

2007 Assessment of Upper Fraser White Sturgeon; Critical Habitat Identification, Population Assessment and Capacity Development

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Final Project Report Prepared for the Aboriginal Funds for
Species at Risk Program**

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Executive Summary

Sampling (setlining and angling) for white sturgeon was completed between September 20 and October 30, 2007 over 255km of the mainstem of the Fraser River from rkm 740.7 (Woodpecker Rapids) to rkm 996.0 (Slim Creek confluence).

The upper Fraser's white sturgeon stock is one of four genetically unique/distinct components of the Fraser's four white sturgeon populations. The upper Fraser population is the smallest and slowest growing of the populations, and therefore inherently susceptible to any event(s) that may cause a decline in the population's numbers and/or the productive capacity of its habitats. The population was placed on Schedule 1 of Canada's *Species at Risk Act* (SARA) in 2006.

The population was first assessed from 1999-2001 and estimated at a population of 815 sturgeon ≥ 50 cm total length. The population was observed to possess a healthy age and size distribution suggesting that recruitment was occurring frequently and successfully. Work in 2007 was undertaken to re-assess the population's status, begin the process of identifying the stock's important habitats, and build capacity within Lheidli T'enneh personnel for the purposes of stewarding the stock into the future.

In 2007, a total of 35 white sturgeon were captured during the course of sampling, including a single fish that was captured twice (i.e. 34 individuals were captured). Eleven of the 34 white sturgeon captured in 2007 had been captured during sampling programs prior to 2007, including two fish that had been previously captured near rkm 110 in the Nechako River. The total lengths of fish captured ranged from 60-274cm. Aging structures were collected from 24 of the fish captured and the ages of fish captured ranged from 9-78 years, including those that were assigned ages based on previous age determinations. A total of 12 fish were implanted with radio tags.

Based on the relatively small sample of fish collected in 2007, the population appeared to be stable. Capture and preliminary telemetry information, indicated important rearing and overwintering habitats appear to exist in the Longworth (Grand Canyon) and McGregor River confluence areas. Capacity building efforts were highly successful. Recommendations are provided to guide additional work of this nature.

Introduction and Background

In order to address concerns related to the status and health of Fraser River white sturgeon populations, BC initiated a multi-year study of the Fraser's white sturgeon in 1995. This program involved juvenile and adult sampling and tagging programs within Provincial Regions 2, 3, 5 and 7, generally throughout the entire Fraser watershed (RL&L 2000). In 1999, 2000 and 2001 Lheidli T'enneh initiated a comprehensive assessment of white sturgeon within the "Region 7 portions of the Fraser River", generally upstream of the Blackwater River Confluence to the community of McBride (Lheidli T'enneh 2000, 2001, 2002)

The assessments of white sturgeon conducted throughout the Fraser River watershed resulted in the identification of at least four genetically distinct stock groupings within specific geographically bounded portions of the watershed, including the lower, middle, and upper Fraser, and Nechako (Nelson et al. 1999; Pollard 2000; Smith et al. 2002). The population of white sturgeon within the Nechako are presently "red listed" or "critically imperiled" by the BC CDC, inferring that this unique stock is facing imminent extirpation without intervention. Other Fraser River white sturgeon populations are designated as "imperiled" or "threatened" by the BC Conservation Data Centre (BC CDC 2002). Further, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the North American White Sturgeon as Endangered, including populations within all portions of the known range of the species in the Fraser and Columbia/Kootenay watersheds north of the US/Canada border. In August 2006, the Fraser's Nechako and Upper Fraser "Endangered" white sturgeon populations were placed on Schedule 1 of Canada's *Species at Risk Act*.

The assessment work completed by Lheidli T'enneh from 1999-2001 indicated that the upper Fraser's white sturgeon population possessed a healthy age structure, indicating recruitment was occurring regularly, but that the overall population size was small (Lheidli T'enneh 2002). This population was placed on Schedule 1 of SARA due to what was felt to be its inherent susceptibility (owing to its small size) to any event(s) that may cause a decline in the population's numbers and/or the productive capacity of its habitats (National Recovery Team for White sturgeon – NRTWS 2006).

Its protection under SARA necessitates a number of activities be conducted in relation to the population, including initiating a Conservation and/or Recovery Planning process for the stock, regularly assessing the population's health, and

working towards identifying the stock's Critical Habitats (Species at Risk Public Registry 2008). The Nechako White Sturgeon Recovery Initiative's Technical Working Group (TWG) has become the interim TWG for the Upper Fraser stock group. A preliminary Recovery Strategy and Critical/Important Habitat Identification process has been completed by the National White Sturgeon Recovery Team for all white sturgeon populations in Canada, including the Upper Fraser stock group, but was substantially information-limited for this population (NRTWS 2006). This Draft Plan largely identified and prioritized information needs related to the Upper Fraser stock group.

Purpose and Objectives

This project was initiated to begin addressing information/research needs that were identified as a result of the Recovery and Conservation Planning processes referred to above. The goals of the project are to:

1. Begin the process of identifying the Upper Fraser stock's Critical Habitats; apply radio tags to up to 20 individual white sturgeon in the latter stages of maturity, to allow for the determination of their locations during various seasons.
2. Complete a status-assessment of the upper Fraser white sturgeon population; utilize the existing tagged/marked component of the population and apply additional tags to facilitate ongoing monitoring of the population's status.
3. Continue capacity development of two Lheidli T'enneh fisheries personnel in the area of white sturgeon research and assessment.

The project is intended to eventually lead to critical habitat protection (and recovery, as deemed necessary). The specific stated objectives of the project (and their timeframe) are as follows:

- Objective 1 – Conservation Planning – Population Status Monitoring (short term)
- Objective 2 – Critical Habitat Identification (medium-long term)
- Objective 3 – Critical Habitat Protection (long term)
- Objective 4 – Capacity Development (on-going)

Study Area

The upper Fraser watershed, defined for the purposes of this project as those portions of the Fraser watershed within MoE 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. The range of the Upper Fraser white sturgeon is generally defined to include the Fraser River from the confluence of the Blackwater River, upstream to the community of McBride (Lheidli T'enneh 2002).

This upper portion of the Fraser River watershed falls within the Traditional Territory of the Lheidli T'enneh First Nation (LTN). 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 MoWLAP imposed a no-kill regulation on white sturgeon harvest within the Fraser watershed in 1994, most Fraser River First Nations have voluntarily complied with this regulation.

A Recovery Potential Assessment indicated the existing level of incidental harm posed by FSC fisheries occurring within the Upper Fraser white sturgeon stock's range do not pose a threat to the population's status.

Methodology

Knowledge gained from the sturgeon assessment work conducted within the upper Fraser watershed in from 1999 to 2001 was utilized to guide the activities undertaken in 2007. Sampling efforts were concentrated from the Woodpecker Rapids south of Prince George to the Grand Canyon at Longworth (Figure 1 – from the imapBC website). The “basic” objective of this project was to apply sampling effort throughout the areas identified, utilizing set lines and angling, for the purposes of capturing, sampling and tagging captured white sturgeon.

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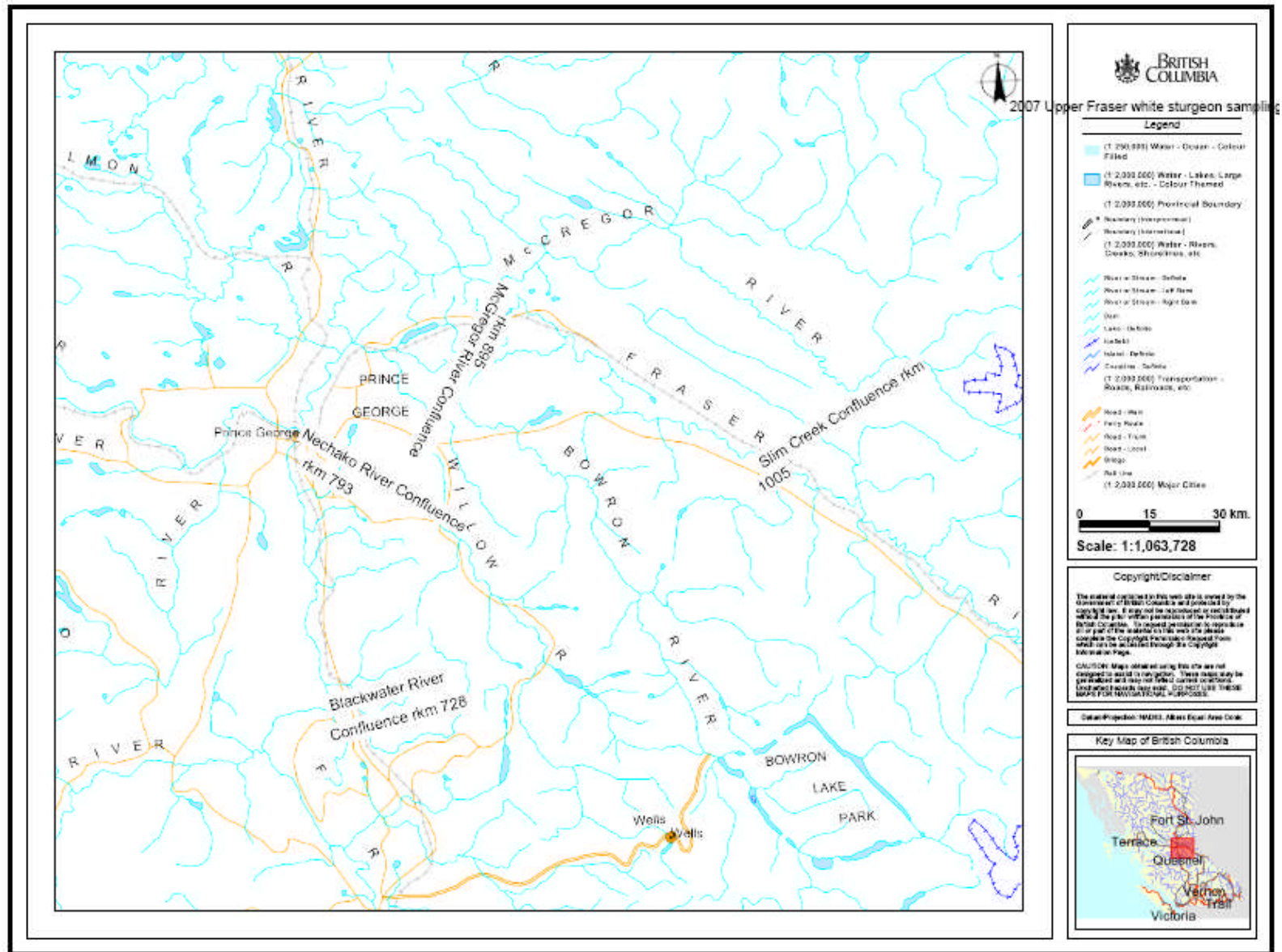


Figure 1. Upper Fraser River watershed with river kilometer (rkm) markings at key areas.

Capture Effort

Setline and angling methodologies utilized were as per those utilized in other white sturgeon assessment projects conducted within the Fraser watershed, including previous works in the upper Fraser (see Lheidli T'enneh 2000 for a description of gear and deployment procedures). Sockeye tissue and roe were the only baits utilized. Locations of gear deployments were referenced utilizing a handheld GPS or the sampling vessel's fish finder's GPS, deployment depths were determined utilizing the vessel's fish finder, and water temperatures were obtained through either a handheld alcohol thermometer or the vessel's fish finder. Crews carried TRIM basemaps of the study area labeled with both a UTM grid and river kilometer (rkm) designations which have been assigned to the Fraser's mainstem and have been utilized in all sturgeon sampling programs since the 1990s.

Sampling and Tagging

Captured sturgeon were sampled for morphological parameters (length, girth, and weight), and aging structures and tissue samples for DNA analysis were collected from previously unsampled fish. Individuals were also tagged with PIT tags prior to being released, and fish ~greater than 1meter total length were internally assessed to determine their sex and state of sexual maturity. Captured white sturgeon meeting criteria¹ developed prior to the initiation of the project were implanted with LoTek (MCFT-3L) radio tags. Extensive records of all sampling activities were recorded on an ongoing basis.

For a description of methodologies related to the morphological measurements collected during this study see Lheidli T'enneh (2002). For a description of the sex and sexual maturity classifications applied during this study see Conte et al. (1988).

Physical Conditions

In order to interpret and correlate the results of sampling efforts and observations of fish behavior relative to environmental conditions, water temperature and discharge information from within the study area was gathered from a Water

¹ Criteria for radio tag application were determined in conjunction with the Technical Working Group Chair (Cory Williamson) to include individuals in the latter stages of maturity, with a bias toward tagging more males than females.

Survey of Canada station (Fraser River at Shelley 08KB001) within the study area. River temperatures were also collected daily while in the field.

Telemetry

A LoTek SRX 600 radio receiver was utilized to detect the frequencies and codes of the LoTek (MCFT-3L) radio tags. Tags were monitored via front-mounted antennae on a Bell JetRanger helicopter flown approximately 30-80 metres above the river's surface.

Age Determination

Fin rays (aging) structures sectioned and mounted by project technical staff. Structures were read with the aid of a dissecting microscope with light table capability by technical staff and consulting experts from Environmental Dynamics Inc. The same individual (Jason Yarmish) that aged the previous upper Fraser white sturgeon samples (1999-2001) provided the final age determinations in 2007. A description of aging structure preparation and analysis is available in Lheidli T'enneh (2002).

Report Contents

Data relating to angling and setline effort are provided in Appendix 1. A summary of information relating to white sturgeon captured during this project are provided in Appendix 2. Maps showing distribution of sampling efforts and white sturgeon captures within the study area are provided in Appendix 3.

Results

Sampling for white sturgeon was completed between September 20 and October 30, 2007 over 255km of the mainstem of the Fraser River from rkm 740.7 (Woodpecker Rapids) to rkm 996.0 (Slim Creek confluence). Sampling was also undertaken within the lowest 3km of the Bowron River. A total of 35 white sturgeon were captured during the course of the sampling program, and 12 individuals were implanted with radio tags.

Physical Conditions

Sampling occurred over a range of discharge conditions that varied with fall rain

events (Figure 2). Discharge conditions at the onset of sampling were generally at summer low flow (500cms) and increased quickly on several occasions with intense rain events in the upper watershed. Water temperature generally declined consistently from 10°C at the onset of sampling to less than 4°C at the completion of sampling. Data in figure 2 were obtained from Environment Canada's Water Survey Website. Temperature data in figure 3 were collected daily during field sampling, and demonstrate a similar trend.

Water clarity was measured regularly while in the field using a Secchi Disc. Clarity was consistently less than 1metre.

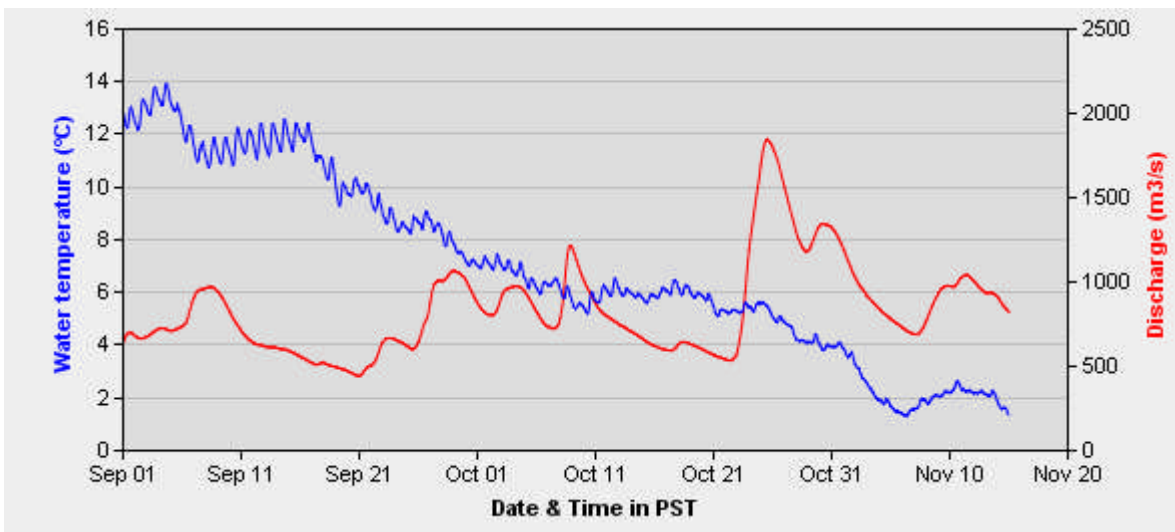


Figure 2. Fraser River discharge and temperature conditions during the timeframe of white sturgeon sampling in 2007 (from Water Survey of Canada Station; Fraser River at Shelley 08KB001).

Sampling Effort Summary

A total of 32011 hook-hours of setline effort and 92.8 rod-hours of angling effort, both focused on the capture of white sturgeon, were applied during the course of this study. Setlines were utilized as the primary method of sampling, with angling being utilized as a secondary method, as it was convenient and possible to undertake without compromising setlining efforts.

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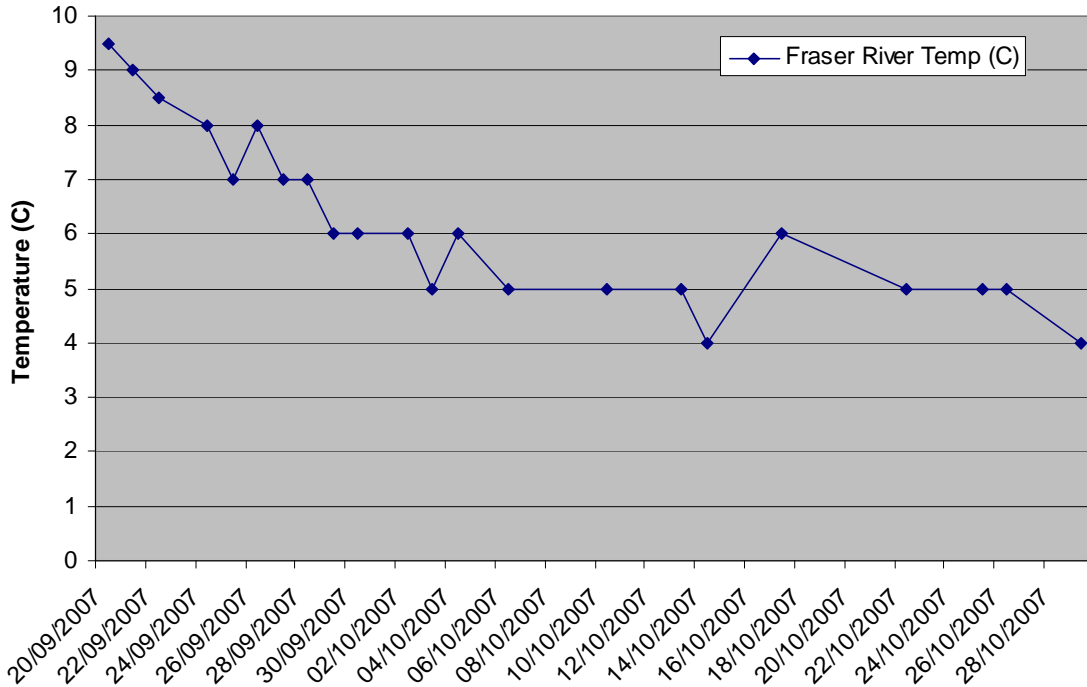


Figure 3. Fraser River temperature measured daily while in the field (from various locations within the study area).

Setlines

A total of 32,011 hook-hours of setline effort were applied resulting in the capture of 28 white sturgeon and a total catch per unit effort (CPUE) of 0.0875 white sturgeon per 100 hook-hours of effort. Setline effort was applied throughout the study area but was not intended to be synoptic in nature and focused proven sturgeon rearing/holding areas. Efforts and resulting white sturgeon (WSG) CPUE was strongly biased towards the upper portions of the study area, largely as a result of the knowledge gained from previous sampling (Figure 4). The distribution of setline effort and white sturgeon captures are provided in Appendix 3.

Angling

A total of 92.8 rod-hours of angling effort were applied resulting in the capture of 7 white sturgeon and a CPUE of 0.075 white sturgeon per rod-hour. Angling effort was largely focused in areas where setlines were deployed in close proximity to on another, which allowed time for crews to angle between setline deployment and retrieval (Figure 5). The distribution of angling effort and white sturgeon captures are provided in Appendix 3.

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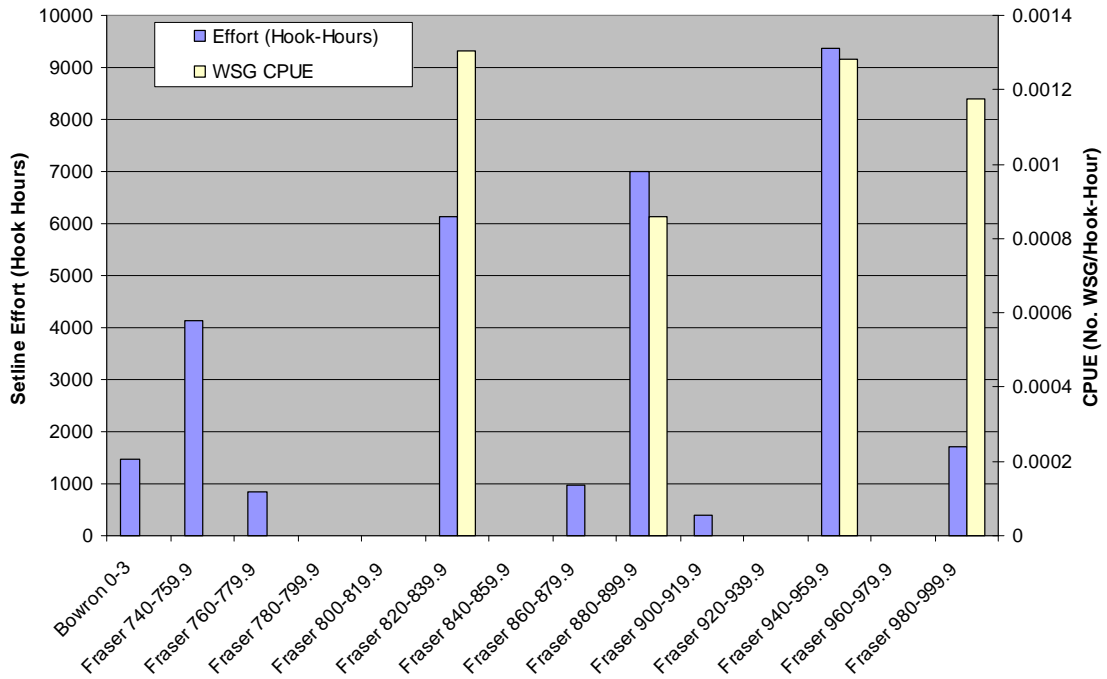


Figure 4. Distribution of setline sampling effort (hook-hours) throughout the study area in 20km increments of river length and corresponding-resulting CPUE (WSG).

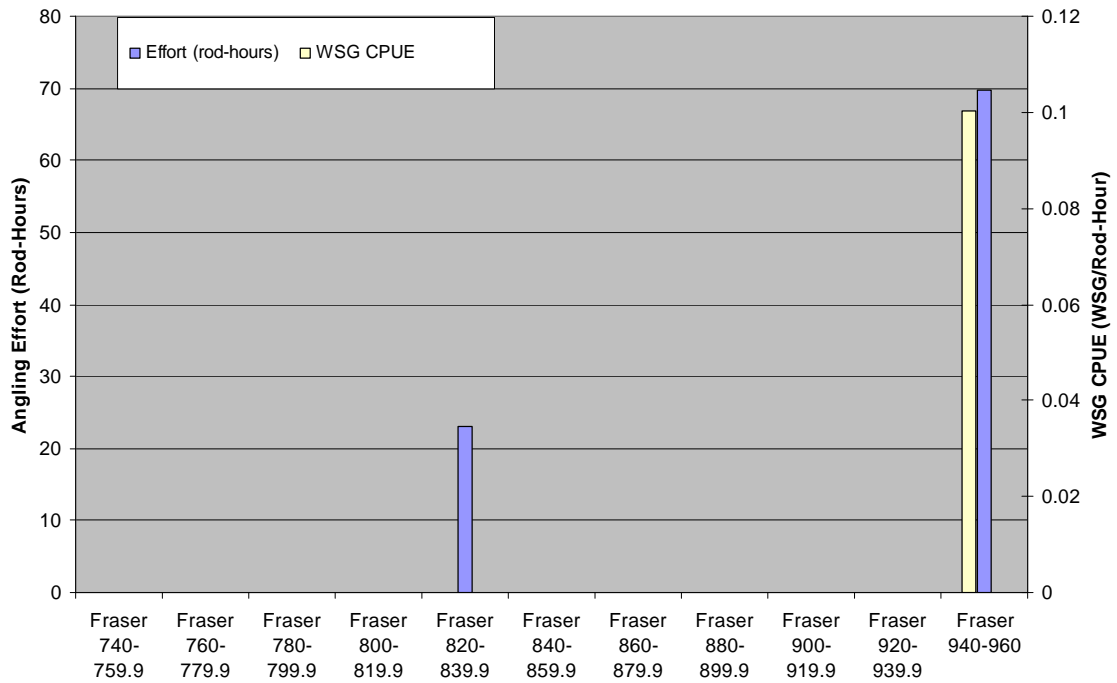


Figure 5. Distribution of angling effort (hook-hours) throughout the study area in 20km increments of river length and corresponding-resulting CPUE (WSG).

Summary; White Sturgeon Captures

A total of 35 white sturgeon were captured during the course of sampling in 2007, including a single fish that was captured twice in 2007 (i.e. 34 individuals were captured). The summary characteristics the fish captured are provided in table 1 below, and comprehensive information relating to the fish captured is provided in Appendix 2. Locations of white sturgeon captures are provided in Appendix 3.

Eleven of the 34 white sturgeon captured in 2007 had been captured during sampling programs prior to 2007, including two fish that had been previously captured near rkm 110 in the Nechako River (see Appendix 2). The total lengths of fish captured ranged from 60-274cm. Aging structures were collected from 24 of the fish captured and the ages of fish captured ranged from 9-78 years, including those that were assigned ages based on previous age determinations. A total of 12 fish were implanted with radio tags.

Bi-Captured Species

A total of 10 non-targeted fish were bi-captured during 2007, including 4 bull trout, 2 burbot and 4 peamouth chub (Table 2). Eight fish were bi-captured by angling and 2 by setlining. Both burbot died as a result of capture trauma and/or stress, and the other fish were released in good condition.

Assessment of Effort and CPUE

The application of effort was largely guided by knowledge gained from previous sampling, although, attempts were made to distribute effort throughout the study area (Figure 4). Higher CPUE for white sturgeon was related the areas sampled, with CPUE being consistently higher above rkm 820 (upstream of the Willow River confluence), and highest in areas where sturgeon holding habitats are concentrated (Figure 4). CPUE was observed to be most strongly linked to water temperature, with CPUE decreasing with declining river temperatures (Figure 6). To maintain the highest level of sampling efficiency possible, efforts should be made to ensure that sampling can take place prior to temperatures falling below 7°C.

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Table 1. Summary information for 35 white sturgeon captured during sampling in the upper Fraser River in 2007. Comprehensive information is provided for fish captured in Appendix 3.

| Station (rkm) | Date of Capture | Sex Mat. Code | Fork Length (cm) | Total Length (cm) | Girth (cm) | Weight (lbs) | Age | Recap | Tags at Capture (F-P-R) | Tags at Release (F-P-R) |
|---------------|-----------------|---------------|------------------|-------------------|------------|--------------|-----|-------|-------------------------|-------------------------|
| AS 950.6 R | 09/26/2007 | 98 | 66.0 | 73.0 | 26.0 | 3.5 | 16 | N | N-N-N | N-P-N |
| AS 950.6 L | 09/20/2007 | 98 | 51.0 | 60.0 | 17.0 | 2.0 | 9 | N | N-N-N | N-P-N |
| AS 950.4 L | 09/21/2007 | 98 | 67.0 | 79.0 | 23.5 | 3.5 | 12 | N | N-N-N | N-P-N |
| AS 950.4 L | 09/21/2007 | 98 | 68.0 | 81.0 | 19.0 | 2.0 | 11 | N | N-N-N | N-P-N |
| AS 950.4 L | 09/21/2007 | 98 | 70.0 | 82.0 | 24.5 | 4.0 | 13 | N | N-N-N | N-P-N |
| AS 950.5 R | 09/21/2007 | 98 | 83.0 | 96.0 | 27.0 | 7.0 | 23 | N | N-N-N | N-P-N |
| SL 829.9 R | 09/25/2007 | 98 | 76.0 | 87.0 | 26.5 | 4.5 | 22 | Y | F-P-N | F-P-N |
| SL 831.3 R | 09/25/2007 | 97 | 95.0 | 108.0 | 35.5 | 14.0 | 13 | N | N-N-N | N-P-N |
| SL 831.3 R | 09/25/2007 | 3 | 167.0 | 195.5 | 65.5 | 90.0 | 27 | Y | N-P-N | N-P-R |
| SL 829.95 L | 09/25/2007 | 97 | 247.0 | 274.0 | 98.0 | Na | 73 | N | N-N-N | N-P-R |
| SL 950.4 L | 09/28/2007 | 97 | 100.0 | 111.0 | 34.0 | 12.0 | 27 | Y | F-P-N | N-P-N |
| SL 950.4 L | 09/28/2007 | 98 | 72.5 | 83.5 | 25.5 | 5.0 | 16 | N | N-N-N | N-P-N |
| SL 950.4 L | 09/28/2007 | 98 | 63.0 | 74.0 | 22.0 | 3.5 | 13 | N | N-N-N | N-P-N |
| SL 829.9 R | 09/26/2007 | 98 | 75.5 | 88.0 | 26.0 | 4.0 | 10 | N | N-N-N | N-P-N |
| SL 829.9 R | 09/26/2007 | 97 | 89.5 | 102.0 | 31.0 | 9.0 | 27 | Y | F-P-N | F-P-N |
| SL 950.4 L | 09/27/2007 | 12 | 165.0 | 191.0 | 61.0 | 81.0 | 47 | Y | F-P-N | N-P-N |
| SL 950.8 R | 09/27/2007 | 97 | 120.5 | 138.5 | 42.0 | 24.0 | 29 | N | N-N-N | N-P-N |
| SL 950.6 M | 09/27/2007 | 97 | 146.0 | 162.0 | 51.5 | 81.0 | 46 | N | N-N-N | N-P-N |
| SL 948.3 R | 09/30/2007 | 2 | 131.5 | 148.5 | 50.5 | 33 | 25 | N | N-N-N | N-P-R |
| SL 948.3 M | 09/29/2007 | 3 | 165 | 189 | 65 | 73 | 29 | Y | F-P-N | N-P-R |
| SL 950.4 L | 09/29/2007 | 98 | 67 | 75.5 | 24 | 3.5 | 14 | N | N-N-N | N-P-N |
| SL 992.5 L | 10/01/2007 | 98 | 69 | 78 | 24.5 | 4 | 11 | N | N-N-N | N-P-N |
| SL 992.7 R | 10/01/2007 | 98 | 70.5 | 78 | 25 | 4 | 14 | N | N-N-N | N-P-N |
| SL 949.8 L | 09/30/2007 | 3 | 188.5 | 209 | 69 | 102 | 52 | Y | F-P-N | N-P-R |
| SL 884.1 R | 10/04/2007 | 11 | 109 | 124.5 | 42 | 17 | 20 | N | N-N-N | N-P-N |
| SL 880.6 L | 10/03/2006 | 2 | 114 | 127.5 | 46 | 21 | 22 | Y | F-P-N | N-P-R |
| SL 883.6 L | 10/04/2007 | 02-03 | 219.5 | 274 | 84.5 | 174 | 78 | Y | F-P-N | F-P-R |
| SL 882.3 L | 10/18/2007 | 2 | 145 | 163 | 57.5 | 46 | 36 | Y | F-P-N | N-P-R |
| SL 880.5 L | 10/18/2007 | 2 | 131 | 149 | 44 | 24 | 25+ | N | N-N-N | N-P-R |
| SL 948.3 M | 10/14/2007 | 2 | 110.5 | 123 | 38.5 | 16 | 36 | Y | F-P-N | F-P-R |
| SL 950.6 L | 10/14/2007 | 3 | 138 | 158 | 53 | 36 | 37 | N | N-N-N | N-P-R |
| AB 950.6 L | 10/13/2007 | | 61 | 68 | 20.5 | 1.5 | 10+ | N | N-N-N | N-P-N |
| SL 831.3 R | 10/11/2007 | NA | 67 | 76 | 23 | 3 | 13 | N | N-N-N | N-P-N |
| SL 831.3 R | 10/07/2007 | 2 | 92.5 | 103 | 31.5 | 8 | 27 | Y | F-P-N | F-P-N |
| SL 884.1 R | 10/05/2007 | NA | 217 | 240 | 87 | 196 | 48+ | N | N-N-N | N-P-R |

Table 2. Summary of fish bi-captured via setline (SL) and angling (AS/AB) during sampling for white sturgeon on the Fraser River in 2007.

| Date | Station | Species | Total Length (cm) | Fate | Hook Size |
|-----------|------------|---------|-------------------|-------|-----------|
| 20-Sep-07 | AS 950.6 L | PCC | 31.0 | Lived | 7/0 |
| 21-Sep-07 | AS 950.6 L | PCC | 28.0 | Lived | 9/0 |
| 21-Sep-07 | AS 950.6 L | PCC | 31.0 | Lived | 4/0 |
| 21-Sep-07 | AB 950.5 M | PCC | 32.0 | Lived | 7/0 |
| 21-Sep-07 | AB 950.5 M | BB | 65.0 | Died | 4/0 |
| 23-Sep-07 | AS 831.3 R | BT | 50.0 | Lived | 4/0 |
| 23-Sep-07 | AS 831.3 R | BT | 54.0 | Lived | 4/0 |
| 23-Sep-07 | AS 831.3 R | BT | 40.0 | Lived | 9/0 |
| 04-Oct-07 | SL 882.7 L | BT | 62.5 | Lived | 14/0 |
| 27-Sep-07 | SL 948.3 M | BB | 69.0 | Died | 14/0 |

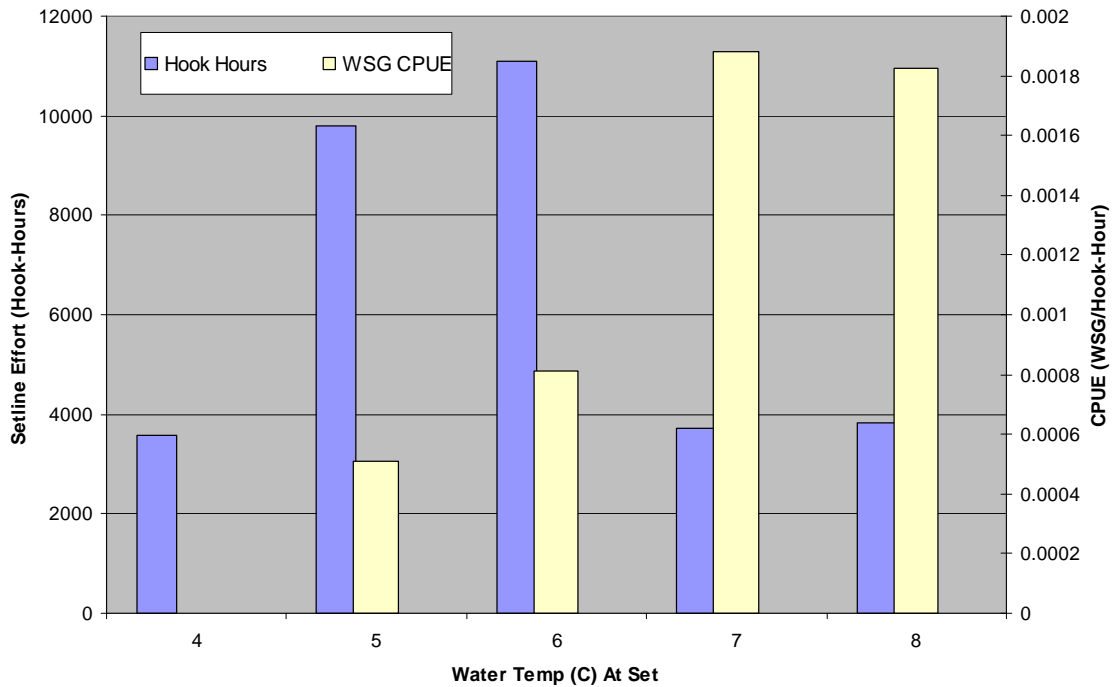


Figure 6. Setline effort and resulting WSG CPUE applied over the range of water temperatures recorded at the time of gear deployment.

Telemetry

Radio tags were implanted in 12 white sturgeon during sampling in September and October (see Appendix 2 for capture locations and frequency/code information). Ice-over conditions occurred shortly after sampling. A single over-

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flight was conducted January 12, 2008 from rkm 763 (Red Rock Canyon) to rkm 954 (Grand Canyon) in an attempt to determine fish movements since the time of their tagging and identify potential overwintering sites. Five of 12 radio tags were detected (Table 3).

Table 3. Information relating to 5 radio tags detected on a telemetry monitoring flight completed on January 12, 2008.

| Tag Data | | Location (Jan. 12, 2008) | | | Fall 2007 location at time of radio tag application | | | Comments |
|-----------|------|-----------------------------|---------|----------|--|---------|----------|---|
| Frequency | Code | rkm | Easting | Northing | rkm | Easting | Northing | |
| 148.400 | 50 | 948.3 | 587280 | 5979410 | 950.6 | 588892 | 5978228 | Originally tagged in middle of Grand Canyon and relocated in lower portion of the canyon. |
| 148.400 | 51 | ~925 | 581082 | 5987742 | 949 | 587222 | 5979507 | Originally tagged in Grand Canyon. Fish was relocated between the Bowron River and Grand Canyon. |
| 148.380 | 55 | ~900 | 562980 | 6003637 | 880.5 | 551563 | 6006314 | Originally tagged along North Fraser Road. Fish was relocated upstream at the McGregor River/Fraser River confluence. |
| 148.420 | 54 | ~900 | 562980 | 6003637 | 829.95 | 530421 | 5992330 | Fish was originally tagged just downstream of the Willow River confluence with the Fraser River. Relocated at the McGregor River/Fraser River confluence. |
| 148.420 | 53 | ~898 | 560064 | 6005012 | 880.6 | 551563 | 6006314 | Originally tagged along North Fraser Road. Fish was relocated upstream approximately 2km downstream of the McGregor confluence with the Fraser River. |

Table from EDI (2008).

Ice cover combined with the depths of some of the study area's suspected overwintering habitats likely explain the inability to detect 7 of the tags deployed, although it is possible some radio tagged fish migrated out of the study area to overwinter.

Summary Conclusions

The results of this study are assessed below in terms of the primary objectives of the work, including the upper Fraser white sturgeon population's status, preliminary information regarding important habitats, and the development of capacity within Lheidli T'enneh personnel.

Population Status

Although the sample of white sturgeon collected in 2007 is relatively small, it does provide an opportunity to compare critical components of this recent data with the information developed regarding the stock from the previous sampling

period (1999-2001).

The population estimate generated from three years of marking/sampling (1999-2001) generated a population estimate of 630 (+/- 109 95% CI) sturgeon $\geq 50\text{cm} < 100\text{cm}$ total length and 185 (+/- 29 95% CI) sturgeon $\geq 100\text{cm}$ (Lheidli T'enneh 2002). Using the same (Modified Schnabel) method of population size estimation with the data collected in 2007 yields a population estimate of 752 (+/- 76 95% CI) white sturgeon of all sizes (recruitable to sampling gear). This population estimate assumes the marked component of the population is unchanged from 2001. Arbitrarily assuming a 10% reduction in the previously marked component of the population yields a current estimate of 689 (+/- 68 95% CI) white sturgeon within the population. Utilizing only 2007 data and disregarding the previously marked component of the population, yields a population estimate of 578 (+/- 333 95% CI) white sturgeon. All of the estimates fall within the range of the combined estimate generated in 2001.

As noted in Lheidli T'enneh (2002), the length distribution of sturgeon captured via each of the methods of angling and setlining indicate that fish do not become fully recruitable to capture until a total length of 61-70cm and 71-80cm for each method, respectively. Therefore sturgeon $< 70\text{cm}$ total length are under-represented within the catch and within this population estimate.

The size distribution (total length) of the white sturgeon catch from 2007 is compared with the combined catch from 1999-2001 in figure 7 below. The length-frequency of catches appears very similar between the two periods.

The age distribution of the white sturgeon catch from 2007 is compared with the combined catch from 1999-2001 in figure 8 below. The distribution of ages of catches appears similar between the two periods. Differences apparent are likely a reflection of the small sample size from 2007 and the large range of ages that are present in the population. Also, the fact that limited effort was applied in 2007 using smaller hook sizes on setlines, which can be slightly biased toward the capture of smaller fish, likely explains the absence of the youngest age classes recruitable to the gear types utilized.

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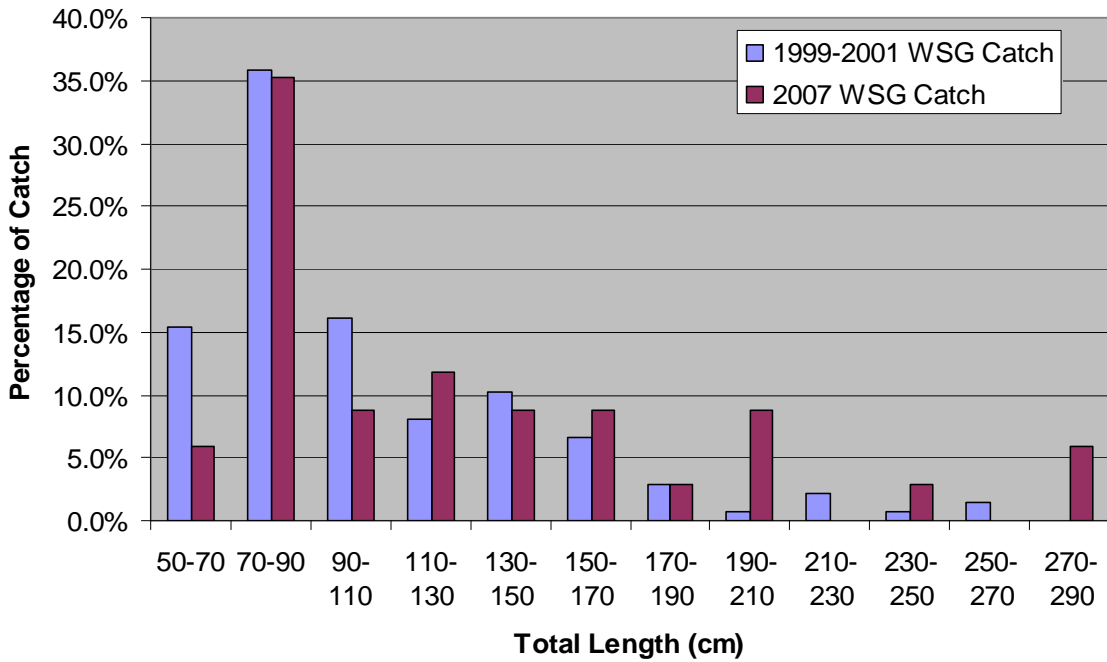


Figure 7. Comparison of the size range (total length) of white sturgeon setlined and angled catches from the upper Fraser from 1999-2001 (combined n=137 individuals) and 2007 (n=34 individuals).

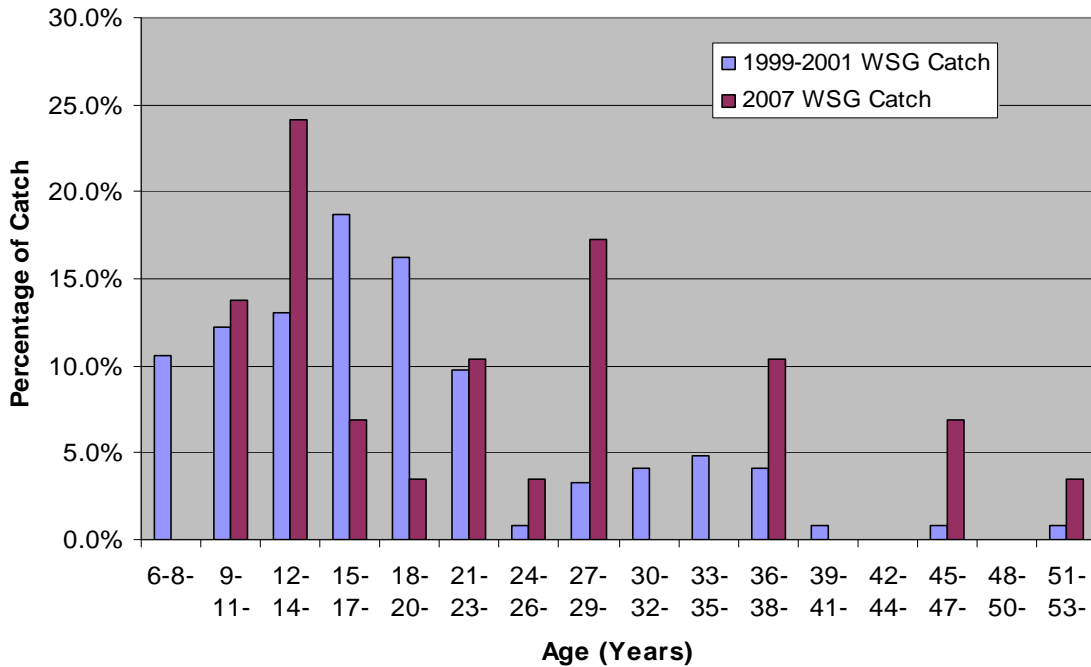


Figure 8. Comparison of the distribution of age classes of white sturgeon catches setlined and angled from the upper Fraser from 1999-2001 (combined n=123 individuals) and 2007 (n=29 individuals). Only those fish definitively assigned an age between 6 and 53 years are presented.

Important Habitats

Capture data indicated several key rearing or holding areas, including most notably rkm 954 or the area known as the Grand Canyon. This area provides the largest concentration of deepwater holding habitats within the upper portion of the study area. A single over-flight conducted in January 2008 also indicated several tagged fish holding in the vicinity of the McGregor River confluence, suggesting some use of the area for overwintering.

Capacity Development

Capacity development efforts were largely successful. Up to three Lheidli T'enneh personnel received experience through this project and one receive valuable experience in surgical procedures involving sex and sexual maturity assessment of white sturgeon, and radio tag implantation. All received experience in telemetry procedures.

Conclusions & Discussion

The status of upper Fraser white sturgeon population appears (based on preliminary data from 2007) to be unchanged, in terms of population size and age and size demographics observed, relative to the previous assessment of the population that was completed. While additional sampling and telemetry monitoring is required, habitats in the area of Longworth locally known as the "Grand Canyon" appear to be heavily used for late summer-early fall rearing, and to some degree overwintering. Areas in the vicinity of the McGregor River confluence with the Fraser River appear to attract some overwintering use.

Capacity development efforts were largely successful and should continue focusing on internal surgical assessments and radio tag implantation, as well as telemetry monitoring and data management.

Recommendations

1. Additional sampling and tagging should be conducted to:
 - a. Further develop and refine the population status information gathered in 2007
 - b. Apply additional radio tags to increase the sample size of adult fish

available for monitoring

2. Sampling efforts should begin much earlier in the season and preferably be spread throughout the period May-September, while Fraser temperatures are at optimum levels for feeding.
3. Telemetry flights using fixed-wing aircraft should be attempted in the ice-free period to determine if they are effective in this study area – and if they are, fixed-wing flights should be utilized to achieve the costs efficiencies offered relative to helicopter use.
4. Radio tag frequencies from the upper Fraser should be incorporated into Nechako and mid-Fraser monitoring activities, and vice versa.
5. Capacity development efforts should continue with Lheidli T'enneh personnel, focusing on internal surgical assessments and radio tag implantation, as well as telemetry monitoring and data management. Recommendations regarding required upgrades for sampling and assessment equipment were provided by the consulting expertise that guided capacity development efforts.

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Appendix 1 - Data relating to angling and setline effort

2007 Assessment of Upper Fraser White Sturgeon;
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Appendix 1: 2007 Upper Fraser White Sturgeon Sampling (Angling)
Baittypes: SK (Sockeye), PSQ (Pickled Squid), CH (Chinook), PCC (Peanut Chub), OO (Ochleons), ROE (Sockeye or Chinook Eggs)

| River | Station | River km | UTM | | | Bait Type (I/B) | Personnel | Channel Location | Date | Water Temp (°C) | Visibility (m) | Depth | Rod Number | Start Time | End Time | Total Effort (hrs) | Hook Size | Bait Type | Hook Fouled (Y/N) | Bait Use (Y/N) | Loose | Bite Description | Weather | Comments | Sturgeon Captured (Y/N) | B. Capture (Y/N) |
|--------|-----------|----------|-----|---------|----------|-----------------|------------|------------------|-----------|-----------------|----------------|-------|------------|------------|----------|--------------------|-----------|-----------|-------------------|----------------|-------|--------------------------------------|-----------|----------|-------------------------|------------------|
| | | | NAD | Easting | Northing | | | | | | | | | | | | | | | | | | | | | |
| Fraser | AS950.6 R | 950.6 | 10 | 58305+ | 597327 | I | JY, JG, LH | R | 2509/2007 | 8 | <1m | 9 | 1 | 14:20 | 14:30 | 0:12 | 70 | PSQ | N | N | N | Off rock island, above sandbar | Sunny | NA | Y | N |
| Fraser | AS950.6 R | 950.6 | 10 | 58305+ | 597327 | I | JY, LPOG | R | 2509/2007 | 8 | <1m | 9 | 2 | 14:20 | 17:00 | 2:40 | 90 | PSQ | N | Y | N | Off rock island, above sandbar | Sunny | NA | N | N |
| Fraser | AS950.6 R | 950.6 | 10 | 58305+ | 597327 | I | JY, LPOG | R | 2509/2007 | 8 | <1m | 9 | 3 | 14:20 | 17:00 | 2:40 | 90 | PSQ | N | N | N | Off rock island, above sandbar | Sunny | NA | N | N |
| Fraser | AS950.6 R | 950.6 | 10 | 58305+ | 597327 | I | JY, LPOG | R | 2509/2007 | 8 | <1m | 9 | 4 | 14:20 | 17:00 | 2:40 | 70 | PSQ | N | Y | N | Off rock island, above sandbar | Sunny | NA | N | N |
| Fraser | AS950.6 R | 950.6 | 10 | 58305+ | 597327 | I | JY, LPOG | R | 2509/2007 | 8 | <1m | 9 | 5 | 14:35 | 17:00 | 2:25 | 70 | PSQ | N | N | N | Off rock island, above sandbar | Sunny | NA | N | N |
| Fraser | AB950.6 L | 950.6 | 10 | 583352 | 597322 | I | JG, SM, LH | L | 1310/2007 | 5 | <1m | 11 | 1 | 12:00 | 14:10 | 2:10 | 60 | PSQ | N | N | N | In back eddy by rock diff and island | Overscast | NA | Y | N |
| Fraser | AB950.6 L | 950.6 | 10 | 583352 | 597322 | I | JG, SM, LH | L | 1310/2007 | 5 | <1m | 8 | 2 | 12:00 | 14:10 | 2:10 | 64 | PSQ | N | N | N | In back eddy by rock diff and island | Overscast | NA | N | N |
| Fraser | AB950.6 L | 950.6 | 10 | 583352 | 597322 | I | JG, SM, LH | L | 1310/2007 | 5 | <1m | 9 | 3 | 12:00 | 14:10 | 2:10 | 62 | PSQ | N | N | N | In back eddy by rock diff and island | Overscast | NA | N | N |
| Fraser | AS946.3M | 946.3 | 10 | 587222 | 597907 | I | JY, JG, FC | M | 2009/2007 | 9.5 | <1m | 812 | 1 | 16:10 | 17:40 | 1:30 | 90 | SK | N | N | N | Off island allobim of canyon | Overscast | NA | N | N |
| Fraser | AS946.3M | 946.3 | 10 | 587222 | 597907 | I | JY, JG, FC | M | 2009/2007 | 9.5 | <1m | 812 | 2 | 16:10 | 17:40 | 1:30 | 90 | SK | N | N | N | Off island allobim of canyon | Overscast | NA | N | N |
| Fraser | AS946.3M | 946.3 | 10 | 587222 | 597907 | I | JY, JG, FC | M | 2009/2007 | 9.5 | <1m | 812 | 3 | 16:10 | 17:40 | 1:30 | 70 | SK | N | N | N | Off island allobim of canyon | Overscast | NA | N | N |
| Fraser | AS946.3M | 946.3 | 10 | 587222 | 597907 | I | JY, JG, FC | M | 2009/2007 | 9.5 | <1m | 812 | 4 | 16:10 | 17:40 | 1:30 | 70 | SK | N | N | N | Off island allobim of canyon | Overscast | NA | N | N |
| Fraser | AS950.6 L | 950.6 | 10 | 587222 | 597907 | I | JY, JG, FC | M | 2009/2007 | 9.5 | <1m | 812 | 5 | 16:10 | 17:40 | 1:30 | 60 | ROE | N | N | N | Off island allobim of canyon | Overscast | NA | N | N |
| Fraser | AS950.6 L | 950.6 | 10 | 583352 | 598222 | I | JY, JG, FC | L | 2009/2007 | 9 | <1m | 812 | 1 | 12:00 | 15:00 | 3:00 | 90 | SK | N | N | N | Off rock pdnlln canyon | Sunny | NA | N | N |
| Fraser | AS950.6 L | 950.6 | 10 | 583352 | 598222 | I | JY, JG, FC | L | 2009/2007 | 9 | <1m | 812 | 2 | 12:00 | 15:00 | 3:00 | 90 | SK | N | N | N | Off rock pdnlln canyon | Sunny | NA | N | N |
| Fraser | AS950.6 L | 950.6 | 10 | 583352 | 598222 | I | JY, JG, FC | L | 2009/2007 | 9 | <1m | 812 | 3 | 12:00 | 14:30 | 2:30 | 60 | ROE | N | N | N | Off rock pdnlln canyon | Sunny | NA | Y | N |
| Fraser | AS950.6 L | 950.6 | 10 | 583352 | 598222 | I | JY, JG, FC | L | 2009/2007 | 9 | <1m | 812 | 4 | 12:00 | 15:00 | 3:00 | 70 | SK | N | N | N | Off rock pdnlln canyon | Sunny | NA | N | N |
| Fraser | AS950.6 L | 950.6 | 10 | 583352 | 598222 | I | JY, JG, FC | L | 2009/2007 | 9 | <1m | 812 | 5 | 12:40 | 15:00 | 2:20 | 70 | SK | N | N | N | Off rock pdnlln canyon | Sunny | NA | N | N |
| Fraser | AS950.6 L | 950.6 | 10 | 583352 | 598222 | I | JY, JG, FC | L | 2009/2007 | 9 | <1m | 812 | 6 | 14:40 | 15:00 | 1:20 | 60 | ROE | N | N | N | Off rock pdnlln canyon | Sunny | NA | N | Y |
| Fraser | AS950.6 L | 950.6 | 10 | 583346 | 597333 | I | JY, JG, FC | L | 2109/2007 | 9 | <1m | 812 | 1 | 10:30 | 14:00 | 3:30 | 70 | SK | N | N | N | Angling throughout the lower canyon | Sunny | NA | N | Y |
| Fraser | AS950.6 L | 950.6 | 10 | 583346 | 597333 | I | JY, JG, FC | L | 2109/2007 | 9 | <1m | 812 | 2 | 10:30 | 14:00 | 3:30 | 90 | ROE | N | N | N | Angling throughout the lower canyon | Sunny | NA | N | Y |
| Fraser | AB950.5M | 950.5 | 10 | 583346 | 597333 | I | JY, JG, FC | M | 2109/2007 | 9 | <1m | 812 | 3 | 10:35 | 15:30 | 5:00 | 90 | SK | N | N | N | Angling throughout the lower canyon | Sunny | NA | N | Y |
| Fraser | AB950.5M | 950.5 | 10 | 583346 | 597333 | I | JY, JG, FC | M | 2109/2007 | 9 | <1m | 812 | 4 | 10:35 | 15:30 | 5:00 | 90 | SK | N | N | N | Angling throughout the lower canyon | Sunny | NA | N | Y |
| Fraser | AS950.4 L | 950.4 | 10 | 583346 | 597333 | I | JY, JG, FC | L | 2109/2007 | 9 | <1m | 812 | 5 | 10:50 | 11:30 | 0:40 | 60 | ROE | N | N | N | Angling throughout the lower canyon | Sunny | NA | N | N |
| Fraser | AS950.4 L | 950.4 | 10 | 583346 | 597333 | I | JY, JG, FC | L | 2109/2007 | 9 | <1m | 812 | 6 | 11:40 | 12:30 | 0:40 | 60 | ROE | N | N | N | Angling throughout the lower canyon | Sunny | NA | N | N |
| Fraser | AS950.4 L | 950.4 | 10 | 583346 | 597333 | I | JY, JG, FC | L | 2109/2007 | 9 | <1m | 812 | 7 | 13:40 | 14:10 | 0:30 | 40 | ROE | N | N | N | Angling throughout the lower canyon | Sunny | NA | Y | N |
| Fraser | AS950.4 L | 950.4 | 10 | 583346 | 597333 | I | JY, JG, FC | L | 2109/2007 | 9 | <1m | 812 | 8 | 14:15 | 14:25 | 0:10 | 40 | ROE | N | N | N | Angling throughout the lower canyon | Sunny | NA | Y | N |
| Fraser | AS950.4 L | 950.4 | 10 | 583346 | 597333 | I | JY, JG, FC | L | 2109/2007 | 9 | <1m | 812 | 9 | 14:30 | 14:40 | 0:20 | 40 | ROE | N | N | N | Angling throughout the lower canyon | Sunny | NA | Y | N |
| Fraser | AS950.5 R | 950.5 | 10 | 583346 | 597333 | I | JY, JG, FC | R | 2109/2007 | 9 | <1m | 812 | 10 | 15:30 | 15:30 | 1:00 | 40 | ROE | N | N | N | Angling throughout the lower canyon | Sunny | NA | N | N |
| Fraser | AS950.5 R | 950.5 | 10 | 583346 | 597333 | I | JY, JG, FC | R | 2109/2007 | 9 | <1m | 812 | 11 | 14:10 | 14:30 | 0:20 | 90 | SK | N | N | N | Angling throughout the lower canyon | Sunny | NA | Y | N |
| Fraser | AS950.5 R | 950.5 | 10 | 583346 | 597333 | I | JY, JG, FC | R | 2109/2007 | 9 | <1m | 812 | 12 | 15:00 | 15:30 | 1:30 | 90 | SK | N | N | N | Angling throughout the lower canyon | Sunny | NA | N | N |
| Fraser | AS950.5 R | 950.5 | 10 | 583346 | 597333 | I | JY, JG, FC | R | 2109/2007 | 9 | <1m | 812 | 13 | 14:10 | 15:30 | 2:20 | 70 | SK | N | N | N | Angling throughout the lower canyon | Sunny | NA | N | N |
| Fraser | AS831.3 R | 831.3 | 10 | 531503 | 598293 | I | JY, JG, FC | R | 2309/2007 | 8.5 | <1m | 58 | 1 | 11:30 | 15:30 | 5:00 | 90 | SK | N | N | N | Below large mid-channel rock | Sunny | NA | N | Y |
| Fraser | AS831.3 R | 831.3 | 10 | 531503 | 598293 | I | JY, JG, FC | R | 2309/2007 | 8.5 | <1m | 58 | 2 | 11:30 | 15:30 | 5:00 | 90 | SK | N | N | N | Below large mid-channel rock | Sunny | NA | N | Y |

2007 Assessment of Upper Fraser White Sturgeon;
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Appendix 1; 2007 Upper Fraser White Sturgeon Sampling (Angling)

Bait types: SK (Sockeye), PSQ (Pickled Squid), CH (Chinook), PCC (Peanut Chub), OO (Ochleons), ROE (Sockeye or Chinook Eggs)

| River | Station | River km | UTM | | | Bait Type (J/B) | Personnel | Channel Location | Date | Water Temp (°C) | Visibility (m) | Depth | Rod Number | Start Time | End Time | Total Effort (hrs) | Hook Size | Bait Type | Hook Fouled (Y/N) | Bait Occ (Y/N) | Lost | Bite Description | Weather | Comments | Sturgeon Captured (Y/N) | B Capture c (Y/N) |
|--------|----------|----------|-----|---------|----------|-----------------|------------|------------------|------------|-----------------|----------------|-------|------------|------------|----------|--------------------|-----------|-----------|-------------------|----------------|------|------------------------------|---------|----------|-------------------------|-------------------|
| | | | NAD | Easting | Northing | | | | | | | | | | | | | | | | | | | | | |
| Fraser | AS-313 R | 31.3 | 10 | 531508 | 5862538 | I | JY, JB, FC | R | 23/08/2007 | 8.5 | <1m | 5-8 | 3 | 11:30 | 16:30 | 500 | 70 | SK | N | N | N | Below large mid-channel rock | Sunny | NA | N | Y |
| Fraser | AS-313 R | 31.3 | 10 | 531508 | 5862538 | I | JY, JB, FC | R | 23/08/2007 | 8.5 | <1m | 5-8 | 4 | 11:30 | 16:30 | 500 | 70 | SK | N | N | N | Below large mid-channel rock | Sunny | NA | N | N |
| Fraser | AS-313 R | 31.3 | 10 | 531508 | 5862538 | I | JY, JB, FC | R | 23/08/2007 | 8.5 | <1m | 5-8 | 5 | 11:50 | 14:50 | 300 | 40 | ROE | N | N | N | Below large mid-channel rock | Sunny | NA | N | N |

**Appendix 2 – Summary of information relating to white sturgeon captured
during this project**

2007 Assessment of Upper Fraser White Sturgeon;
Critical Habitat Identification, Population Assessment and Capacity Development

2007 White Sturgeon Sampling; Lheidli T'enneh Upper Fraser River
Appendix 2. Information for sturgeon captured in 2007.

| Fish No. | Station (km) | Method | Capture Location Information | | | | | | | Bio-physical Characteristics | | | | | | | | | | Tagging Information | | | | Radio Tag No. | Radio Tag Type | Comments |
|----------|--------------|--------|------------------------------|-----------------|------------|------|---------|---------|---------------|------------------------------|-----------|------|------------------|-------------------|------------------|-------------------|------------|-------------|-----|---------------------|----------------------|----------------------|----------------------|---------------|----------------|--|
| | | | Watercourse | Date of Capture | Operator | Area | Banking | Noting | Capture Depth | Hook Size (mm) | Sex (M/F) | Code | Head Length (mm) | Snout Length (mm) | Head Length (mm) | Total Length (mm) | Girth (mm) | Weight (kg) | Age | UNA Sample | Parapharyngeal (Y/N) | Tag R# Capture (Y/N) | Tag R# Release (Y/N) | | | |
| 1 | AS 950.6 L | AG | Fraser River | 09/20/2007 | JY, IG, FC | 10 | 588892 | 5998228 | 12.0 | 6 | 98 | 7.0 | 13.5 | 51.0 | 60.0 | 17.0 | 2.0 | 9 | LP | N | N-N-N | N-P-N | | 422E6E5818 | Na | Healthy (true file - no distinguishing marks) |
| 2 | AS 950.4 L | AG | Fraser River | 09/21/2007 | JY, IG, FC | 10 | 588846 | 5978333 | 8 to 12 | 4 | 98 | 9.5 | 18.0 | 67.0 | 79.0 | 23.5 | 3.5 | 12 | LP | N | N-N-N | N-P-N | | 424E7F1E1D | Na | Healthy |
| 3 | AS 950.4 L | AG | Fraser River | 09/21/2007 | JY, IG, FC | 10 | 588846 | 5978333 | 8 to 12 | 4 | 98 | 10.0 | 18.5 | 68.0 | 81.0 | 19.0 | 2.0 | 11 | LP | N | N-N-N | N-P-N | | 422E401969 | Na | Healthy |
| 4 | AS 950.4 L | AG | Fraser River | 09/21/2007 | JY, IG, FC | 10 | 588846 | 5978333 | 8 to 12 | 4 | 98 | 10.0 | 18.5 | 70.0 | 82.0 | 24.5 | 4.0 | 13 | LP | N | N-N-N | N-P-N | | 423C16092D | Na | Healthy |
| 5 | AS 950.5 R | AG | Fraser River | 09/21/2007 | JY, IG, FC | 10 | 588846 | 5978333 | 8 to 12 | 9 | 98 | 11.5 | 22.0 | 83.0 | 96.0 | 27.0 | 7.0 | 23 | LP | N | N-N-N | N-P-N | | 422E39156C | Na | Healthy |
| 6 | SL 829.9 R | SL | Fraser River | 09/25/2007 | JY, IG, FC | 10 | 530132 | 5992354 | 10.0 | 14 | 98 | 10.0 | 19.5 | 76.0 | 87.0 | 26.5 | 4.5 | 22 | N | Y | F-P-N | F-P-N | R00364 | 4158421025 | Na | Healthy - recapture - red floy tag F-400 PG. Prebasally captured September 11, 1998 at km 831.3 and September 8, 2000 at km 831.3. Aged 14 years in 2000. |
| 7 | SL 831.3 R | SL | Fraser River | 09/25/2007 | JY, IG, FC | 10 | 531508 | 5992938 | 7.0 | 14 | 97 | 12.5 | 24.5 | 95.0 | 108.0 | 35.5 | 14.0 | 13 | LP | N | N-N-N | N-P-N | | 502D160D6E | Na | Healthy - no distinguishing marks |
| 8 | SL 831.3 R | SL | Fraser River | 09/25/2007 | JY, IG, FC | 10 | 531508 | 5992938 | 7.0 | 16 | 3 | 21.5 | 44.0 | 167.0 | 195.5 | 65.5 | 90.0 | 27 | N | Y | N-P-N | N-P-R | | 50283B403A | 148.40052 | Male - otoscope not working well but in belly wall allowed good visual. Dep byed rad b tag. Fish previously captured 400m up Neclako July 15, 2000. Aged 19 in 2000. |
| 9 | SL 829.95 L | SL | Fraser River | 09/25/2007 | JY, IG, FC | 10 | 530421 | 5992330 | 5.0 | 16 | 97 | 28.0 | 62.0 | 247.0 | 274.0 | 98.0 | Na | 73 | LP | N | N-N-N | N-P-R | | 423C054334 | 148.42054 | No tags or evidence of previous capture. Could not successfully assess sex externally. Could not weigh fish without dewater on boat. Two lock boxes were made to attempt final assessment. Dep byed rad b tag. |
| 10 | AS 950.6 R | AG | Fraser River | 09/26/2007 | JY, IG, LH | 10 | 589054 | 5978277 | 8.0 | 7 | 98 | 10.0 | 18.5 | 66.0 | 73.0 | 25.0 | 3.5 | 16 | LP | N | N-N-N | N-P-N | | 422E6D667E | Na | Healthy (true file - no distinguishing marks) |
| 11 | SL 829.9 R | SL | Fraser River | 09/26/2007 | JY, IG, FC | 10 | 530132 | 5992354 | 9.2 | 14 | 98 | 10.0 | 19.5 | 75.5 | 88.0 | 26.0 | 4.0 | 10 | LP | N | N-N-N | N-P-N | | 422E674C3F | Na | Healthy (true file) |
| 12 | SL 829.9 R | SL | Fraser River | 09/26/2007 | JY, IG, FC | 10 | 530132 | 5992354 | 8.5 | 14 | 97 | 11.0 | 22.0 | 89.5 | 102.0 | 31.0 | 9.0 | 27 | N | Y | F-P-N | F-P-N | Y0096 | 423B79067A | Na | Recapture. Age structure scar well healed. Fish has been caught 4 times previously; August and October 2000 - km 830; twice in August 2001 - km 831; aged 19 in 2000. |
| 13 | SL 950.4 L | SL | Fraser River | 09/27/2007 | JY, IG, LH | 10 | 588846 | 5978333 | 11.0 | 14 | 12 | 16.5 | 40.0 | 165.0 | 191.0 | 61.0 | 81.0 | 47 | N | Y | F-P-N | N-P-N | Y0094 | 423B777ED4 | Na | Recapture. Flat belly, darks whitish, small clear eggs visible. Removed floy tag - major irritation evident. Previously captured July 28, 2000 at km 916.5. Aged 39+ in 2000. |
| 14 | SL 950.8 R | SL | Fraser River | 09/27/2007 | JY, IG, LH | 10 | 589153 | 5978103 | 9.0 | 16 | 97 | 14.0 | 31.0 | 120.5 | 138.5 | 42.0 | 24.0 | 29 | LP | N | N-N-N | N-P-N | | 422E2E7426 | Na | 3 bbes on tail - otherwise, healthy looking |
| 15 | SL 950.6 M | SL | Fraser River | 09/27/2007 | JY, IG, LH | 10 | 589007 | 5978256 | 8.0 | 16.0 | 97 | 15.5 | 34.0 | 146.0 | 162.0 | 51.5 | 81.0 | 46 | LP | N | N-N-N | N-P-N | | 422E4C1B06 | Na | Healthy fish - no distinguishing marks. Two singly scars on tail. Otoliths failed, and could not access body cavity due to belly wall thickness. |

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Appendix 2. Information for sturgeon captured in 2007.

| Fish No. | Station (km) | Method | Capture Location Information | | | | | | | Bio-physical Characteristics | | | | | | | | | | Tagging Information | | | | Comments | | |
|----------|--------------|--------|------------------------------|-----------------|-------------|------|--------|----------|---------------|------------------------------|--------------|-------------------------|-------------------|------------------|-------------------|------------|-------------|-----|------------|---------------------|-----------------------|--------------|--------------------------|-------------|------------|---|
| | | | Watercourse | Date of Capture | CPID | Area | Basin | Reaching | Capture Depth | Hook Size (mm) | Sex Mat Code | Peak Gravid Length (mm) | Snout Length (mm) | Hook Length (mm) | Total Length (mm) | Girth (mm) | Weight (kg) | Age | UNA Sample | Recapture (Y/N) | Legs At Capture (F/N) | Legs R (M/N) | Floy Tag Colour & Number | | PK Tag No. | Radio Tag No. |
| 16 | SL 950.4 L | SL | Fraser River | 09/28/2007 | JY, IG, LH | 10 | 88846 | 5978333 | 9.0 | 16 | 97 | 11.5 | 25.0 | 100.0 | 111.0 | 34.0 | 12.0 | 27 | N | Y | F-P-N | N-P-N | Y0057 | 50283D2512 | Na | Removed floy tag. Healthy, no distinguishable marks. Previously captured August 28, 2000 at km 882. Aged 19 in 2000. |
| 17 | SL 950.4 L | SL | Fraser River | 09/28/2007 | JY, IG, LH | 10 | 88846 | 5978333 | 9.0 | 12 | 98 | 10.5 | 19.5 | 72.5 | 83.5 | 25.5 | 5.0 | 16 | LP | N | N-N-N | N-P-N | | 422E3F3C61 | Na | NA |
| 18 | SL 950.4 L | SL | Fraser River | 09/28/2007 | JY, IG, LH | 10 | 88846 | 5978333 | 9.0 | 12 | 98 | 9.0 | 17.0 | 63.0 | 74.0 | 22.0 | 3.5 | 13 | LP | N | N-N-N | N-P-N | | 422E2A3744 | Na | NA |
| 19 | SL 948.3 M | SL | Fraser River | 09/29/2007 | JY, LH, BT | 10 | 887235 | 5979523 | 10.0 | 16 | 3 | 19 | 39.5 | 165 | 189 | 65 | 73 | 29 | N | Y | F-P-N | N-P-R | Y0027 | 7F7 D77302F | 148.420 52 | Removed floy tag. Some damage on left pelvic fin. Deployed radio tag. Previously captured (RLL) at Neclako confluence in 1996. Also previously captured (Lheidli) September 5, 1999 at km 831, and July 15, 2000 - 400m up Neclako. Aged 20 in 1999. |
| 20 | SL 950.4 L | SL | Fraser River | 09/29/2007 | JY, LH, BT | 10 | 888829 | 5978294 | 8.0 | 12 | 98 | 10 | 18.5 | 67 | 75.5 | 24 | 3.5 | 14 | LP | N | N-N-N | N-P-N | | 422E3A2D24 | Na | Healthy (true file) |
| 21 | SL 948.3 R | SL | Fraser River | 09/30/2007 | JY, IG, LH | 10 | 887248 | 5979562 | 9.5 | 16 | 2 | 16 | 33 | 131.5 | 148.5 | 50.5 | 33 | 25 | LP | N | N-N-N | N-P-R | | 422E6F173E | 148.420 50 | Healthy; tear on dorsal fin; flaccid belly; male - gonads w/ greyish flecks on surface. Deployed radio tag. |
| 22 | SL 949.8 L | SL | Fraser River | 09/30/2007 | JY, IG, LH | 10 | 888477 | 5978821 | 12.0 | 14 | 3 | 19.5 | 45 | 188.5 | 209 | 69 | 102 | 52 | N | Y | F-P-N | N-P-R | Y0003 | 22236F2C51 | 148.420 51 | Recapture. Floy tag appears to be from another system program. Floy was removed as it was causing irritation. Fish was missing tip of tail. Fish also appears to have a surgery scar from previous capture. Fish was originally tagged in the Neclako on August 18, 1995 at km 110.1. Deployed radio tag. Fish was aged 39 years in 1995. |
| 23 | SL 992.5 L | SL | Fraser River | 10/01/2007 | JY, IG, LH | 10 | 612007 | 5966799 | 7.0 | 14 | 98 | 9.5 | 18.5 | 69 | 78 | 24.5 | 4 | 11 | LP | N | N-N-N | N-P-N | | 424E553934 | Na | Healthy (true file) |
| 24 | SL 992.7 R | SL | Fraser River | 10/01/2007 | JY, IG, LH | 10 | 612169 | 5966864 | 5.0 | 14 | 98 | 10 | 19.5 | 70.5 | 78 | 25 | 4 | 14 | LP | N | N-N-N | N-P-N | | 422E394C0E | Na | Single attempt to determine maturity and sex class (not possible) in conchostome. Healthy (true file) |
| 25 | SL 880.5 L | SL | Fraser River | 10/03/2007 | IG, CF, LH | 10 | 551563 | 6006314 | 5.0 | 12 | 2 | 13 | 27 | 114 | 127.5 | 46 | 21 | 22 | N | Y | F-P-N | N-P-R | Y0076 | 50283C3F0A | 148.420 53 | Floy tag removed due to irritation. Gonads filling most of body cavity. Deployed radio tag. Previously captured July 14, 2000 at km 810.7. Aged 14 years in 2000. |
| 26 | SL 884.1 R | SL | Fraser River | 10/04/2007 | IG, LH, JY, | 10 | 554185 | 6007477 | 5.0 | 14 | 11 | 12 | 5 | 109 | 124.5 | 42 | 17 | 20 | LP | N | N-N-N | N-P-N | | 423C1B465D | Na | Missing snout; large limp in abdomen. Sex very difficult to determine - code based on texture of gonad. Didn't deploy radio tag due to condition of the fish. |
| 27 | SL 883.6 L | SL | Fraser River | 10/04/2007 | IG, JY, LH, | 10 | 553994 | 6006890 | 7.5 | 14 | 02 to 03 | 27 | 61 | 219.5 | 274 | 84.5 | 174 | 78 | N | Y | F-P-N | F-P-R | Y050 | 7F7B031824 | 148.400 54 | 5th dorsal scale removed. Appears to have previous surgery scar (not recent). Minor bleed at hook site made sex determination difficult - suspect male 02/03. Radio tag deployed. Fish was originally tagged in the Neclako September 19, 1997 at km 110.0. Aged 67 years in 1997 and assigned sex/mat code 02. |

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Appendix 2. Information for sturgeon captured in 2007.

| Fish No. | Station (km) | Method | Capture Location Information | | | | | | | Bio-physical Characteristics | | | | | | | | | | Tagging Information | | | | Radio Tag No. | Radio Tag Date | Comments |
|----------|--------------|--------|------------------------------|-----------------|------------|------|---------|----------|---------------|------------------------------|-----------|-------------------|-------------------|------------------|-------------------|------------|-------------|-----|------------|---------------------|--------------|--------------|--------------------------|---------------|----------------|--|
| | | | Watercourse | Date of Capture | CPID | Area | Banking | Northing | Capture Depth | Hook Size (mm) | Sex (M/F) | Total Length (mm) | Snout Length (mm) | Head Length (mm) | Total Length (mm) | Girth (mm) | Weight (kg) | Age | LNA Sample | Parasite (Y/N) | Tagged (Y/N) | Tagged (Y/N) | Flow Tag Colour & Number | | | |
| 28 | SL884.1 R | SL | Fraser River | 10/05/2007 | IG, JY, LH | 10 | 554197 | 6007462 | 9.0 | 16 | NA | 27 | 57.5 | 217 | 240 | 87 | 196 | 48+ | LP | N | N-N-N | N-P-R | | 422E6C0733 | 148.400 53 | Healthy fish. Difficult to sex - oviscapte requires large read. Deployed radio tag. |
| 29 | SL831.3 R | SL | Fraser River | 10/07/2007 | IG, SN, LH | 10 | 531425 | 5992845 | 6.0 | 14 | 2 | 12 | 23.5 | 92.5 | 103 | 31.5 | 8 | 27 | N | Y | F-P-N | F-P-N | Y0096 | 423B79067A | Na | Fish was captured on September 25, 2007 - this program - see note above. Prior to 2007, fish has been caught 4 times previously; August and October 2000 ~ km 830; twice in August 2001 ~ km 831; aged 19 in 2000. |
| 30 | SL831.3 R | SL | Fraser River | 10/11/2007 | IG, SN, LH | 10 | 531425 | 5992845 | 8.1 | 14 | NA | 11 | 19 | 67 | 76 | 23 | 3 | 13 | LP | N | N-N-N | N-P-N | | 422E323834 | Na | Tear in dorsal fin |
| 31 | AB 950.6 L | AG | Fraser River | 10/13/2007 | IG, SN, LH | 10 | 588892 | 5978228 | 11.0 | 6 | | 8.5 | 15.5 | 61 | 68 | 20.5 | 1.5 | 10+ | LP | N | N-N-N | N-P-N | | 501F6C587D | Na | NA |
| 32 | SL 948.3 M | SL | Fraser River | 10/14/2007 | IG, SN, LH | 10 | 587222 | 5979507 | 13.0 | 16 | 2 | 12.5 | 26 | 110.5 | 123 | 38.5 | 16 | 36 | RP | Y | F-P-N | F-P-R | Y0068 | 424F1E346A | 148.400 51 | Appears healthy. Scales/fish good. Missing piece off end of tail. Deployed radio tag. Took age structure despite being recapture. |
| 33 | SL 950.6 L | SL | Fraser River | 10/14/2007 | IG, SN, LH | 10 | 588892 | 5978228 | 16.0 | 12 | 3 | 16 | 33.5 | 138 | 158 | 53 | 36 | 37 | LP | N | N-N-N | N-P-R | | 422E32584E | 148.400 50 | Healthy fish. Deployed radio tag. |
| 34 | SL 882.3 L | SL | Fraser River | 10/18/2007 | JY, SN, LH | 10 | 552441 | 6006243 | 6.0 | 16 | 2 | 17 | 37.5 | 145 | 163 | 57.5 | 46 | 36 | N | Y | F-P-N | N-P-R | Y0020 | 5028247314 | 148.380 53 | Removed flow tag. Otoliths bbe on gonads, cream colored - otoliths male. Some grey spotting on the surface. Deployed radio tag. Previously captured September 3, 1999 at km 950.4 and July 25, 2000 700m up the Bowron. Aged 27 in 1999. |
| 35 | SL 880.5 L | SL | Fraser River | 10/18/2007 | JY, SN, LH | 10 | 551567 | 6006291 | 3.5 | 12 | 2 | 16 | 34 | 131 | 149 | 44 | 24 | 25+ | LP | N | N-N-N | N-P-R | | 422E3F7044 | 148.380 55 | Healthy. Maturity may be observed in lobes otoliths but bright white. Radio tag deployed. |

**Appendix 3 - Maps showing the distribution of sampling efforts and
white sturgeon captures within the study area**

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