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 \geq 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:

- 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

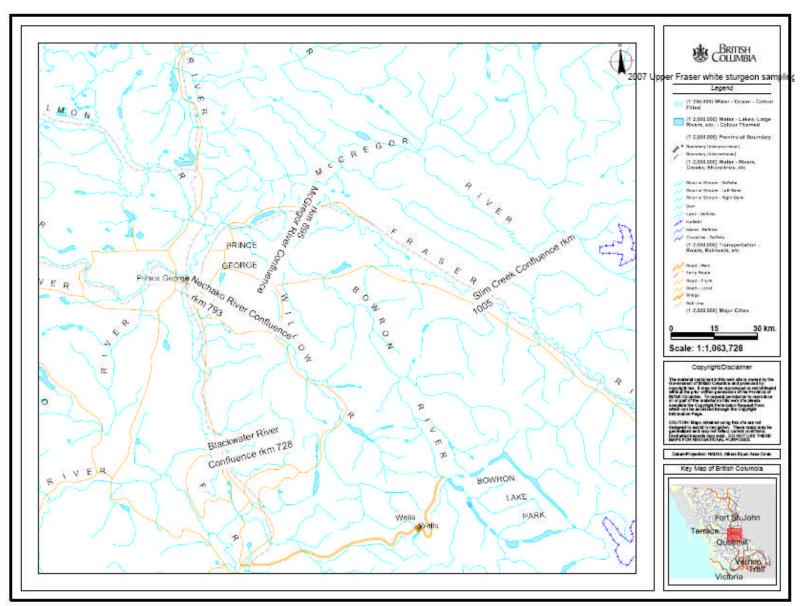
The upper Fraser watershed, defined for the purposes of this project as those portions of the Fraser watershed within MoE Region 7; Omineca-Peace, is the most sparsely populated and least developed portion of the Fraser River watershed. It is also one of the most poorly inventoried and studied portions 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.

<u>Methodology</u>

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.



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

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 flown at a moderated speed 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.

<u>Results</u>

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 1 metre.



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.

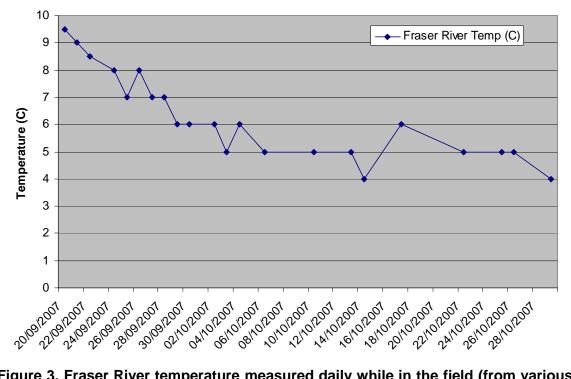


Figure 3. Fraser River temperature measured daily while in the field (from various locations within the study area).

<u>Setlines</u>

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.

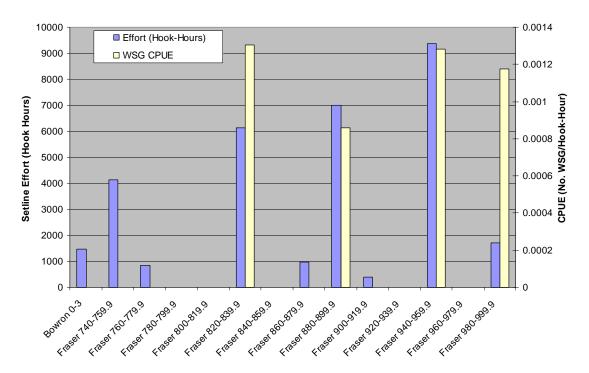


Figure 4. Distribution of setline sampling effort (hook-hours) throughout the study area in 20km increments of river length and corresponding-resulting CPUE (WSG).

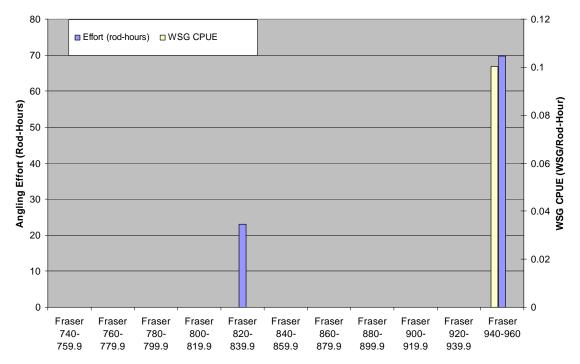


Figure 5. Distribution of angling effort (hook-hours) throughout the study area in 20km increments of river length and corresponding-resulting CPUE (WSG).

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 (Ibs)	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	Ν	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	Ν	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	Ν	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	Ν	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	Ν	N-N-N	N-P-N
SL 950.6 M	09/27/2007	97	146.0	162.0	51.5	81.0	46	Ν	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	Ν	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+	Ν	N-N-N	N-P-R

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

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.

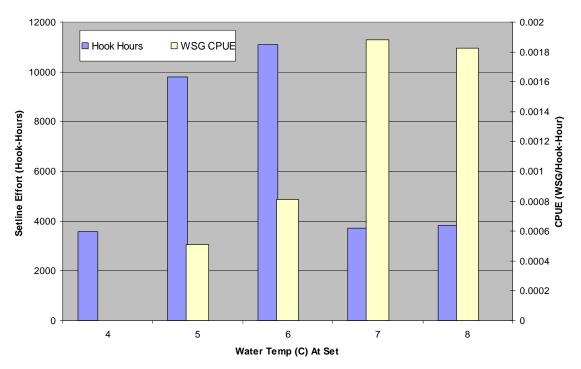


Figure 6. Setline effort and resulting WSG CPUE applied over the range of water temperatures recorded at the time of gear deployment.

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 overflight 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 Da	ta	(Locatio Jan. 12, 2)7 location o tag appli	at time of ication	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.
								Originally tagged along North Fraser Road. Fish was relocated upstream approximately 2km downstream of the McGregor confluence with the Fraser
148.420	53	~898	560064	6005012	880.6	551563	6006314	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

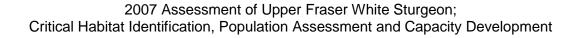
period (1999-2001).

The population estimate generated from three years of marking/sampling (1999-2001) generated a population estimate of 630 (+/- 109 95% CI) sturgeon \geq 50cm<100cm total length and 185 (+/- 29 95% CI) sturgeon \geq 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.



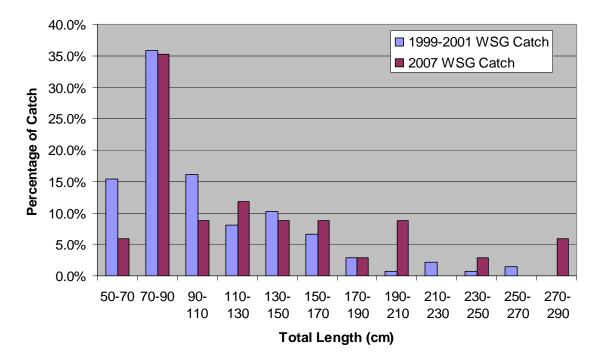


Figure 7. Comparison of the size range (total length) of white sturgeon setlined and angled catches from the upper Fraser from 1999-2001 (combined n=137 individuals) and 2007 (n=34 individuals).

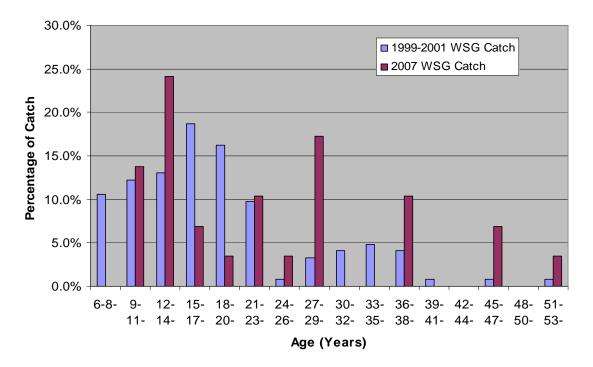


Figure 8. Comparison of the distribution of age classes of white sturgeon catches setlined and angled from the upper Fraser from 1999-2001 (combined n=123 individuals) and 2007 (n=29 individuals). Only those fish definitively assigned an age between 6 and 53 years are presented.

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 icefree 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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	, contraction					· ·	31, 10, 10	<u> </u>							~			<u> </u>		<u> </u>	<u> </u>	Arging froughout he		80	<u> </u>	<u> </u>
Frærer	<i>1</i> 89 50.5 R	950.5	10	588846	55(2303		JY, IO, FC	R	2109/202	9	<1m	91Z	13	1 € 10	16:30	220	70	sк	N	н	H	lover caryon	Suny	NA	×	N
																						Below large mid-charmel				
Fræser	AS 231.3 R	813	10	53608	990292C		JY, IO, FC	R	Z309/207	85	<1m	5 8	1	11:30	16:30	500	90	8K	N N		N	rock Relax here a Mathematic	Suny	NA.		Γ Y
Fræser	AS \$313 R	813	10	53808	9992938		JY, IG, FC		2309/202	85	<1m	58	7	11:30	1670	500	90	l av l				Below large mid-charmel	Suny	NA		
nater	/Colla R	ل الم ر	10	22006	200228		ar, 10, 10		تعماصعت	62	00	- 26	4		L C L		30	90					- oung	80		

Appendix 1;2007 Upper Fraser White Sturgeon Sampling (Angling) _Baittypes: SK(Sockeye), PSQ (Pickled Squid), CH (Chirook), PCC (Pearrouth Chub), OO (Euchleons), ROE (Sockeye or Chirook Eggs) _

Appendix 1; 2007 Upper Fraser White Sturgeon Sampling (Angling) Baittypes: SK(Sockeve), PSQ (Pickled Squid), CH (Chinook), PCC (Pearnouth Chub), OO (Euchleons), ROE (Sockeve or Chinook Eags)

										Water						Total			Hook						Bhungeon	B
		River				BetType		Channel		Temp	vidulity		Rod	Btart	End	Effort	Hook	Bait	Fouled	Baitle co					Cap tu red	Captures
River	Btation	нm		U T M		(78)	Per connel	Location	Date	(0C)	(m)	Cepth	Nu mbe r	Time	Time	(ከተፍ)	Blæ	Туре	(778)	(17/0)	Loct	Bite Decoription	Weather	Com men to	(778)	(WW)
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			MAD	Eacling	Northing	Bynaptia)																				
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Fræser	/68313 R	. 8313	10	53608	98298	1	JY, 10, FC	R.	Z309/202	8 <i>5</i>	<1m	5 8	З	1138	1633	500	70	SK	M	M		rock	Suny	NA	N N	Y
																						Below large mid-charmel				
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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 fo<u>r sturgeon captured in 2007.</u>

, abb cure			Stargeon	captured in 2	Cepture Locat	sen ins	c mutatan						His-ph	yancal Ch	enstensi	101						i vaging ins	nagen			
Fah Nc.	Salaca irkau	Method	Webercourse	Deta er Captura	Crew	£n ∎	Lusing	Northing	Capture Depth	Heck Hock	Seo Met Cote	Peat Gribbal Langth Ionii	Snout Lungth Ionii	Fork Langth Ionii	ictal Langth Ichii	Grith Ionii	Weight i Literi	Ады	LNA Sangla	larcaptu na i≃Ni	Tega At Cepture (h- 1948)	Lega At Ratassa (F- 1943)	Hoy Tag Colour & Number	Ph Ling No.	Kudis Lugitrug	Connents
1	AS 950.6 L	AG	Fraser Riue r	09/20/2007	JY, IG, FC	10	588892	5998228	12 0	6	98	ם ז	13.5	51D	600	ם 17	20	9	LP	N	N-N-N	N-P-N		422 B5 B5818	Na	Healthy (ue vie – vo disting visioning marks
2	AS 950.4 L	AG	Fraser Riue r	09/21/2007	JY, IG, FC	10	SS 46	597 83 33	8 to 12	ł	98	9.5	18 0	67 D	79D	23.5	3.5	12	LP	N	N-N-N	N-P-N		424 E7 F1E1D	Na	Healtby
з	AS 950.4 L	AG	Fraser Riue r	09/21/2007	JY, IG, FC	10	SS 46	597 83 33	8 to 12	ł	98	10 0	18.5	68D	81D	19 D	20	11	LP	N	N-N-N	N-P-N		422E 40 1969	Na	Healtby
۰	AS 950.4 L	AG	Fraser Riue r	09/21/2007	JY, IG, FC	10	588846	597 83 33	8 to 12	٤	98	10.0	18.5	ם סז	820	24.5	4.0	13	LP	N	N-N-N	N-P-N		423C 160920	Na	Healtby
5	AS 950.5 R	AG	Fraser Riue r	09/21/2007	JY, IG. FC	10	588846	5978333	8 to 12	9	98	11.5	22.0	83D	96D	27 D	םז	23	LP	N	N-N-N	N-P-N		422E39156C	Na	Healtby
6	SL 829.9 R	SL	Fraser Rive r	09/25/2007	JY, IG. FC	10	530132	5992354	ت 10	14	98	10.0	19.5	76D	87 D	26 S	4.5	22	N	γ	F-P-N	F-P-N	R00384	4158421025	Na	Healthy - recepture - red floy tag F400 PG. P nub is y captured September 11, 1998 at ikm 531.3 aud September 8, 2000 at km 831.3. Aged 14 years 1, 2000.
7	SL831.3 R	SL	Fraser Riue r	09/25/2007	JY, IG. FC	10	53 15 0 8	5992938	ם ז	14	97	12.5	24.5	95D	108.0	3 6.5	140	13	LP	N	N-N-N	N-P-N		502016006E	Na	iealiy - io dittigi ki ligmarks
ø	SL831,3 R	SL	Fraser River	09/25/2007	JY, IG. FC	10	s31508	5992938	םז	16	3	21.5	44 D	167 D	195.5	65.5	900	27	N	Y	N-P-N	N-P-R		502838403A	148.400 52	Mak - ofoscope not working we ibirthin belly wall albued good ulstal. Dep byed radio tag. Fish preuiously captured 400m inp. Nec kako Jufy 15, 2000. Aged 19 in 2000.
9	SL82995 L	SL	Fraser Riber	09/25/2007	JY, IG. FC	10	530421	5992330	50	16	97	28.0	62.0	247.0	27 4.0	98 0	Na	73	LP	N	N-N-N	N-P-R		4230054334	148.42054	No tags or euidence of preubits capitrie. Con bi not successfriev as sess sextinaturity. Con binot weigh fish with on to daulta mioniboat. Two incisions were made to attemp think nai assessment. Dep byed radibitarq.
10	AS 950.6 R	AG	Fraser Riue r	09/26/2007	JY, IG, LH	10	589054	597 8277	80	7	98	10.0	18 <i>.</i> 5	66D	730	26 🛛	3.5	16	LP	N	N-N-N	N-P-N		42265D667E	Na	Healthy (sue site - so disting site is gm ark s
11	SL829.9 R	SL	Fraser Riue r	09/26/2007	JY, IG, FC	10	530132	5992354	92	14	98	10.0	19.5	75.5	880	26 🛛	4.0	10	LP	N	N-N-N	N-P-N		422E67 4C3F	Na	Healthy (que ple
12	SL 829.9 R	SL	Fraser Riue r	09/26/2007	JY, IG, FC	10	530132	5992354	8.5	14	97	11 0	22.0	89.5	102.0	31 D	90	27	N	γ	F-P-N	F-P-N	Y0096	423879067A	Na	Recapture. Age structure scarwell liealed. Fisi Nas been canglitik times preulonsty: Angrist and October 2000 ~ Km 830; twice in Angrist 2001 ~ rkm 831; aged 19 in 2000.
13	SL 960.4 L	SL	Fraser Riue r	09/27/2007	JY, IG, LH	10	5358 6 6	597 83 33	11 0	14	12	16.5	40.0	165.D	191 D	61 D	81D	47	N	γ	F-P-N	N-P-N	Y0094	4238777804	Na	Recapture. Flacti bety, quarts wittisi, smail, okareggsu bible. Remoued Floytag - major Initation euident. Preulonsly captured J ny 28, 2000 atrikm 916.5. Aged 39+ 1, 2000.
14	SL 950.8 R	SL	Fraser Riue r	09/27/2007	JY, IG, LH	10	38 9153	597 81 03	90	16	97	14.0	31 D	120.5	138.5	42.0	240	29	LP	N	N-N-N	N-P-N		422 E2 E7 426	Na	3 bbeson tall-othenwise, lealth looking
15	SL 950.6 M	SL	Fraser Riuer	09/27/2007	JY, IG, LH	10	589007	597 8256	80	16 D	97	15.5	34 D	1460	1620	51.5	81D	46	LP	N	N-N-N	N-P-N		422E4C18D5	Na	Healtönyfki – to distingtisk ing marks. Two stingeryscars bitton fisi. O to scope taled, and could not access body cau by die to beliywali tisbkiess.

2007 White Sturgeon Sampling; Lheidli T'enneh Upper Fraser River Appendix 2. Information fo<u>r sturgeon captured in 2007.</u>

, bb cur			stargeon	captured in 2	Capture Local	ben im	cmutan						bio-ph	yancel Ch	enclans	50						l vaging lime	napen			
Fah Nc.	Sala sa nikani	Method	Wataroousa	Dete er Captura	Crew	iatan ∎	Lusing	Northing	Capture Dapth	Heek উল্লেখ ম	Seo Met Code	Pat Gradal Langth Ionii	Snout Lungth Ionii	Fork Langth Ionii	ical Langta Icali	Girth Ionii	Weight (Liter)	Age	LNA Sengle	iðarsaptu na i≦Ni	Taga At Captura (F- 1948)	Taga At Rahasan P- 1985	Hoy lag Colour & Number	Ph Ling No.	Kadis Lag Iraq	Connents
16	SL 950.4 L	SL	Fraser Riue r	09/28/2007	JY, IG, LH	10	588846	597 83 33	90	16	97	11.5	25.0	1000	1110	34.0	120	27	N	Ŷ	F-P-N	N-P-N	পত্রজ	5028302512	Na	Remoued floy tag. Healtby, to disting tisting marks. Preulorsly captured Argust 28,2000 at fkm (882, Aged 19 in 2000.
17	SL 950.4 L	SL	Fraser Riue r	09/28/2007	JY, IG, LH	10	5888 6 6	5978333	90	12	98	10.5	19.5	725	83.5	25.5	50	16	LP	N	N-N-N	N-P-N		422E3F3C61	Na	NA
18	SL 950.4 L	SL	Fraser Riue r	09/28/2007	JY, IG, LH	10	SS (6	5978333	90	12	98	9Д	17 D	63D	740	22 0	3.5	13	LP	N	N-N-N	N-P-N		422E2A3744	Na	NA
19	SL 948.3 M	SL	Fraser Rive r	09/29/2007	JY, LH, BT	10	587235	5979623	10 0	16	3	19	39.5	165	189	65	73	29	N	Y	F-P-N	N-P-R	Y0027	7F7 D773D2F	148.420.52	Remoued Floy tag. Some damage on leftpelub fln. Dep byed radb tag. Pleulonsty captured (RLL) at Nechako confitence in 1996. Also pleulonsty captured (Liekili) September 5, 1999 at rkm 831, and July 15, 2000 - 400m up Nechako. Aged 20 in 1999.
20	SL 950.4 L	SL SL	Fraser Riue r	09/29/2007	JY, LH, 8T	10	SS 829	597 8294	80	12	98	10	18.5	ថ	75.5	24	35	14	LP	N	N-N-N	N-P-N		422E3A2D24	Na	Healthy (sue sile
21	SL948.3 R	SL	Fraser Riue r	09/30/2007	JY, IG, LH	10	587248	5979562	9.5	16	2	16	33	131.5	148.5	ទាន	33	25	LP	N	N-N-N	N-P-R		422E6F173E	148.420.50	Healtby; tear on door al fin; flactibelly; make - gonads w/greytshiflecks on sinface. Deployed radbitaq
22	SL 949.8 L	SL	Fraser Rive r	09/30/2007	JY, IG, LH	10	5884 77	5978821	12 D	14	3	19.5	45	188.5	209	69	102	52	N	Y	F-P-N	N-P-R	נססי	22236F2C51	148.420.51	Recapture. Floy tag appears to be from a wother system.program. Floy was removed as twas catsling initiation. Floi was missing the oftal. Floi also appears to have a singely scar from previous capture. Floi was originally tagged in the Nechako on August 18, 1995 at Km, 110.1. Deployed radio tag. Floi was aged 39 years in 1995.
23	SL 992.5 L	SL	Fraser Riue r	1001/2007	JY, IG, LH	10	612007	59667.99	ם ז	14	98	9.5	18 <i>.</i> 5	69	78	24.5	ł	11	LP	N	N-N-N	N-P-N		424E553934	Na	Healthy (que » le
24	SL992.7 R	SL	Fraser Riue r	1001/2007	JY, IG, LH	10	612169	5966864	50	14	98	10	19.5	705	78	25	ł	14	LP	N	N-N-N	N-P-N		422E394C0E	Na	Surgeny attempted - maturity and sex classification in conclusive. Health y juvenile
25	SL 380.6 L	SL	Fraser Riuer	1003/2007	IG, CF, LH	10	ऽ ङ १५६३	ഞെങ14	50	12	2	13	27	114	127.5	46	21	22	N	γ	F-P-N	N-P-R	Y 00 76	5028303 FDA	148.420.53	Floy tag removed dire to initator. Gonads filing mich of body caulty. Deployed radio tag. Preubitsty captired Jily 14, 2000 at Km 810.7. Aged 14 years 1, 2000.
26	SL884.1 R	SL	Fraser Riue r	1004/2007	IG, LH, JY,	10	554185	6007477	50	14	11	12	5	109	124.5	42	17	20	LP	N	N-N-N	N-P-N		423C18465D	Na	Missing short; targe imps in abdomen. Sex ue wydmontho defa mile - code based on fexture of gonad. Ddn't dep by radio tag dre to cond bb of the fish.
27	SL 883.6 L	SL	Fraser Riue r	10,0 4/2007	IG, JY, LH,	10	553994	6006890	75	14	02 to 03	27	61	219.5	274	84.5	174	78	N	Y	F-P-N	F-P-R	Y050	7 F78031824	148.400 54	Sti do sal sorte remoued. Appears to i aue pleuious surgery scar (i otrecent). Minor bleed athick bil made sex dele mination difficrit- suspectmate D2.03. Radio tag dep byed. Fisi was orghally tagged in the Nechako September 19, 1997 atrikm 110.0. Aged 67 years in 1997 and assigned sextimat code D2.

2007 White Sturgeon Sampling; Lheidli T'enneh Upper Fraser River Appendix2. Information for <u>sturgeon captured in 2007.</u>

			Captured In 2007 . Capture Loaden Internation									Bio-physical Charactanatics								Lagging Intervition						
hah Nc.	Sada cin ukinu	Method	Wetercourse	Dete er Cepture	Crew	±n ⊌	Lusing	Northing	Capture Depth	Heck Maria N	Seo Met Code	Peat Gribbal Langth Ionii	Snout Langth Jonii		ictal Langth Ichii	Garth Ionii	Weight i Literi	Agu	LNA Sengle	larcaptu na i≃Ni	Lega At Capture (F- INR)	Taga At Ratasan (F- 1943)	Ficy lag Octour & Number	PK Lig No.	Redis Legitreg	Connents
28	SL884.1 R	SL	Fraser Riue r	1005/2007	IG, JY, LH	10	554197	6007462	9D	16	NA	27	ទាន	217	240	87	195	48+	LP	N	N-N-N	N-P-R		422E6C0733	148.400 53	Healithy fish. Difficult to sex -orbscope requires longer and. Deployed radio tag.
29	SL831.3 R		Fraser Riber	10/07/2007	IG, SN, LH	10	ឆា រ រន	5992845	60	14	2	12	235	92.5	103	31.5	8	27	N	Y	F-P-N	F-P-N	Y0096	423879067A	Na	Fishwascaptried on September 25,2007 - tis program - see note aboue. Prior to 2007, fish hasbeen cangit 4 times preu busly; Angustand October 2000 ~ rkm 830; twbe h Angust2001 ~ km 831; aged 19 h 2000.
30	SL831.3 R	SL	Fraser Riue r	10/11/2007	IG, SN, LH	10	នា រ 425	5992845	8.1	14	NA	11	19	ត	76	23	з	13	LP	N	N-N-N	N-P-N		422E323834	Na	Tear & dorsal file
31	A8 950.6 L	AG	Fraser Riue r	10/13/2007	IG, SN, LH	10	588892	597 82 28	ם 11	6		8.5	15.5	61	68	20 S	1.5	10+	LP	N	N-N-N	N-P-N		501 F6C587D	Na	NA
32	SL 948.3 M	SL	Fraser Riuer	10/14/2007	IG, SN, LH	10	587222	597 96 0 7	13 0	16	2	12.5	26	110.5	123	3 8.5	16	36	RP	γ	F-P-N	F-P-R	Y0068	424F1E346A	148.400 51	Appears healthy. Sontes/Mis good. Ulashig pace offend of tall. Deployed radio tag. Took age structure despite being recapture.
33	SL 960.6 L		Fraser Riue r	10/14/2007	IG, SN, LH	10	588892	597 8228	16 D	12	з	16	33.5	138	158	53	36	37	LP	N	N-N-N	N-P-R		422 E32584 E	148.400 50	Healthy 16 i . Deployed rad b tag.
34	SL 882.3 L		Fraser Riber	10/18/2007	JY, SN, LH	10	552441	6006243	6Д	16	2	17	ភ េន	145	រឆ	ទាន	45	36	N	γ	F-P-N	N-P-R	Y 00 20	5028247314	16380 ទ	Remoued Floy tag. Obulors ble or gonads, cream colored - obulorsmate. Some grey spotting on the strates. Dep byed radib tag. Preubitsty captured September 3, 1999 at Km 950.4 and Jrty 25, 2000 7000 mit the Bowron. Aged 27 in 1999.
35	SL 880.5 L	SL	Fra≴er Ri⊔er	10/18/2007	JY, SN, LH	10	55 1567	6006291	3.6	12	2	16	34	131	149	**	24	25+	LP	N	N-N-N	N-P-R		422E3F7044	148.380.95	Healtliv, Maturlivm ay be obser to D1 - lobes obulous but bright wintle. Radio tag dep byed.

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

