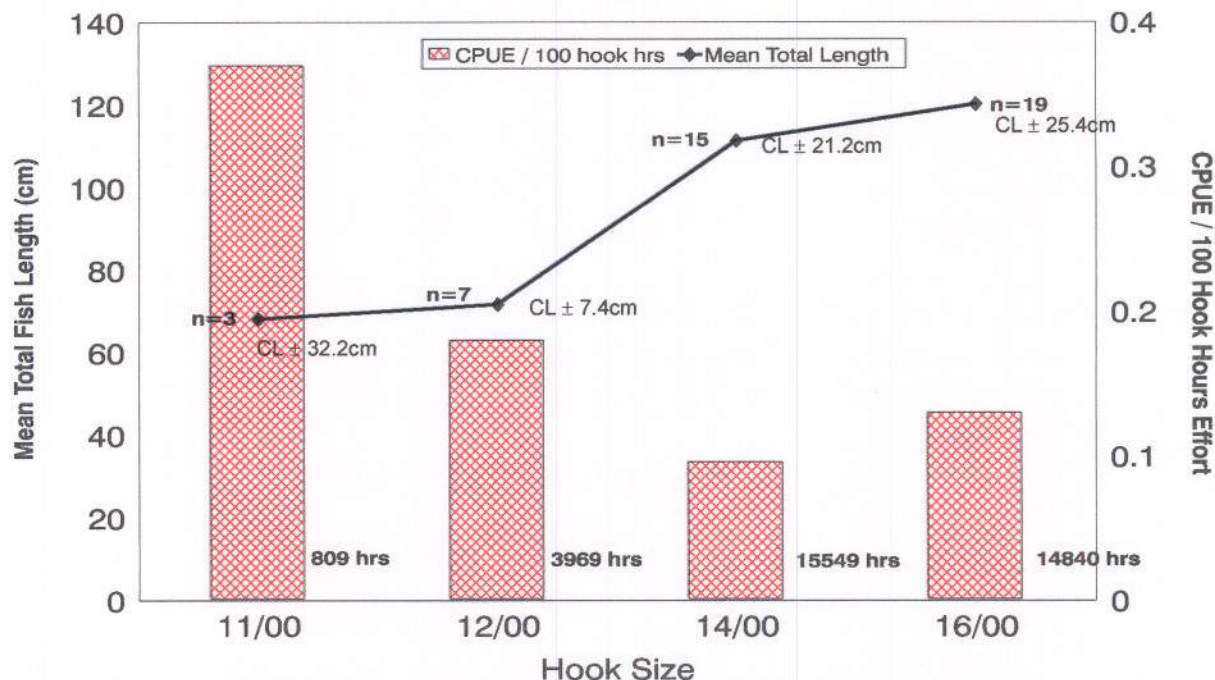


Figure 6. Mean total lengths of sturgeon captured on each size of hook utilized on setlines during sampling in 1999, and the CPUE for each hook size. Total effort in hook hours for each the four sizes of hooks is indicated in black text. Confidence limits (95%) for mean total lengths are indicated

4.6 Population Characteristics

4.6.1 Age Distribution of Catch

Figure 7 indicates the age-frequency of 49 sturgeon captured within the upper Fraser River study area from 1997-99 and 58 sturgeon sampled from the Nechako River from 1997-98. The distribution of these catches falling within 5 year age classes is compared between the samples from the Nechako and Fraser rivers. A summary of the ages and morphological characteristics of the 44 sturgeon captured in 1999 in the upper Fraser study area is provided in Appendix 6.

Although it is likely that set lines do not catch a sample which is representative of the population, it can be seen from Figure 7 that the same sampling techniques applied to the mainstem of the Fraser and Nechako rivers resulted in catches of fish that did not reflect one another in terms of age structure. Younger fish, under the age of 20 years, made up the majority of the sturgeon captured within two years of sampling on the upper Fraser River. During sampling in the Nechako River in 1997 and 1998, a total 58 sturgeon were captured. The bulk of this sample was of sturgeon between the ages of 30-40 years, with no fish falling within the 0-20 year age classes. It would appear that the upper Fraser sturgeon population is largely composed of juvenile individuals,

suggesting adults are living to reproductive age and successfully producing offspring which are recruiting into the population.

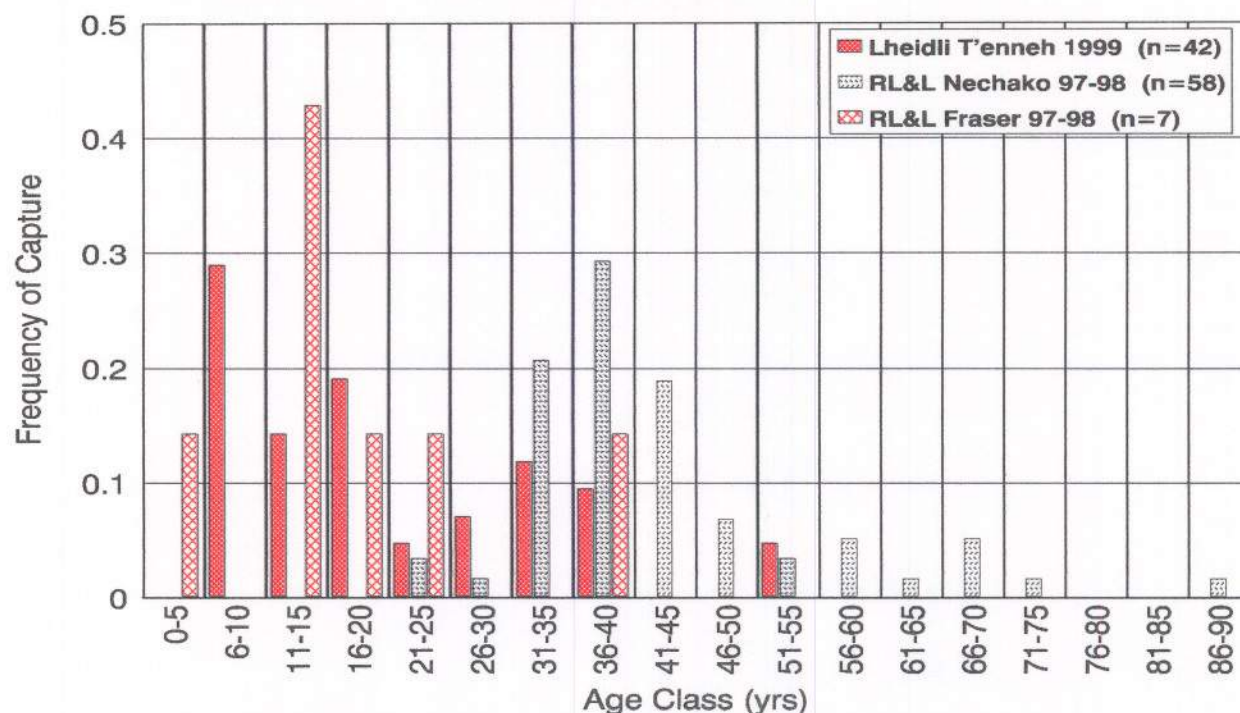


Figure 7. Frequency of fish captured within 5 year age classes in the Nechako River and upper Fraser River. Nechako fish presented are from RL&L 1997 and 1998 data, which included 7 fish captured within the upper Fraser study area.

4.6.2 Length/Weight Distribution of Catch

Figure 8 displays the relationship of sturgeon weight at age for fish sampled from 4 locations within the Fraser basin. A power regression relationship curve is drawn through samples from three of these areas. The absence of juvenile fish from the Nechako River, and few samples of fish greater than 60 years of age from all areas, biases these relationships. However, it is apparent that fish from the Nechako and upper Fraser areas are closely related in terms of their rate of growth. Fish from the more southerly and downstream portions of the Fraser River (Region 3 and 5) attained larger weights at an earlier age in comparison to the upper Fraser and Nechako samples.

Figure 9 below shows the mean fork length attained by sturgeon at specific ages sampled from 4 locations within the Fraser basin. A log regression relationship is drawn through samples from 3 of these locations in order to demonstrate the trend that exists. A similar relationship to the one demonstrated in Figure 8 is apparent. Fork length at age is greater in the southern populations and is relatively similar for the Nechako and upper Fraser populations. This relationship is again complicated by the absence of

juvenile samples from the Nechako River and relatively few samples within the >60 year age classes from all areas.

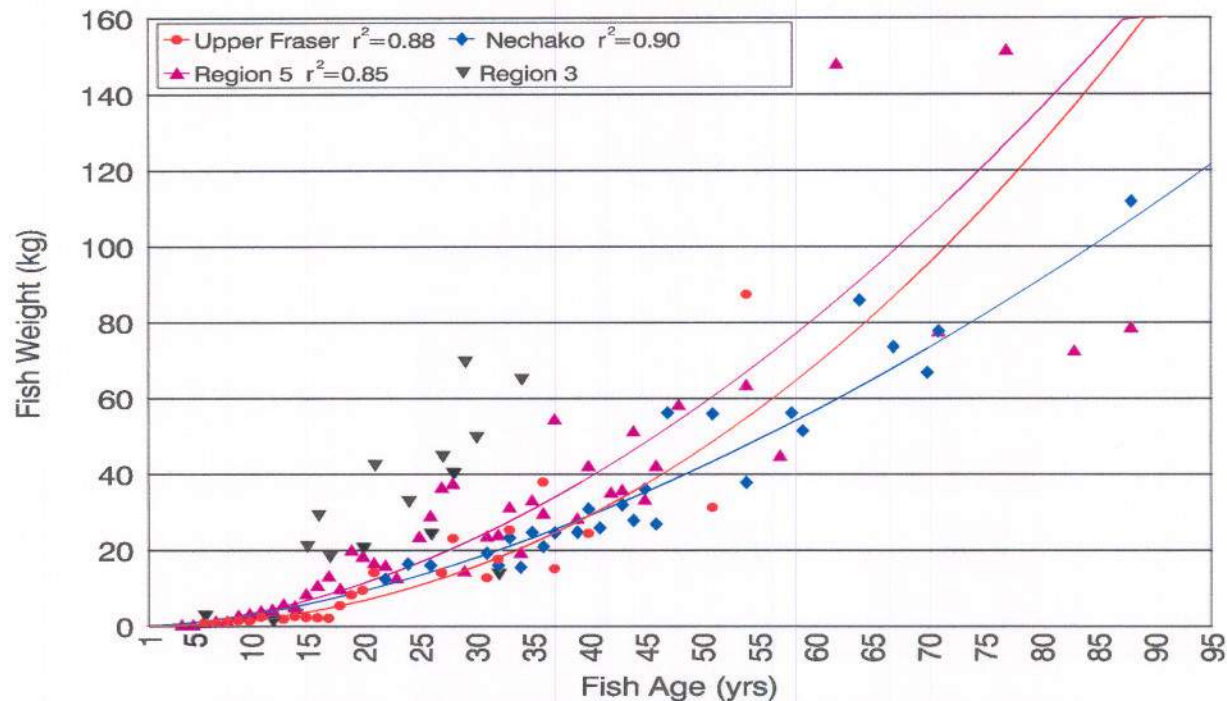


Figure 8. Mean weight of sturgeon of specific ages sampled from the Nechako River (1997-98) and portions of the Fraser River in Region 5 (1995-98), Region 3 (1998) and Region 7 (1999-Upper Fraser).

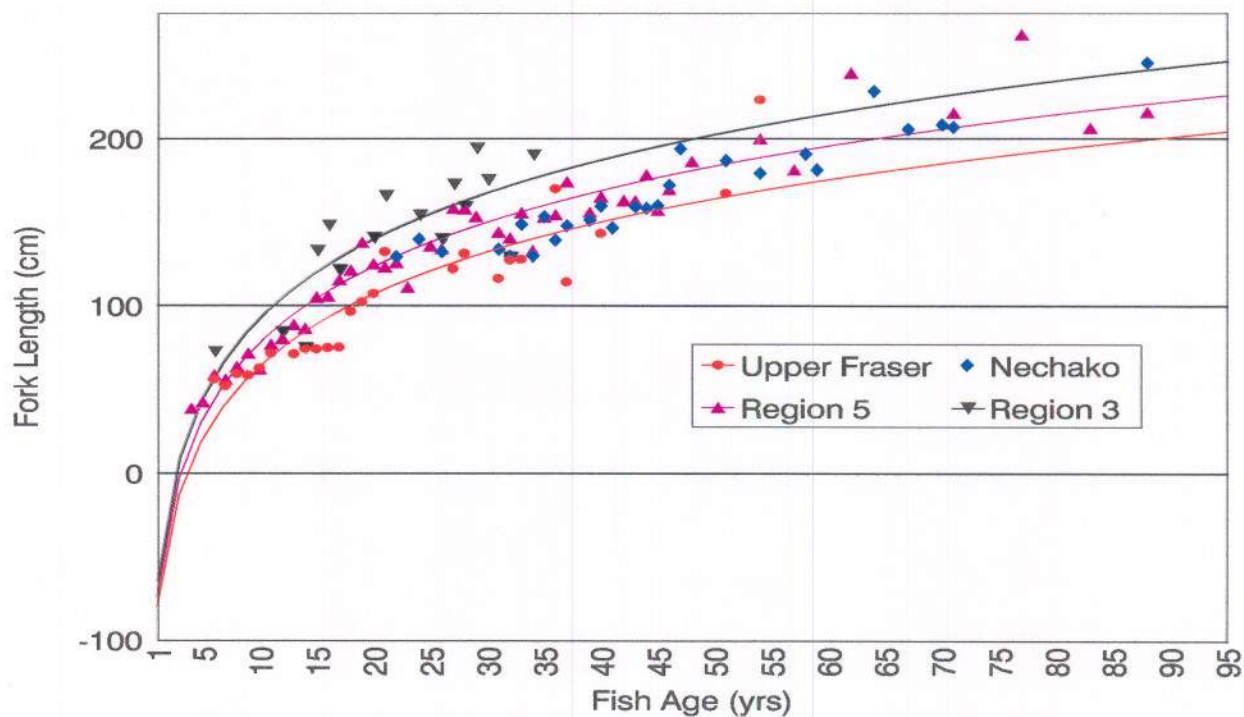


Figure 9. Mean fork length of sturgeon of specific ages sampled from the Nechako River (1997-98) and portions of the Fraser River in Region 5 (1995-98), Region 3 (1998) and Region 7 (1999-Upper Fraser).

The increased growth rates in the southern populations is likely a reflection of the increased water temperature and thus growing season, increases in the variety and availability of food sources, and a general increase in productivity that would be expected in a southerly or downstream direction within the watershed.

4.6.3 Life History

The differences in growth rates between groups of sturgeon from differing geographical areas of the Fraser River watershed likely results in significant differences in the life history patterns of sturgeon from these areas. The age at which maturity is attained is likely increased in the upper Fraser populations, due to the slower growing conditions. It also likely reduces the frequency of repeat spawning in fish of reproductive age.

4.6.4 Habitat Use and Preference

An approximation of the water depth was recorded at all locations where sturgeon were captured. Figure 10 indicates the water depth at which each of 42 sturgeon were captured during sampling in 1999. Although no statistical analysis was performed, there appears to be no significant relationship between the age of fish and the water depth where they were captured. All fish captured were encountered in water depths between approximately 3 and 9 meters.

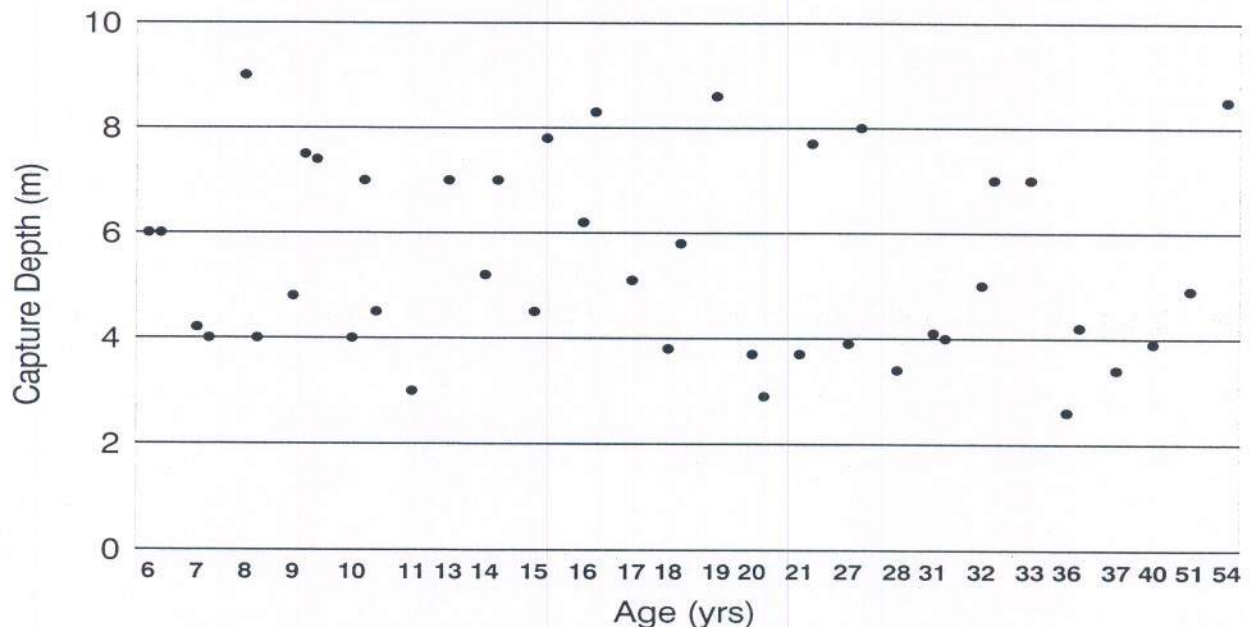


Figure 10. Water depth at which sturgeon (42) of specific ages were captured during sampling in the upper Fraser River study area in 1999.

In general, habitat units where sturgeon were consistently captured by set line in the upper Fraser included backwater eddies and low velocity laminar flow areas, both of which habitat types could be categorized as depositional areas. Proximity to the stream bank appeared to influence fish presence in relation to the propensity for shoreline

structure to influence flow and create depositional areas. Mid-channel structures that served to break-up flow, create scour type pools, and the associated backwater eddy type habitat units, appeared to attract fish equally as well as shoreline areas. Low velocity laminar flow areas were generally present on thalweg margins on the inside or outside of bends, or at the tail-outs of large scour type pools. Low velocity laminar areas of flow were also present within the lower portions of the Bowron and McGregor rivers, where the outflow of these streams was impeded by back-flow from the Fraser.

The absence of fish under the age of 6 is likely a reflection of the absence of fish from the 0-5 year age class from the habitats preferred and occupied by the older age classes, where the majority of sampling effort was applied. The size of the set line gear utilized would also likely limit very small fish from becoming hooked and captured. A total of 12 fish within the 6-10 year old age class were captured during sampling in 1999. Of these 12 juvenile fish, 6 were captured within 1km of the Willow River confluence (km831), 2 were captured at km882 (Limestone Creek confluence), 2 were captured at km863 (Barney Creek confluence) and single juveniles were captured within the lower portions of the Bowron and McGregor rivers. It is interesting to note that all 6-10 year age class juveniles captured were within, or in proximity to, tributary streams to the Fraser River mainstem. Appendix 7 is a summary of the habitat characteristics collected at each set line deployment location.

4.6.5 Genetic Variability

Two types of DNA analysis were performed on sturgeon tissue samples as per the methods outlined in section 3.7. These samples were collected from sturgeon captured throughout various portions of the Fraser and Nechako rivers during the last 5 years of sampling. These analyses provided information pertaining to the extent to which sturgeon populations or groups from different geographical areas of the Fraser River watershed vary in terms of their genetic material, which also provides information as to the extent of interbreeding between groups, and the relative population size of each group. The description of the genetic differences between sturgeon populations within the Fraser basin was interpreted from preliminary results forwarded by Sue Pollard.

Lower Fraser Population (km78-186)

The lowest group of fish sampled from the Fraser (km78-123) was the most genetically distinct from all other groups, but was most genetically similar to the next group sampled in an upstream direction (km169-186). The km169-186 group was also distinct from the other groups, although less distinctively than the lower group. The samples derived from the lower river were also more diverse in terms of both mtDNA and the nuclear DNA microsatellite loci analyzed. This likely reflects the larger population size within the lower Fraser River, and the fact that this section of the river is accessible to individuals migrating from sturgeon populations originating from other Pacific coast

streams (i.e. Columbia). These factors would be expected to contribute to an increase in the mtDNA and nuclear DNA loci variation.

Middle Fraser Population (km220-554)

The samples from the middle Fraser groups (km220-554) did not appear to be distinct from one another, suggesting gene flow through this section of the Fraser is significant enough to prevent genetic differentiation between groups of sturgeon in this section of the Fraser. Too few samples have been collected from km555-790 to allow for interpretation.

Nechako and Upper Fraser (km791-920) Populations

The Nechako and upper Fraser groups appear to be genetically distinct from each other and from the other Fraser groups. However, in terms of genetically grouping fish from different areas of the Fraser basin, the Nechako and Fraser sturgeon are most closely related to one another than any of the other groups. The upper Fraser sturgeon, followed by the Nechako population, was found to be the least diverse in terms of mtDNA variation. This lack of genetic variation is likely the result of a smaller population size, founder effects, and possibly population isolation in terms of the degree of gene flow with sturgeon outside the upper Fraser and Nechako geographical areas.

5.0 Summary

The sampling conducted in 1999 indicated that sturgeon are present and resident within the upper Fraser River in numbers substantial enough to warrant their consideration in fisheries management objectives for this area. Genetic information derived from samples collected indicated that the upper Fraser sturgeon population is genetically distinct from the groups of fish sampled in other locations within the Fraser River watershed. This includes distinction from the Nechako River sturgeon population. The upper Fraser sturgeon express the least amount of genetic diversity, relative to sturgeon from other areas of the Fraser watershed, suggesting that the population is small, and confirming an absence of interbreeding with other populations. Based on the size and age distribution of the sturgeon captured, it was apparent that this population appears to be surviving to reproductive age and successfully producing offspring.

Based on the relatively small number of samples that have been collected from the upper Fraser to date, differences in the growth rates of the upper Fraser sturgeon, relative to fish from the more southerly populations, are apparent. This difference likely influences the life history characteristics of this population. The age at which sexual maturity is reached in upper Fraser sturgeon, and possibly the degree of iteroparity, is likely increased and reduced respectively, relative to southern populations. This has implications as to the applicability of any sturgeon management regime being applied to the Fraser River watershed as a whole.

6.0 Recommendations

It is apparent that the white sturgeon present within the upper Fraser River are present in significant numbers, and that this population is distinct from the Nechako River and middle Fraser sturgeon. Five years of sampling effort within the Nechako River has indicated there appears to be an absence of juvenile fish within this system, suggesting adult fish are not producing offspring successfully and/or offspring are not surviving. Sturgeon work within the Nechako system is now moving into the recovery stage. Sampling within the mainstem of the Fraser River upstream of Prince George resulted in the capture of sturgeon in a wide variety of size and age classes, suggesting that adult fish are reproducing and juvenile sturgeon are recruiting into the population successfully. To provide additional baseline biological information pertaining to this unique population, which is fundamental for the purposes of proper management, further work should be conducted in the upper Fraser study area, as per the emphasis and format suggested below.

In order to attempt to document population size, structure and life history parameters, and habitat use on an age class and/or life stage specific basis, continued sampling effort within the upper Fraser study area should take the form of two separate, but related, sampling program components. This should include a continuation of the synoptic type roving sampling initiated in 1999, with an expansion of this program into additional areas, and throughout a wider range of dates and physical conditions. The 1999 program was successful in capturing sturgeon in a wide variety of age classes greater than 5 years. A sampling program should also be initiated to identify habitat utilization of fish in the 0-5 year age class. This program should also attempt to identify habitat units that are utilized by spawning sturgeon.

6.1 Component 1: Continued Synoptic Sampling

- Initiate sampling activities earlier within the study area to more completely apply sampling effort throughout the study area over a range of discharge and temperature conditions. It is apparent from review of temperature and discharge records for the upper Fraser that appropriate conditions exist to begin sampling efforts earlier, possibly in June. This will provide further information pertaining to the structure, life history and distribution of this population. Additional tagging and sampling (recovery) effort will eventually provide a robust enough data set to produce population size and density estimates, and will also provide information relating to the movements of fish within the study area. Sampling earlier in the summer, while discharge is still relatively high, will improve conditions for sampling within the upper portions of the study area in the Crescent Spur area. Continued sampling efforts within the lower portions of tributary streams to the Fraser will also provide information as to the importance of these streams and areas to sturgeon.

- Ensure that sampling is conducted downstream of Prince George to the Blackwater River confluence. It is apparent that there is a genetic difference between the sturgeon sampled in the upper Fraser and those from portions of the middle Fraser. Samples from the Fraser River downstream of Prince George will assist in identifying if there is gene flow occurring between the middle Fraser and the Fraser upstream of the Blackwater confluence, or if there is a barrier (physical or otherwise) that inhibits migration and interbreeding between fish from these areas.
- Apply additional sampling effort to the mainstem of the McGregor River. Sturgeon were captured within the lower portions of this tributary, but due to time and funding constraints, sampling was not conducted throughout its length in 1999. Sampling should be conducted throughout its accessible length (slightly upstream of the Herrick Creek confluence) to determine the use and importance of the McGregor River in relation to the upper Fraser sturgeon.

6.2 Component 2a: Spawning Habitat Identification and Timing/Triggers

Radio telemetry tagging methodologies employed in other sturgeon studies in order to ascertain information with respect to sturgeon movements/migrations, in relation to spawning behaviour and habitat utilization, has provided valuable information in some instances. However, with the vast length of stream within this portion of the Fraser River, and limited information pertaining to suspected spawning locations and the timing of such activity within the area, implementation of this technique at this time would not be cost effective. Monitoring movements over this large area, combined with the frequency required to acquire the necessary information given limited background knowledge, would make the costs associated with this activity very high and would be a major impediment to the success of this approach. It is suggested, for the purposes of this study, that an integrated and less technological approach be undertaken to attempt to address the questions of spawning habitat location/utilization, and the triggers to and timing of spawning. A literature review should be conducted to determine timing and triggers to spawning activity that have been observed in other studies and locations. Methods utilized in this portion of the study should include the following:

- Deployment of temperature monitoring devices throughout the study area. Discharge information can be obtained from WSC station at Shelley, and turbidity information can be measured regularly in the field.
- Crews should be trained in the identification of egg, larval and metamorphosed larval (fry) stages. This could be accomplished by visiting the sturgeon culturing facility in Nanaimo.

- Stomach analysis of coarse fish species (by-catch) captured through the variety of sampling effort employed, should be completed via a non-lethal technique, in an attempt to collect egg, larval and/or fry forms of sturgeon.
- Fyke type nets should be designed and built specifically for the purposes of collecting sturgeon egg, larval and fry life stages within the habitats and conditions that are prevalent within the upper Fraser. These should be deployed in a strategic manner, predetermined based on suspect or probable spawning locations.
- If sturgeon egg, larval or fry life stages can be collected and documented (and preserved) from specific locations, the timing of spawning could be back calculated based on the temperature information from the area of collection, and existing fish culture related literature for this species. Physical information collected could then be utilized to look for trends that may have triggered spawning. The location of egg, larva and/or fry collections, in conjunction with the timing of spawning, could also be used to ascertain information with respect to the general locations where spawning activity occurred.

If information pertaining to the factors that trigger spawning activity can be determined, any attempts at utilizing telemetry techniques to locate spawning locations, through the observations of movements of suspected sexually mature fish, could be better coordinated and interpreted.

6.3 Component 2b: Juvenile Habitat Usage

In order to collect information pertaining to juvenile (0-5 year age class) sturgeon presence and habitat usage, it is apparent that set line sampling does not likely provide a viable means of collecting fish of this size/age. It is also apparent that alternative sampling techniques will have to be developed, as an extensive program of small mesh gillnetting, and/or set lining with smaller hook sizes, would likely result in severe incidental species mortality.

- Review literature related to previous studies documenting juvenile sturgeon habitat usage.
- Develop traps specifically for the purposes of capturing sturgeon within the 0-5 year age class. These would likely resemble minnow type traps, but include modifications to increase the susceptibility of juvenile sturgeon to be attracted to and captured in such devices.

- Distribute traps throughout the study area, at a variety of physical stream conditions and habitats, emphasizing effort on habitats identified within the literature as being potential juvenile rearing areas.
- Any juvenile fish captured should be tagged with FLOY and PIT tags of a smaller size than those utilized on the adult fish. This tagging information will be utilized to identify habitat specific juvenile fish movements in response to stream physical conditions and other factors.

It is anticipated that a program of sampling including any or all of the methodologies identified in components 1 and 2 above, could be applied in conjunction with one another, resulting in cost savings to the program and an increase in the amount of information collected. Should the above recommendations be utilized in an effort to improve the knowledge base of the upper Fraser sturgeon population, and continue this assessment work in the near future, information derived from this work, and other related studies, should be utilized in developing this study design. Several potential sites were identified within the upper Fraser River in 1999 that appeared to contain habitat characteristics that match those that have been identified as suspected sturgeon spawning sites in previous studies. These areas include portions of the Fraser River between the Blackwater River and Redrock Canyon, Willow River (Giscome) Rapids, Grand Canyon at Longworth, and the Goat River rapids. Juvenile sturgeon (approx. 3" length) were visually observed in the Goat River (Zimmerman pers. comm. 1999) indicating the possible presence of spawning habitat in the Crescent Spur area. Based on this information, and the locations of capture for 12 juvenile fish (6-10 year age class) in 1999, any additional egg, larvae, fry and juvenile sampling effort should be distributed in such a fashion as to take advantage of this information.

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Appendix 1

Examples of the forms utilized for recording data related to sampling effort.

Project No. _____
Page _____ of _____
Sample _____ of _____

River: _____ Station: _____ River km: _____ UTM: _____ E _____ N Set Type (circle) Index Synoptic

Personnel: _____ Channel Location: _____ Site Description: _____ Weather: _____

SET: ____ / ____ / ____ @ ____ h Water Temp: ____ °C Visibility: ____ m Depth: ____ m (Min) ____ m (Max)

PULL: ____ / ____ / ____ @ ____ h Water Temp: ____ °C Visibility: ____ m Total Effort: ____ h

Gear Type (Set Line Length) _____ m No. Hooks Set (Lost): Size 11= _____ (____), Size 12= _____ (____), Size 14= _____ (____), Size 16= _____ (____)

Bait Type: _____ No. Hooks Fouled: _____ No. Baitless (Fleshed) _____ () Sampling Efficiency (1-4): _____

BIOLOGICAL DATA:

				LENGTH												TAG NUMBERS			
No.	Depth (m)	Hook Size	Sex Mat. Code	Fork Length (cm)	Total Length (cm)	Snout Length (cm)	Post-Orbital Length (cm)	Girth (cm)	Weight (lbs)	DNA Sample (location taken)	Fish Disposition	Tags @ Capture	Tags @ Release	Mark @ Capture	Mark @ Release	C.	Floy Tag No.	PIT Tag Size	PIT Tag No.
1											-	- -	-						
1																			
2											-	- -	-						
2																			
3											-	- -	-						
3																			
4											-	- -	-						
4																			
5											-	- -	-						
5																			
6											-	- -	-						
6																			
7											-	- -	-						
7																			
8											-	- -	-						
8																			

WHITE STURGEON DATA FORM - GILLNET (GN) or MINNOW TRAP (MT)

PHYSICAL DATA:

Project No. _____
Page _____ of _____
Sample _____ of _____

River: _____ Station: _____ River km: _____ UTM: _____ E _____ N
Set Type (circle) Index Synoptic
Personnel: _____ Channel Location: _____ Site Description: _____ Weather: _____
SET: ____/____/____ @ ____ h Water Temp: ____ °C Visibility: ____ m Depth: ____ m (Min) ____ m (Max)
PULL: ____/____/____ @ ____ h Water Temp: ____ °C Visibility: ____ m Total Effort: ____ h
Net Type: Gill Tangle Net Length: _____ Panel Length: _____ Panel Height: _____ Overall Net Area: _____
Mesh Sizes: _____, _____, _____, _____ Condition: _____ Set Orientation: _____ Set Location: Bottom Mid Surface

BIOLOGICAL DATA:

Sampling Efficiency (1-4): _____

				LENGTH												TAG NUMBERS			
No.	Depth (m)	Hook Size	Sex Mat. Code	Fork Length (cm)	Total Length (cm)	Snout Length (cm)	Post-Orbital Length (cm)	Girth (cm)	Weight (lbs)	DNA Sample (location taken)	Fish Disposition	Tags @ Capture	Tags @ Release	Mark @ Capture	Mark @ Release	C.	Floy Tag No.	PIT Tag Size	PIT Tag No.
1											-	- -	-						
1																			
2											-	- -	-						
2																			
3											-	- -	-						
3																			
4											-	- -	-						
4																			
5											-	- -	-						
5																			
6											-	- -	-						
6																			
7											-	- -	-						
7																			
8											-	- -	-						
8																			

WHITE STURGEON DATA FORM - ANGLING (AB - boat or AS - shore)

PHYSICAL DATA:

Project No. _____
Page _____ of _____

River: _____ Station: _____ River km: _____ UTM: _____ E _____ N

Set Type (circle) Index Synoptic

Personnel: _____ Channel Location: _____ Site Description: _____ Weather: _____

DATE: ____/____/____ Water Temp: ____°C Visibility: ____m Depth: ____m Boat or Shore: ____

Rod #1	Rod #2	Rod #3	Rod #4	Rod #5	Rod #6
Start: _____	Start: _____	Start: _____	Start: _____	Start: _____	Start: _____
End: _____	End: _____	End: _____	End: _____	End: _____	End: _____
Effort: _____	Effort: _____	Effort: _____	Effort: _____	Effort: _____	Effort: _____
Hook Size: _____	Hook Size: _____	Hook Size: _____	Hook Size: _____	Hook Size: _____	Hook Size: _____
Bait: _____	Bait: _____	Bait: _____	Bait: _____	Bait: _____	Bait: _____
Baitless: _____	Baitless: _____	Baitless: _____	Baitless: _____	Baitless: _____	Baitless: _____
Fouled: _____	Fouled: _____	Fouled: _____	Fouled: _____	Fouled: _____	Fouled: _____
Lost: _____	Lost: _____	Lost: _____	Lost: _____	Lost: _____	Lost: _____

*If lost, indicate if snagged (S) or due to fish (F)

BIOLOGICAL DATA:

				LENGTH												TAG NUMBERS			
No.	Depth (m)	Hook Size	Sex Mat. Code	Fork Length (cm)	Total Length (cm)	Snout Length (cm)	Post-Orbital Length (cm)	Girth (cm)	Weight (lbs)	DNA Sample (location taken)	Fish Disposition	Tags @ Capture	Tags @ Release	Mark @ Capture	Mark @ Release	C.	Floy Tag No.	PIT Tag Size	PIT Tag No.
1											-	- -	-						
1																			
2											-	- -	-						
2																			
3											-	- -	-						
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4											-	- -	-						
4																			
5											-	- -	-						
5																			
6											-	- -	-						
6																			
7											-	- -	-						
7																			
8											-	- -	-						
8																			

Appendix 2

***1999 Upper Fraser Sturgeon set line sampling deployment and location
information.***

River	Station	Effort Units	River km	UTM			Set Type Index/ Synoptic	Personnel	Channel Location	Set Date	Set Time	Pull Date	Pull Time	Total Effort (hrs)	Set Water Temp (°C)	Set Visability (m)	Pull Water Temp (°C)	Pull Visability (m)	Set Line Length (m)	Bait Type	Sampling Efficiency	Site Description	Weather	Comments	Sturgeon Captured (Y/N)
				NAD	Easting	Northing																			
Fraser	SL1076.1R	1080.1-1080	1076.1	10	647856.494	5943798.912	S	JY/DF	RUB	9/21/99	1300	9/22/99	1140	22.66	10	0.7	10	0.5	80	SK	1	Eddy below Snowahoe C.	Sunny	Strong eddy, difficult to set but good potential for sturgeon presence.	N
Fraser	SL1086.4R	1080.1-1100	1086.4	10	653310.487	5940638.173	S	JY/DF	RUB	9/21/99	1210	9/22/99	1122	23.20	10	0.7	10	0.5	80	SK	1	Eddy below canyon, below Morkill FSR	Sunny	Site has potential.	N
Fraser	SL1086.5L	1080.1-1100	1086.5	10	653422.144	5940689.707	S	JY/DF	LUB	9/21/99	1135	9/22/99	1110	23.58	10	0.7	10	0.5	80	SK	1	Eddy in canyon, below Morkill FSR bridge	Sunny		N
Fraser	SL1086.5L	1080.1-1100	1086.5	10	653422.144	5940689.707	S	JY/DF	LUB	9/22/99	1355	9/23/99	1130	21.58	10	0.5	9	0.4	80	SK	2	Eddy below Morkill Bridge.	Windy, overcast	Test using J-hooks, sample of potential by-catch.	N
Fraser	SL1094.0L	1080.1-1100	1094.0	10	657201.289	5937425.9	S	JY/DF	LUB	9/22/99	1300	9/22/99	1805	5.08	10	0.5	10	0.5	80	SK	1	Big Eddy, below Goat River Rapids.	Overcast	Site appears to have high potential for fish presence of multiple species.	N
Fraser	SL1094.0L	1080.1-1100	1094.0	10	657201.289	5937425.9	S	JY/DF	LUB	9/22/99	1815	9/23/99	1150	17.58	11	0.5	9	0.4	80	SK	1	Bottom of Big Eddy	Overcast		N
Fraser	SL1094.3L	1080.1-1100	1094.3	10	657184.111	5937022.219	S	JY/DF	LUB	9/22/99	1800	9/23/99	1200	18.00	11	0.5	9	0.5	80	SK	1	Top of big eddy.	Overcast	Cold, wet day	N
McGregor	SL0.65R	0-20	0.65	10	563152.117	6003964.616	S	JY/DF/RZ	RUB	8/23/99	1740	8/24/99	1319	19.65	10	0.3	9	0.3	80	SK	1	Across from sand bar.	Cloudy	Slow waters at confluence, deposition zone for organic debris.	N
McGregor	SL0.8L	0-20	0.8	10	563023.282	6004136.395	S	JY/DF/RZ	LUB	8/23/99	1730	8/24/99	1309	19.65	10	0.3	9	0.3	80	SK	1	Mouth of McGregor.	Cloudy	Looks like a good spot	N
McGregor	SL1.6R	0-20	1.6	10	563633.099	6004514.309	S	JY/DF/RZ	RUB	8/23/99	1800	8/24/99	1236	16.60	10	0.3	9	0.3	80	SK	4	Approximately 1km u/s from Fraser R.	Cloudy	Slow flows	Y

River	Station	Effort Units	River km	UTM			Set Type Index/ Synoptic	Personnel	Channel Location	Set Date	Set Time	Pull Date	Pull Time	Total Effort (hrs)	Set Water Temp (°C)	Set Visibility (m)	Pull Water Temp (°C)	Pull Visibility (m)	Set Line Length (m)	Bait Type	Sampling Efficiency	Site Description	Weather	Comments	Sturgeon Captured (Y/N)
				NAD	Easting	Northing																			
Fraser	SL830.0R	820.1-840	830.0	10	530378.893	5992323.813	I	JY/RS/MS	RUB	10/4/99	1450	10/5/99	1210	21.33	5	1	5	1	80	SK	1	Eddy below island, off of rip rap.	Sunny (15oC air)		N
Fraser	SL830.0L	820.1-840	830.0	10	530181	5992532	S	JY/RS	LUB	10/5/99	1320	10/6/99	1155	22.58	5	0.8	5	0.8	40	SK	1	D/s end of back channel around island.	Sunny, mild	Marginal site, has depth but limited flow in tight to island. May be better out into eddy in main channel but flow too quick.	N
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	I	JY/DF/RZ	LUB	8/20/99	1015	8/20/99	1450	4.58	14	0.3	15	0.3	40	SK	4	Tail end of pool.	Sunny	Good position and habitat.	Y
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	I	JY/DF/RZ	LUB	8/20/99	1500	8/21/99	0910	18.16	15	0.3	15	0.3	40	CH	3	Tail end of pool.	Sunny	Lost large fish. Straightened out an 11/0 hook.	N
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	I	JY/DF/RZ	LUB	9/3/99	1845	9/4/99	1100	16.25	11	0.3	10	0.3	80	SK	4	Off sand bar.	Sunny	Index site	Y
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	I	JY/DF/RZ	LUB	9/4/99	1645	9/5/99	1120	18.58	11	0.3	10	0.3	80	SK	4	Off sand bar.	Overcast		Y
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	I	JY/RS/MS	LUB	10/4/99	1405	10/5/99	1115	21.16	5	1	5	1	80	SK	4	Off sand bar.	Sunny (15oC air)	Eddy behind rock below Willow R. Good index site.	Y
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	I	JY/RS	LUB	10/5/99	1430	10/6/99	1055	20.41	5	1	5	1	80	SK	1	Off sand bar below rock outcrop.	Sunny, mild	Index site. Water level and temperature a big factor with fishing success now.	N
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	S	JY/DF/RZ	LUB	8/18/99	1820	8/19/99	1010	17.50	14	0.3	13	0.3	40	SK	4	Behind boulder, d/s Willow River.	Clear	Excellent site, very large pool	Y
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	I	JY/DF/RZ	LUB	8/19/99	1055	8/19/99	1500	4.08	14	0.3	14	0.3	40	SK	4	Behind boulder, d/s Willow River.	Sunny		Y
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	I	JY/DF/RZ	LUB	8/19/99	1830	8/20/99	0855	14.41	15	0.3	14	0.3	80	SK	4	Hole below Willow R.	Sunny	Good flow and excellent site.	Y
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	I	JY/DF/RZ	LUB	8/20/99	1038	8/20/99	1441	4.05	14	0.3	15	0.3	80	SK	2	Hole below Willow R.	Sunny		N
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	I	JY/DF/RZ	LUB	8/20/99	1445	8/21/99	0920	17.58	15	0.3	14	0.3	80	SK	1	Hole below Willow R.	Sunny	Good site.	N
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	I	JY/DF/RZ	LUB	8/21/99	1155	8/21/99	1530	3.58	14	0.3	15	0.3	40	CH	1	Hole below Willow R.	Sunny	Proven site.	N
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	I	JY/DF/RZ	LUB	9/3/99	1830	9/4/99	1130	17.00	11	0.3	10	0.3	80	SK	4	Off rock island	Sunny	Index site	Y
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	I	JY/DF/RZ	LUB	9/4/99	1655	9/5/99	1200	19.91	11	0.3	10	0.3	80	SK	1	Off rock island	Overcast	Index site	N
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	I	JY/RS/MS	LUB	10/4/99	1425	10/5/99	1200	21.58	5	1	5	1	80	SK	2	Off of rock below Willow R.	Sunny (15oC air)	Still a good site, very slow flows behind rock.	N
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	I	JY/RS	LUB	10/5/99	1445	10/6/99	1105	20.33	5	1	5	1	80	SK	4	Off of rock below Willow R.	Sunny	Good site, continues to produce fish.	Y
Fraser	SL833.6R	820.1-840	833.6	10	531768.037	5994628.41	S	JY/DF/RZ	RUB	8/18/99	1602	8/19/99	1035	18.55	14	0.3	13	0.3	40	SK	1	1.8 km above Willow R. below island	Clear	Rocky substrate, site has some potential.	N
Fraser	SL844.5R	840.1-880	844.5	10	528014.659	5999635.777	S	JY/DF/RZ	RUB	8/18/99	1530	8/19/99	1600	24.5	14	0.3	14	0.3	40	SK	1	Small eddy off of Giscome Rapids	Clear	No bait even touched, very poor site.	N
Fraser	SL863.6R	860.1-880	863.6	10	537651.478	6010881.187	S	JY/DF/RZ	RUB	8/22/99	1408	8/23/99	1525	25.28	13	0.3	13	0.3	40	SK	4	Above sand bar.	Sunny	Small eddy off of bar.	Y
Fraser	SL863.7L	860.1-880	863.7	10	537640.242	6010808.962	S	JY/DF/RZ	LUB	8/22/99	1305	8/23/99	1455	25.83	13	0.3	13	0.3	40	SK	4	Downstream of creek mouth.	Sunny	Hole behind rock bar.	Y
Fraser	SL882.3R	880.1-900	882.3	10	553008.549	6006146.213	S	JY/DF/RZ	RUB	8/22/99	1223	8/23/99	1315	24.86	13	0.3	12	0.3	80	SK	4	Back eddy behind rock wall.	Cloudy	Good site.	Y
Fraser	SL882.3R	880.1-900	882.3	10	553008.549	6006146.213	S	JY/DF/RZ	RUB	8/24/99	1520	8/25/99	1241	21.35	12	0.3	11	0.3	80	SK	4	Eddy behind point.	Rainy	Good hole behind rock outcropping.	Y
Fraser	SL882.5R	880.1-900	882.5	10	553283.395	6006214.925	S	JY/DF/RZ	RUB	8/22/99	1200	8/23/99	1300	25.00	13	0.3	12	0.3	80	SK	1	Back eddy behind rock wall.	Cloudy	Site appears good.	N
Fraser	SL882.6R	880.1-900	882.6	10	553403.641	6006275.047	S	JY/DF/RZ	RUB	8/24/99	1538	8/25/99	1310	21.53	12	0.3	11	0.3	40	SK	4	Opposite boat launch.	Rainy	Small patch of holding water.	Y
Fraser	SL883.6R	880.1-900	883.6	10	554030.635	6006902.042	S	JY/DF/RZ	RUB	8/24/99	1205	8/24/99	1540	3.58	13	0.3	12	0.3	80	CH/SK	1	Downstream opposite Limestone C.	Rainy	Good looking area, possible for resample.	N
Fraser	SL883.6R	880.1-900	883.6	10	554030.635	6006902.042	S	JY/DF/RZ	RUB	8/24/99	1555	8/25/99	1350	21.08	12	0.3	11	0.3	80	SK	4	Downstream opposite Limestone C.	Rain		Y
Fraser	SL884.2L	880.1-900	884.2	10	554185.237	6007486.091	S	JY/DF/RZ	LUB	8/23/99	1900	8/24/99	1150	16.83	13	0.3	11	0.3	80	CH/SK	1	200m u/s of Limestone C.	Rainy	Surprised that only fish captured was BT. Water here looks promising. Should return.	N
Fraser	SL886.0M	880.1-900	886.0	10	555705.484	6008001.429	S	JY/DF/RZ	MID	8/24/99	1445	8/25/99	1505	24.33	12	0.3	11	0.2	80	SK	1	Mid channel set, opposite Herring C.	Rain	No shore anchor. 25lb anchor and float at each end. Forward anchor drifted down and fouled up line.	N
Fraser	SL900.5M	900.1-920	900.5	10	567223.286	6001525.349	S	JY/DF/RZ	MID	8/24/99	1410	8/25/99	1542	25.53	12	0.3	11	0.3	80	SK	4	Off d/s end of island.	Sunny		Y
Fraser	SL900.5M	900.1-920	900.5	10	567223.286	6001525.349	I	JY/DF/RZ	MID	8/27/99	1000	8/28/99	0945	23.75	11	0.2	10	0.2	80	SK	1	Off d/s end of island.	Mixed sun-cloud	River is up 1m at this local. Very muddy.	N
Fraser	SL915.7M	900.1-920	915.7	10	576155.811	5991553.561	S	JY/DF/RZ	MID	8/27/99	1310	8/28/99	1210	23.00	10	0.2	10	0.2	40	SK	1	End tip off island	Sunny		N
Fraser	SL916.9R	900.1-920	916.9	10	576757.038	5990591.596	S	JY/DF/RZ	RUB	8/27/99	1045	8/28/99	1025	23.86	11	0.2	13	0.3	80	SK	4	Off of point at Bowron, Fraser R. confluence.	Cloudy	Fraser River is very dirty, muddy. Never have see it this dirty in our lives. Must be a landslide u/s.	Y
Fraser	SL916.9R	900.1-920	916.9	10	576757.038	5990591.596	I	JY/DF/RZ	RUB	8/28/99	1300	8/29/99	0932	20.53	13	0.3	14	0.3	80	SK	4	Off of point at Bowron, Fraser R. confluence.	Sunny	Good spot, mixing water	Y
Fraser	SL916.9R	900.1-920	916.9	10	576757.038	5990591.596	I	JY/DF/RZ	RUB	8/29/99	1155	8/30/99	1015	22.33	14	1.3	15	1.5	80	SK	4	Bowron Fraser confluence	Cloudy		Y
Fraser	SL916.9R	900.1-920	916.9	10	576757.038	5990591.596	I	JY/DY/HA	RUB	8/30/99	1230	8/31/99	0950	21.33	12	1	11	1	80	SK	2	Bowron Fraser confluence	Overcast		N
Fraser	SL916.95R	900.1-920	916.95	10	576782.805	5990548.652	S	JY/DY/HA	RUB	8/30/99	1300	8/31/99	0940	20.66	11	0.2	11	0.2	80	SK	2	Bowron Fraser confluence	Overcast		N
Fraser	SL940.7L	940.1-960	940.7	10	585758.274	5982732.693	S	JY/DF/RZ	LUB	8/31/99	1200	9/1/99	1205	24.08	10	0.2	10	0.2	80	SK	4	Upstream Muller Homestead	Cold as Hell	Nice deep hole with higher surface velocity	Y
Fraser	SL940.7L	940.1-960	940.7	10	585758.274	5982732.693	I	JY/DF/RZ	LUB	9/1/99	1710	9/2/99	1009	16.98	10	0.2	9	0.2	80	SK	1	Upstream Muller Homestead	Overcast		N
Fraser	SL941.8R	940.1-960	941.8	10	584933.733	5983462.755	S	JY/DF/RZ	RUB	9/1/99	1640	9/2/99	1020	17.86	10	0.2	9	0.2	40	SK	1	Off of bank	Overcast		N

Appendix 3

***199 Upper Fraser Sturgeon gillnetting and trapping deployment, location
and habitat related information.***

1999 Upper Fraser White Sturgeon Project
Gillnet and Minnow Trapping Habitat Related Data

River	Set No.	Station	River km	UTM			Set Type (VS) (Index or Synoptic)	Channel Location	Set Water Temp (°C)	Set Visibility (m)	Pull Water Temp (°C)	Pull Visibility (m)	Set Depth (min)	Set Depth (max)	Net Type	Set Location	Site Description	Comments	Sturgeon Capture (Y/N)	Fish Captured (Y/N)	Flow characteristics			
																					Depth (m)	Velocity Measurement Local	Surface Velocity (m/s)	Substrate
				NAD	Easting	Northing																		
Fraser	1	GN829.95R	829.95	10	530302.241	5992301.935	I	RUB	15	0.3	15	0.3	2	5.1	GILL	Bottom	Eddy behind island	Current is too fast probably for juveniles - by-catch too high.	N	Y	2.5	N	0.25	Silt
Fraser	2	GN829.95R	829.95	10	530302.241	5992301.935	I	RUB	15	0.3	15	0.3	2	4.4	GILL	Bottom	Eddy behind island	Net is working properly, night sets may work better here.	N	Y	3	N	0.1	Silt
Fraser	1	GN830.0R	830.0	10	530378.893	5992323.813	I	RUB	14	0.3	15	0.3	2	5.1	GILL	Bottom	Slack water at bottom of island	Net is working properly, night sets may work better here.	N	Y				
Fraser	1	GN831.0L	831.0	10	531063.742	5992867.672	I	RUB	14	0.3	15	0.3	0	6.8	GILL	Bottom	Large eddy below rock		N	Y	2	N	0.25	Silt
Fraser	2	GN831.0L	831.0	10	531063.742	5992867.672	I	RUB	14	0.3	15	0.3	0	6.8	GILL	Bottom	Large eddy below rock		N	Y				Silt
Fraser	2	GN830.0R	830.0	10	530378.893	5992323.813	I	RUB	14	0.3	14	0.3	2	5.1	GILL	Bottom	Slack water at bottom of island	High sampling efficiency, captured fish in appropriate area.	N	Y				
Bowron		MT0.4R	0.4	10	576480.937	5990587.858	I	RUB	12	1.1	11	1.1	2.5	6.5	MT	Bottom	Slack water in main channel		N					
Bowron		MT0.3L	0.3	10	576567.375	5990568.65	I	LUB	12	1.1	11	1.1	2.5	6.5	MT	Bottom	Slack water in main channel		N					
Bowron		MT0.7R	0.7	10	576125.743	5990552.358	I	RUB	12	1.1	11	1.1	2.5	6.5	MT	Bottom	Slack water in main channel		N					
Bowron		MT2.1L	2.1	10	575866.265	5989483.37	I	LUB	12	1.1	11	1.1	2.5	6.5	MT	Bottom	Slack water in main channel		N					
Bowron		MT2.0R	2	10	575976.714	5989545.797	I	RUB	12	1.1	11	1.1	2.5	6.5	MT	Bottom	Slack water in main channel		N					
Bowron		MT0.7L	0.7	10	576125.743	5990552.358	I	LUB	12	1.1	11	1.1	2.5	6.5	MT	Bottom	Slack water in main channel		N					
Fraser		MT937.1L	937.1	10	586664.406	5985910.025	S	LUB		2.5		2.5	1.5	2.5	MT	Bottom	Slow water at Moxley C. confluence.	One small RB	N	Y				
Fraser		MT937.1L	937.1	10	586664.406	5985910.025	S	LUB		2.5		2.5	1.5	2.5	MT	Bottom	Slow water at Moxley C. confluence.	Set under LWD along banks.	N	N				
Fraser		MT937.1L	937.1	10	586664.406	5985910.025	S	LUB		2.5		2.5	1.5	2.5	MT	Bottom	Slow water at Moxley C. confluence.		N	N				
Fraser		MT937.1L	937.1	10	586664.406	5985910.025	S	LUB		2.5		2.5	1.5	2.5	MT	Bottom	Slow water at Moxley C. confluence.		N	N				
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	RUB	11	0.3	10	0.3	2.2	3.5	MT	Bottom	slack water below island.	Deep, good cover. Juveniles caught on setline in this area.	N	N				
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	RUB	11	0.3	10	0.3	2.2	3.5	MT	Bottom	slack water below island.		N	N				
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	RUB	11	0.3	10	0.3	2.2	3.5	MT	Bottom	slack water below island.	1 Peamouth, 1 Juv CH	N	Y				
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	RUB	11	0.3	10	0.3	2.2	3.5	MT	Bottom	slack water below island.		N	N				
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	RUB	11	0.3	10	0.3	2.2	3.5	MT	Bottom	slack water below island.	Caught 3 peamouth, 1 CAS	N	Y				
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	RUB	11	0.3	10	0.3	2.2	3.5	MT	Bottom	slack water below island.	Caught 1 peamouth, 1 MW, 2 CAS	N	Y				

1999 Upper Fraser White Sturgeon Project
Gillnet and Minnow Trapping Deployment and Locational Data

River	Set No.	Station	River km	UTM			Set Type (US) (Index or Synoptic)	Personnel	Channel Location	Set Date	Set Time	Pull Date	Pull Time	Total Effort (hrs-min)	Set Water Temp (°C)	Set Visibility (m)	Pull Water Temp (°C)	Pull Visibility (m)	Set Depth (min)	Set Depth (max)	Net Type	Net Length (ft)	Panel Length (ft)	Panel Height (ft)	Overall Net Area (ft²)	Mesh Sizes (inches)	Net Condition	Set Location	Sampling Efficiency	Site Description	Weather	Comments	Sturgeon Capture (Y/N)
				NAD	Easting	Northing																											
Fraser	1	GN829.95R	829.95	10	530302.241	5992301.935	I	JY/DF/RZ	RUB	99/8/21	1341	99/8/21	1400	0.19	15	0.3	15	0.3	2	5.1	GILL	150	50	4	600	2.5, 1.0	Good	Bottom	2	Eddy behind island	Mixed sun-cloud	Current is too fast probably for juveniles - by-catch too high.	N
Fraser	2	GN829.95R	829.95	10	530302.241	5992301.935	I	JY/DF/RZ	RUB	99/8/21	1405	99/8/21	1435	0.30	15	0.3	15	0.3	2	4.4	GILL	150	50	4	600	2.5, 1.0	Good	Bottom	2	Eddy behind island	Mixed sun-cloud	Net is working properly, night sets may work better here.	N
Fraser	1	GN830.0R	830.0	10	530378.893	5992323.813	I	JY/DF/RZ	RUB	99/8/21	1300	99/8/21	1330	0.30	14	0.3	15	0.3	2	5.1	GILL	150	50	4	600	2.5, 1.0	Good	Bottom	2	Slack water at bottom of island	Mixed sun-cloud	Net is working properly, night sets may work better here.	N
Fraser	1	GN831.0L	831.0	10	531063.742	5992867.672	I	JY/DF/RZ	RUB	99/8/21	1112	99/8/21	1130	0.18	14	0.3	15	0.3	0	6.8	GILL	150	50	4	600	2.5, 1.0	Good	Bottom	3	Large eddy below rock	Cloudy		N
Fraser	2	GN831.0L	831.0	10	531063.742	5992867.672	I	JY/DF/RZ	RUB	99/8/21	1145	99/8/21	1210	0.25	14	0.3	15	0.3	0	6.8	GILL	150	50	4	600	2.5, 1.0	Good	Bottom	3	Large eddy below rock	Cloudy		N
Fraser	2	GN830.0R	830.0	10	530378.893	5992323.813	I	JY/DF/RZ	RUB	99/8/21	1230	99/8/21	1255	.25	14	0.3	14	0.3	2	5.1	GILL	150	50	4	600	2.5, 1.0	Good	Bottom	3	Slack water at bottom of island	Cloudy	High sampling efficiency, captured fish in appropriate area.	N
Bowron		MT0.4R	0.4	10	576480.937	5990587.858	I	JY/DF/RZ	RUB	8/31/99	1500	9/1/99	930	18.5	12	1.1	11	1.1	2.5	6.5	MT					0.5	Good	Bottom		Slack water in main channel	Cloudy		N
Bowron		MT0.3L	0.3	10	576567.375	5990568.85	I	JY/DF/RZ	LUB	8/31/99	1500	9/1/99	930	18.5	12	1.1	11	1.1	2.5	6.5	MT					0.5	Good	Bottom		Slack water in main channel	Cloudy		N
Bowron		MT0.7R	0.7	10	576125.743	5990552.358	I	JY/DF/RZ	RUB	8/31/99	1500	9/1/99	930	18.5	12	1.1	11	1.1	2.5	6.5	MT					0.5	Good	Bottom		Slack water in main channel	Cloudy		N
Bowron		MT2.1L	2.1	10	575866.265	5989483.37	I	JY/DF/RZ	LUB	8/31/99	1500	9/1/99	930	18.5	12	1.1	11	1.1	2.5	6.5	MT					0.5	Good	Bottom		Slack water in main channel	Cloudy		N
Bowron		MT2.0R	2	10	575978.714	5989545.797	I	JY/DF/RZ	RUB	8/31/99	1500	9/1/99	930	18.5	12	1.1	11	1.1	2.5	6.5	MT					0.5	Good	Bottom		Slack water in main channel	Cloudy		N
Bowron		MT0.7L	0.7	10	576125.743	5990552.358	I	JY/DF/RZ	LUB	8/31/99	1500	9/1/99	930	18.5	12	1.1	11	1.1	2.5	6.5	MT					0.5	Good	Bottom		Slack water in main channel	Cloudy		N
Fraser		MT937.1L	937.1	10	586664.406	5985910.025	S	JY/DF/RZ	LUB	09/01/99	1800	9/2/99	900	18		2.5		2.5	1.5	2.5	MT					0.5	Good	Bottom		Slow water at Moxley C. confluence.	Clear	One small RB.	N
Fraser		MT937.1L	937.1	10	586664.406	5985910.025	S	JY/DF/RZ	LUB	09/01/99	1800	9/2/99	900	18		2.5		2.5	1.5	2.5	MT					0.5	Good	Bottom		Slow water at Moxley C. confluence.	Clear	Set under LWD along banks.	N
Fraser		MT937.1L	937.1	10	586664.406	5985910.025	S	JY/DF/RZ	LUB	09/01/99	1800	9/2/99	900	18		2.5		2.5	1.5	2.5	MT					0.5	Good	Bottom		Slow water at Moxley C. confluence.	Clear		N
Fraser		MT937.1L	937.1	10	586664.406	5985910.025	S	JY/DF/RZ	LUB	09/01/99	1800	9/2/99	900	18		2.5		2.5	1.5	2.5	MT					0.5	Good	Bottom		Slow water at Moxley C. confluence.	Clear		N
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	JY/DF/RZ	RUB	9/3/99	1700	9/4/99	1000	17	11	0.3	10	0.3	2.2	3.5	MT					0.5	Good	Bottom		slack water below island.	Overcast	Deep, good cover. Juveniles caught on settline in this area.	N
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	JY/DF/RZ	RUB	9/3/99	1700	9/4/99	1000	17	11	0.3	10	0.3	2.2	3.5	MT					0.5	Good	Bottom		slack water below island.	Overcast		N
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	JY/DF/RZ	RUB	9/3/99	1700	9/4/99	1000	17	11	0.3	10	0.3	2.2	3.5	MT					0.5	Good	Bottom		slack water below island.	Overcast		N
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	JY/DF/RZ	RUB	9/3/99	1700	9/4/99	1000	17	11	0.3	10	0.3	2.2	3.5	MT					0.5	Good	Bottom		slack water below island.	Overcast	1 Peamouth, 1 Juv CH	N
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	JY/DF/RZ	RUB	9/3/99	1700	9/4/99	1000	17	11	0.3	10	0.3	2.2	3.5	MT					0.5	Good	Bottom		slack water below island.	Overcast		N
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	JY/DF/RZ	RUB	9/3/99	1700	9/4/99	1000	17	11	0.3	10	0.3	2.2	3.5	MT					0.5	Good	Bottom		slack water below island.	Overcast	Caught 3 peamouth, 1 CAS	N
Fraser		MT830.1R	830.1	10	530569.941	5992277.329	S	JY/DF/RZ	RUB	9/3/99	1700	9/4/99	1000	17	11	0.3	10	0.3	2.2	3.5	MT					0.5	Good	Bottom		slack water below island.	Overcast	Caught 1 peamouth, 1 MW, 2 CAS	N

Appendix 4

1999 Upper Fraser Sturgeon angling deployment, location and habitat information.

1999 Upper Fraser White Sturgeon Project
Angling Deployment, Locational and Habitat Data

Angling Deployment, Locational and Habitat Data																										Flow characteristics				
River	Station	River km	UTM			Set Type (US)	Personnel	Channel Location	Date	Water Temp (°C)	Visibility (m)	Depth	Rod Number	Start Time	End Time	Total Effort (hrs-min)	Hook Size	Bait Type	Hook Fouled (Y/N)	Baitless (Y/N)	Lost	Site Description	Weather	Comments	Sturgeon Captured (Y/N)	Fish Captured (Y/N)	Depth (m)	Velocity Measurement Local	Velocity (m/s)	Substrate
			NAD	Easting	Northing	(Index or Synoptic)																						Nearshore (N) Mid (M)		
Fraser	AB831.3L	831.3	10	531381.534	5992902.028	I	JYDF/RZ	LUB	99/08/19	14	0.3	6	1	1700	1815	1.15	9/0	SK CH	N	N		Pool below boulder	Clear		N	N				
Fraser	AB831.3L	831.3	10	531381.534	5992902.028	I	JYDF/RZ	LUB	99/08/19	14	0.3	6	2	1700	1815	1.15	9/0	SK CH ROE	N	N		Pool below boulder	Clear		N	N				
Fraser	AB831.3L	831.3	10	531381.534	5992902.028	I	JYDF/RZ	LUB	99/08/19	14	0.3	6	3	1700	1815	2.15	9/0	ROE	N	N		Pool below boulder	Clear		N	N				
Fraser	AB831.0L	831.0	10	531063.742	5992867.872	I	JYDF/RZ	LUB	99/08/20	14	0.3	7	1	1255	1308	0.13	9/0	SK	N	Y		100m d/s of large rock	Clear, hot	Good site for angling.	N	N				
Fraser	AB831.0L	831.0	10	531063.742	5992867.872	I	JYDF/RZ	LUB	99/08/20	14	0.3	7	2	1255	1400	1.05	9/0	ROE	N	Y		100m d/s of large rock	Clear, hot	Good site for angling.	N	N				
Fraser	AB831.0L	831.0	10	531063.742	5992867.872	I	JYDF/RZ	LUB	99/08/20	14	0.3	7	3	1255	1400	1.05	9/0	SK	N	Y		100m d/s of large rock	Clear, hot	Good site for angling.	N	N				
Fraser	AB831.0L	831.0	10	531063.742	5992867.872	I	JYDF/RZ	LUB	99/08/20	14	0.3	7	4	1310	1331	0.21	3/0	ROE	N	Y		100m d/s of large rock	Clear, hot	Good site for angling.	N	Y				
Fraser	AB831.0L	831.0	10	531063.742	5992867.872	I	JYDF/RZ	LUB	99/08/20	14	0.3	7	5	1335	1400	0.25	3/0	ROE	N	Y		100m d/s of large rock	Clear, hot	Good site for angling.	N	N				
Fraser	AS950.6R	950.6	10	588893.246	5978180.541	I	JYDF/RZ	RUB	99/09/01	10	0.2	5	1	1400	1630	2.30	9/0	ROE	N	N	Snagged	Eddy in canyon	Mixed		N	N				
Fraser	AS950.6R	950.6	10	588893.246	5978180.541	I	JYDF/RZ	RUB	99/09/01	10	0.2	5	2	1400	1630	2.30	9/0	ROE	N	N		Eddy in canyon	Mixed		N	N				
Fraser	AS950.6R	950.6	10	588893.246	5978180.541	I	JYDF/RZ	RUB	99/09/01	10	0.2	5	3	1400	1600	2.00	9/0	ROE	N	N		Eddy in canyon	Mixed		N	N				
Fraser	AS832.2R	832.2	10	532199.879	5993321.846	S	JYDF/RZ	RUB	99/09/04	10	0.7	1.7	1	1210	1225	0.15	9/0	ROE	N	N		Willow Fraser R. confluence	Mixed	Probably better for sturgeon at higher water levels.	N	Y	1.6	N	0.2	silt, gravel
Fraser	AS832.2R	832.2	10	532199.879	5993321.846	S	JYDF/RZ	RUB	99/09/04	10	0.7	1.7	2	1210	1500	2.50	9/0	ROE	N	N		Willow Fraser R. confluence	Mixed	Probably better for sturgeon at higher water levels.	N	Y	1.6	N	0.2	silt, gravel
Fraser	AS832.2R	832.2	10	532199.879	5993321.846	S	JYDF/RZ	RUB	99/09/04	10	0.7	1.7	3	1210	1500	2.50	6/0	ROE	N	N		Willow Fraser R. confluence	Mixed	Probably better for sturgeon at higher water levels.	N	Y	1.6	N	0.2	silt, gravel
Fraser	AS832.2R	832.2	10	532199.879	5993321.846	S	JYDF/RZ	RUB	99/09/04	10	0.7	1.7	4	1230	1450	2.20	9/0	ROE	N	N	Snagged	Willow Fraser R. confluence	Mixed	Probably better for sturgeon at higher water levels.	N	Y	1.6	N	0.2	silt, gravel
Fraser	AS827.7L	827.7	10	528691.371	5990688.421	S	JYDF/RZ	LUB	99/09/05	11	2.2	2.2	1	1155	1210	0.15	9/0	SK	N	N		D/s Salmon R - Fraser R. confluence	Overcast, rain	Not a great sturgeon site.	N	Y	2.2	N	0.25	Gravel
Fraser	AS827.7L	827.7	10	528691.371	5990688.421	S	JYDF/RZ	LUB	99/09/05	11	2.2	2.2	2	1155	1225	0.30	6/0	ROE	N	N		D/s Salmon R - Fraser R. confluence	Overcast, rain	Not a great sturgeon site.	N	Y	2.2	N	0.25	Gravel
Fraser	AS827.7L	827.7	10	528691.371	5990688.421	S	JYDF/RZ	LUB	99/09/05	11	2.2	2.2	3	1155	1220	0.25	9/0	ROE	N	Y		D/s Salmon R - Fraser R. confluence	Overcast, rain	Not a great sturgeon site.	N	N	2.2	N	0.25	Gravel
Fraser	AS827.7L	827.7	10	528691.371	5990688.421	S	JYDF/RZ	LUB	99/09/05	11	2.2	2.2	4	1215	1218	0.03	9/0	SK	N	N		D/s Salmon R - Fraser R. confluence	Overcast, rain	Not a great sturgeon site.	N	Y	2.2	N	0.25	Gravel
Fraser	AS827.7L	827.7	10	528691.371	5990688.421	S	JYDF/RZ	LUB	99/09/05	11	2.2	2.2	5	1230	1410	1.40	6/0	SK	N	N		D/s Salmon R - Fraser R. confluence	Overcast, rain	Not a great sturgeon site.	N	N	2.2	N	0.25	Gravel
Fraser	AS827.7L	827.7	10	528691.371	5990688.421	S	JYDF/RZ	LUB	99/09/05	11	2.2	2.2	6	1230	1415	0.15	9/0	SK	N	N		D/s Salmon R - Fraser R. confluence	Overcast, rain	Not a great sturgeon site.	N	N	2.2	N	0.25	Gravel
Fraser	AS756.4R	756.4	10	521787.659	5943051.673	S	JYRS/MS	RUB	99/9/30	6	0.6	4	1	1120	1145	0.25	9/0	ROE	N	Y		Eddy below Stone C.	Overcast, sun	Site good for sturgeon, maybe better earlier in the year.	N	N				
Fraser	AS756.4R	756.4	10	521787.659	5943051.673	S	JYRS/MS	RUB	99/9/30	6	0.6	4	2	1120	1122	0.02	9/0	ROE	N	N	Snagged	Eddy below Stone C.	Overcast, sun	Site good for sturgeon, maybe better earlier in the year.	N	N				
Fraser	AS756.4R	756.4	10	521787.659	5943051.673	S	JYRS/MS	RUB	99/9/30	6	0.6	4	3	1120	1150	0.30	6/0	SK	N	N		Eddy below Stone C.	Overcast, sun	Site good for sturgeon, maybe better earlier in the year.	N	N				
Fraser	AS756.4R	756.4	10	521787.659	5943051.673	S	JYRS/MS	RUB	99/9/30	6	0.6	4	4	1125	1145	0.20	9/0	ROE	N	Y	Snagged	Eddy below Stone C.	Overcast, sun	Site good for sturgeon, maybe better earlier in the year.	N	N				
Fraser	AS756.4R	756.4	10	521787.659	5943051.673	S	JYRS/MS	RUB	99/9/30	6	0.6	4	5	1145	1155	0.10	9/0	ROE	N	Y	Snagged	Eddy below Stone C.	Overcast, sun	Site good for sturgeon, maybe better earlier in the year.	N	N				
Fraser	AS753.7L	753.7	10	520786.352	5940555.054	S	JYRS/MS	LUB	99/9/30	6	0.6	5	1	1510	1522	0.12	6/0	ROE	N	N		Slow water behind island	Overcast	Good site, good habitat.	N	Y				
Fraser	AS753.7L	753.7	10	520786.352	5940555.054	S	JYRS/MS	LUB	99/9/30	6	0.6	5	2	1510	1515	0.05	9/0	ROE	N	N		Slow water behind island	Overcast	Good site, good habitat.	N	Y				
Fraser	AS753.7L	753.7	10	520786.352	5940555.054	S	JYRS/MS	LUB	99/9/30	6	0.6	5	3	1510	1600	0.50	9/0	ROE	N	N	Snagged	Slow water behind island	Overcast	Good site, good habitat.	N	N				
Fraser	AS753.7L	753.7	10	520786.352	5940555.054	S	JYRS/MS	LUB	99/9/30	6	0.6	5	4	1525	1531	0.06	6/0	ROE	N	N		Slow water behind island	Overcast	Good site, good habitat.	N	N				
Fraser	AS753.7L	753.7	10	520786.352	5940555.054	S	JYRS/MS	LUB	99/9/30	6	0.6	5	5	1535	1550	0.15	6/0	ROE	N	N	Snagged	Slow water behind island	Overcast	Good site, good habitat.	N	N				
Fraser	AS753.7L	753.7	10	520786.352	5940555.054	S	JYRS/MS	LUB	99/9/30	6	0.6	5	6	1517	1600	0.43	9/0	ROE	N	N		Slow water behind island	Overcast	Good site, good habitat.	N	N				

Appendix 5

***Summary of incidental species captured during the course of sampling
work in 1999.***

1999 Upper Fraser White Sturgeon Project
Summary of Incidental Species Captured (By-Catch)

Date	Set Number (gill net)	Station	Species	Number	Length (cm)	Weight (lbs)	Sex	Fate	Hook Size	Comment
99/08/19		SL820.5L	NSC	1	40			LIVED	14/0	
99/08/20		AB831.0L	NSC	1	35			LIVED	3/0	
99/08/21	1	GN829.95R	SK	1	62			LIVED		Caught in gillnet
99/08/21	1	GN829.95R	SU	1	22			DIED		Caught in gillnet
99/08/21	1	GN829.95R	PCC	4	16-22			BOTH		Caught in gillnet, two died
99/08/21	2	GN829.95R	PCC	5	17-23			BOTH		Caught in gillnet, three died
99/08/21	1	GN830.0R	PCC	8	16-24			BOTH		Caught in gillnet, most died. Large fish passed through net.
99/08/21	1	GN830.0R	NSC	2	28-35			DIED		Caught in gillnet
99/08/21	1	GN830.0R	SU	2	19-21			DIED		Caught in gillnet
99/08/21	1	GN831.0L	PCC	16	15-24			BOTH		7 morts, 9 survived.
99/08/21	1	GN831.0L	SU	4	19-23			BOTH		3 morts, 1 survived.
99/08/21	2	GN831.0L	BT	3	22-25			BOTH		1 morts, 2 survived.
99/08/21	2	GN831.0L	PCC	5	18-22			BOTH		1 morts, 2 survived.
99/08/21	2	GN831.0L	SU	2	17-27			BOTH		May have survived.
99/08/21	2	GN830.0R	SK	1	58		F	DIED		Caught in gillnet
99/08/21	2	GN830.0R	PCC	10	14-21			BOTH		Undetermined number of morts.
99/08/21	2	GN830.0R	SU	4	17-24			BOTH		Undetermined number of morts.
99/08/24		SL884.2L	BT	1	42		M	LIVED	14/0	Sex based on visual observaton.
99/08/28		SL900.5M	NSC	1	30			LIVED	14/0	
99/09/04		AS831.6R	BT	1	38			LIVED	9/0	
99/09/04		AS831.6R	BT	1	41			DIED	6/0	Bleeding badly
99/09/04		AS831.6R	NSC	1	33			LIVED	9/0	
99/09/04		AS831.6R	NSC	1	25			LIVED	9/0	
99/09/05		SL820.4R	BT	1	35			LIVED	14/0	
99/09/05		SL820.4R	NSC	1	41			LIVED	12/0	
99/09/05		AS827.7L	BT	2	42-57			LIVED	9/0	
99/09/05		AS827.7L	NSC	1	35			LIVED	6/0	
99/09/19		SL1025.1R	BT	1	36	1.3		DIED	14/0	Hooked through gill plate, died on set line.
9/22/99		SL1076.1R	BT	1	38	1.1		LIVED	14/0	Released unharmed.

Date	Set Number (gill net)	Station	Species	Number	Length (cm)	Weight (lbs)	Sex	Fate	Hook Size	Comment
9/23/99		SL1086.5L	BT	2	34 41	2.2		LIVED DIED	6/0 6/0	Healthy, cut line and released Swallowed hook
9/23/99		SL1086.5L	NSC	1	38			LIVED	8/0	
9/30/99		SL756.4R	BB	1	70	4.6		DIED	14/0	
9/30/99		AS753.7L	BT	1	43			LIVED	6/0	
9/30/99		AS753.7L	NSC	1	38			LIVED	9/0	
9/30/99		SL753.7L	BT	1	68			LIVED	14/0	Large BT
10/5/99		SL831.3L	BB	1	71			DIED	14/0	Healthy, caught ~ 4.0m depth.
9/4/99		MT830.1R	CH	1	10			LIVED		
9/4/99		MT830.1R	MW	1	15			LIVED		
9/4/99		MT830.1R	PCC	5	15-20			LIVED		
9/4/99		MT830.1R	CAS	3	15			LIVED		
9/2/99		MT937.1L	RBT	1	15			LIVED		

Appendix 6

***Summary of morphological and age information pertaining to sturgeon
captured in 1999.***

1999 Upper Fraser White Sturgeon Project

Fish Capture and Tagging Data

Tags: FL = Floy Tag; PT = Pit Tag Fish Disposition: B = basic work-up; AU = adult unders DNA Sample Location and Marks: LP = left pectoral fin; RP = right pectoral fin

Sex Mat. Code: 98 = juvenile WST under 1m total length Sex Mat. Code: 97 = adult WST over 1m total length

Capture Site Information					Length										Tagging Information										
Date of Capture	River of Capture	Capture Station	Capture Depth (m)	Hook Size	Sex Mat. Code	Fork Length (cm)	Total Length (cm)	Snout Length (cm)	Post-Orbital Length (cm)	Girth (cm)	Weight (lbs)	Weight (kgs)	Age (years)	DNA Sample Location	Fish Disposition	Tags @ Capture	Tags @ Release	Marks @ Capture	Marks @ Release	Floy Tag (Yellow or Blue)		Pit Tag (large size)		Comments	
																				Colour	Number	Size	Number		
August 19, 1999	Fraser	SL830.0R	4.0	14/0	98	64.0	73.0	16.5	8.5	23.0	3.0	1.4	10.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0025	L	501C144B5D	No identifying marks, well developed pectoral fins. No unique scars.	
August 19, 1999	Fraser	SL830.0R	3.0	11/0	98	71.5	83.0	20.0	11.5	26.0	5.0	2.3	11.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0024	L	50283B6C65	No identifying marks, well developed pectoral fins. No unique scars.	
August 19, 1999	Fraser	SL831.3L	6.0	16/0	98	58.0	68.0	16.0	9.0	20.0	2.0	0.9	6.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0023	L	50283B6E51	Healthy juvenile, no obvious marks.	
August 19, 1999	Fraser	SL831.3L	8.5	16/0	97	223.0	254.0	56.5	25.0	89.0	194.0	87.3	54.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0022	L	5028364E1D	Removed 6th dorsal scute from posterior. Some damage to left gill plate. 1 scar on gill plate. Possible female, very large, rounded belly.	
August 20, 1999	Fraser	SL831.0L		12/0	98	59.5	66.5	16.0	8.5	22.5	3.0	1.4	10.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0002	L	5027797B55	Healthy juvenile.	
August 20, 1999	Fraser	SL831.3L	9.0	12/0	98	57.5	67.0	15.0	8.5	21.0	2.0	0.9	8.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0001	L	5028265144	Healthy fish.	
August 21, 1999	Fraser	SL829.95R	4.8	11/0	98	54.0	62.5	15.1	9.0	22.5	3.5	1.6	9.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0003	L	50283A5569	Healthy juvenile, no marks or scars.	
August 23, 1999	Fraser	SL863.6R	4.0	14/0	98	61.0	69.0	17.0	9.5	21.0	2.6	1.2	8.0	LP	B - AU	N-N-N	FL - PT	N	LP	B	00097	L	5028364241	Healthy juvenile.	
August 23, 1999	Fraser	SL882.3R	7.5	16/0	98	61.0	71.0	17.0	9.5	22.0	3.0	1.4	9.0	LP	B - AU	N-N-N	FL - PT	N	LP	B	00100	L	5028381F05	Healthy.	
August 23, 1999	Fraser	SL882.3R	6.2	14/0	98	72.5	84.0	19.0	10.5	26.0	4.9	2.2	16.0	LP	B - AU	N-N-N	FL - PT	N	LP - RP	Y	0004	L	5028272D08	Healthy. Aging structure taken from right pectoral fin, slight anomaly on the left pectoral.	
August 23, 1999	Fraser	SL882.3R	5.1	12/0	98	75.0	85.5	19.0	10.0	24.0	4.5	2.0	17.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0005	L	50277D7626	Damage to left nostril. Otherwise healthy.	
August 23, 1999	Fraser	SL882.3R	4.5	12/0	98	61.0	70.5	15.0	8.0	20.0	2.7	1.2	10.0	LP	B - AU	N-N-N	FL - PT	N	LP	B	00099	L	502837513C	Slight trauma to tail (either set line or tail noose). Right nostril has previous damage but has healed.	
August 23, 1999	Fraser	SL863.7L	7.4	12/0	98	60.0	73.0	17.0	9.0	22.0	3.1	1.4	9.0	LP	B - AU	N-N-N	FL - PT	N	LP	B	00098	L	502823341F	Healthy.	
August 24, 1999	McGregor	SL1.6R	4.2	11/0	98	52.0	59.0	13.0	7.0	18.0	1.5	0.7	7.0	LP	B - AU	N-N-N	FL - PT	N	LP	B	00096	L	50274B0D63	Photos 3 and 4 of roll#2. Healthy juvenile. Smallest fish to date.	
August 25, 1999	Fraser	SL882.6R	5.0	16/0	97	146.0	164.5	33.0	16.0	54.0	57.0	25.7	32.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0006	L	5027447327	No damage to scutes. Right eye has some blood trauma. Scar on left pelvic fin, old scar on belly.	
August 25, 1999	Fraser	SL900.5M	3.4	14/0	97	131.0	149.0	32.5	15.0	51.0	51.0	23.0	28.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0008	L	50283B0354	Healthy.	
August 25, 1999	Fraser	SL883.6R	7.0	16/0	97	127.5	146.0	30.5	14.0	52.5	56.0	25.2	33.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0007	L	5027545566	Tear in dorsal fin. Rounded belly. No eggs visible when belly squeezed.	
August 25, 1999	Fraser	SL882.3R	4.5	14/0	98	65.0	74.5	19.0	10.5	24.0	3.0	1.4	15.0	LP	B - AU	N-N-N	FL - PT	N	LP	B	00095	L	502827623A	Healthy.	
August 28, 1999	Bowron	SL0.4L	4.0	12/0	98	52.0	61.5	14.5	8.5	18.5	1.5	0.7	7.0	LP	B - AU	N-N-N	FL - PT	N	LP	B	00094	L	502835091A	Healthy. small tear in dorsal fin.	
August 28, 1999	Bowron	SL0.4L	3.9	14/0	97	119.0	133.0	28.0	13.0	41.5	31.0	14.0	27.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0010	L	502828734F	Small amount of blood trauma to dorsal fin. Probably occurred while on set line.	
August 28, 1999	Bowron	SL0.4L	3.7	14/0	97	117.0	134.0	31.0	15.0	43.0	25.0	11.3	20.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0011	L	50282C5811	Healthy adult.	
August 28, 1999	Bowron	SL0.4L	3.4	16/0	97	114.0	130.0	27.5	12.0	40.0	21.0	9.5	37.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0012	L	50282A7328	Healthy adult.	
August 28, 1999	Fraser	SL916.9R	3.9	16/0	97	143.0	160.5	32.0	14.5	52.5	54.0	24.3	40.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0009	L	5027256602	Small tear in tail. Rounded belly. Small black spots over body. Both pectoral fins have curvature. Scutes are intact. Old scar on dorsal fin; possible net scar.	
August 29, 1999	Fraser	SL916.9R	4.1	14/0	97	130.0	147.5	31.0	13.5	48.0	36.0	16.2	31.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0013	L	50282F5941	Healthy. Scute are in good condition. Small tear in dorsal fin. Probably occurred during capture.	
August 29, 1999	Bowron	SL0.5R	3.7	16/0	97	126.0	143.0	30.5	15.0	45.0	31.0	14.0	21.0	RP	B - AO	N-N-N	FL - PT	N	RP	Y	0014	L	50274F2E7B	Deformity in left pectoral leading fin ray. DNA and aging structure removed from right pectoral fin. Scute intact.	
August 29, 1999	Bowron	SL0.7R	2.6	16/0	97	140.5	157.0	33.0	16.0	50.5	44.0	19.8	36.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0015	L	5028011B27	Two old scars on back. Tear in tail. Scutes are O.K. Curvature of both pectoral fins.	
August 30, 1999	Fraser	SL916.9R	3.8	14/0	97	105.0	120.0	25.0	10.5	37.0	15.0	6.8	18.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0016	L	5028036A67	Healthy fish with no unique marks.	

Tags: FL = Floy Tag; PT = Pit Tag Fish Disposition: B = basic work-up; AU = adult unders DNA Sample Location and Marks: LP = left pectoral fin; RP = right pectoral fin

Sex Mat. Code: 98 = juvenile WST under 1m total length Sex Mat. Code: 97 = adult WST over 1m total length

Capture Site Information						Length										Tagging Information								
Date of Capture	River of Capture	Capture Station	Capture Depth (m)	Hook Size	Sex Mat. Code	Fork Length (cm)	Total Length (cm)	Snout Length (cm)	Post-Orbital Length (cm)	Girth (cm)	Weight (lbs)	Weight (kgs)	Age (years)	DNA Sample Location	Fish Disposition	Tags @ Capture	Tags @ Release	Marks @ Capture	Marks @ Release	Floy Tag (Yellow or Blue)		Plt Tag (large size)		Comments
August 30, 1999	Bowron	SL2.2L	3.0	14/0	98									N	AU	N-N-N	N	N	N					Captured but slipped from tail noose. Approximate length of 75 cm. No tags or identifying marks.
September 1, 1999	Fraser	SL940.7L	7.0	12/0	98	71.0	78.0	17.0	8.0	24.5	4.1	1.8	13.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0017	L	5028284E4D	Top portion of tail is missing but has healed.
September 1, 1999	Fraser	SL943.1R	5.8	16/0	98	87.5	98.0	21.0	10.0	31.0	8.2	3.7	18.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0018	L	50282C4724	Healthy.
September 1, 1999	Fraser	SL950.6R	5.2	14/0	98	62.0	71.0	18.0	10.0	25.0	3.9	1.8	14.0	LP	B - AU	N-N-N	FL - PT	N	LP	B	00093	L	5027761810	Darker colouration. Longer nose. Small bony plates (scutes?) between lateral line and dorsal scute line very obvious. Pectoral fins appear to be very rounded.
September 2, 1999	Fraser	SL950.4M	7.8	16/0	98	83.0	94.0	22.0	11.5	29.0	6.6	3.0	15.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0019	L	502829735B	Healthy.
September 3, 1999	Fraser	SL950.4M	4.0	16/0	97	102.0	114.0	24.0	11.0	42.0	20.0	9.0	31.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0021	L	5028002E77	Healthy fish. Blunt nose. Darker colouration.
September 3, 1999	Fraser	SL950.4M	8.0	14/0	97	124.5	142.0	32.5	14.5	48.0	31.0	14.0	27.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0020	L	5028247314	Marks (scars) on dorsal fin and tail. Otherwise healthy.
September 4, 1999	Fraser	SL831.0L	8.6	16/0	97	102.0	118.0	26.0	13.0	39.0	18.0	8.1	19.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0026	L	5027187F2D	No scars or unique marks. Healthy.
September 4, 1999	Fraser	SL831.3L	8.3	16/0	98	77.0	88.0	19.0	10.0	25.0	4.4	2.0	16.0	LP	B - AU	N-N-N	FL - PT	N	LP	B	00092	L	5027580F48	Hooked through opercular plate to left pectoral fin. No apparent damage to gill or fin.
September 5, 1999	Fraser	SL831.0L	7.7	16/0	97	138.0	156.0	33.0	16.0	66.0	65.0	29.3	21.0	N	B - AO	N-PT-N	FL - PT	LP	N	Y	0027	L	7F7D77302F	Recapture, RL&L 1996 Fraser - Nechako confluence. Added a new floy tag. Left pectoral fin well healed from proir sampling. No DNA or aging structures taken.
September 5, 1999	Fraser	SL831.0L	8.4	14/0	98									N		FL-PT-N	FL - PT	LP	N	Y	0024	L	50283B6C65	Recapture, ours from August 19, 1999 at original capture station SL830.0R. New measurements not deemed necessary. Left pectoral fin is healing well from aging structure removal. Floy tag looks good.
September 9, 1999	Fraser	SL958.6L	2.9	14/0	97	97.0	111.0	24.0	12.5	37.0	16.0	7.2	20.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0028	L	501F7B1B17	Healthy, no unique marks.
September 16, 1999	Fraser	SL1007.9L	4.9	14/0	97	167.0	187.0	34.5	15.0	62.0	69.0	31.1	51.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0029	L	5020205006	Dorsal deformity - piece missing. Left pelvic tip cut. Blunt snout. Photos of dorsal fin and fish taken. Slightly flacid belly. Frames 1&2 of Roll #3
September 20, 1999	Fraser	SL1042.1R	7.0	16/0	97	108.0	125.0	26.0	11.5	39.0	21.0	9.5	32.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0030	L	5020267B3F	Healthy fish, no evidence of past tagging. Frames 3&4, roll #3
September 20, 1999	Fraser	SL1042.1R	4.2	16/0	97	199.0	225.0	47.0	18.5	73.0	124.0	55.8	36.0	LP	B - AO	N-N-N	FL - PT	N	LP	Y	0031	L	502017624B	Large adult. Healthy. No previous tagging evidence. No unique marks. Frames 5&6 of Roll #3.
October 5, 1999	Fraser	SL831.0L	7.0	14/0	98	86.5	99.5	22.0	12.0	31.5	7.1	3.2	14.0	LP	B - AU	N-N-N	FL - PT	N	LP	Y	0032	L	501F6E292A	Healthy, with no identifying scars.
October 6, 1999	Fraser	SL831.3L	6.0	16/0	98	54.0	64.0	13.5	7.5	21.5	1.6	0.7	6.0	LP	B - AU	N-N-N	FL - PT	N	LP	B	00091	L	501F701824	Healthy juvenile, hooked behind opercular plate but no apparent gill damage or bleeding.

Appendix 7

***Habitat related characteristics collected at set line deployment locations in
1999.***

1999 Upper Fraser White Sturgeon Project
Set Line Habitat Related Data

Set Line Habitat Related Data																			Flow characteristics					
River	Station	Effort Units	River km	UTM			Total Effort (hrs)	Set Water Temp (°C)	Set Visibility (m)	Pull Water Temp (°C)	Pull Visibility (m)	Set Depth Minimum (m)	Set Depth Maximum (m)	Site Description	Comments	Sturgeon Captured (Y/N)	Fish Captured (Y/N)	Depth (m)	Velocity Measurement Local	Velocity (m/s)	Substrate			
				NAD	Easting	Northing													Nearshore (N) Mid (M)					
Bowron	SL0.4L	0-20	0.4	10	576506.395	5990532.533	22.25	11	0.2	13	0.3	3.4	4.1	Slow water/confluence with Fraser R.	Dead water at bottom of Bowron R.	Y	Y	4	N	0.1	Silt			
Bowron	SL0.5R	0-20	0.5	10	576323.999	5990580.114	21.33	13	0.3	14	0.3	2.3	3.8	Off of cutbank.		Y	Y	3	N	0.25	Silt			
Bowron	SL0.5R	0-20	0.5	10	576323.999	5990580.114	23.16	14	1	12	1.1	2	3.5	Cut bank, inside of corner	Sampling efficiency 2 based on fleshed hooks.	N	N							
Bowron	SL0.7R	0-20	0.7	10	576125.743	5990552.358	22.08	13	0.3	14	0.3	2.2	2.9	700m u/s of Fraser R.	Outside of bend, slow water.	Y	Y	2.2	N	0.2	Silt			
Bowron	SL0.7R	0-20	0.7	10	576125.743	5990552.358	23.83	14	1	12	1.1	2.1	2.5	700m u/s of Fraser R.	Sampling efficiency 2 based on fleshed hooks.	N	N							
Bowron	SL2.1R	0-20	2.1	10	575899.73	5989541.25	21.75	12	1.1	11	1.1	2	7.2	Inside of bend		N	N	2.5 4.0	N M	0.2 0.25	Silt Silt			
Bowron	SL2.2L	0-20	2.2	10	575796.637	5989541.25	23.91	14	1	11	1	2.4	3.4	Outside bend, off of cutbank.	Fish captured but lost as it slipped from tail noose.	Y	Y	2.5	N	0.25	Silt			
Fraser	SL751.3R	740.1-760	751.3	10	521437.359	5938417.787	20.5	6	0.6	6	0.6	1.8	10.5	Rock and LWD point	More woody debris in back eddy vs yesterdays set. Very little velocity in set area. Few fleshed hooks	N	N	2.5	N	0.1	silt, woody debris			
Fraser	SL753.6L	740.1-760	753.6	10	520847.768	5940493.638	24.66	6	0.6	6	0.6	1.8	6.2	Slow water behind island	Reasonable site. Anglege BT and NSC yesterday. One BT on SL yesterday. Good depth and back eddy. Sturgeon picked from sockeye gillnet approximately 65cm TL.	N	N	2.0 5.0	N M	0.25 0.1	Silt, rock			
Fraser	SL753.7L	740.1-760	753.7	10	520786.352	5940555.054	20.00	7	0.6	6	0.6	2.5	6.3	Slow water behind island	Good habitat.	N	Y	2.4	N	0.1	Silt			
Fraser	SL755.1R	740.1-760	755.1	10	521289.499	5941986.641	22.25	6	0.6	6	0.6	3.2	3.7	Laminar flow behind point.	Fast laminar flow except near shore. Too fast, limited potential.	N	N	3.2	N	0.4	Silt, rock			
Fraser	SL756.4R	740.1-760	756.4	10	521787.659	5943051.673	19.08	7	0.6	6	0.6	2	4.7	Eddy below Stone C.	Site is angle often based on evidence on sand bar.	N	Y	2.2	N	0.18	Silt			
Fraser	SL756.4R	740.1-760	756.4	10	521787.659	5943051.673	21.16	6	0.6	6	0.6	2.6	5.6	Sand bar below Stone C.	Excellent site. Public angles for sturgeon off this sand bar. Sockeye cleaned just u/s at boat launch. Angled here yesterday as well. NFC. Many fleshed hooks.	N	N	2.6 3.4	N M	0.5 1.0	Silt Silt, rock			
Fraser	SL756.6R	740.1-760	756.6	10	521882.138	5943137.562	20.00	7	0.6	7	0.6	3.2	11.2	Mouth of Stone C., boulder area.	Fairly strong current, good potential for sturgeon presence however water temp may be slowing activity.	N	N							
Fraser	SL756.7R	740.1-760	756.7	10	521985.205	5943206.274	22.25	6	0.6	6	0.6	2.6	8.2	u/s of Stone C.	Good site, no fish. Water temp too cold possibly.	N	N	5.0 2.6	M N	0.25 0.1	Rock			
Fraser	SL756.7L	740.1-760	756.7	10	521985.205	5943206.274	21.58	6	0.6	6	0.6	2.8	4.6	Across Fraser R. from Stone C.	Reasonable site. May intercept migrating sturgeon. Not much holding water here. Lots of food (sockeye).	N	N	2.6	N	0.3	Silt, rock			
Fraser	SL761.0R	760.1-780	761.0	10	519820.786	5946367.013	20.58	7	0.6	6	0.6	1.9	4.2	Eddy above red rock outcropping, above Red Rock Cr.	Should have sturgeon.	N	Y	1.8	N	0.1	Silt, gravel			
Fraser	SL761.0R	760.1-780	761.0	10	519820.786	5946367.013	21.5	6	0.6	5	0.6	2.3	5.1	Eddy above red rock outcropping, above Red Rock Cr.	Good location but NFC. A lot of fleshed hooks	N	N	2.5	N	0.3	Silt, rock			
Fraser	SL803.2L	800.1-820	803.2	10	519133.669	5978919.192	6.33	13	0.3	14	0.3	4.5	7.8	Large deep eddy - downstream Northwood	Faster flowing section without much holding water, below effluent discharge.	N	N							
Fraser	SL803.3L	800.1-820	803.3	10	519047.779	5978996.493	6.5	13	0.3	14	0.3	2.2	16	Downstream of Northwood	Poor fishing likely due to effluent discharge u/s	N	N							
Fraser	SL808.4R	800.1-820	808.4	10	522998.703	5980559.685	6.5	13	0.3	14	0.3	3.2	5.8	Opposite Northwood, behind island	Higher flow velocities, not much holding water.	N	N	3.2	N	0.45	Rock			
Fraser	SL808.4R	800.1-820	808.4	10	522998.703	5980559.685	6.36	13	0.3	14	0.3	2.8	3.5	Deep slot behind island, opposite Northwood		N	N							
Fraser	SL820.4R	820.1-840	820.4	10	526563.124	5987181.777	19.00	14	0.3	13	0.3	2.4	3.8	D/s island - has potential.	Site above Shelly reserve. Historical evidence of sturgeon capture.	N	N				Rock silt mixed			
Fraser	SL820.4R	820.1-840	820.4	10	526563.124	5987181.777	17.08	11	0.3	10	0.3	3	8	U/s of Shelley reserve	Can't seem to catch sturgeon here.	N	Y							
Fraser	SL820.5L	820.1-840	820.5	10	526356.989	5987173.188	18.78	14	0.3	13	0.3	1.5	3.7	D/s of bend, slow water.	Captured one squawfish.	N	Y				Rock silt mixed			
Fraser	SL827.6L	820.1-840	827.6	10	528650.243	5990600.185	18.41	16	0.35	15	0.35	3.2	5.7	300m d/s of Salmon River.		N	N							
Fraser	SL829.9L	820.1-840	829.9	10	530118.956	5992360.923	18.25	14	0.3	13	0.3	2.8	4	D/s large rock point	Site has potential.	N	N				Rock silt mixed			
Fraser	SL829.9L	820.1-840	829.9	10	530118.956	5992360.923	14.66	15	0.3	15	0.3	5.4	8.8	Hole below Willow R.		N	N							
Fraser	SL829.95R	820.1-840	829.95	10	530302.241	5992301.935	14.66	15	0.3	14	0.3	2.3	4.7	Downstream of island.		N	N							
Fraser	SL829.95R	820.1-840	829.95	10	530302.241	5992301.935	17.13	15	0.3	14	0.3	3.5	4.5	Slack water below island.		Y	Y							
Fraser	SL829.95M	820.1-840	829.95	10	530247.79	5992335.156	3.58	14	0.3	14	0.3	3.8	6.1	Slack water below island.	Previous fish capture site.	N	N							
Fraser	SL830.0R	820.1-840	830.0	10	530378.893	5992323.813	18.16	13	0.3	13	0.3	2	4.7	Slow water behind island, 1.5 km above Salmon River.	Good site.	Y	Y	3	N	0.2	Silt			
Fraser	SL830.0R	820.1-840	830.0	10	530378.893	5992323.813	14.66	15	0.3	14	0.3	3.6	5.6	Downstream of island.	Good rearing habitat.	N	N							
Fraser	SL830.0R	820.1-840	830.0	10	530378.893	5992323.813	21.33	5	1	5	1	1.7	4.8	Eddy below island, off of rip rap.		N	N	2.2	N	0.1	Silt			
Fraser	SL830.0L	820.1-840	830.0	10	530181	5992532	22.58	5	0.8	5	0.8	2.2	3.4	D/s end of back channel around island.	Marginal site, has depth but limited flow in tight to island. May be better out into eddy in main channel but flow too quick.	N	N	2.2 3.0	N M	0 0.2	Rock, silt			
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	4.58	14	0.3	15	0.3	5.4	8	Tail end of pool.	Good position and habitat.	Y	Y				Silt			

Set Line Habitat Related Data

Set Line Habitat Related Data																		Flow characteristics			
River	Station	Effort Units	River km	UTM			Total Effort (hrs)	Set Water Temp (°C)	Set Visibility (m)	Pull Water Temp (°C)	Pull Visibility (m)	Set Depth Minimum (m)	Set Depth Maximum (m)	Site Description	Comments	Sturgeon Captured (Y/N)	Fish Captured (Y/N)	Depth (m)	Velocity Measurement Local	Velocity (m/s)	Substrate
				NAD	Easting	Northing													Nearshore (N) Mid (M)		
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	18.16	15	0.3	15	0.3	5.4	8	Tail end of pool.	Lost large fish. Straightened out an 11/0 hook.	N	N				
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	16.25	11	0.3	10	0.3	8.4	8.7	Off sand bar.	Index site	Y	Y				
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	18.58	11	0.3	10	0.3	3.3	8.6	Off sand bar.		Y	Y	3.4	N	0.25	Silt
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	21.16	5	1	5	1	2.8	9.8	Off sand bar.	Eddy behind rock below Willow R. Good index site.	Y	Y	3.2	N	0.2	Silt
Fraser	SL831.0L	820.1-840	831.0	10	531063.742	5992867.672	20.41	5	1	5	1	3.1	8	Off sand bar below rock outcrop.	Index site. Water level and temperature a big factor with fishing success now.	N	N	3	N	0.2	Silt
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	17.50	14	0.3	13	0.3	4.2	9.2	Behind boulder, d/s Willow River.	Excellent site, very large pool	Y	Y				Silt
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	4.08	14	0.3	14	0.3	2.8	9.6	Behind boulder, d/s Willow River.		Y	Y				Silt
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	14.41	15	0.3	14	0.3	4	9.6	Hole below Willow R.	Good flow and excellent site.	Y	Y	5	M	0.25	Silt
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	4.05	14	0.3	15	0.3	3.7	10.8	Hole below Willow R.		N	N				Silt
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	17.58	15	0.3	14	0.3	4	9.6	Hole below Willow R.	Good site.	N	N				
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	3.58	14	0.3	15	0.3	3.1	5.2	Hole below Willow R.	Proven site.	N	N				
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	17.00	11	0.3	10	0.3	3.6	8.5	Off rock island	Index site	Y	Y				
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	19.91	11	0.3	10	0.3	3.8	10.4	Off rock island	Index site	N	N		N	0.25	Silt
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	21.58	5	1	5	1	4.7	10.3	Off of rock below Willow R.	Still a good site, very slow flows behind rock.	N	Y	4.5	N	0.15	Silt
Fraser	SL831.3L	820.1-840	831.3	10	531381.534	5992902.028	20.33	5	1	5	1	4.2	9	Off of rock below Willow R.	Good site, continues to produce fish.	Y	Y	4.5	N	0.15	Silt
Fraser	SL833.6R	820.1-840	833.6	10	531768.037	5994628.41	18.55	14	0.3	13	0.3	2.1	4.1	1.6 km above Willow R. below island	Rocky substrate, site has some potential.	N	N	2.5	N	0.2	Rock silt mixed
Fraser	SL844.5R	840.1-860	844.5	10	528014.659	5999635.777	24.5	14	0.3	14	0.3	2.1	3.8	Small eddy off of Giscome Rapids	No bait even touched, very poor site.	N					Silt
Fraser	SL863.6R	860.1-880	863.6	10	537651.478	6010681.187	25.28	13	0.3	13	0.3	2.4	5	Above sand bar.	Small eddy off of bar.	Y	Y	3	N	0.3	Silt
Fraser	SL863.7L	860.1-880	863.7	10	537640.242	6010808.962	25.83	13	0.3	13	0.3	3.2	7.4	Downstream of creek mouth.	Hole behind rock bar.	Y	Y	4.2	N	0.2	Mixed
Fraser	SL882.3R	880.1-900	882.3	10	553008.549	6006146.213	24.86	13	0.3	12	0.3	4	8.4	Back eddy behind rock wall.	Good site.	Y	Y				Silt
Fraser	SL882.3R	880.1-900	882.3	10	553008.549	6006146.213	21.35	12	0.3	11	0.3	4	8.2	Eddy behind point.	Good hole behind rock outcropping.	Y	Y				
Fraser	SL882.5R	880.1-900	882.5	10	553283.395	6006214.925	25.00	13	0.3	12	0.3	2.5	6.7	Back eddy behind rock wall.	Site appears good.	N	N				Mixed
Fraser	SL882.6R	880.1-900	882.6	10	553403.641	6006275.047	21.53	12	0.3	11	0.3	4.8	5.2	Opposite boat launch.	Small patch of holding water.	Y	Y				
Fraser	SL883.6R	880.1-900	883.6	10	554030.635	6006902.042	3.58	13	0.3	12	0.3	2.5	6.1	Downstream opposite Limestone C.	Good looking area, possible for resample.	N	N				Silt.
Fraser	SL883.6R	880.1-900	883.6	10	554030.635	6006902.042	21.08	12	0.3	11	0.3	6.5	11.5	Downstream opposite Limestone C.		Y	Y				
Fraser	SL884.2L	880.1-900	884.2	10	554185.237	6007486.091	16.83	13	0.3	11	0.3	4.8	11.2	200m u/s of Limestone C.	Surprised that only fish captured was BT. Water here looks promising. Should return.	N	Y				Silt.
Fraser	SL886.0M	880.1-900	886.0	10	555705.484	6008001.429	24.33	12	0.3	11	0.2	5.8	6.8	Mid channel set, opposite Herring C.	No shore anchor. 25lb anchor and float at each end. Forward anchor drifted down and fouled up line.	N	N				Gravel.
Fraser	SL900.5M	900.1-920	900.5	10	567223.286	6001525.349	25.53	12	0.3	11	0.3	1.7	3.6	Off d/s end of island.		Y	Y				
Fraser	SL900.5M	900.1-920	900.5	10	567223.286	6001525.349	23.75	11	0.2	10	0.2	2.5	5	Off d/s end of island.	River is up 1m at this local. Very muddy.	N	Y				
Fraser	SL915.7M	900.1-920	915.7	10	576155.811	5991553.561	23.00	10	0.2	10	0.2	4.1	4.4	End tip off island		N	N				
Fraser	SL916.9R	900.1-920	916.9	10	576757.038	5990591.596	23.66	11	0.2	13	0.3	3.7	4.5	Off of point at Bowron, Fraser R. confluence.	Fraser River is very dirty, muddy. Never have see it this dirty in our lives. Must be a landslide u/s.	Y	Y				Silt, gravel
Fraser	SL916.9R	900.1-920	916.9	10	576757.038	5990591.596	20.53	13	0.3	14	0.3	3.3	4.2	Off of point at Bowron, Fraser R. confluence.	Good spot, mixing water	Y	Y	3.3	N	0.25	Silt, gravel
Fraser	SL916.9R	900.1-920	916.9	10	576757.038	5990591.596	22.33	14	1.3	15	1.5	3.1	4	Bowron Fraser confluence		Y	Y	3	N	0.2	Silt
Fraser	SL916.9R	900.1-920	916.9	10	576757.038	5990591.596	21.33	12	1	11	1	2.8	3.8	Bowron Fraser confluence		N	N	3.5	N	0.2	Silt
Fraser	SL916.95R	900.1-920	916.95	10	576782.805	5990548.652	20.66	11	0.2	11	0.2	2.2	3.8	Bowron Fraser confluence		N	N				
Fraser	SL940.7L	940.1-960	940.7	10	585758.274	5982732.693	24.08	10	0.2	10	0.2	5.2	9.5	Upstream Muller Homestead	Nice deep hole with higher surface velocity	Y	Y	5.5	N	0.5	Silt
Fraser	SL940.7L	940.1-960	940.7	10	585758.274	5982732.693	16.98	10	0.2	9	0.2	2.2	6.3	Upstream Muller Homestead		N	N	2.2	N	0.3	Silt
Fraser	SL941.8R	940.1-960	941.8	10	584933.733	5983462.755	17.66	10	0.2	9	0.2	3.1	6.2	Off of bank		N	N				
Fraser	SL941.8R	940.1-960	941.8	10	584933.733	5983462.755	22.08	9	0.2	9	0.2	3	6.8	Big back eddy	Surprised that no fish captured here. Habitat appears viable. River is still very dirty from u/s sediment input.	N	N	3	N	0.2	Silt
Fraser	SL943.1R	940.1-960	943.1	10	584504.285	5982363.367	24.63	11	0.2	10	0.2	4.2	12	Hole below rock face.	Fair amount of rock and woody debris on bottom.	Y	Y	4	N	0.35	Rock silt mixed
Fraser	SL943.1R	940.1-960	943.1	10	584504.285	5982363.367	17.91	10	0.2	9	0.2	3.8	8	Hole below rock face.		N	N				
Fraser	SL946.1L	940.1-960	946.1	10	587278.521	5981487.293	22.05	9	0.2	9	0.2	3.3	3.9	Off tributary, mouth of creek	Potential for capture of occasional sturgeon.	N	N	3.2	N	0.5	Gravel, silt
Fraser	SL948.8L	940.1-960	948.8	10	587862.57	5979219.806	24.5	11	0.2	10	0.2	4	5.1	Slow water in canyon	Moderate potential for fish capture, recommend reset.	N	N	3.8	N	0.3	Silt
Fraser	SL948.8L	940.1-960	948.8	10	587862.57	5979219.806	18.55	10	0.2	9	0.2	3.7	4.4	Slow water in canyon			N				
Fraser	SL950.4M	940.1-960	950.4	10	588807.357	5978317.965	19.66	10	0.2	9	0.2	7.4	8.8	In canyon, off of rock island	Deep collection area, good habitat	Y	Y				Silt, rock
Fraser	SL950.4M	940.1-960	950.4	10	588807.357	5978317.965	22.33	9	0.2	9	0.2	3.8	10	Rock island in canyon	Good site, deep and slow.	Y	Y	9.5	N	0.2	Rock, silt

Set Line Habitat Related Data

Set Line Habitat Related Data																		Flow characteristics				
River	Station	Effort Units	River km	UTM			Total Effort (hrs)	Set Water Temp (°C)	Set Visibility (m)	Pull Water Temp (°C)	Pull Visibility (m)	Set Depth Minimum (m)	Set Depth Maximum (m)	Site Description	Comments	Sturgeon Captured (Y/N)	Fish Captured (Y/N)	Depth (m)	Velocity Measurement Local	Velocity (m/s)	Substrate	
				NAD	Easting	Northing													Nearshore (N) Mid (M)			
Fraser	SL950.6R	940.1-960	950.6	10	588893.246	5978180.541	24.41	11	0.2	10	0.2	2.7	9	In canyon, wide slow area	Fish captured looked different. Longer, flatter nose Darker colouration.	Y	Y	2.6	N	0.25	Rock silt mixed	
Fraser	SL950.6R	940.1-960	950.6	10	588893.246	5978180.541	20.16	10	0.2	9	0.2	3.2	14	In canyon, slow water	Good habitat	N	N					
Fraser	SL950.6R	940.1-960	950.6	10	588893.246	5978180.541	2.41	9	0.2	9	0.2	2.7	5.2	In canyon, slow water	Set time too short.	N	N				Silt	
Fraser	SL958.6L	940.1-960	958.6	10	591452.758	5975715.508	21.5	10	0.35	9	0.35	1.3	2.9	Slack water outside bend, above rock wall	Large slow outside bend.	Y	Y	1.5	N	0.2	Silt	
Fraser	SL958.6L	940.1-960	958.6	10	591452.758	5975715.508	20.70	9	0.35	9	0.35	1.1	2.8	Outside bend, off of cutbank.	River still dropping.	N	N			0.15		
Fraser	SL958.6L	940.1-960	958.6	10	591452.758	5975715.508	27.00	9	0.35	9	0.4	1	2.7	Slack water outside bend, above rock wall	River dropping	N	N					
Fraser	SL964.6L	960.1-980	964.6	10	595498.161	5974298.329	22.11	10	0.35	9	0.35	2.3	3.1	Steep bank	Not a good site.	N	N	2.3	N	0.25	Mixed	
Fraser	SL970.5L	960.1-980	970.5	10	601089.577	5973319.187	26.91	9	0.35	9	0.4	3.3	5.2	Tail of eddy.	River still dropping rapidly	N	N	3.3	N	0.2	Silt	
Fraser	SL970.6L	960.1-980	970.6	10	601244.179	5973216.119	22.00	9	0.35	9	0.35	4.8	6.9	Big eddy, u/s of creek and midchannel bar.	Promising site.	N	N					
Fraser	SL970.6L	960.1-980	970.6	10	601244.179	5973216.119	20.41	10	0.35	9	0.35	3.4	7.8	Top of eddy.	Site is promising however our timing may be wrong.	N	N	4	N	0.2	Silt	
Fraser	SL971.1L	960.1-980	971.1	10	601501.848	5972924.094	21.66	10	0.35	9	0.35	3.2	5	Eddy, outside of bend.	Moderate habitat.	N	N	3	N	0.1	Silt	
Fraser	SL972.6R	960.1-980	972.6	10	601624	5971462	26.21	9	0.35	9	0.4	3	3.8	Slot off of creek mouth	Just above unnamed creek, high velocity.	N	N				Gravel	
Fraser	SL975.6R	960.1-980	975.6	10	603202.463	5969780.533	20.38	9	0.35	9	0.35	1	2.3	Driscoll Creek confluence.		N	N	1.1	N	0.4	Gravel, silt	
Fraser	SL975.6R	960.1-980	975.6	10	603202.463	5969780.533	26.80	9	0.35	9	0.4	1.1	4.8	Mouth of Driscoll C.	Gravel substrate.	N	N				Gravel substrate	
Fraser	SL975.8R	960.1-980	975.8	10	603271.175	5969960.901	20.08	10	0.35	9	0.35	2.1	3.1	Above Driscoll C. confluence	Must be a high density of fish at this site (other than just sturgeon) as the bait was well picked over.	N	N					
Fraser	SL992.5R	980.1-1000	992.5	10	611971.797	5966740.039	16.66	11	0.65	9	0.7	2.2	6	Penny landing. Deep pool.	Hole behind pilings, deep and slow.	N	N	4	N	0.15	Silt	
Fraser	SL994.5L	980.1-1000	994.5	10	612573.024	5965443.105	17.20	10	0.65	9	0.65	2.3	4.2	Slow water above island.		N	N	2.3	N	0.2	Silt, gravel	
Fraser	SL999.1L	980.1-1000	999.1	10	615390.205	5966559.671	19.08	10	0.65	9	0.65	2.8	3.8	Along rip rap, outside of bend	Straight but slow flow. Possible migration interception.	N	N	2.6	N	0.3	Silt, rock	
Fraser	SL1005.3M	1000.1-1020	1005.3	10	619349.718	5962419.79	18.90	10	0.65	9	0.65	1.4	4.9	Off island, behind log jam at Slim C.		N	N	4.4	N	0.3	Silt, gravel	
Fraser	SL1007.9L	1000.1-1020	1007.9	10	620603.707	5964343.718	19.65	10	0.65	9	0.65	1.5	5.9	Mouth of Patricia C., end of rip rap.	Large eddy, fairly deep and good flow.	Y	Y	2.2	N	0.15	Silt, rock	
Fraser	SL1007.9L	1000.1-1020	1007.9	10	620603.707	5964343.718	17.83	10	0.65	9	0.7	3.2	5	Eddy, end of rip rap.		N	N	3.4	N	0.2	Silt, rock	
Fraser	SL1008.1L	1000.1-1020	1008.1	10	620835.609	5964292.184	17.66	10	0.65	9	0.7	4.1	5.4	Along rip rap, deep hole	Fairly laminar flow, possible migration interception.	N	N	4.1	N	0.25	Mixed	
Fraser	SL1012.0L	1000.1-1020	1012.0	10	623523.955	5961861.507	17.83	10	0.65	9	0.7	3	10.3	Eddy, top of rip rap.	Good site for habitat, should try earlier in the year.	N	N	3.2	N	0.2	Silt	
Fraser	SL1012.0L	1000.1-1020	1012.0	10	623523.955	5961861.507	25.83	9	0.7	9	0.7	3.7	8.3	Top of rip rap.		N	N	3.5	N	0.25	Silt, rock	
Fraser	SL1019.0L	1000.1-1020	1019.0	10	625207.392	5961767.028	25.75	9	0.7	9	0.7	3	4.7	Outside bend, off of rip rap	Marginal habitat.	N	N	3	N	0.25	Silt	
Fraser	SL1025.1R	1020.1-1040	1025.1	10	626135.001	5959542.486	22.25	9	0.7	9	0.7	3	8.2	Eddy along right bank.	Good habitat. Deep hole with good flow.	N	Y	2.8	N	0.2	Silt	
Fraser	SL1033.1L	1020.1-1040	1033.1	10	632258.933	5958494.632	22.10	9	0.7	9	0.7	3.2	6.5	Eddy below cutbank	Couple of kilometers above done Creek	N	N	3	N	0.18	Silt	
Fraser	SL1033.1L	1020.1-1040	1033.1	10	632258.933	5958494.632	21.13	10	0.7	10	0.7	3.4	6.4	Eddy below cutbank	Lots of fish must be present at this site. Good general fish habitat.	N	N	3.4	N	0.15	Silt	
Fraser	SL1042.1R	1040.1-1060	1042.1	10	637412.312	5953530.21	21.85	9	0.7	9	0.7	3.5	7.2	Bottom of rip rap, top of island		N	N	3.5	N	0.2	Silt, rock	
Fraser	SL1042.1R	1040.1-1060	1042.1	10	637412.312	5953530.21	22.25	10	0.7	10	0.7	3.6	7	Eddy above island, off of rip rap	Good habitat.	Y	Y	3.6	N	0.2	Silt, rock	
Fraser	SL1049.8L	1040.1-1060	1049.8	10	640074.892	5952808.737	21.91	10	0.7	9	0.7	3.1	9.7	Opposite island, upstream Ptarmigan C.	Slow water, Small eddy.	N	N					
Fraser	SL1049.8L	1040.1-1060	1049.8	10	640074.892	5952808.737	23.83	10	0.7	10	0.7	3.9	9	Upstream of Ptarmigan C. eddy		N	N	3.8	N	0.18	Silt, rock	
Fraser	SL1058.6R	1040.1-1060	1058.6	10	642479.802	5948179.285	25.41	10	0.7	11	0.7	3	5.9	Outside bend, above rip rap	Small eddy.	N	N	3	N	0.2	Silt	
Fraser	SL1066.1R	1060.1-1080	1066.1	10	645382.872	5946418.547	18.00	11	0.7	10	0.7	2.7	6.2	Eddy below bar.		N	N					
Fraser	SL1067.9L	1060.1-1080	1067.9	10	646404.959	5947303.21	18.08	10	0.7	10	0.7	4.7	8.1	Opposite island	Appears to be decent habitat.	N	N	4.6	N	0.15	Silt	
Fraser	SL1076.1R	1060.1-1080	1076.1	10	647856.494	5943798.912	22.66	10	0.7	10	0.5	2.9	5	Eddy below Snowshoe C.	Strong eddy, difficult to set but good potential for sturgeon presence.	N	Y	2.9 4.0	N M	0.4 0.15	Gravel Silt	
Fraser	SL1086.4R	1080.1-1100	1086.4	10	653310.487	5940638.173	23.20	10	0.7	10	0.5	2.6	8.1	Eddy below canyon, below Morkill FSR	Site has potential.	N	N	2.6	N	0.2	Silt, rock	
Fraser	SL1086.5L	1080.1-1100	1086.5	10	653422.144	5940689.707	23.58	10	0.7	10	0.5	2.4	7.3	Eddy in canyon, below Morkill FSR bridge		N	N	2.4	N	0.18	Silt, rock	
Fraser	SL1086.5L	1080.1-1100	1086.5	10	653422.144	5940689.707	21.58	10	0.5	9	0.4	2.2	7.1	Eddy below Morkill Bridge	Test using J-hooks, sample of potential by-catch.	N	Y	2.2	N	0.2	Silt	
Fraser	SL1094.0L	1080.1-1100	1094.0	10	657201.289	5937425.9	5.08	10	0.5	10	0.5	2	4	Big Eddy, below Goat River Rapids.	Site appears to have high potential for fish presence of multiple species.	N	N	2	N	0.1	Silt	
Fraser	SL1094.0L	1080.1-1100	1094.0	10	657201.289	5937425.9	17.58	11	0.5	9	0.4	3	5.3	Bottom of Big Eddy		N	N	3	N	0.1	Silt	
Fraser	SL1094.3L	1080.1-1100	1094.3	10	657184.111	5937022.219	18.00	11	0.5	9	0.5	2.3	6.3	Top of big eddy.	Cold, wet day	N	N	2.3	N	0.22	Silt	
McGregor	SL0.65R	0-20	0.65	10	563152.117	6003964.616	19.65	10	0.3	9	0.3	1.9	3.1	Across from sand bar.	Slow waters at confluence, deposition zone for organic debris.	N	N					

Set Line Habitat Related Data

River	Station	Effort Units	River km	UTM			Total Effort (hrs)	Set Water Temp (°C)	Set Visibility (m)	Pull Water Temp (°C)	Pull Visibility (m)	Set Depth Minimum (m)	Set Depth Maximum (m)	Site Description	Comments	Sturgeon Captured (Y/N)	Fish Captured (Y/N)	Flow characteristics			
																		Depth (m)	Velocity Measurement Local	Velocity (m/s)	Substrate
				NAD	Easting	Northing															
McGregor	SL0.8L	0-20	0.8	10	563023.282	6004136.395	19.65	10	0.3	9	0.3	2.5	3.8	Mouth of McGregor.	Looks like a good spot	N	N	2.8	N	0.1	Silt, wood
McGregor	SL1.6R	0-20	1.6	10	563633.099	6004514.309	16.60	10	0.3	9	0.3	1.8	6	Approximately 1km u/s from Fraser R.	Slow flows	Y	Y	4	N	0.1	Silt