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

File 2007AFSAR1270
Final Project Report Prepared for the Aboriginal Funds for Species at Risk Program

May 2008

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Acknowledgements

Funding to undertake this initiative was provided by Canada's Aboriginal Funds for Species at Risk Program and Lheidli T'enneh's Aboriginal Fisheries Strategy Agreement. Fisheries and Oceans Canada (DFO) personnel Louvi Nurse, Al Charbonneau and Linda Stevens administered program funding. Lheidli T'enneh managed the project's funding and completed the project.

Technical staff included Irvin Gagnon (Lheidli T'enneh), Lisa Hardy (Upper Fraser Fisheries Conservation Alliance), and Sean Nome (Lheidli T'enneh). Jason Yarmish, R.P.Bio., Environmental Dynamics Inc. assisted with project coordination and provided scientific and technical direction to project staff. Triton Environmental Services Ltd. provided the use of their telemetry receiver for this project. Brian Toth, R.P.Bio., Lheidli T'enneh, managed the project and completed reporting.

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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 ≥50cm 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 as 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 from1999 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.

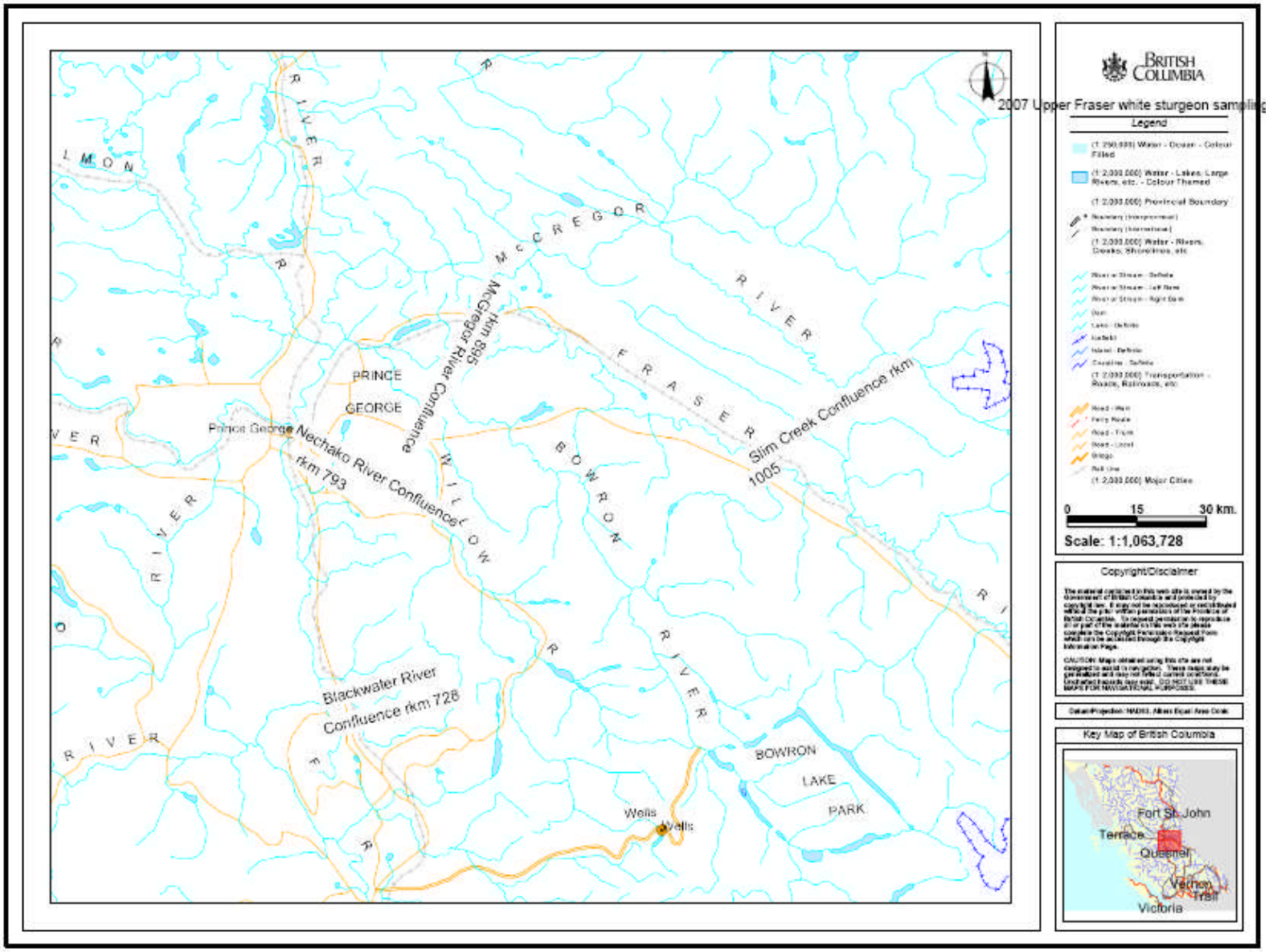

Figure 1. Upper Fraser River watershed with river kilometer (rkm) markings at key areas.

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 criteria[1] 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 flown at a moderated speed approximately 30-80metres 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).

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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.

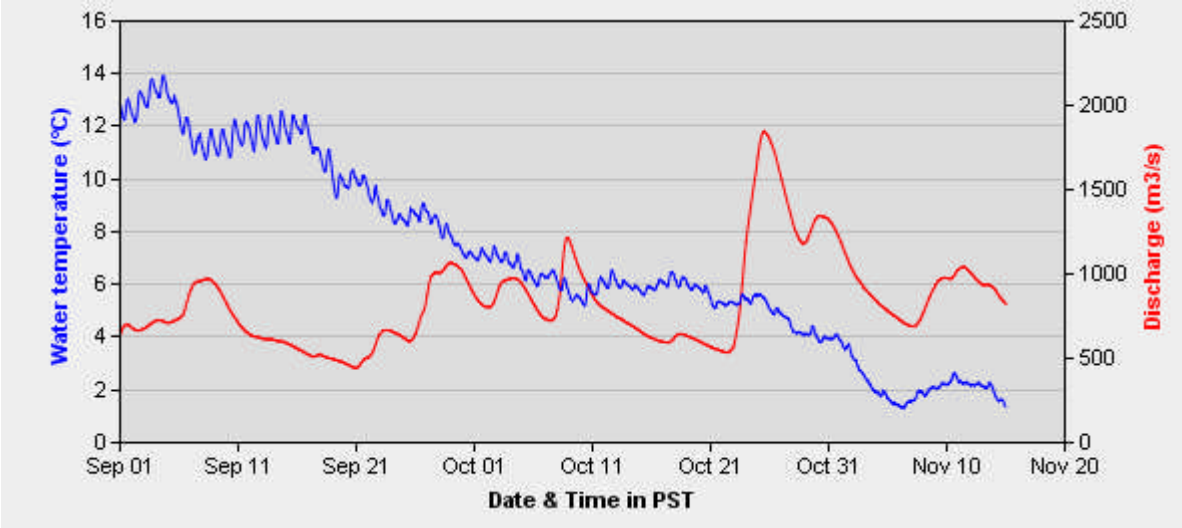

Figure 2. Fraser River discharge and temperature conditions during the timeframe of white sturgeon sampling in 2007 (from Water Survey of Canada Station; Fraser River at Shelley 08KB001).

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.

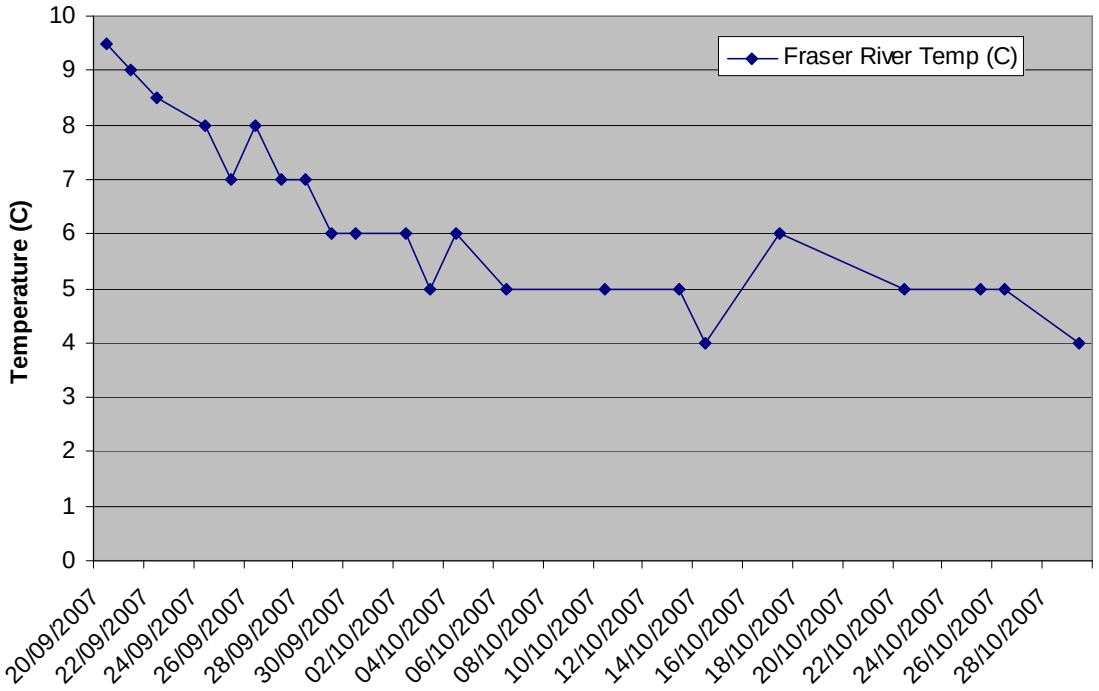

Figure 3. Fraser River temperature measured daily while in the field (from various locations within the study area).

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.

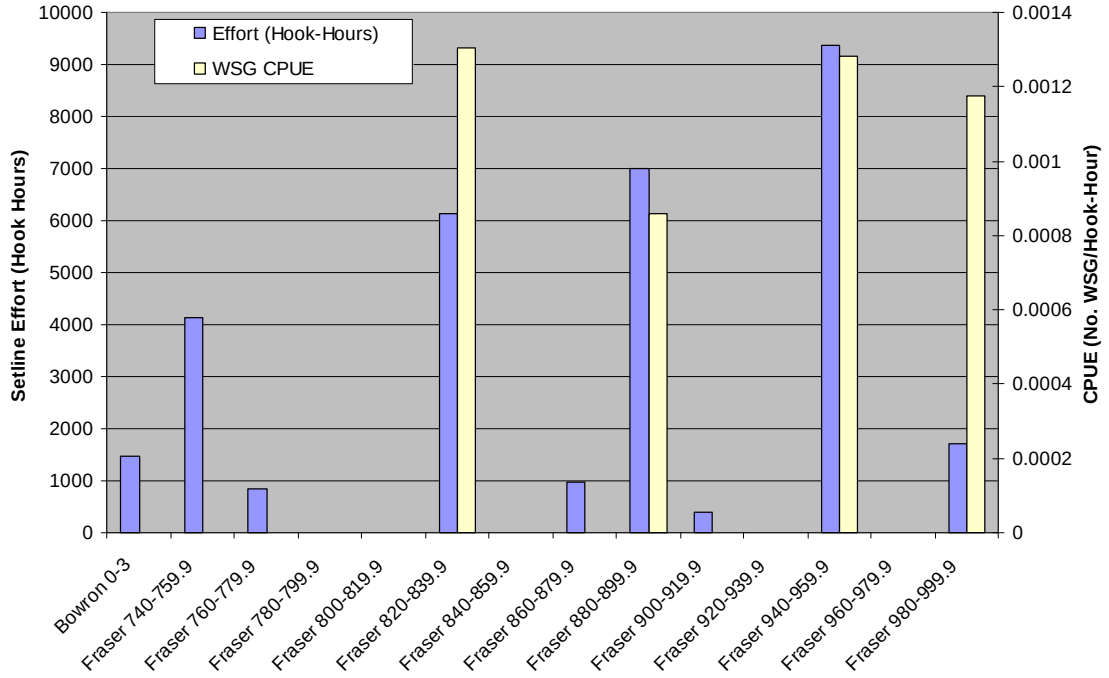

Figure 4. Distribution of setline sampling effort (hook-hours) throughout the study area in 20km increments of river length and corresponding-resulting CPUE (WSG).

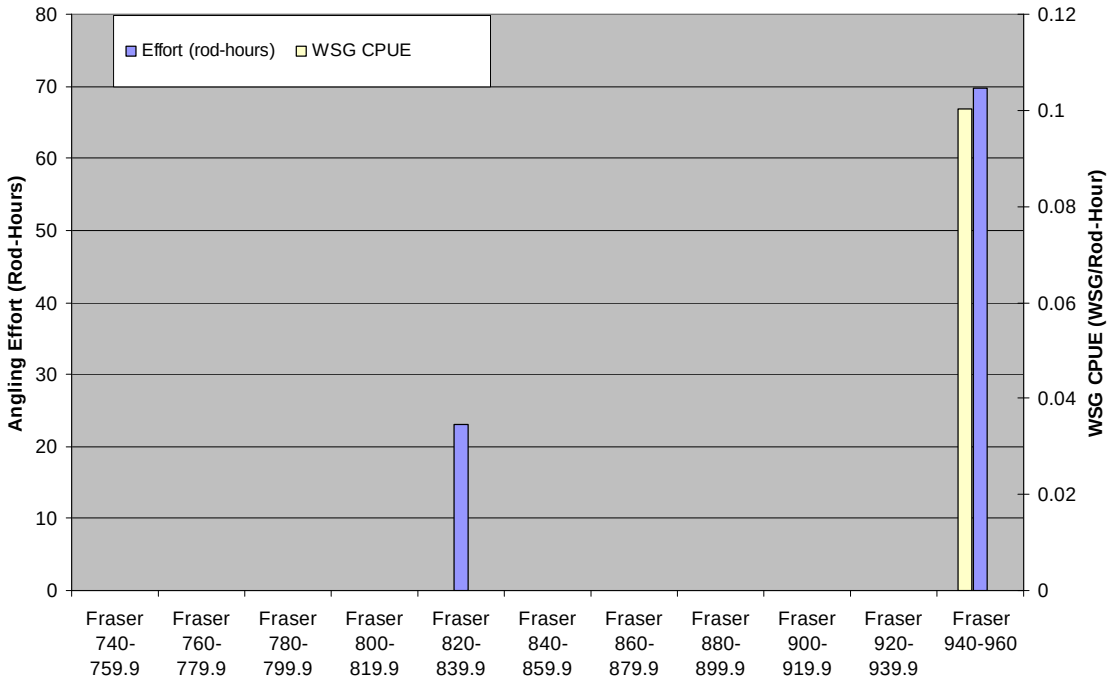

Figure 5. Distribution of angling effort (hook-hours) throughout the study area in 20km increments of river length and corresponding-resulting CPUE (WSG).

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.

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
SL829.95 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

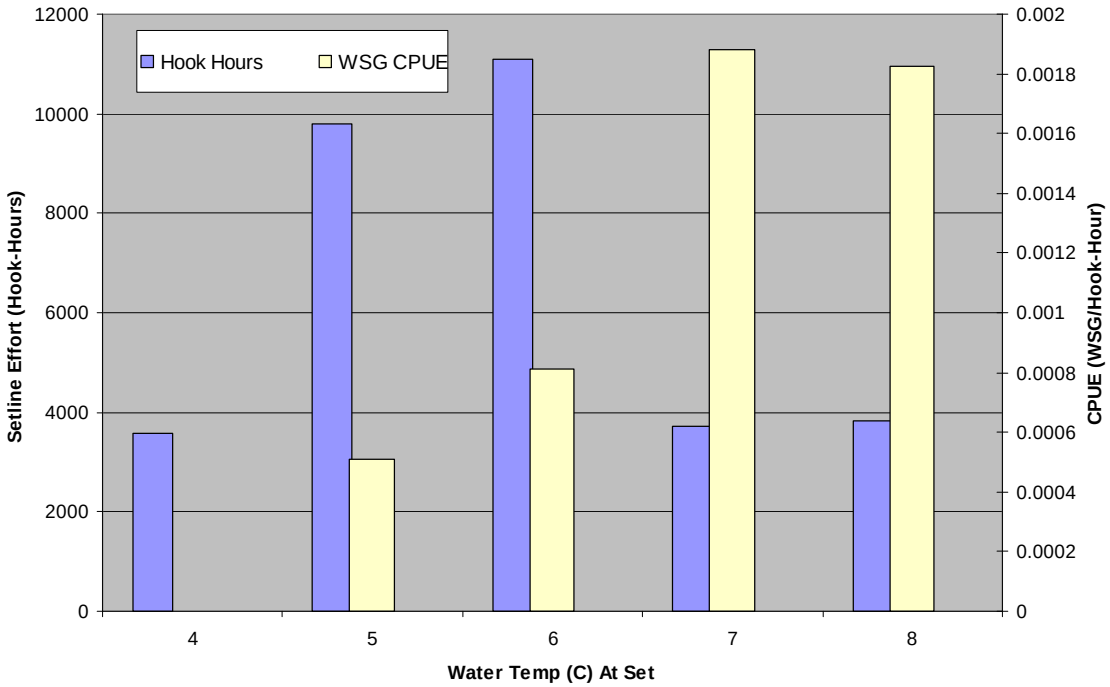

Figure 6. Setline effort and resulting WSG CPUE applied over the range of water temperatures recorded at the time of gear deployment.

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-

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 ≥50cm<100cm total length and 185 (+/- 29 95% CI) sturgeon ≥100cm (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 <70cm 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.

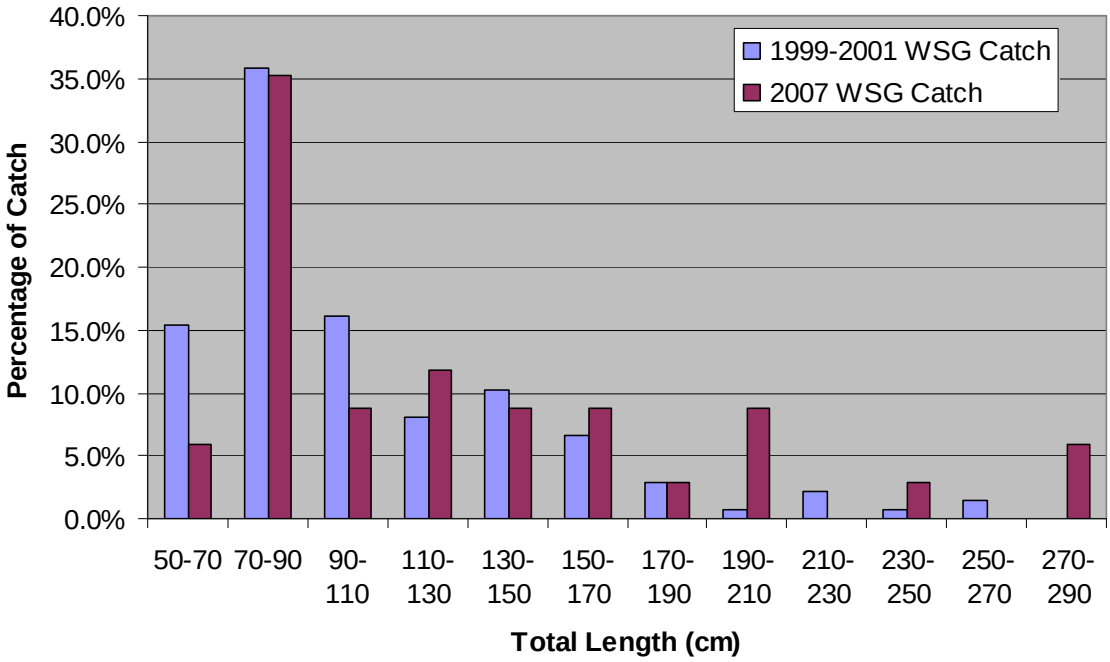

Figure 7. Comparison of the size range (total length) of white sturgeon setlined and angled catches from the upper Fraser from 1999-2001 (combined n=137 individuals) and 2007 (n=34 individuals).

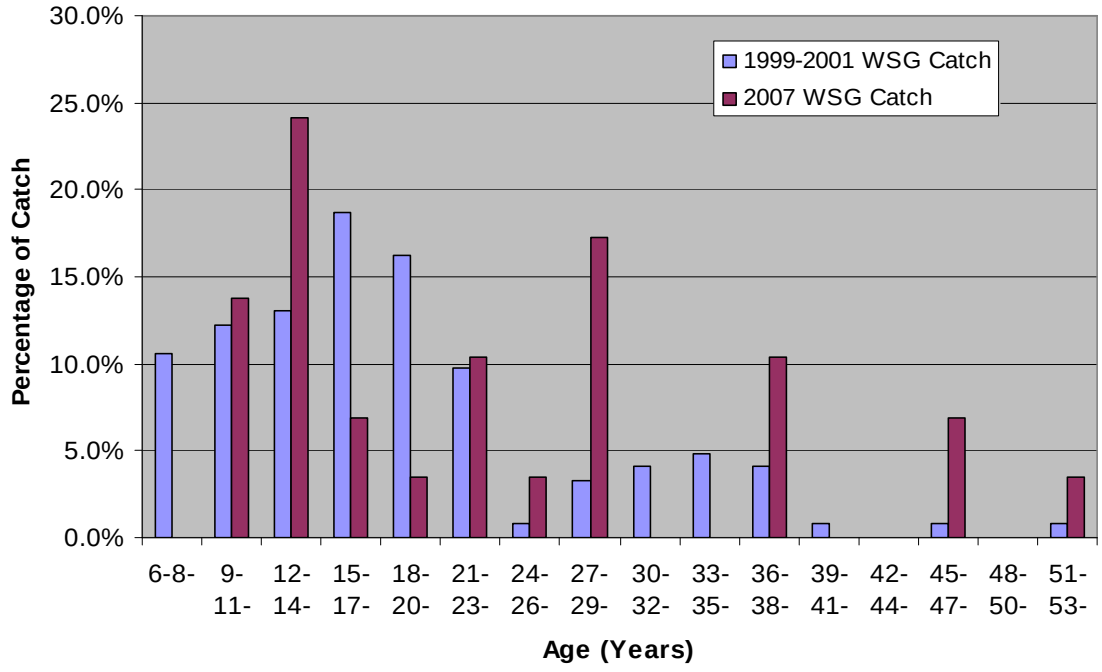

Figure 8. Comparison of the distribution of age classes of white sturgeon catches setlined and angled from the upper Fraser from 1999-2001 (combined n=123 individuals) and 2007 (n=29 individuals). Only those fish definitively assigned an age between 6 and 53 years are presented.

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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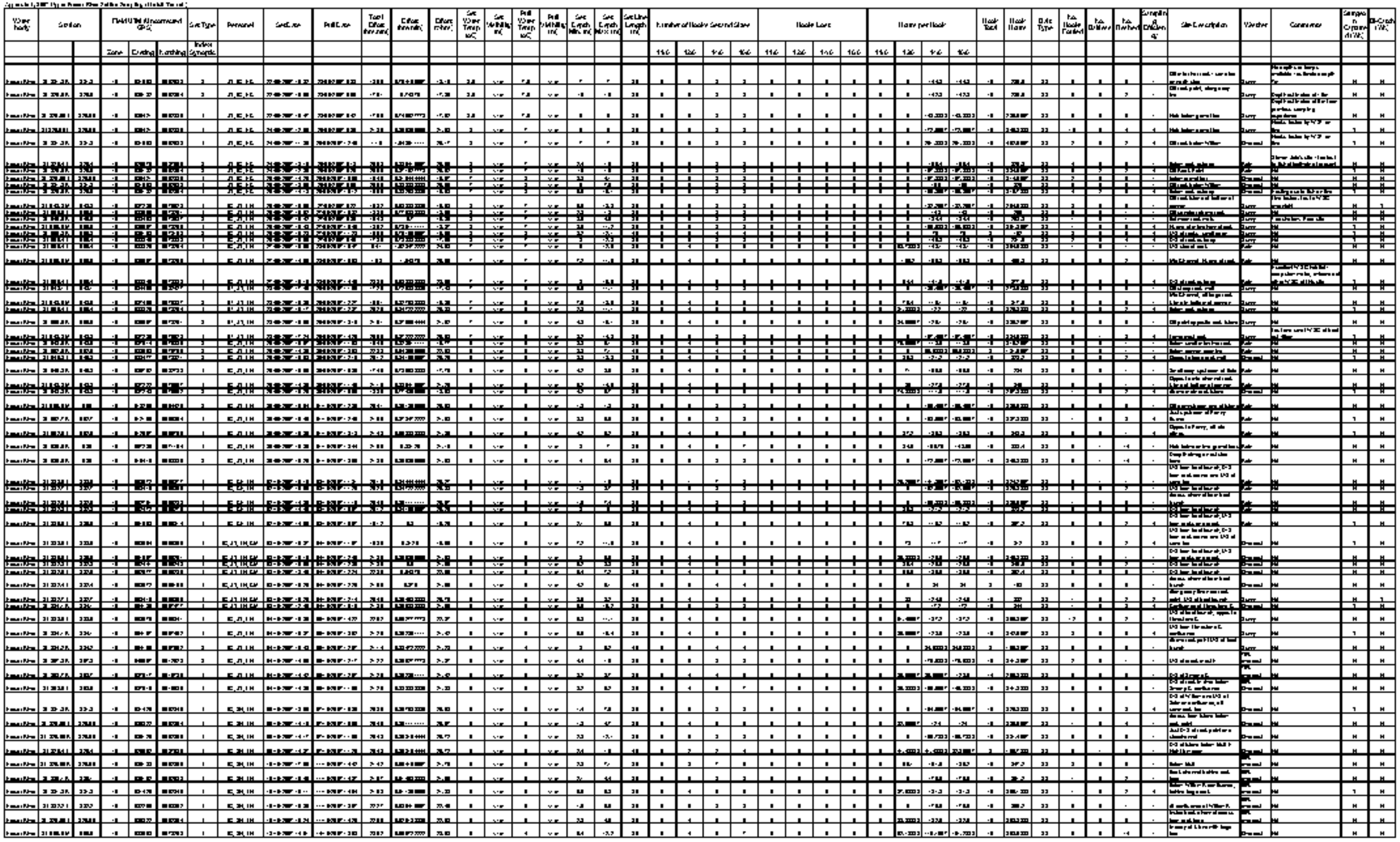
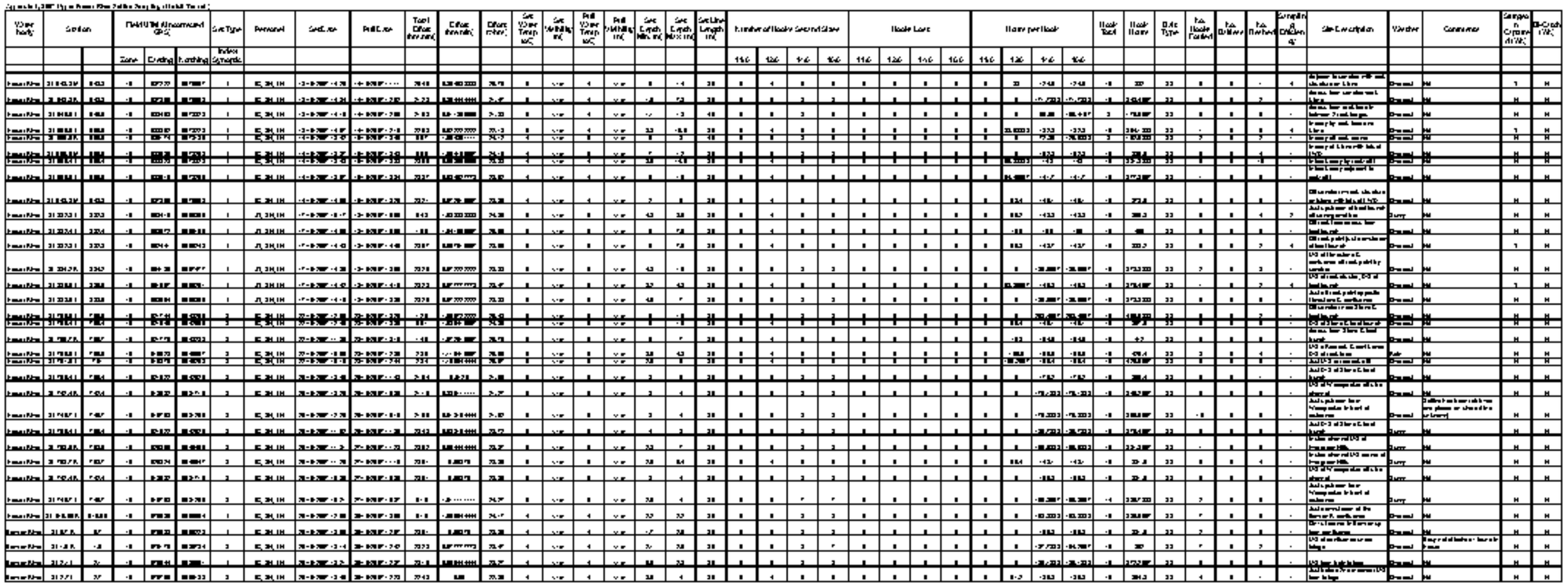
Appendix 1 - Data relating to angling and setline effort





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

River	Station	River km	UTM			Set Type (I/B)	Personnel	Channel Location	Date	Water Temp (oC)	Visibility (m)	Depth	Rod Number	Start Time	End Time	Total Effort (hrs)	Hook Size	Bait Type	Hook Fouled (Y/N)	Baitfish (Y/N)	Lost	Site Description	Weather	Comments	Sturgeon Captured (Y/N)	Bi Captured (Y/N)
			NAD	Easting	Northing	(Index or Synoptic)																			
Fraser	AS960.6 R	960.6	10	588054	5978277	I	JY, KS, LH	R	26/09/2007	8	<1m	9	1	14:20	14:32	0:12	7/0	PSQ	N	N	N	Off rock island, above sandbar	Sunny	NA	Y	N
Fraser	AS960.6 R	960.6	10	588054	5978277	I	JY LP CG	R	26/09/2007	8	<1m	9	2	14:20	17:00	2:40	9/0	PSQ	N	Y	N	Off rock island, above sandbar	Sunny	NA	N	N
Fraser	AS960.6 R	960.6	10	588054	5978277	I	JY LP CG	R	26/09/2007	8	<1m	9	3	14:20	17:00	2:40	9/0	PSQ	N	N	N	Off rock island, above sandbar	Sunny	NA	N	N
Fraser	AS960.6 R	960.6	10	588054	5978277	I	JY LP CG	R	26/09/2007	8	<1m	9	4	14:20	17:00	2:40	7/0	PSQ	N	Y	N	Off rock island, above sandbar	Sunny	NA	N	N
Fraser	AS960.6 R	960.6	10	588054	5978277	I	JY LP CG	R	26/09/2007	8	<1m	9	5	14:35	17:00	2:25	7/0	PSQ	N	N	N	Off rock island, above sandbar	Sunny	NA	N	N
Fraser	AS960.6 L	960.6	10	588392	5978228	I	KS SM LH	L	13/10/2007	5	<1m	11	1	12:00	14:10	2:10	6/0	PSQ	N	N	N	In back eddy by rock cliff and island	Quesnel	NA	Y	N
Fraser	AS960.6 L	960.6	10	588392	5978228	I	KS SM LH	L	13/10/2007	5	<1m	8	2	12:00	14:10	2:10	6/1	PSQ	N	N	N	In back eddy by rock cliff and island	Quesnel	NA	N	N
Fraser	AS960.6 L	960.6	10	588392	5978228	I	KS SM LH	L	13/10/2007	5	<1m	9	3	12:00	14:10	2:10	6/2	PSQ	N	N	N	In back eddy by rock cliff and island	Quesnel	NA	N	N
Fraser	AS948.3M	948.3	10	587222	5979407	I	JY, KS, FC	M	20/09/2007	9.5	<1m	8-12	1	16:10	17:40	1:30	9/0	SK	N	N	N	Off island at bottom of canyon	Quesnel	NA	N	N
Fraser	AS948.3M	948.3	10	587222	5979407	I	JY, KS, FC	M	20/09/2007	9.5	<1m	8-12	2	16:10	17:40	1:30	9/0	SK	N	N	N	Off island at bottom of canyon	Quesnel	NA	N	N
Fraser	AS948.3M	948.3	10	587222	5979407	I	JY, KS, FC	M	20/09/2007	9.5	<1m	8-12	3	16:10	17:40	1:30	7/0	SK	N	N	N	Off island at bottom of canyon	Quesnel	NA	N	N
Fraser	AS948.3M	948.3	10	587222	5979407	I	JY, KS, FC	M	20/09/2007	9.5	<1m	8-12	4	16:10	17:40	1:30	7/0	SK	N	N	N	Off island at bottom of canyon	Quesnel	NA	N	N
Fraser	AS960.6 L	960.6	10	587222	5979407	I	JY, KS, FC	M	20/09/2007	9.5	<1m	8-12	5	16:10	17:40	1:30	6/0	ROE	N	N	N	Off island at bottom of canyon	Quesnel	NA	N	N
Fraser	AS960.6 L	960.6	10	588392	5978228	I	JY, KS, FC	L	20/09/2007	9	<1m	8-12	1	12:00	16:00	4:00	9/0	SK	N	N	N	Off rock pdn in canyon	Sunny	NA	N	N
Fraser	AS960.6 L	960.6	10	588392	5978228	I	JY, KS, FC	L	20/09/2007	9	<1m	8-12	2	12:00	16:00	4:00	9/0	SK	N	N	N	Off rock pdn in canyon	Sunny	NA	N	N
Fraser	AS960.6 L	960.6	10	588392	5978228	I	JY, KS, FC	L	20/09/2007	9	<1m	8-12	3	12:00	14:30	2:30	6/0	ROE	N	N	N	Off rock pdn in canyon	Sunny	NA	Y	N
Fraser	AS960.6 L	960.6	10	588392	5978228	I	JY, KS, FC	L	20/09/2007	9	<1m	8-12	4	12:20	16:00	3:40	7/0	SK	N	N	N	Off rock pdn in canyon	Sunny	NA	N	N
Fraser	AS960.6 L	960.6	10	588392	5978228	I	JY, KS, FC	L	20/09/2007	9	<1m	8-12	5	12:40	16:00	3:20	7/0	SK	N	N	N	Off rock pdn in canyon	Sunny	NA	N	N
Fraser	AS960.6 L	960.6	10	588392	5978228	I	JY, KS, FC	L	20/09/2007	9	<1m	8-12	6	14:40	16:00	1:20	6/0	ROE	N	N	N	Off rock pdn in canyon	Sunny	NA	N	Y
Fraser	AS960.6 L	960.6	10	588346	5978333	I	JY, KS, FC	L	21/09/2007	9	<1m	8-12	1	10:30	14:00	3:30	7/0	SK	N	N	N	Angling throughout the lower canyon	Sunny	NA	N	Y
Fraser	AS960.6 L	960.6	10	588346	5978333	I	JY, KS, FC	L	21/09/2007	9	<1m	8-12	2	10:30	14:00	3:30	9/0	ROE	N	N	N	Angling throughout the lower canyon	Sunny	NA	N	Y
Fraser	AS960.5M	960.5	10	588346	5978333	I	JY, KS, FC	M	21/09/2007	9	<1m	8-12	3	10:35	16:30	5:55	9/0	SK	N	N	N	Angling throughout the lower canyon	Sunny	NA	N	Y
Fraser	AS960.5M	960.5	10	588346	5978333	I	JY, KS, FC	M	21/09/2007	9	<1m	8-12	4	10:35	16:30	5:55	9/0	SK	N	N	N	Angling throughout the lower canyon	Sunny	NA	N	Y
Fraser	AS960.4 L	960.4	10	588346	5978333	I	JY, KS, FC	L	21/09/2007	9	<1m	8-12	5	10:50	11:30	0:40	6/0	ROE	N	N	N	Angling throughout the lower canyon	Sunny	NA	N	N
Fraser	AS960.5 L	960.5	10	588346	5978333	I	JY, KS, FC	L	21/09/2007	9	<1m	8-12	6	11:40	12:20	0:40	6/0	ROE	N	N	N	Angling throughout the lower canyon	Sunny	NA	N	N
Fraser	AS960.4 L	960.4	10	588346	5978333	I	JY, KS, FC	L	21/09/2007	9	<1m	8-12	7	13:40	14:10	0:30	4/0	ROE	N	N	N	Angling throughout the lower canyon	Sunny	NA	Y	N
Fraser	AS960.4 L	960.4	10	588346	5978333	I	JY, KS, FC	L	21/09/2007	9	<1m	8-12	8	14:15	14:25	0:10	4/0	ROE	N	N	N	Angling throughout the lower canyon	Sunny	NA	Y	N
Fraser	AS960.4 L	960.4	10	588346	5978333	I	JY, KS, FC	L	21/09/2007	9	<1m	8-12	9	14:30	14:50	0:20	4/0	ROE	N	N	N	Angling throughout the lower canyon	Sunny	NA	Y	N
Fraser	AS960.5 R	960.5	10	588346	5978333	I	JY, KS, FC	R	21/09/2007	9	<1m	8-12	10	15:30	16:30	1:00	4/0	ROE	N	N	N	Angling throughout the lower canyon	Sunny	NA	N	N
Fraser	AS960.5 R	960.5	10	588346	5978333	I	JY, KS, FC	R	21/09/2007	9	<1m	8-12	11	14:10	14:30	0:20	9/0	SK	N	N	N	Angling throughout the lower canyon	Sunny	NA	Y	N
Fraser	AS960.5 R	960.5	10	588346	5978333	I	JY, KS, FC	R	21/09/2007	9	<1m	8-12	12	15:00	16:30	1:30	9/0	SK	N	N	N	Angling throughout the lower canyon	Sunny	NA	N	N
Fraser	AS960.5 R	960.5	10	588346	5978333	I	JY, KS, FC	R	21/09/2007	9	<1m	8-12	13	14:10	16:30	2:20	7/0	SK	N	N	N	Angling throughout the lower canyon	Sunny	NA	N	N
Fraser	AS831.3 R	831.3	10	591508	5982988	I	JY, KS, FC	R	23/09/2007	8.5	<1m	5-8	1	11:30	16:30	5:00	9/0	SK	N	N	N	Below large mid-channel rock	Sunny	NA	N	Y
Fraser	AS831.3 R	831.3	10	591508	5982988	I	JY, KS, FC	R	23/09/2007	8.5	<1m	5-8	2	11:30	16:30	5:00	9/0	SK	N	N	N	Below large mid-channel rock	Sunny	NA	N	Y

Appendix 1; 2007 Upper Fraser White Sturgeon Sampling (Angling)
Bait types: SK (Sockeye), PSQ (Pickled Squid), CH (Chinook), PCC (Pearmouth Chub), OO (Eulachons), ROE (Sockeye or Chinook Eggs)

River	Station	River km	UTM			Bait Type (J/B)	Personnel	Channel Location	Date	Water Temp (oC)	Visibility (m)	Depth	Rod Number	Start Time	End Time	Total Effort (hrs)	Hook Size	Bait Type	Hook Fouled (Y/N)	Baitless (Y/N)	Lost	Site Description	Weather	Comments	Sturgeon Captured (Y/N)	SI Captured (Y/N)
			NAD	Easting	Northing	(Index or Synoptic)																			
Fraser	AS 831.3 R	831.3	10	531508	5982508	I	JY, IG, FC	R	23/05/2007	8.5	<1m	5-8	3	11:30	16:30	5:00	7/0	SK	N	N	N	Below large mid-channel rock	Sunny	N.A.	N	Y
Fraser	AS 831.3 R	831.3	10	531508	5982508	I	JY, IG, FC	R	23/05/2007	8.5	<1m	5-8	4	11:30	16:30	5:00	7/0	SK	N	N	N	Below large mid-channel rock	Sunny	N.A.	N	N
Fraser	AS 831.3 R	831.3	10	531508	5982508	I	JY, IG, FC	R	23/05/2007	8.5	<1m	5-8	5	11:50	14:50	3:00	4/0	ROE	N	N	N	Below large mid-channel rock	Sunny	N.A.	N	N

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

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

			Capture Location Information								Bio-physical Characteristics								Tagging Information									
Fish No.	Station rkm	Method	Watercourse	Date of Capture	Crew	Zone	Easting	Northing	Capture Depth	Hook Size	Sex Det Code	Post Orbital Length (cm)	Snout Length (cm)	Fork Length (cm)	Total Length (cm)	Girth (cm)	Weight (Lbs)	Age	DNA Sample	Recapture (Y/N)	Tagged At Capture (F-P-N)	Tagged At Release (F-P-N)	Floy Tag Colour & Number	PIT Tag No.	Radio Tag Freq	Comments
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		422E65E5818	Na	Healthy juvenile - 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		423C160920	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	R00384	4158421025	Na	Healthy - recapture - red floy tag F400 PG. Previously captured September 11, 1998 at rkm 831.3 and September 8, 2000 at rkm 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		502160D6E	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	148.400 52	Male - otoscope not working well but thin belly wall allowed good ultrasal. Deployed radio tag. Fish previously captured 400m up Nechako July 15, 2000. Aged 19 in 2000.
9	SL829.95 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		423CD54334	148.420 54	No tags or evidence of previous capture. Could not successfully assess sex/maturity. Could not weigh fish without daultam on boat. Two incisions were made to attempt internal assessment. Deployed radio 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	26.0	3.5	16	LP	N	N-N-N	N-P-N		422E5D667E	Na	Healthy juvenile - 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 juvenile
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 ~ rkm 830; twice in August 2001 ~ rkm 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	423B777E04	Na	Recapture. Flaccid belly, quarter whitish, small, clear eggs visible. Removed Floy tag - major irritation evident. Previously captured July 28, 2000 at rkm 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, health 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		422E4C1BD5	Na	Healthy fish - no distinguishing marks. Two surgery scars left on fish. Otoscope failed, and could not access body cavity due to belly wall thickness.

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

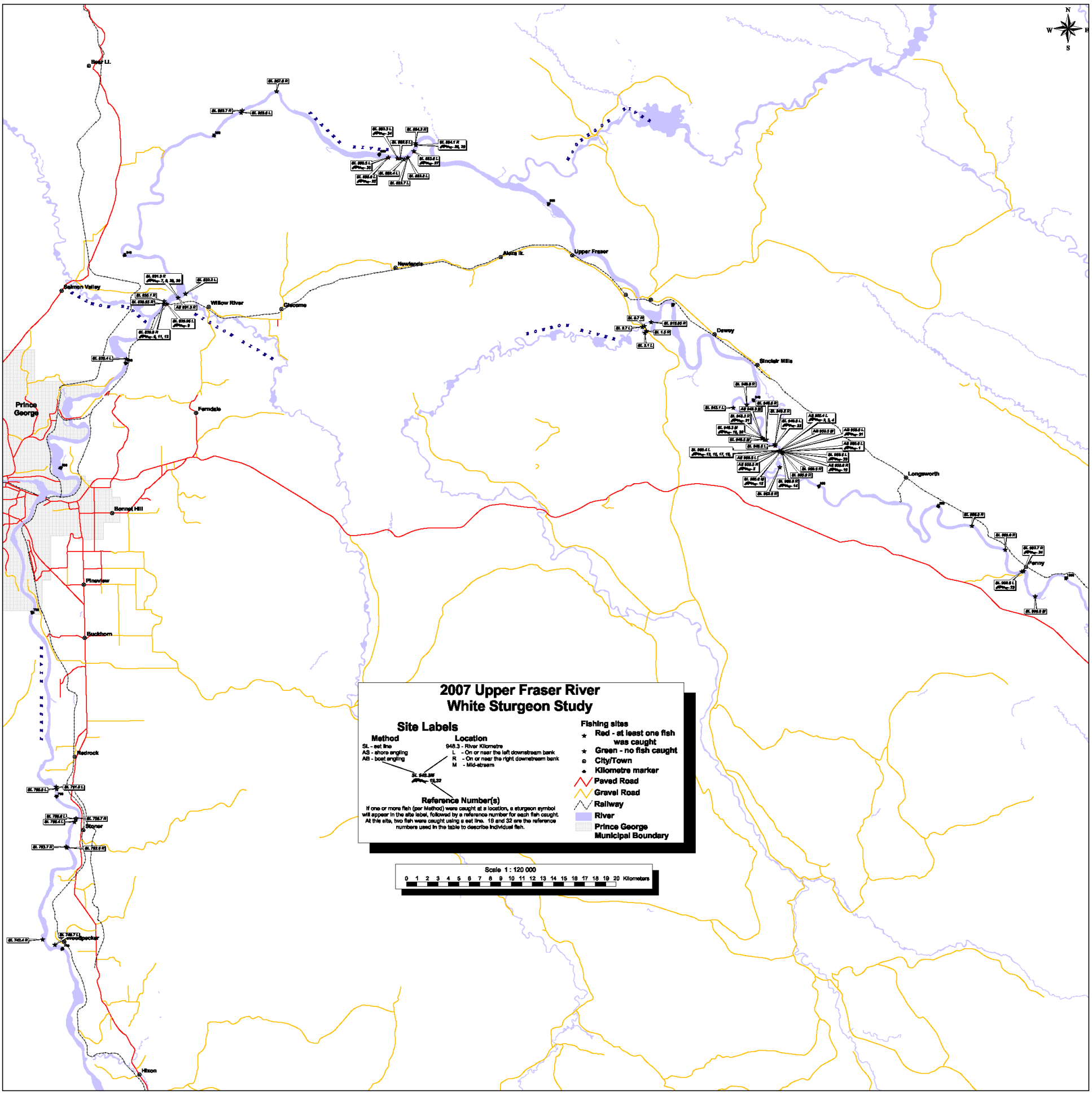
			Capture Location Information								Bio-physical Characteristics								Tagging Information								
Fish No.	Station name	Method	Watercourse	Date of Capture	Crew	Zone	Easting	Northing	Capture Depth	Hook Size	Sex/Mat Code	Post Orbital Length (cm)	Snout Length (cm)	Fork Length (cm)	Total Length (cm)	Girth (cm)	Weight (Lbs)	Age	DNA Sample	Recapture (Y/N)	Tagged At Capture (F-P-N)	Tagged At Release (F-P-R)	Floy Tag Colour & Number	PIT Tag No.	Radio Tag Freq	Comments
16	SL 950.4 L	SL	Fraser River	09/28/2007	JY, IG, LH	10	588846	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	YO057	5D283D2512	Na	Removed floy tag. Healthy, no distinguishing marks. Previously captured August 28, 2000 at rkm 882. Aged 19 in 2000.
17	SL 950.4 L	SL	Fraser River	09/28/2007	JY, IG, LH	10	588846	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	588846	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	587235	5979523	10.0	16	3	19	39.5	165	189	65	73	29	N	Y	F-P-N	N-P-R	YO027	7F7D773D2F	148.420 52	Removed Floy tag. Some damage on left pelvic fin. Deployed radio tag. Previously captured (RLL) at Necliako confluence in 1996. Also previously captured (Lheidli) September 5, 1999 at rkm 831, and July 15, 2000 - 400m up Necliako. Aged 20 in 1999.
20	SL 950.4 L	SL	Fraser River	09/29/2007	JY, LH, BT	10	588829	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/juvenile
21	SL 948.3 R	SL	Fraser River	09/30/2007	JY, IG, LH	10	587248	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; ffacid 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	588477	5978821	12.0	14	3	19.5	45	188.5	209	69	102	52	N	Y	F-P-N	N-P-R	YO03	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 Necliako on August 18, 1995 at rkm 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/juvenile
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		422E394CDE	Na	Surgery attempted - maturity and sex classification inconclusive. Healthy/juvenile
25	SL 880.6 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	YO076	5D283C3F0A	148.420 53	Floy tag removed due to irritation. Gonads filling much of body cavity. Deployed radio tag. Previously captured July 14, 2000 at rkm 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 lumps 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	YO50	7F7B031824	148.400 54	5th dorsal scute removed. Appears to have previous surgery scar (not recent). Minor bleed at hook but made sex determination difficult - suspect male 02.03. Radio tag deployed. Fish was originally tagged in the Necliako September 19, 1997 at rkm 110.0. Aged 67 years in 1997 and assigned sex/mat code 02.

2007 White Sturgeon Sampling; Lheidli T'enneh Upper Fraser River

Appendix 2. Information for sturgeon captured in 2007.

	Capture Location Information										Bio-physical Characteristics								Tagging Information								
Fish No.	Station (km)	Method	Watercourse	Date of Capture	Crew	Zone	Easting	Northing	Capture Depth	Hook Size #	Sex Mat Code	Post Orbital Length (cm)	Snout Length (cm)	Fork Length (cm)	Total Length (cm)	Girth (cm)	Weight (Lbs)	Age	DNA Sample	Recapture (Y/N)	Tagged At Capture (F-P-N)	Tagged At Release (F-P-N)	Floy Tag Colour & Number	PIT Tag No.	Radio Tag Freq	Comments
28	SL 884.1 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 - otoscope requires longer read. Deployed radio tag.
29	SL 831.3 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	YO096	423B79067A	Na	Fish was captured on September 26, 2007 - this program - see note above. Prior to 2007, fish has been caught 4 times previously; August and October 2000 ~ rkm 830; twice in August 2001 ~ km 831; aged 19 in 2000.
30	SL 831.3 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	YO068	424F1E346A	148.400 51	Appears healthy. Scutes/fins 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	YO020	5028247314	148.380 53	Removed Floy tag. Obulous bbe on gonads, cream colored - obulous male. Some grey spotting on the surface. Deployed radio tag. Previously captured September 3, 1999 at km 950.4 and July 26, 2000 7.00m up the Blowron. Aged 27 in 1999.
35	SL 880.5 L	SL	Fraser River	10/18/2007	JY, SN, LH	10	551567	6006291	3.6	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 closer to 01 - lobes obulous but bright white. Radio tag deployed.

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


Prince George
Salmon Valley
Willow River
Giscome
Newlands
Aleza lk.
Upper Fraser
Dewey
Sinclair Mills
Longworth
Penny
Ferndale
Bonnet Hill
Pineview
Buckhorn
Redrock
Stoner
Hixon
Fraser River
Nechako River
2007 Upper Fraser River
White Sturgeon Study
Site Labels
Method
SL - set line
AS - shore angling
AB - boat angling
Location
948.3 - River Kilometre
L - On or near the left downstream bank
R - On or near the right downstream bank
M - Mid-stream
Reference Number(s)
If one or more fish (per Method) were caught at a location, a sturgeon symbol will appear in the site label, followed by a reference number for each fish caught. At this site, two fish were caught using a set line. 19 and 32 are the reference numbers used in the table to describe individual fish.
Fishing sites
Red - at least one fish was caught
Green - no fish caught
City/Town
Kilometre marker
Paved Road
Gravel Road
Railway
River
Prince George Municipal Boundary
Scale 1 : 120 000
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Kilometers
N
W
E
S