2008 Assessment of Upper Fraser White Sturgeon; Critical Habitat Identification and Refinement of Population Status

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

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Technical staff included Irvin Gagnon (Lheidli T'enneh), Lisa Hardy (Upper Fraser Fisheries Conservation Alliance - UFFCA), 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. Brian Toth, R.P.Bio., Lheidli T'enneh, managed the project. Lisa Hardy (UFFCA) and Brian Toth completed data entry and reporting tasks.

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Executive Summary

Sampling (setlining and angling) for white sturgeon was completed between June 11 and October 8, 2008 over 196km of the mainstem of the upper Fraser River from rkm 741.0 (Woodpecker Rapids) to rkm 955 (Longworth Canyon). Sampling also occurred in the lowest portions of the Nechako River (above the Fraser River confluence) between rkm 1.0 to rkm 1.9 and in the Bowron River, above the Fraser River confluence, between rkm 0.2 and rkm 2.1.

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 2008 was a continuation of efforts initiated in 2007 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 2008, a total of 34 white sturgeon were captured during setline sampling and 14 white sturgeon captured during angling, including two fish that were captured twice (i.e. 46 individuals were captured). Twenty-four of the 46 white sturgeon captured in 2008 had been captured during sampling programs prior to 2008. The total lengths of fish captured ranged from 48.5 – 206 cm. Aging structures were collected from 33 of the fish captured and the ages of fish captured ranged from 4-50 years, including those that were assigned ages based on previous age determinations. A total of 5 fish were implanted with radio tags in 2008.

Combined data from 2007 and 2008 sampling indicates the population appears to be stable. Capture and preliminary telemetry information, indicated important rearing and over-wintering 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 imperilled" by the BC CDC, inferring that this unique stock is facing imminent extirpation without intervention. Other Fraser River white sturgeon populations are designated as "imperilled" 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 that 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 MoE imposed a no-kill regulation on recreational white sturgeon harvesting within the Fraser watershed in 1994, most Fraser River First Nations have voluntarily complied with this regulation.

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

Methodology

Knowledge gained from the sturgeon assessment work conducted within the upper Fraser watershed in from 1999 to 2001 was utilized to guide the activities undertaken in 2008. 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.

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 and pickled squid and salmon roe were the 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 labelled with both a UTM grid and river kilometre (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 and some sampled fish. Individuals were also tagged with PIT tags prior to being released, and un-stressed fish ~greater than 1m 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.

[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.

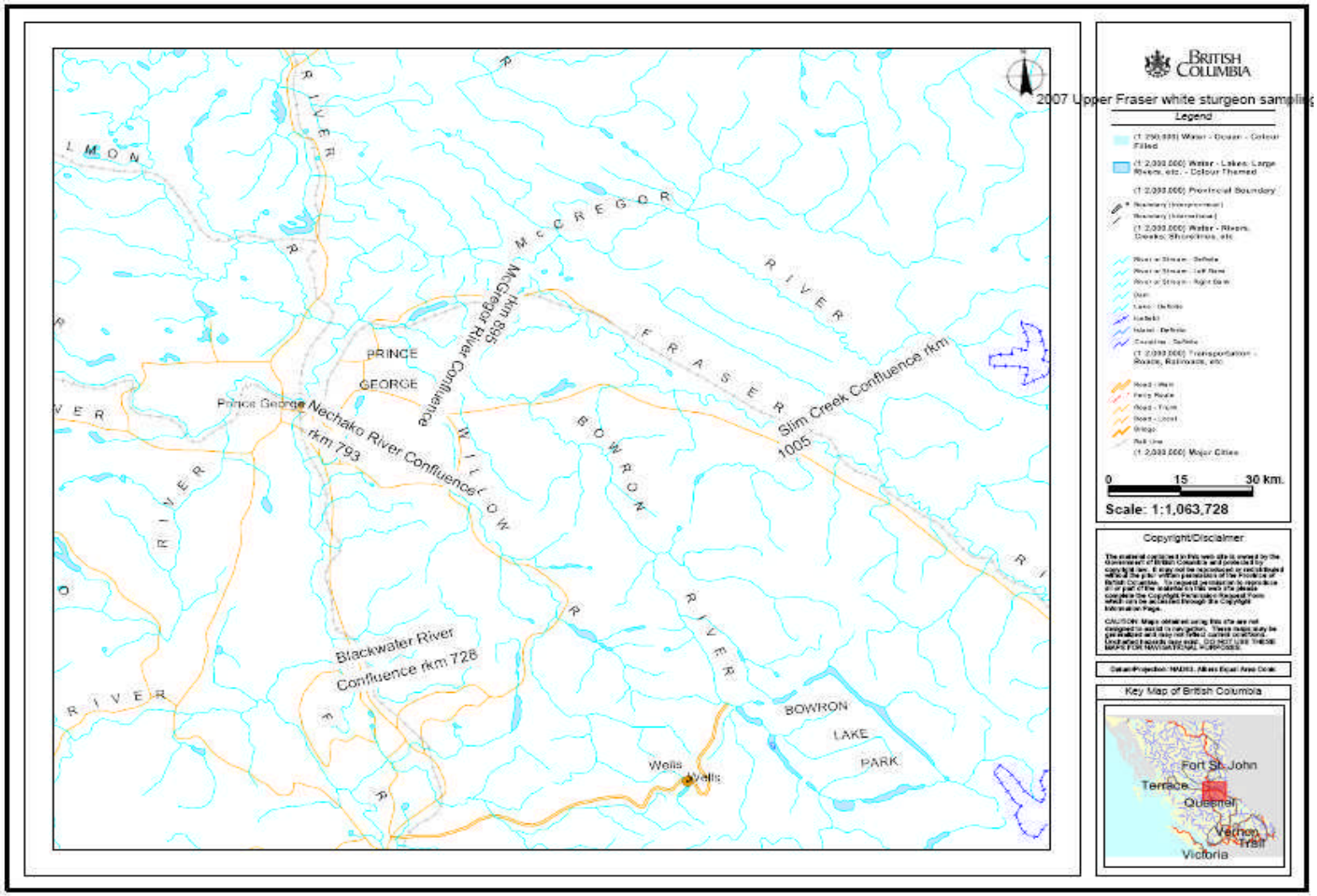

Figure 1. Upper Fraser River watershed with river kilometre (rkm) markings at key areas.

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 behaviour relative to environmental conditions, water temperature and discharge information was gathered from a Water 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 and Cessna airplane flown at a moderated speed approximately 30-80metres above the river's surface.

Age Determination

Fin rays (aging) structures were sectioned and mounted by project technical staff. Structures were read/interpreted with the aid of a dissecting microscope with light table capability. 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 June 11 and October 8, 2008 over 196km of the mainstem of the Fraser River from rkm 757.0 (Woodpecker Rapids) to rkm 951.0 (Longworth Canyon). Sampling was also undertaken within the lowest 3km of the Bowron River and lowest 2km of the Nechako River. A total of 48 white sturgeon captures occurred (including 46 different fish) during the course of the sampling program, and 5 individuals were implanted with radio tags.

Physical Conditions

Sampling occurred over a range of discharge conditions from freshet conditions to fall low flows. Discharge also varied extensively in 2008 with intense late summer rain events in the upper watershed (Figure 2). Water temperature was ~10°C at the beginning of sampling. Temperatures increased to 18°C during the middle of sampling and then generally decreased to ~5°C to 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.

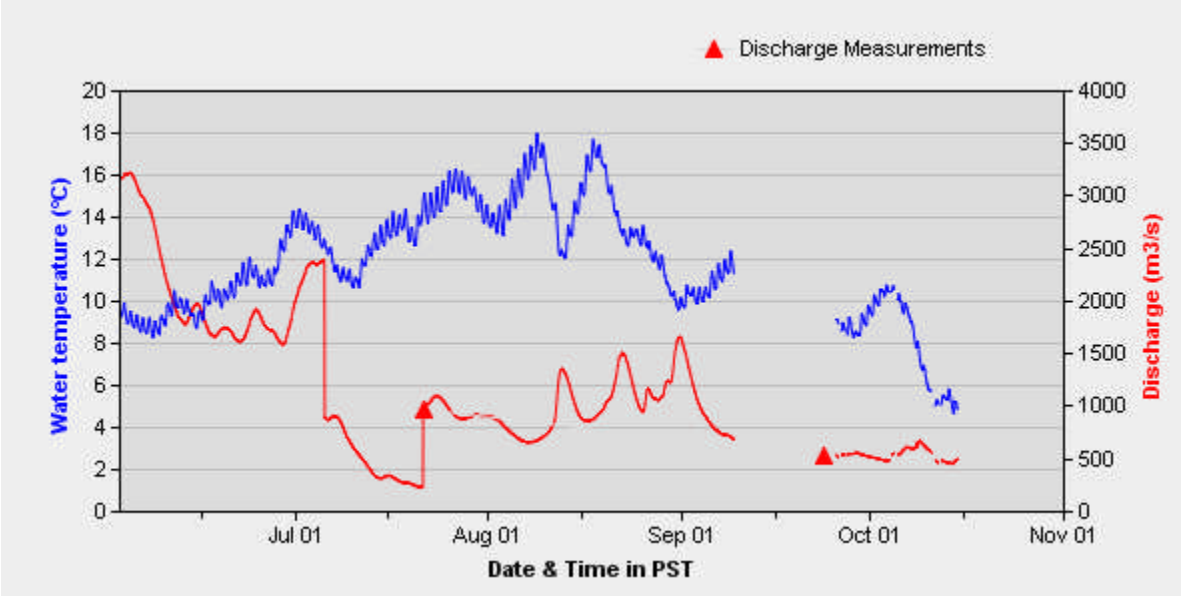

Figure 2. Fraser River Discharge and temperature conditions during the timeframe of white sturgeon sampling in 2008 (from Water Survey of Canada Station; Fraser River at Shelley 08KB001).

Sampling Effort Summary

A total of 29,118 hook-hours of setline effort and 18.88 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.

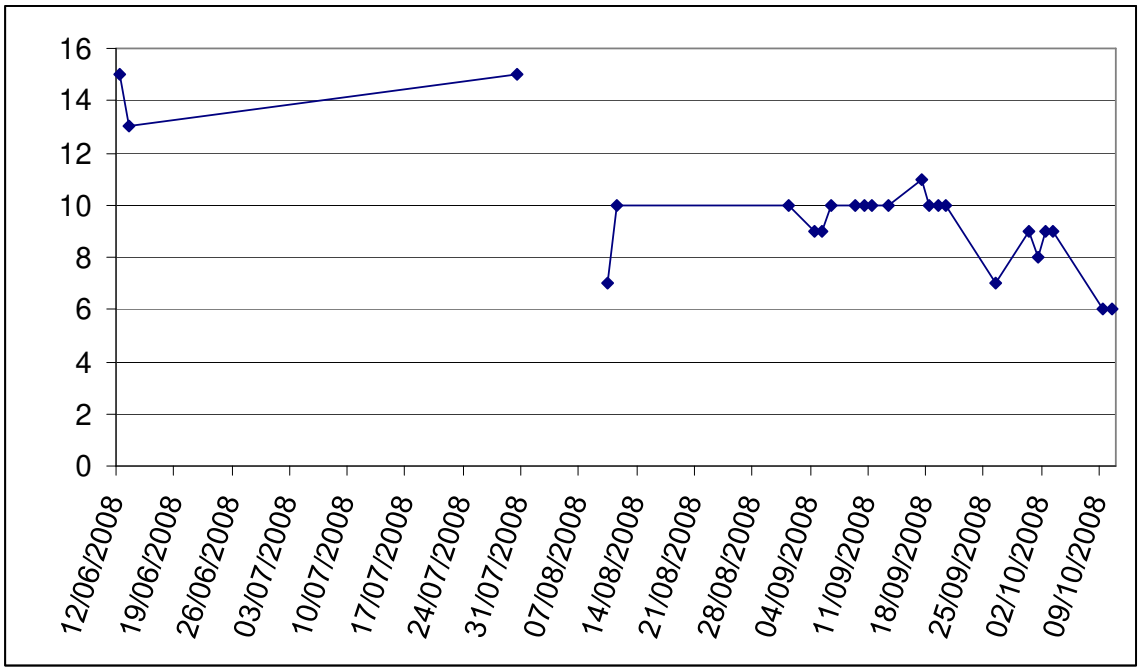

Figure 3. Fraser River temperature measured daily while in the field (from various locations within the study area).

Setlines

A total of 29,118 hook-hours of setline effort were applied resulting in the capture of 34 white sturgeon and a total catch per unit effort (CPUE) of 0.117 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 was focused on proven sturgeon rearing/holding areas. Effort 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 geographical distribution of setline effort and white sturgeon captures are provided in Appendix 3.

Angling

A total of 18.88 rod-hours of angling effort were applied resulting in the capture of 14 white sturgeon and a CPUE of 0.75 white sturgeon per rod-hour. Angling effort was largely focused in areas where setlines were deployed in close proximity to one another, which allowed time for crews to angle between setline deployment and retrieval (Figure 5). The geographical distribution of angling effort and white sturgeon captures are provided in Appendix 3.

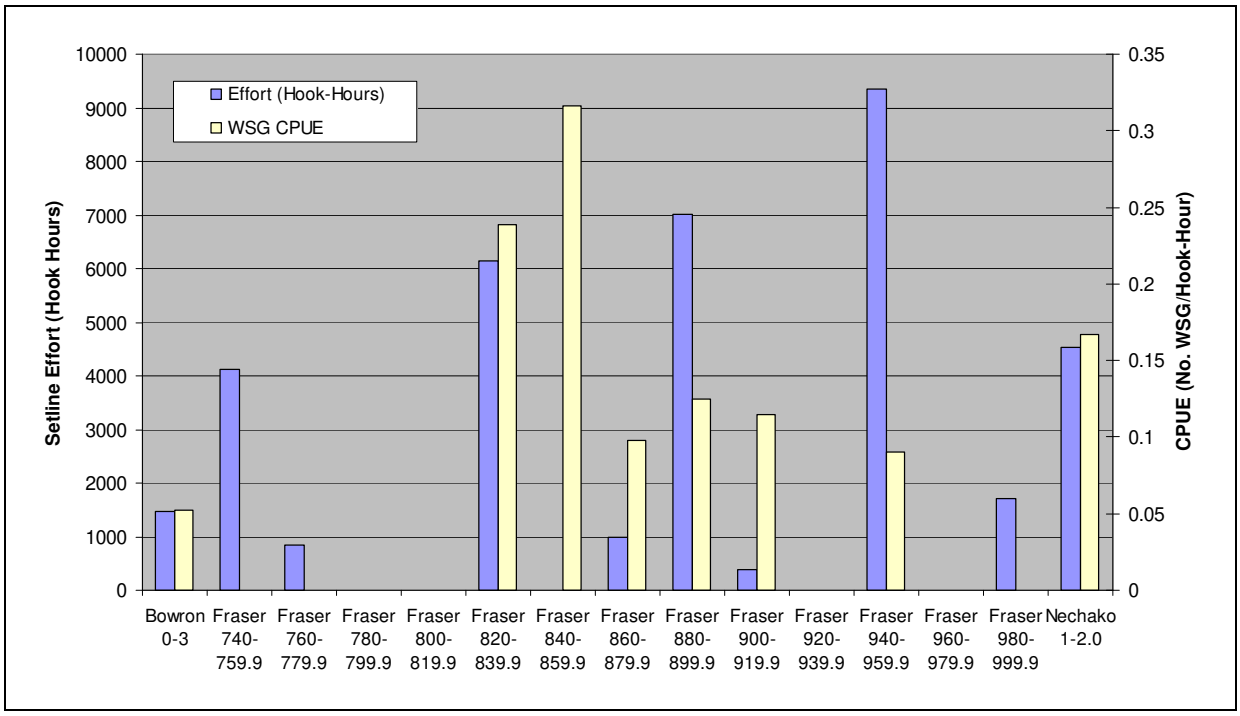

Figure 4. Distribution of setline sampling effort (hook-hours) throughout the study area in 20km increments of river length and corresponding-resulting CPUE (WSG).

Summary; White Sturgeon Captures

A total of 48 white sturgeon capture events occurred during the course of sampling in 2008, including a two fish that were captured twice in 2008 (i.e. 46 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.

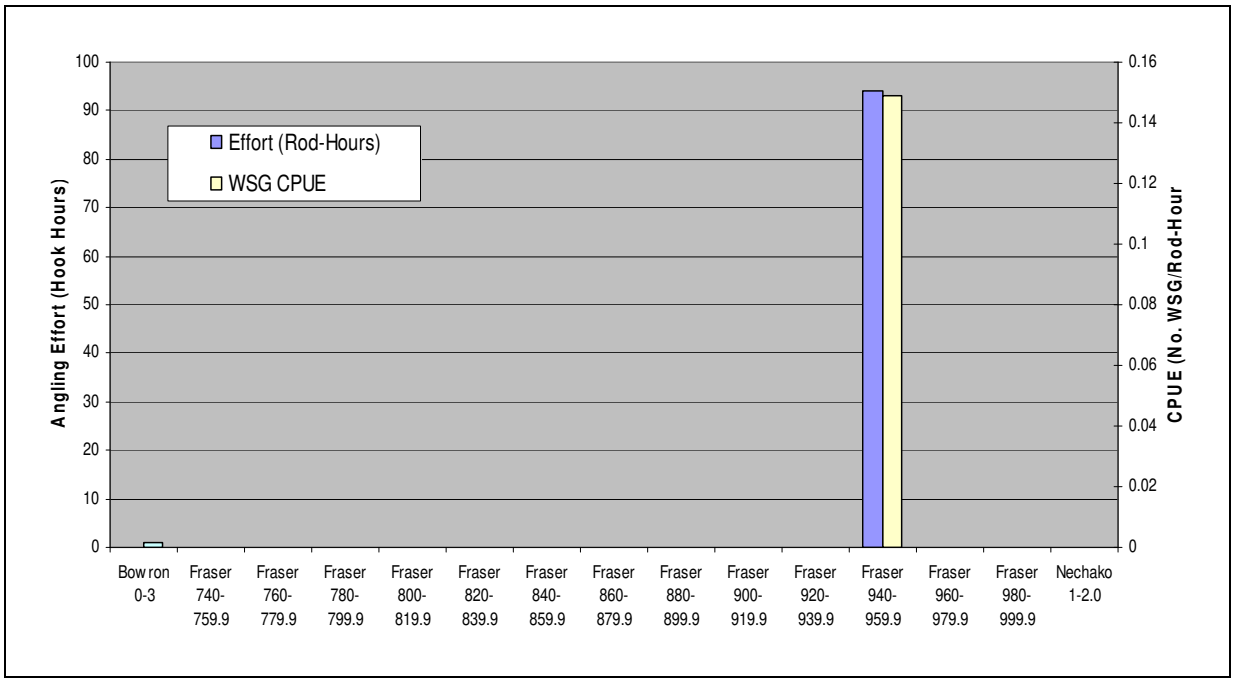

Figure 5. Distribution of angling effort (rod-hours) throughout the study area in 20km increments of river length and corresponding-resulting CPUE (WSG).

Nineteen of the 34 white sturgeon captured via setlining in 2008 were confirmed as being previously captured during sampling programs conducted prior to 2008 (2 fish were captured when the PIT tag reader failed and one fish escaped at the side of the boat before being processed). Five of 14 sturgeon captured via angling were confirmed as being previously captured and sampled prior to 2008. The total lengths of fish captured ranged from 48.5 – 206cm. Aging structures were collected from 26 of the fish captured and the ages of fish captured ranged from 4-50 years, including those that were assigned ages based on previous age determinations. A total of 5 fish were implanted with radio tags.

Bi-Captured Species

A total of 20 non-targeted fish were bi-captured during 2008, including 7 bull trout, 5 burbot and 8 northern pikeminnow (Table 2). Fourteen fish were bi-captured by angling and 6 by setlining. One burbot and three bull trout 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 to 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 48 white sturgeon captures during sampling in the upper Fraser River in 2008.

[2]Map No.	Waterbody	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)
16	Fraser	AS 948.2 M	11/08/2008	98	67	76	25	4	14	N	n-n-n	n-pt-n
17	Fraser	AS 948.2 M	11/08/2008	98	55.5	62	24.5	3	n/a	Y	n-pt-n	n-pt-n
18	Fraser	AS 948.2 M	11/08/2008	98	63	71	22	2	12	N	n-n-n	n-pt-n
19	Fraser	AS 948.2 M	11/08/2008	98	57.5	65.5	20	1.5	16	N	n-n-n	n-pt-n
20	Fraser	AS 948.2 M	11/08/2008	98	95	108	35.5	10	13	N	n-n-n	n-pt-n
21	Fraser	AS 948.2 M	11/08/2008	98	46	48.5	17	0.5	8	N	n-n-n	n-pt-n
22	Fraser	AS 948.2 M	11/08/2008	98	67	76.5	26	2.5	n/a	Y	n-pt-n	n-pt-n
23	Fraser	AS 948.2 M	11/08/2008	98	53.5	62.5	21	1	4	Y	n-pt-n	n-pt-n
24	Fraser	AS 950.5 L	01/09/2008	98	72	81	26	4	13	Y	n-pt-n	n-pt-n
25	Fraser	AS 950.5 L	01/09/2008	98	74	85	25.5	4	n/a	Y	ft-pt-n	n-pt-n
26	Fraser	AS 950.5 L	01/09/2008	98	68	78	26	4	7	N	n-n-n	n-pt-n
27	Fraser	AS 950.5 M	04/09/2008	98	68	76	23	3	14	N	n-n-n	n-pt-n
28	Fraser	AS 950.5 L	05/09/2008	98	70	81	24	4	13	N	n-n-n	n-pt-n
32	Fraser	AS 950.5 M	06/09/2008	98	62	71	22	n/a	16	N	n-n-n	n-pt-n
1	Nechako	SL 1.0 M	12/06/2008	97	89.5	102	33	9	n/a	N	n-n-n	n-pt-n
2	Nechako	SL 1.0 M	12/06/2008	97	94	108	37	11.5	n/a	Y	n-pt-n	n-pt-n
3	Nechako	SL 1.0 M	12/06/2008	2	137	152	54.5	40	n/a	Y	ft-pt-n	n-pt-n
4	Nechako	SL 1.0 M	12/06/2008	98	99.5	113	35	14	n/a	Y	n-pt-n	n-pt-n
5	Nechako	SL 1.0 M	12/06/2008	2	142	158	58	49	n/a	N	n-n-n	n-pt-rt
6	Nechako	SL 1.0 M	12/06/2008	98	62.5	69	24	3.5	n/a	N	n	n-n-n
7	Nechako	SL 1.0 M	13/06/2008	n/a	n/a	~60	n/a	n/a	n/a	n/a	n/a	n/a
8	Fraser	SL 831.7 L	07/08/2008	98	77	88.5	27	6	n/a	N	n-n-n	n-pt-n
9	Fraser	SL 831.3 R	07/08/2008	98	75	83	25	5.5	n/a	Y	ft-pt-n	n-pt-n
10	Fraser	SL 831.3 R	07/08/2008	97	95	105	32	10	n/a	Y	n-pt-n	n-pt-n
11	Fraser	SL 829.9 L	07/08/2008	98	78	87	25.5	6	n/a	Y	ft-pt-n	ft-pt-n

[2] Relates to numbers applied to white sturgeon capture locations on Map (Appendix 3)

[2]Map No.	Waterbody	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)
12	Fraser	SL 829.9 R	07/08/2008	4	184	206	67.5	86	n/a	Y	ft-pt-n	n-pt-n
13	Fraser	SL 916.9 L	10/08/2008	98	70	81.5	28	6	14	N	n-n-n	n-pt-n
14	Fraser	SL 916.9 L	10/08/2008	98	69	79	25	5	16	Y	n-pt-n	n-pt-n
15	Bowron	SL 2.0 L	10/08/2008	98	88.5	99	32	10	20	N	n-n-n	n-pt-n
29	Fraser	SL 950.5 M	05/09/2008	98	73	85	26	5	13	Y	ft-pt-n	ft-pt-n
30	Fraser	SL 948.1 L	05/09/2008	97	169	193	62	86	48	Y	n-pt-rt	n-pt-rt
31	Fraser	SL 943.0 L	05/09/2008	97	122	140	44	27	30	Y	n-pt-n	n-pt-n
33	Fraser	SL 950.5 L	06/09/2008	11	110.5	124	43.5	22	n/a	Y	n-pt-n	n-pt-rt
34	Fraser	SL 948.1 L	06/09/2008	97	177	195	67	90	n/a	N	n-n-n	n-pt-rt
31	Fraser	SL 948.1 L	06/09/2008	97	122	139	45	28	30	Y	n-pt-n	n-pt-n
35	Fraser	SL 882.8 L	09/09/2008	97	94.5	107	31	12	17	N	n-n-n	n-pt-rt
36	Fraser	SL 882.8 L	09/09/2008	98	75	86	25.5	6	17	N	n-n-n	n-pt-n
37	Fraser	SL 881.0 R	09/09/2008	97	91	103.5	33.5	9	19	N	n-n-n	n-pt-n
38	Fraser	SL 881.0 R	09/09/2008	97	179	199	62.5	58	50	Y	n-pt-n	n-pt-n
39	Fraser	SL 855.0 L	10/09/2008	97	110	125	43	22	21	Y	n-pt-rt	n-pt-rt
8	Fraser	SL 863.7 R	11/09/2008	98	78	91	27	6	n/a	Y	n-pt-n	n-pt-n
40	Fraser	SL 831.2 L	13/09/2008	98	70.5	81.5	25.5	4	n/a	N	n-n-n	n-pt-n
41	Fraser	SL 820.5 L	13/09/2008	98	76.5	87	27	5	n/a	Y	n-pt-n	n-pt(2)-n
42	Fraser	SL 948.3 M	20/09/2008	2	139	156	53.5	45	21	Y	n-n-n	n-pt-rt
43	Fraser	SL 948.2 M	20/09/2008	n/a	137	155	57	40	48	Y	n-?-rt	n-pt-rt
44	Fraser	SL 831.2 L	26/09/2008	n/a	119	135.5	47	28	n/a	Y	n-?-rt	n-?-rt
45	Fraser	SL 830.0 L	26/09/2008	98	66	73.5	23.5	3	11	N	n-n-n	n-pt-n
46	Fraser	SL 830.0 L	26/09/2008	98	78	87	26	6	14	Y?	n-?-n	n-pt-n

Table 2. Summary of fish bi-captured via setline (SL) and angling (AS/AB) during sampling for white sturgeon on the Fraser River in 2008.

Date	Station	Species	Total Length (cm)	Fate	Hook Size
12/06/2008	SL 1.0 L	NSC	59	L	Na
13/06/2008	SL 1.0 L	NSC	37	L	Na
30/07/2008	SL 1.0 L	NSC	33	L	Na
17/09/2008	SL 741.0 R	NSC	31.9	L	12/0
18/09/2008	AS 921.5 L	NSC	42.5	L	6/0
19/09/2008	AS 950.5 MR	BB	34	L	6/0
19/09/2008	AS 950.5 MR	BT	32	L	6/0
19/09/2008	AS 950.5 MR	NSC	13	L	6/0
19/09/2008	SL 919.3 R	BT	59	L	14/0
19/09/2008	SL 918.1 R	NSC	57	L	Na
20/09/2008	AS 950.5 M	NSC	30	L	6/0
02/10/2008	AS 951.0 M	BB	84	D	6/0
02/10/2008	AS 951.0 M	BT	43	D	7/0
02/10/2008	AS 951.0 M	BT	35	D	7/0
02/10/2008	AS 951.0 M	BT	40	D	7/0
02/10/2008	AS 951.0 M	BT	45	L	6/0
02/10/2008	AS 951.0 M	BT	37	L	6/0
03/10/2008	AS 951.0 M	BB	54	L	6/0
03/10/2008	AS 951.0 M	BB	72	L	6/0
03/10/2008	AS 951.0 M	BB	61	L	6/0

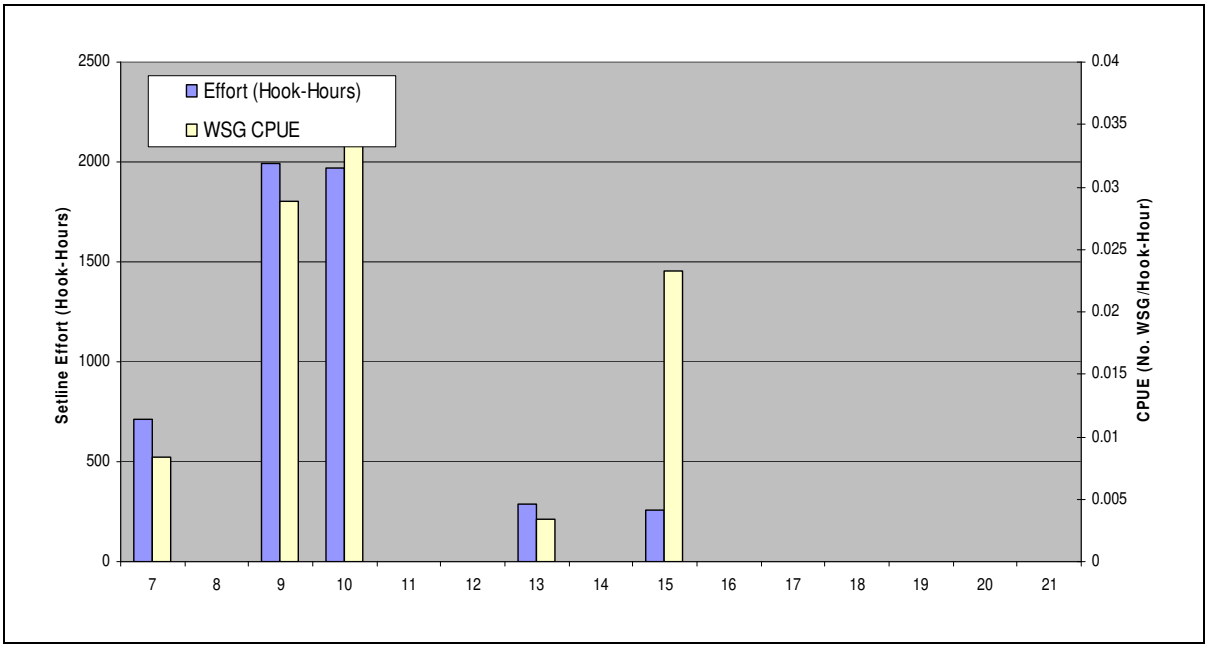

Figure 6. Setline effort and resulting WSG CPUE applied over the range of water temperatures recorded at the time of gear deployment.

Telemetry

During 2008, radio tags were implanted in 5 white sturgeon during sampling in June to October (see Appendix 2 for capture locations and frequency/code information).

Four over-flights were conducted (one fixed-wing and 3 helicopter) from May to November 24, 2008 in an attempt to determine fish movements since the time of their tagging and identify potential sites. The May 8, 2008 helicopter survey covered the entire study area. The fixed wing flight (October 1, 2008) commenced from rkm 954.0 (Grand Canyon) to rkm 893 (confluence of Nechako and Fraser). One of the 5 tags deployed in 2008 was detected (Table 3). This was the first attempt at telemetry in the upper Fraser utilizing a fixed-wing craft and it was not deemed to be feasible give the topography of the upper Fraser River area. A second helicopter over-flight on November 12, 2008 commenced at Hungary Creek and ended at Stone Creek. Eight tags were detected on the flight, 2 of them deployed in 2008 (Table 3). An additional helicopter flight on November 24, 2008 commenced at Goat Creek and ended at the confluence of the Nechako and Fraser rivers. Seven tags were detected on the flight, 3 of them deployed in 2008 (Table 3).

Ice cover combined with the depths of some of the study area's suspected habitats likely explains the ability to detect less than half of the total number of radio tags now deployed in the fall flights, although it was confirmed (in the spring of 2009 – as this report was being compiled) that at least 3 of the sturgeon radio tagged in the upper Fraser were detected a substantial distance up the Nechako River, in the most commonly utilized site on that system.

Telemetry work completed in 2008 provided considerable information regarding spring habitats/areas occupied, suggestion potential proximity to staging and spawning areas. It also confirmed the importance of several areas as sites.

Table 3. Information relating to 16 radio tags detected on telemetry monitoring flights completed on May 8, October 1, and November 12 and 24, 2008.

Flight Date	Tag Data		Location Detected (UTM)		Originally Tagged; 2008 Flight comments
	Frequency	Code	E	N	
08-May-08	148.400	50	587559	5979319	~949.2 Longworth Canyon
08-May-08	148.400	51	580344	5986313	~928 Below Longworth Canyon
08-May-08	148.420	54	563566	6003379	~896.3 McGregor confluence area
08-May-08	148.420	53	558529	6005645	~890.7 McGregor confluence area
08-May-08	148.420	51	588245	5978910	~950.2 Longworth Canyon
08-May-08	148.400	52	522801	5980592	~810
08-May-08	148.400	53	563566	6003379	~896.3 McGregor confluence area
01-Oct-08	148.380	56	585789	5986806	Oct 2008: start of Grand Canyon
12-Nov-08	148.380	52	562350	6003580	Fraser River rkm 828.8 (Sept 9/08); Nov 12/08: just d/s McGregor Confluence
12-Nov-08	148.380	54	560775	6004400	Nechako River rkm 1.0 (June 12/08); Nov 12/08: d/s from McGregor confluence
12-Nov-08	148.380	55	560775	6004400	Fraser River rkm 880.5 (Oct 18/07); Nov 12/08: d/s from McGregor confluence
12-Nov-08	148.380	59	560775	6004400	Fraser River rkm 948.3 (Sept 20/08); Nov 12/08: d/s from McGregor confluence
12-Nov-08	148.400	53	556000	6007275	Fraser River rkm 888.1 (Fall 2007); Nov 12/08: u/s of Herring Creek
12-Nov-08	148.400	54	588550	5975600	Fraser River rkm 883.6 (Oct 4/07); Nov 12/08: confluence of Hungry Creek
12-Nov-08	148.400	55	525000	5988200	Fraser River rkm 950.5 (Sept 6/08); Nov 12/08: d/s Salmon River
12-Nov-08	148.420	53	558750	6005550	Fraser River rkm 884.1 (Oct 5/07); Nov 12/08: u/s of Herring Creek
24-Nov-08	148.320	101	524116	5886601	Nov 24/08: u/s Cottonwood - Middle Fraser Tag?
24-Nov-08	148.380	51	601167	5971651	Fraser River rkm 948.1 (Sept 6/08); Nov 24/08: just d/s Driscoll Creek
24-Nov-08	148.380	52	562350	6003580	Fraser River rkm 828.8 (Sept 9/08);Nov 24/08: just d/s McGregor confluence
24-Nov-08	148.380	54			Nechako River rkm 1.0 (June 12/08); Nov 24/08: on McGregor at confluence of Fraser
24-Nov-08	148.380	55	525518	5987728	Fraser River rkm 881 (Fall 2007); Nov 24/08: just u/s Shelly Reserve
24-Nov-08	148.380	59	561046	6004480	Fraser River rkm 948.3 (Sept 20/08); Nov 24/08: ~2km d/s McGregor confluence
24-Nov-08	148.400	53	555797	6007839	Fraser River rkm 884.0 (Fall 2007); Nov 24/08: at Herring Creek confluence
24-Nov-08	148.420	53	561046	6004480	Fraser River rkm 881.0 (Fall 2007); Nov 24/08: ~2km d/s McGregor confluence

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 2008 is relatively small, it does provide an opportunity to compare critical components of this recent data (including 2007) with the information developed regarding the stock from the previous sampling period (1999-2001).

The population estimate produced 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 2008 (and 2007) yields a population estimate of 685 (+/- 51 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. Estimating the population size assuming a 10% reduction in number of tagged individuals within the population, or considering only 2008 data, generates estimates that 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 underrepresented within the catch and within this population estimate.

The size distribution (total length) of the white sturgeon catch from 2007-2008 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 2007-2008 is compared with the combined catch from 1999-2001 in Figure 8 below. The distribution of ages within catches appears similar between the two periods. Differences apparent are likely a reflection of the small sample size from 2007-2008 and the large range of ages that are present in the population. Also, the fact that less effort was applied in 2007 and 2008 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.

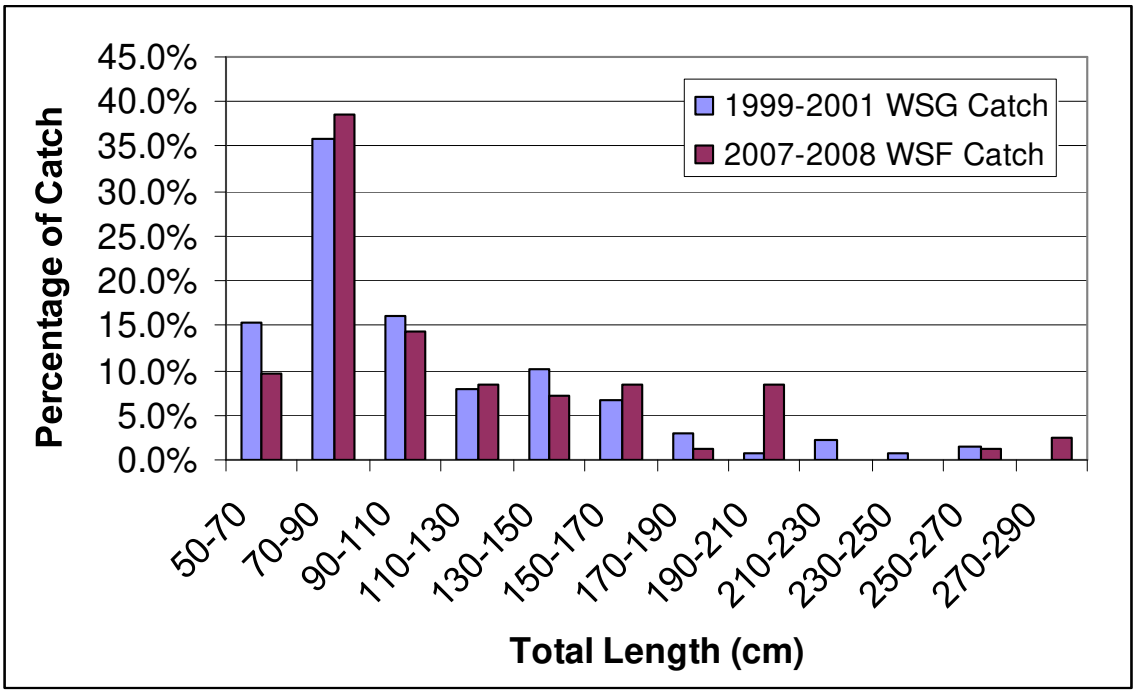

Figure 7. Comparison of the size range (total length) of white sturgeon setlined and angled catches from the upper Fraser from 1999-2001 (combined n=137 individuals) and 2007-2008 (combined n=83 individuals).

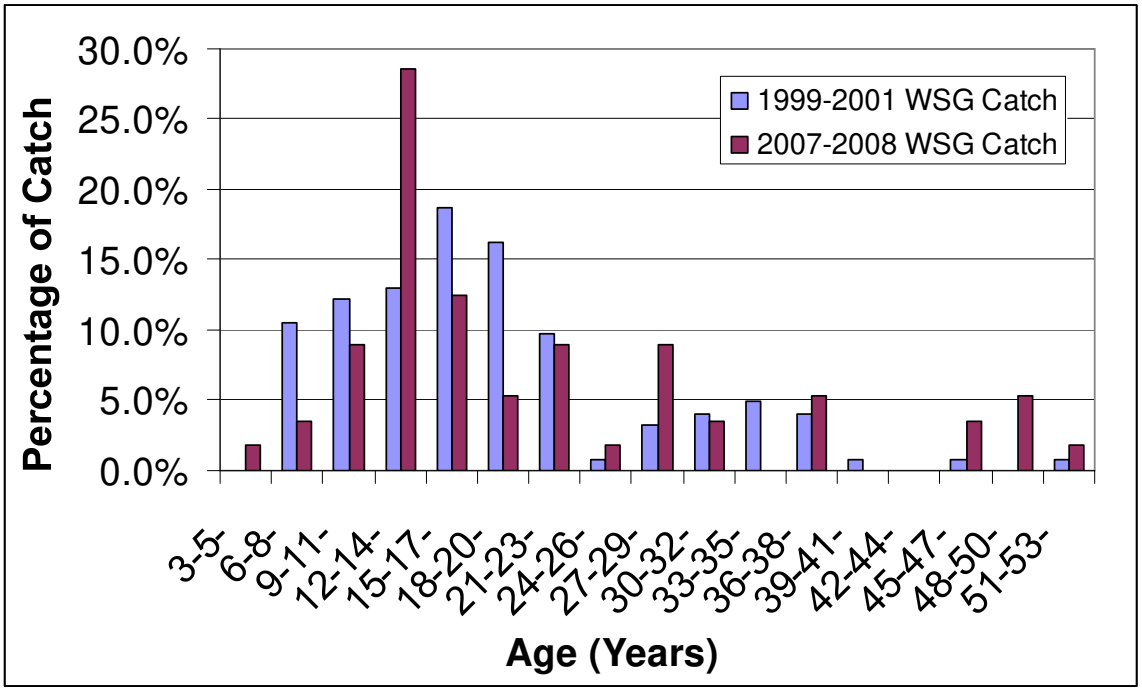

Figure 8. Comparison of the distribution of age classes of white sturgeon catches setlined and angled from the upper Fraser from 1999-2001 (combined n=123 individuals) and 2007-2008 n=56 individuals). Only those fish definitively assigned an age between 4 and 53 years are presented.

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. The 2 over-flights conducted in November 2008 also indicated several tagged fish holding in the vicinity of the McGregor River confluence, suggesting some use of the area for over-wintering. Information generated from the telemetry portion of this study has been heavily utilized for the purposes of identifying proposed Critical Habitats for the upper Fraser white sturgeon stock.

Capacity Development

Capacity development efforts were largely successful. Up to three Lheidli T'enneh personnel received experience through this project and one received 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 data from 2007 and 2008) 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 over-wintering. Areas in the vicinity of the McGregor River confluence with the Fraser River appear to attract some over-wintering use as well as spring use. Data generated through this study has been heavily utilized for the Critical Habitat identification process that has been ongoing through 2008 and 2009.

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. Activities in 2009 and 2010 should focus on an intensive regime of telemetry throughout key portions of the year.
    a. Boat-based telemetry surveys should be attempted to determine their effectiveness in this study area – and if they are, any opportunities to achieve the cost efficiencies relative to helicopter use.
2. Additional sampling and tagging should be conducted to apply additional (remaining) radio tags to increase the sample size of adult fish available for monitoring over the next 3 years.
    a. 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. Radio tag frequencies from the upper Fraser should be incorporated into Nechako and mid-Fraser monitoring activities, and vice versa.
4. 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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