FISHERY RESEARCH

KOOTENAI RIVER WHITE STURGEON SPAWNING AND RECRUITMENT EVALUATION

ANNUAL PROGRESS REPORT
May 1, 2009 — April 30, 2010

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Kootenai River White Sturgeon Spawning and Recruitment Evaluation

Project Progress Report

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By

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ABSTRACT

The objective of this research was to determine the environmental requirements for successful spawning and recruitment of the Kootenai River white sturgeon *Acipenser transmontanus* population. Annual tasks include monitoring and evaluating the response of various life stages of Kootenai River white sturgeon to mitigation flows supplied by the U.S. Army Corps of Engineers (Corps). Inflow into Lake Koocanusa peaked June 1, 2009 at 1,328 m^3/s and outflow discharge from Libby Dam peaked June 13 at 777 m^3/s for four days, then reduced incrementally to 198 m^3/s by July 13 and remained for remainder of the summer. By mid-May, temperatures were above 7°C, and they continued increasing through the spawning season. Temperatures were at 10°C by the end of the spawning season and by late July; water temperatures reached their maximum of 20.0°C. Fourteen adult white sturgeon were tagged in spring 2009, and 17 of the current or previously tagged adult sturgeon exhibited a spawning migration to the lower end of the spawning reach at lower Shortys Island near river kilometer (rkm) 228.5 in 2009. Twelve (71%) of the migrating adults were recorded at rkm 240 just below Deep Creek, and seven (41%) of the migrating adults went upstream as far as rkm 244.5 (Ambush Rock). Only two of the tagged migrating adult sturgeon moved upstream of Bonners Ferry into the braided reach in 2009. We deployed substrate mats to evaluate the temporal and spatial extent of spawning events sampling four different geographic sections (rkm 230.0–245.7) for 1,139 mat days between May 11 and July 6 and collected 111 eggs. The first eggs were collected on May 20, and the last eggs were collected on June 24. The highest catch came from the Shortys Island reach. Based on the stages of the 111 eggs collected, 50 percent of the eggs may have been viable, and we estimated white sturgeon spawned during at least nine days. To address incubation and larval rearing habitat, we released over 801,000 free embryos at five cobble and gravel sites in Idaho and Montana. The first embryos were released on June 18 and the last on July 6, and surface water temperatures during the releases ranged from 10 to 15°C. We sampled for white sturgeon embryos and larvae between June 30 and August 4 and spent 391 h sampling below embryo release sites at rkm 248.1 and 249.7. We sampled for juvenile white sturgeon with gillnets between July and September at 11 sites in Idaho and captured 581 hatchery reared juvenile white sturgeon with 368 h of effort. Ferry Island (rkm 205.0) had the highest catch with 21 percent of the individuals as well as the highest catch rate with 2.8 fish per net h. Ten wild juvenile white sturgeon were collected in Idaho and Canadian sections of the Kootenai River in 2009. Eight different year classes were represented from 1992 to 2006.

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INTRODUCTION

The Kootenai River white sturgeon *Acipenser transmontanus* population is comprised mainly of old-aged adults, and significant recruitment has not occurred since the 1970s. Although the specific causes of recruitment failure remain unclear, years of study suggest that mortality occurs between embryo and larval stages. Over a decade of artificial substrate mat sampling has indicated that from nine to 20 spawning events occur annually, and many viable embryos are produced (Paragamian and Wakkinen 2002). Most of the post-Libby Dam spawning events have been documented in areas where substrate conditions appear to be unsuitable for egg incubation and larval rearing (Paragamian et al. 2001), and only one larvae and very few wild juveniles have been collected despite years of intensive sampling. However, recent bathymetry, sediment transport, shear stress, and velocity studies suggest Libby Dam era flows are unable to scour pockets of existing cobbles and gravels where white sturgeon presently spawn (McDonald et al. 2006; Paragamian et al. 2009). Research to date suggests that egg and/or larval suffocation, predation, and/or other mortality factors associated with these early life stages contribute to persistent recruitment failure (Kock et al. 2006). Hatchery-reared juveniles (as young as nine months of age at release) have average annual growth rates of 6.4 cm per year, and second year survival rates exceed 90% (Ireland et al. 2002). Good growth and survival by hatchery juveniles released at a minimum of age one further suggests that mortality occurs at the egg or larval stage. In an effort to improve conditions for Kootenai River white sturgeon (hereafter white sturgeon) embryos and larvae, Libby Dam has been operated to provide increased spring discharge (>630 m^3/s for 42 d) since 1991.

GOAL

1. To recover the Kootenai River white sturgeon population to a level that is self-sustaining and can provide sportfishing opportunity to the public.

OBJECTIVE

1. To have suitable spawning, rearing, and incubation habitat for white sturgeon for successful wild recruitment. The main task of this program is to monitor the response of all life stages of white sturgeon to mitigative flows from Libby Dam provided by the U.S. Army Corps of Engineers (Corps).

STUDY SITE

The Kootenai River originates in Kootenay National Park, British Columbia (BC), Canada. The river flows south into Montana and turns northwest at Jennings, near the site of Libby Dam, at river kilometer (rkm) 352.4 (Figure 1). Kootenai Falls, 42 rkm downstream of Libby Dam, may be an impassable barrier to white sturgeon. As the river flows through the northeast corner of Idaho, there is a gradient transition at Bonners Ferry. Upstream from Bonners Ferry, the channel has an average gradient of 0.6 m/km, and the velocities are often higher than 0.8 m/s. Downstream from Bonners Ferry, the river slows to velocities typically less than 0.4 m/s (average gradient 0.02 m/km), and the channel deepens as the river meanders north through the Kootenai River Valley. The river returns to BC at rkm 170.0 and enters the South Arm of Kootenay Lake at rkm 120.0. The river leaves the lake through the West Arm of Kootenay Lake and flows to its confluence with the Columbia River at Castlegar, BC. A natural

barrier at Bonnington Falls (now a series of four dams) has isolated the Kootenai River white sturgeon from other populations in the Columbia River basin for approximately 10,000 years (Northcote 1973). The basin drains an area of 49,987 km^2 (Bonde and Bush 1975). Regulation of the Kootenai River following the construction of Libby Dam in 1974 changed the natural hydrograph and temperatures of the river (Partridge 1983). Spring flows were reduced to about one third of pre-dam levels, and flows during winter are now three to four times higher than under a natural flow regime (Figure 2). Post-dam temperatures are now cooler in summer and warmer in winter.

METHODS

Water Levels, Discharge, and River Temperature

On May 15, 2009, United States Fish and Wildlife Service (USFWS) in cooperation with members of the Kootenai River White Sturgeon Recovery Team (KRWSRT) proposed to the Corps a System Operational Request (SOR) FWS #1 (see http://www.nwd-wc.usace.army.mil/tmt/sor/2009/2009-FWS1.pdf) while operating under strict variable flow (VARQ) flood control guidelines. Under VARQ, higher, more stable summer discharges are provided to the extent possible with the available water to meet white sturgeon and bull trout ESA responsibilities (USFWS 2006) and to attempt to mimic a more natural river hydrograph. The intent was to provide spawning and incubation flows to meet attributes for depth, velocity, and temperature in the Kootenai River as defined in the 2006 Biological Opinion RPA for Kootenai River white sturgeon (USFWS 2006) and improve conditions for spawning sturgeon to migrate upstream of Bonners Ferry into the braided reach (above rkm 246). We obtained Kootenai River stage, discharge, and water temperature data at Bonners Ferry from the Corps (Figure 3).

Discharges during white sturgeon spawning in 2009 were expected to be near normal because snowpack in the basin was slightly below 100% of normal (see http://www.mt.nrcs.usda.gov/news/releases/aprilsnow09.html).

Adult White Sturgeon Sampling

Adult white sturgeon were collected by angling or setlines from February through September 2009 following the methods of Paragamian et al. (1996). From February through April, most of the sampling occurred in the staging areas at rkm 205 and 215. These areas are backwater habitats and have depths in excess of 20 m and low current velocities (<0.05 m/s). Later in the spring, upstream areas closer to the spawning locations were sampled more frequently (near rkm 229). Fall 2009 sampling occurred in the spring staging areas and near the Kootenai River delta at rkm 120. We biopsied adult sturgeon to determine sex and level of maturity (Conte et al. 1988; Van Eenennaam and Doroshov 1988). Male and female white sturgeon expected to spawn in 2009 or later were tagged with Vemco model V16 sonic transmitters and released (see telemetry section). Some adult female white sturgeon expected to spawn in 2009 were transported to the Kootenai Tribe of Idaho (KTOI) Hatchery for hatchery production. Gametes from ripe male white sturgeon were collected in the field by extraction through the urogenital opening with a syringe. Gametes were placed in a Ziploc® bag, transported to the KTOI Hatchery, and stored in a refrigerator. White sturgeon sperm is viable for only 48 hours after extraction, so we did not collect male gametes until a female was initially induced to ovulate.

Adult White Sturgeon Telemetry

Monitoring daily and seasonal movements of white sturgeon throughout the Kootenai River/Lake system using telemetry continued to be a high priority of this investigation. From 2003-2009 we deployed an array of passive Vemco model VR2 sonic receivers located from rkm 18.0, near the mouth of the Lardeau River in Kootenay Lake, BC, upstream to rkm 275.5, just below the Montana/Idaho border (Figure 4). We deployed receivers in areas where fish pass through but do not usually hold for long periods to avoid redundant data collection. Most sites were below river bends or along straight reaches that allow for good signal reception but are reasonably free of drifting debris and at low risk of potential vandalism. Each receiver was tethered to a float to keep the hydrophone off the substrate, anchored to a cement block, and chained to the riverbank. Receivers were downloaded in late winter, during the spawning season, and in the fall by connecting proprietary hardware (VR2PC) through a computer serial port to an external port on the receiver. Data were transferred through the serial port to proprietary software for analysis. This array allows continuous monitoring of sturgeon movements within the Kootenai river system and into Kootenay Lake.

Artificial Substrate Mat Sampling

Artificial substrate mats were used to document white sturgeon spawning in the Kootenai River (McCabe and Beckman 1990). The main purpose of this monitoring was to evaluate temporal and spatial distribution of spawning events in the Kootenai River. Mats were deployed in four general areas and were checked two or three times per week. All eggs were removed from mats each day and when eggs were found, a new mat was deployed in the same location to remove any doubts if eggs captured the next day were new or missed from the previous day. Eggs were stored in formalin and brought back to the laboratory at the field station for analysis. All eggs were staged by viewing at 120X magnification under a dissecting microscope to estimate spawn date by the methods described by Beer (1981).

Free Embryo Releases and Larval Sampling

Suitable incubation and larval rearing habitat is critical for successful recruitment, and this habitat is limited in the post-Libby Dam spawning reach (Paragamian et al. 2002). To address these recruitment issues, we released one- to four-day-old embryos (free embryos) at eight sites in 2009 to determine drift rates and survival. All eight of these sites contain substrate and flow conditions that are similar to those used by successfully reproducing and recruiting white sturgeon populations in the basin (Parsley et al. 1993; USFWS 2006). Sampling for drifting free embryos and larvae was performed using 600 *um* plankton nets. Long-term survival will be evaluated using gill nets when potential recruits become vulnerable to this gear type in three years.

Larval white sturgeon sampling was conducted using D-ring plankton nets fished on the surface, in the water column, and on the bottom of the Kootenai River. Sampling began June 30 and continued until August 4. Nets were fished passively in the river current with a boat anchored in the thalweg. Lead weights ranging from 2.7 to 9.1 kg were attached to mid-water column and bottom nets in order to reach desired depths. A diver's depth watch was attached to the mid-column nets to record specific depth within the water column. A General Oceanics model 2030R flow meter was attached to the mouth of each net to record rotor revolutions, which was used along with net diameter and sampling time to give the total volume of water sampled. In addition to the standard boat sampling, later in the season after river discharge and floating debris decreased, 0.5 m nets and D-ring nets were anchored with 100 kg cement blocks

in shallow water, fished overnight, and checked the following morning. Larval sampling took place at various times of day and all sampling was conducted in Webber slough near rkm 249.7.

Juvenile White Sturgeon Sampling

We used weighted multifilament gill nets with 1.3, 1.9, 2.5, 3.8, 5.1, 6.4, and 7.6 cm stretch mesh to sample juvenile and young-of-the-year (YOY) sturgeon. The purpose of this sampling was to evaluate natural recruitment, growth, and mortality rates of marked hatchery juveniles, as well as distribution and densities of both hatchery and wild juveniles. Sampling was conducted from July 16 through September 19, 2009 and followed the methodology of Paragamian et al. (1996). IDFG crews sampled 11 different sites between rkm 174.2 and 244.5. Gill nets were set during the daytime and checked every hour to reduce mortality and all fish were released alive.

From 1992 to 2004, prior to release, each fish received a passive integrated transponder (PIT) tag and a pattern of scutes was removed at the KTOI Hatchery, which provided a unique mark for each brood year. In 2005 and 2006, most (92%) of the released juvenile white sturgeon were not PIT tagged, although scutes were removed from each fish released. All hatchery reared juvenile sturgeon released in the Kootenai River after 2007 were PIT tagged and had scutes removed in a pattern unique to the brood year and rearing facility. We recorded fork (FL) and total length (TL), weight, PIT tag numbers, fish condition, and scute removal patterns (to determine release date and location of hatchery fish) for each sampled fish. Pectoral fin ray sections were removed from all wild juvenile white sturgeon for age determination. British Columbia Ministry of Environment (BCME) crews sampled 12 different sites from Kootenay Lake, BC upriver to rkm 165.0 and followed procedures outlined above.

RESULTS

Water Levels, Discharge, and River Temperature

On June 1, 2009, Lake Koocanusa inflows peaked at 1,328 m^3/s (46,900 ft^3/s) and the reservoir filled to elevation 745 m (2,443 feet) by August 25. Full reservoir elevation is 750 m (2459 ft). Libby Dam outflow peaked June 13 at 770 m^3/s (27,200 ft^3/s) for four days, and then was reduced incrementally from 556 m^3/s (20,000 ft^3/s) on June 20 to 198 m^3/s (7,000 ft^3/s) by July 13. Discharge was held at 198 m^3/s (7,000 ft^3/s) throughout the summer before reducing slightly by November 1 (Figure 3).

Water temperatures measured at Bonners Ferry in 2009 remained mild throughout the winter period and began increasing slowly in mid-April to above 5°C. By early June, temperatures were above 7°C, and they continued increasing through the spawning season (Figure 3). Temperatures were at or above 10°C by the end of the spawning season, and by late July water temperatures reached their maximum of 20.0°C.

Adult White Sturgeon Sampling

Between February 23 and September 30, 2009, IDFG and BCME crews expended more than 6,160 h to capture 17 adult white sturgeon by angling and 130 adult white sturgeon with setlines (Table 1). Additionally, three adult sturgeon were collected in gillnets while sampling for juvenile sturgeon. The adult sturgeon catch per unit effort (CPUE) was 0.123 fish per rod h for angling and 0.021 fish per setline h for setlines (Table 1). One hundred thirty (89%) of the 147

adult white sturgeon collected were recaptures from previous years (Table 1). Twenty-eight adult white sturgeon were biopsied by IDFG and BCME during adult sampling: 14 were females, 12 were males, and sex could not be determined from two individuals. Eight of the 14 females biopsied were stage F4 (mature eggs), two were stage F3 (developing eggs), three were F2 (early developing eggs) and specific stage could not be determined from the remaining females. Three of the biopsied males were stage M8 (mature testes), one of the males had flowing sperm, seven of the males had nonreproductive testes at the time of capture, and specific stage could not be determined from the remaining males. KTOI Hatchery personnel also captured and biopsied adult white sturgeon for their propagation operations; Lewandowski (2009) provides adult capture information.

Adult White Sturgeon Telemetry

Adult white sturgeon movements were analyzed after downloading location data from 61 stationary Vemco VR2 sonic receivers (Figure 4). Fourteen adult white sturgeon were tagged with Vemco sonic transmitters in spring 2009, four were tagged in fall 2009, and 87 adult white sturgeon had active Vemco sonic transmitters from previous years or were not expected to spawn in spring 2009 (Table 2).

Seventeen of the tagged sample of adult white sturgeon (six females) were in spawning condition and exhibited a spawning migration in 2009. A spawning migration was defined by fish observed in spawning condition in 2009 or expected to be in spawning condition based on previous biopsies, which moved upstream to at least the lower end of the spawning reach (rkm 228.0). Fifteen (88%) of these tagged adults moved upstream as far as rkm 235.2. Twelve (71%) of the migrating adults were recorded at rkm 240 just below Deep Creek, and seven (41%) of the migrating adults went upstream as far as rkm 244.5 (Ambush Rock). Additionally, only two of the tagged migrating adult sturgeon went above the Hwy. 95 Bridge in Bonners Ferry into the braided reach in 2009.

Appendix 1 shows the movement extents of six female white sturgeon that moved to Ambush Rock near Bonners Ferry (rkm 244.5) in 2009. Some of these individuals were tagged in previous years.

Artificial Substrate Mat Sampling

We deployed substrate mats in 2009 to evaluate the temporal and spatial extent of spawning events of white sturgeon. We sampled four different geographic river sections (Table 3) within the traditional post-Libby Dam spawning reach (rkm 231.0–250.5) for 1,149 mat days between May 11 and July 6 and collected 111 eggs (Table 3). The highest catch came from the Shortys Island reach (rkm 231.0, Table 3). The first eggs were collected on May 20, and the last eggs were collected on June 24. Most of the eggs were stage 12 (too early in development to determine if fertilization occurred), but the stages ranged from 12 to 24 (Beer 1981). Fifty-six eggs were dead, broken, or otherwise could not be staged (Table 4). Based on the stages of the 111 eggs collected, 50 percent of the eggs may have been viable, and based on the stages of the viable eggs, we estimate that white sturgeon spawned during at least 12 days in 2009 (Table 4).

Free Embryo Releases and Larval Sampling

Over 801,000 free embryos (one- to four-day-old embryos) were released at eight sites in Idaho and Montana in 2009 (Appendix 2). The first embryos were released on June 18 and the last on July 6. Surface water temperatures during the releases ranged from 10 to 15°C.

In 2009, we sampled for white sturgeon embryos and larvae between June 30 and August 4 (Table 5). We spent 391 h sampling at two areas, rkm 248.1 and rkm 249.7 (Table 5). The greatest effort was expended at rkm 249.7 (306 h), and 137 fish larvae were collected.

Most of the sampling effort was with the D-ring nets fished on the bottom or mid-water column, and the highest catch came from these nets (CPUE 0.37 and 0.36 fish/net h respectively). There were no embryos or larvae collected using the surface nets. Additionally, most of the larval fish were collected in late July, but at least some larvae were collected throughout the sampling period. Most of the catch was larval *Catostomidae*.

Juvenile White Sturgeon Sampling

Beginning in 1990 and continuing to the present, the KTOI hatchery has released over 170,000 juvenile white sturgeon (Appendices 3 and 4). We sampled for juvenile white sturgeon with gillnets between July and September 2009 in Idaho and Canadian sections of the Kootenai River. In Idaho, we sampled 11 sites and captured 581 juvenile white sturgeon with 368 h of effort (Table 6). The Ferry Island area (rkm 205.0) had the highest catch with 21 percent of the individuals as well as the highest catch rates of 2.8 fish per net hour. Rock Creek (rkm 215) also was well represented in the catch and had similarly high catch rates (Table 6). The catch was well distributed among the 11 sites, and juvenile white sturgeon were collected throughout the river. One hundred seventy-two of the individuals were collected in the 2.5 cm gillnets, but the highest catch rates were in the 6.4 cm nets (Table 7). The average fork and total length of the hatchery reared juvenile white sturgeon was 37.9 cm FL (n = 570) and 44.2 cm TL (n = 569), and weight of juvenile sturgeon averaged 0.44 kg (n = 557) (Table 8). Appendix 3 lists the details on sizes and numbers and recapture rates of tagged and/or measured hatchery juvenile white sturgeon released in the Kootenai River since 1990. Appendix 4 provides the numbers of untagged and/or not measured juvenile hatchery releases through fall 2009. Appendix 5 provides the specific growth parameters of hatchery-released juveniles captured in 2009.

BCME crews sampled 12 sites and captured 444 juveniles and three adults with 225 net h effort and an overall catch rate of 1.98 fish per net h. Capture locations ranged from Kootenay Lake upriver to rkm 165.0, just downstream of the Idaho-Canada border.

Ten wild juvenile white sturgeon were captured while gill netting in Canada and Idaho in 2009 (Table 9). The TL of these ten individuals ranged from 35.0 to 121.0 cm, and weights ranged from 0.15 to 7.6 kg (Table 9). Eight different year classes between 1992 and 2006 were represented in the 2009 sample (Table 9). Appendix 6 shows the year class assignments from a sample of the wild juvenile white sturgeon collected between 1977 and 2009 that could be aged. Appendix 7 shows the number of wild juvenile white sturgeon collected annually from 1977 to 2009.

DISCUSSION

In 2009, only two of the 17 tagged adult sturgeon in spawning condition migrated above Bonners Ferry into the braided reach. Although we do not know what normal spawning movements, behaviors, and extents are supposed to look like for this population, the movements of the six spawning females (Appendix 1) appears strange. Rapid upstream and downstream movements of these adults, possibly resulting from local river temperature fluctuations (Figure 3), seem to be a waste energetically, especially at a time when presumably the females would be devoting all necessary calories to the developing embryos. Although this rapid upstream and downstream movement has been previously observed in this population, it suggests we still have a lot to learn in terms of providing conditions from Libby Dam that maximize upstream movement extent and duration. Controlling Kootenai River white sturgeon spring movement behavior is a difficult task, and there may be several variables responsible for their behaviors that we currently do not know or measure.

Finding successful spawning habitats and understanding early life history requirements are still unidentified in our understanding of Kootenai River white sturgeon. The initial embryo releases in 2005 and 2006 (Rust and Wakkinen 2007; Rust et al. 2007) were an important first step in selecting sites, determining logistics, and developing sampling techniques, and this began focusing our recovery efforts on early life history studies. However, with spawning stock limitations and hatchery production still having priority, other early life history studies may be a better use of a limited resource. Beginning in 2007 and continuing in 2009, we conducted a project to release one- to four-day-old embryos (free embryos) at sites that appear suitable for early life stage survival and rearing. These embryos are hatched in the KTOI facility and released at one to four days post-hatch over sites comprised of gravel and cobble with water velocities that exceed 1 m/s. Unfortunately, we have not had any success to date with this program and have had no measurable increased recruitment to our gill net catch. Since this study does not jeopardize hatchery production, it should be continued until gill net sampling has continued long enough to successfully judge the program's effectiveness. However, if our monitoring techniques continue to fail to measure any successes with this program, other efforts including later stage larval release should be considered.

RECOMMENDATIONS

1. As soon as water temperature reaches 7°C after April 1, provide flows of 425 m^3/s at Bonners Ferry with stable or increasing temperature using the selective withdrawal gate system at Libby Dam to initiate and maintain spawning migration of Kootenai River white sturgeon.

2. Provide minimum flows of 630 m^3/s for 42 d (as prescribed for spawning and rearing in the Kootenai River White Sturgeon Recovery Plan, USFWS 2006) at Bonners Ferry once water temperatures of 8-10°C are reached to stimulate spawning and optimize egg/larval survival of Kootenai River white sturgeon.

3. Release one- to four-day-old free embryos at several sites in the canyon or braided reaches to evaluate drift, distribution, and survival over gravel and cobble substrates.

4. Continue to develop techniques for sampling sturgeon eggs in the braided and canyon reaches above Bonners Ferry.

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Table 1. Sampling effort and number of adult and juvenile white sturgeon caught by the Idaho Department of Fish and Game alone or with Kootenai Tribe of Idaho or British Columbia Ministry of the Environment personnel in the Kootenai River, Idaho, and Kootenay Delta, B.C., February 23 to September 30, 2009.

	Hours of effort	Number of juvenile sturgeon caught (No. of recaptures)	Number of adult sturgeon caught (No. of recaptures)	Juvenile CPUE (fish/h)	Adult CPUE (fish/h)
Gillnet[a]	593	1025(609)	3(2)	1.7	0.005
Angling[b, c]	73	4(4)	13(12)	0.04	0.12
Setline[d]	6054	6(6)	130(115)	0.001	0.02
Total	6720	1034(619)	146(129)		

[a] Includes 225.1 hours sampling by BCE for IDFG from July 16–-August 26, 2009. There were 444 juveniles (270 recaptures) and three adults (two recaptures) caught during this period and included in the totals above.

[b] Includes 8 hours sampling by BCE for IDFG on September 23, 2009 at Kootenay Delta. Five adults (three recaptures) and two juveniles (both recaptures) were caught and included in the above totals. Three adults (two recaptures) were caught by BCE and one new adult caught by IDFG during spring angling not included in the above totals and for which there was no effort recorded.

[c] An additional 116 adults (89 recaptures) and six juveniles (five recaptures) during KTOI spring broodstock angling efforts from March 2–-July 1, 2009, eight adults (five recaptures) caught on July 15, 2009 and two adults (both recaptures) caught on September 5 and 8, 2009 during KTOI angling efforts on Kootenay Delta for which no effort was recorded.

[d] Based on 24-hour sets.

Table 2. Vital statistics from Kootenai River adult white sturgeon marked with Vemco sonic tags as part of a telemetry study, Kootenai River, Idaho, 2003-2009.

Fish #	Tag year	Sex/Development Stage	Release Date	Release RKM	Fork Length (cm)	Total Length (cm)	Weight (kg)	Vemco Code
2117	2003	F-2	8/26/03	119.0	173.0	195.5	37.8	52
1471	2003	na	9/8/03	19.0	181.0	205.0	45.0	51
22212	2004	F-3[a]	9/7/04	121.0	204.0	229.0	78.8	259
22214	2004	M-8	9/7/04	121.0	179.5	203.0	48.6	261
1791	2004	M	9/7/04	121.0	141.0	163.0	22.5	264
1792	2004	na	9/7/04	121.0	138.0	164.0	26.0	265
22211	2004	F-3	9/8/04	121.0	186.0	213.0	56.3	260
22210	2004	M-8	9/8/04	121.0	169.0	191.0	38.3	262
22222	2004	M-8	9/8/04	121.0	182.0	204.0	45.9	263
690	2004	M-8	9/8/04	121.0	168.5	190.0	38.3	266
22213	2004	M-8	10/4/04	119.0	195.5	220.0	54.9	257
53853	2005	F-4	3/10/05	204.0	170.0	197.0	41.0	275
53855	2005	F-2	3/16/05	215.0	215.0	241.0	[i]	277
53872	2005	F-4	3/29/05	215.0	165.0	191.0	48.0	274
53871	2005	F-3	3/29/05	215.0	182.0	209.0	47.0	276
53863	2005	F-3	4/12/05	215.0	182.0	200.0	59.0	273
947	2005	F-4	4/26/05	215.0	142.0	162.0	26.0	272
958	2005	F-4[b]	4/28/05	226.5	189.0	220.0	58.0	280
348	2005	F-1	5/18/05	230.7	161.0	184.0	[i]	278[c]
906	2005	M-8	6/08/05	229.0	166.0	191.0	35.0	281
330	2005	M-8	6/08/05	229.0	179.0	206.0	43.0	279
53894	2005	M-8	6/08/05	229.0	189.0	217.0	70.0	271
2117	2005	F-4[d]	6/28/05	243.0	170.0	196.0	40.0	52
406	2005	M-7	9/26/05	215.0	168.0	192.0	43.0	50
345	2005	F-4[b]	9/26/05	215.0	164.0	189.0	52.0	269
535	2005	F-4[b]	9/26/05	215.0	177.0	204.0	57.0	270
1578	2005	F-4	9/27/05	215.0	178.0	200.0	40.0	267
804	2005	U[e]	9/27/05	215.0	105.0	132.0	14.0	87
1795	2005	F-4	9/27/05	215.0	185.0	208.0	54.0	268
1794	2005	M-7	9/27/05	215.0	197.0	224.0	63.0	258
1824	2006	F-4	3/23/06	207.0	166.0	189.0	36.9	9dt[f]
202	2006	F-1	3/28/06	190.0	185.0	212.0	48.6	292[d]
939	2006	M	3/28/06	185.0	147.0	171.0	21.2	294
65	2006	M	3/28/06	185.0	167.0	193.0	27.9	290[m]
1305	2006	F-4[b]	3/30/06	215.0	158.0	182.0	36.9	3dt
22218	2006	F-4[b]	4/4/06	205.0	169.0	195.0	37.2	10dt
86	2006	M-8	4/4/06	187.5	161.0	195.0	33.3	7dt
139	2006	M-8	4/6/06	215.0	175.0	202.0	43.5	1dt
1828	2006	F-4[b]	4/10/06	205.0	185.0	215.0	56.0	6dt
1833	2006	F-4[b]	4/13/06	215.0	196.0	228.0	65.0	8dt
1837	2006	F-4[b]	4/19/06	215.0	194.0	223.0	65.9	4dt
1840	2006	F-4[b]	4/25/06	215.0	186.0	217.0	53.3	288
987	2006	M-8	4/26/06	204.0	151.0	174.0	25.5	291
2230	2006	M-8	5/4/06	229.0	214.0	243.0	54.2	2dt
1842	2006	M-8	5/4/06	229.0	155.0	179.0	30.5	295
22212	2006	F-4[a]	5/4/06	229.0	208.0	236.0	[i]	293
2227	2006	F-4	5/9/06	229.0	170.0	190.0	37.2	287
679	2006	M-8	6/1/06	235.5	155.0	177.0	27.3	5dt
1847	2006	M-9	6/6/06	229.0	167.0	187.0	40.3	286

Table 2. Continued.

Fish #	Tag year	Sex/Development Stage	Release Date	Release RKM	Fork Length (cm)	Total Length (cm)	Weight (kg)	Vemco Code
7917	2006	M-9	6/7/06	229.0	145.0	165.0	23.3	289
57859	2006	F-3	9/28/06	121.0	118.0	121.6	57.0	299
57035	2006	F-3	10/5/06	215.0	172.0	194.0	42.8	296
57033	2006	F-3	10/5/06	215.0	179.0	210.0	48.2	298
57034	2006	F-3	10/8/06	215.0	182.0	205.0	54.0	301
1854	2006	F-4	10/24/06	215.0	185.0	213.0	60.0	297
57869	2007	F-4[g]	3/12/07	120.0	207.0	235.0	82	17dt
850	2007	F-4[g]	3/13/07	120.0	207.0	230.0	95	13dt
2216	2007	F-4[g]	3/14/07	123.0	194.0	220.0	67	303
152	2007	F-4[g]	3/14/07	120.0	178.0	197.0	65	305
2198	2007	F-4[g]	3/14/07	137.0	170.0	192.0	51.3	20[n]dt
891	2007	F-4[b]	3/28/07	215.0	193.0	221.0	61.8	16dt
252	2007	M-8	3/28/07	205.0	172.0	208.0	49.7	15dt
57880	2007	F-4[b]	3/29/07	215.0	185.0	214.0	65.9	14dt
57881	2007	F-4[b]	3/29/07	215.0	162.0	186.0	47.0	18dt
57882	2007	F-4[b]	3/29/07	215.0	172.0	193.0	44.8	12dt
57883	2007	M-8	3/29/07	215.0	167.0	191.0	44.8	11dt
2268	2007	M-8	4/3/07	215.0	167.0	190.0	33.2	19dt
162	2007	M-8	4/10/07	215.0	188.0	218.0	58.2	302
1141	2007	M-8	5/23/07	232.0	154.0	178.0	[i]	300
57891	2007	F-4	[k]	[k]	186.0	211.0	57.0	304[l]
22232	2007	F-4[b]	9/25/07	121.0	144.0	169.0	30.9	306
136	2007	F-4/F-3[b]	10/17/07	215.0	152.0	172.0	41.7	313
22401	2007	F-4/F-3[b]	10/17/07	215.0	177.0	200.0	67.2	314
605	2008	F-4[b]	3/12/08	215.0	209.0	241.0	[i]	307
62259	2008	F-4[b]	3/25/08	215.0	186.0	200.0	71.7	311
62260	2008	F-4[b]	3/25/08	205.0	182.0	206.0	49.7	309
1605	2008	F-4[b]	4/1/08	215.0	180.0	211.0	56.9	319
62261	2008	F-4[b]	4/3/08	205.0	193.0	221.0	[i]	317
337	2008	M-8	4/10/08	205.0	204.0	235.0	[i]	321
524	2008	F-4[b]	4/9/08	205.0	189.0	216.0	[i]	323
62262	2008	M-8	4/21/08	205.0	169.0	198.0	40.3	320
364	2008	M-8	4/21/08	205.0	170.0	196.0	41.7	316
62263	2008	M-8	4/22/08	205.0	177.0	202.0	[i]	325
62264	2008	M-8	4/23/08	205.0	156.0	178.0	31.4	318
62265	2008	F-4[b]	4/22/08	205.0	181.0	206.0	[i]	315
8	2008	F-3	9/24/08	117.0	186.0	210.0	[i]	310
970	2008	M	11/4/08	205.0	149.0	168.0	54.0	312
67849	2008	U	11/12/08	205.0	279.0	308.0	[i]	420[d]
19	2008	F-2	11/12/08	190.0	167.0	189.0	85.0	422
812	2009	F	2/24/09	215.0	185.0	213.0	[i]	417
595	2009	M-7	3/3/09	199.5	178.0	207.0	38.7	418[m]
642	2009	M-7	3/3/09	215.0	154.0	178.0	26.6	416
57878	2009	M-7	3/4/09	207.0	154.0	177.0	25.7	419
67853	2009	M-7	3/4/09	207.0	156.0	171.0	27.0	421
202	2009	F-2	3/4/09	195.7	186.0	210.0	[i]	400[l]
229	2009	F-2	3/18/09	190.0	173.0	203.0	45.0	401
241	2009	F-4	3/18/09	215.0	168.0	192.0	38.7	407
57872	2009	F-2	3/24/09	215.0	123.0	141.0	11.3	404
67855	2009	F-4[g,n]	3/24/09	193.2	157.0	183.0	36.5	403
373	2009	F-4[g,n]	4/7/09	190.0	190.0	214.0	[i]	406
213	2009	F-4/F-1	4/21/09	222.3	172.0	202.0	41.0	402

Table 2. Continued.

Fish #	Tag year	Sex/Development Stage	Release Date	Release RKM	Fork Length (cm)	Total Length (cm)	Weight (kg)	Vemco Code
103	2009	F-4/F-1	4/21/09	213.0	181.0	198.0	51.8	405
2288	2009	F3	5/21/09	120.0	203.0	227.0	78.0	415
22209	2009	F-4[o]	9/21/09	215.0	162.0	188.0	35.1	408
712	2009	F-4[o]	9/21/09	215.0	168.0	192.0	39.2	410
1480	2009	F-3	9/30/09	213.0	178.0	205.0	53.0	409

[a] This fish was first tagged with Vemco 259, then 293 in May 2006.
[b] F-1 eggs present.
[c] Fish recaptured twice in 2007; Vemco scar looked good.
[d] Fish recaptured. Fish 202 had new Vemco added at 3/4/09 recapture (tag 400).
[e] Unknown sex/development; 3-year tag.
[f] dt = depth sensitive tag.
[g] F-4 eggs present.
[h] This is the second deployment of this tag code (was on juvenile 21890 previously).
[i] No weight taken.
[j] Fish taken to hatchery and tagged. Originally captured by Montana in May 1976.
[k] Release date and location unknown (probably Kootenai Tribal Hatchery, 241.0).
[l] This fish was first tagged with Vemco 292, then 400 in March 2009.
[m] This fish recaptured March 24, 2009.
[n] Eggs taken to hatchery.
[o] Fish staged as ripe.

Table 3. Location (river kilometer), depth (m), white sturgeon egg catch, and catch per unit effort (CPUE) by standard artificial substrate mats, Kootenai River, Idaho, 2009.

River location (rkm)	Depth range (ft)	Total mat hours	Number white sturgeon eggs	CPUE
231.0	25-58	6,264	52	0.008
237.5	12-75	6,647	34	0.005
245.8	5-29	5,129	25	0.005
247.0	16	0	0	n/a
248.0	6-21	1,386	0	n/a
248.1	3-12	3,586	0	n/a
248.2	6-16	1,341	0	n/a
248.3	4-13	1,220	0	n/a
248.5	18-24	827	0	n/a
250.5	9-13	1,173	0	n/a
All	3-75	27,573	111	0.004

Table 4. Stages of white sturgeon eggs captured by artificial substrate mats, Kootenai River, Idaho, 2009.

Sample No.	Temp Pull °C	Date Pull	End Time	Total Eggs	Egg Stage														Notes	Hours from Fertilization (Spawn Date)
					12	13	14	15	16	17	18	19	20	21	22	23	24	Other		
1	6.1	5/20	10:00	12	10	1												1	dead	
3	8.3	6/1	9:42	8	8+[a]															
3	8.3	6/1	9:42	4	4															
4	8.3	6/1	10:08	1	1															
5	7.2	6/2	10:24	1						1										
6	10.6	6/3	10:34	13														13	dead	
7	10.0	6/4	9:56	1	1+															0(6/4)
9	10.5	6/8	11:42	3	3+															0(6/8)
9	10.5	6/8	11:42	1	1															0(6/8)
10	9.5	6/9	13:00	1	1-															0(6/9)
10	9.5	6/9	13:00	1	1															0(6/9)
11	9.5	6/9	13:22	1														1	dead	
12	9.5	6/9	13:28	1	1-															0(6/9)
12	9.5	6/9	13:28	1	1															
14	11.0	6/16	8:55	2							1	1								27(6/15),33(6/14)
15	10.0	6/16	9:10	1								1								33(6/15)
16	11.0	6/17	9:52	1								1								33(6/16)
17	11.0	6/17	9:40	2			1	1+												5(6/17),8(6/17)
17	11.0	6/17	9:40	2			2+													5(6/17)
18	11.0	6/17	10:46	1				1												8(6/17)
19	10.0	6/18	11:15	12	8													4	dead	0(6/18)
19	10.0	6/18	11:15	1														1		unfertilized
20	11.0	6/22	11:15	9														9	dead	
21	11.0	6/22	11:31	25														25	dead	
22	11.0	6/22	12:10	2														2	dead	
23	11.0	6/24	10:51	3			3													5(6/24)
24	11.0	6/24	11:10	1			1													5(6/24)
Total collected				111	36	1	7	2	0	1	1	3	0	0	0	0	0	56		
Total not staged				56														56		

[a] Indicates whether egg(s) are early (-) or late (+) in particular developmental stage.

Table 5. Summary of 2009 white sturgeon larval sampling effort and volume sampled by gear type and location, Kootenai River, Idaho.

	Location (river kilometer)	Sampling Dates	No. Sites	Catch	Effort (hours)		Volume (m^3) sampled	
					Mean (SD)	Total	Mean (SD)	Total
	248.1	7/27-8/4	18	41	4.0(1.4)	71.7	3,678.7(2,567.6)	66,215.9
Bottom	249.7	6/30-8/4	43	43	3.7(1.9)	157.1	2,059.9(1,630.3)	88,576.6
	248.1	7/27	4	3	3.5(.5)	13.9	3,825.3(1,504.3)	15,301.4
Mid	249.7	7/14-8/4	35	50	3.8(1.8)	131.6	981.7(915.2)	34,359.4
Surface	249.7	6/30-7/15	8	0	2.1(1.0)	16.9	1,305.6(1,553.3)	10,444.7
Combined	All	6/30-8/4	108	137[a]	3.6(1.7)	391.0	1,989.8(1,885.0)	214,897.9

[a] Catch was entirely species other than white sturgeon.

Table 6. Idaho Department of Fish and Game juvenile white sturgeon gill net sampling effort by sampling location for August 5 through September 19, 2009.

River Kilometer	Number of Sets	Hours of Effort	Number of Adults Captured	Number of Juveniles Captured	Sturgeon Catch Per Unit of Effort
174.2	36	46.0	0	25	0.5
176.5	32	45.8	0	30	0.7
190.0	20	26.7	0	48	1.8
193.2	16	25.7	0	27	1.1
193.5	10	17.0	0	13	0.7
199.5	4	4.4	0	6	1.4
205.0	34	44.0	0	122	2.7
207.0	36	47.4	0	105	2.2
215.0	18	25.2	0	67	2.7
225.0	36	44.3	0	63	1.4
244.5	35	41.3	0	74	1.8
Total	277	367.8	0	581	1.6

Table 7. Idaho Department of Fish and Game juvenile white sturgeon gill net sampling effort by mesh size for August 5 through September 19, 2009.

Gill Net Mesh Size (in)	Number of Sets	Hours of Effort	Number of Adults Captured	Number of Juveniles Captured	Sturgeon Catch Per Unit Effort
0.5	69	92.0	0	118	1.3
1.0	75	93.4	0	172	1.8
2.0	60	82.4	0	140	1.7
2.5	43	57.0	0	109	1.9
3.0	30	43.0	0	42	1.0

Table 8. Summary statistics of recaptured juvenile hatchery white sturgeon from 2009 gill net sampling, Kootenai River, Idaho.

Statistic	Fork length (cm) n = 570	Total length (cm) n = 569	Mean weight (kg) n = 557
Average	37.9	44.2	0.44
Standard deviation	11.1	12.6	0.43
Minimum	20.2	23.5	0.05
Maximum	85.6	88.5	4.12

Table 9. Wild juvenile white sturgeon captured in gillnets in 2009, Kootenai River, Idaho.

Date	Capture rkm	Fork length (cm)	Total length (cm)	Weight (kg)	Year class
7/29	165.0	30.5	35.0	0.15	2006
8/10	225.0	39.3	45.9	0.35	2003
8/18	120.0	85.0	98.0	4.90	1998
8/18	215.0	44.2	50.3	0.53	2002
8/19	120.0	40.2	47.1	0.38	2002
8/19	120.0	38.5	44.0	0.32	2004
8/19	120.0	102.0	121.0	7.60	1992
8/19	193.2	30.4	35.2	0.16	2006
8/25	244.5	41.9	48.5	0.40	2005
8/25	244.5	61.5	69.9	1.44	1997

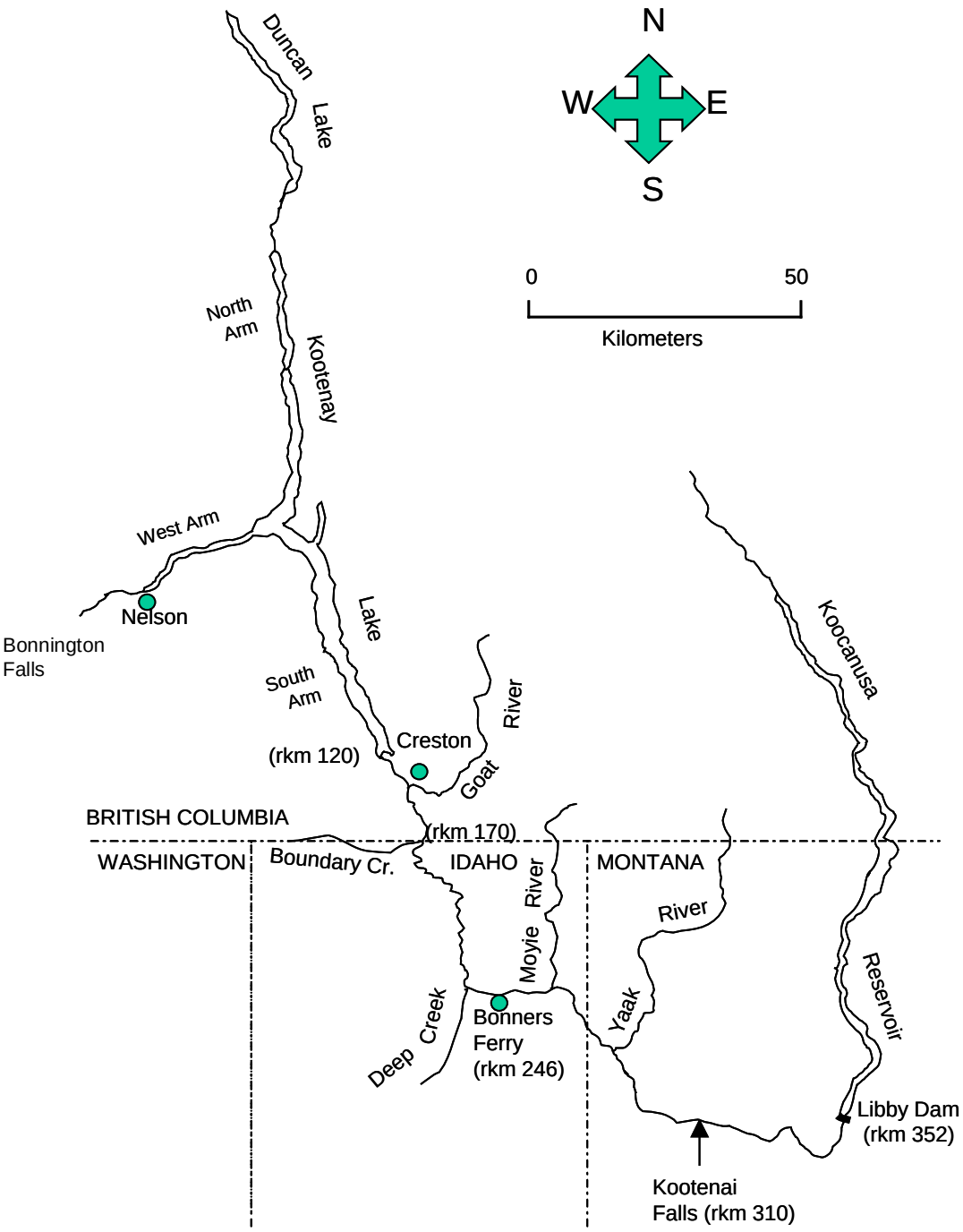


Figure 1. Location of the Kootenai River, Kootenay Lake, Lake Koocanusa, and major tributaries. The river distances from the northernmost reach of Kootenay Lake are in river kilometers (rkm) and are indicated at important access points.

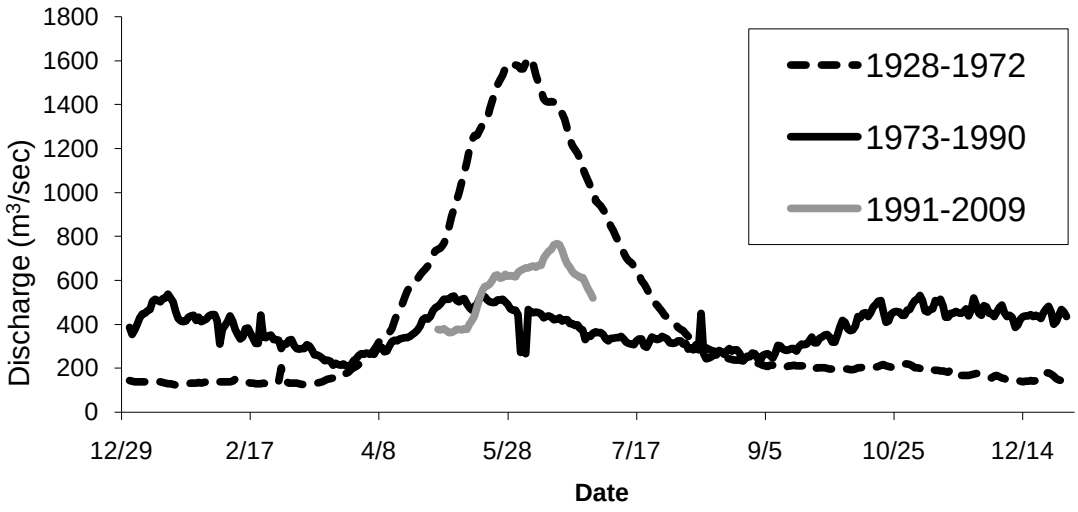


Figure 2. Mean daily flow patterns in the Kootenai River at Bonners Ferry, Idaho from 1928-1972 (pre-Libby Dam), 1973-1990 (post-Libby Dam), and 1991-2009 (post-Libby Dam with augmented flows, May 1 through June 30).

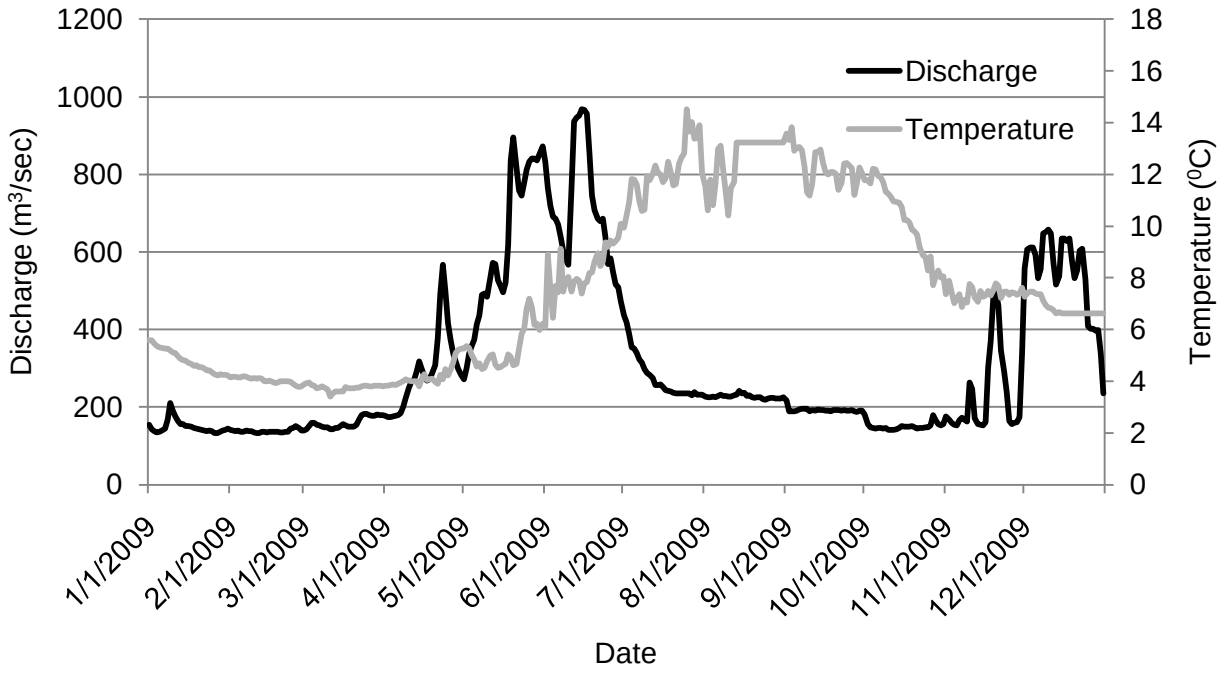


Figure 3. Mean daily discharge (m^3/sec) and temperature (°C) for Kootenai River at Bonners Ferry, Idaho, 2009.

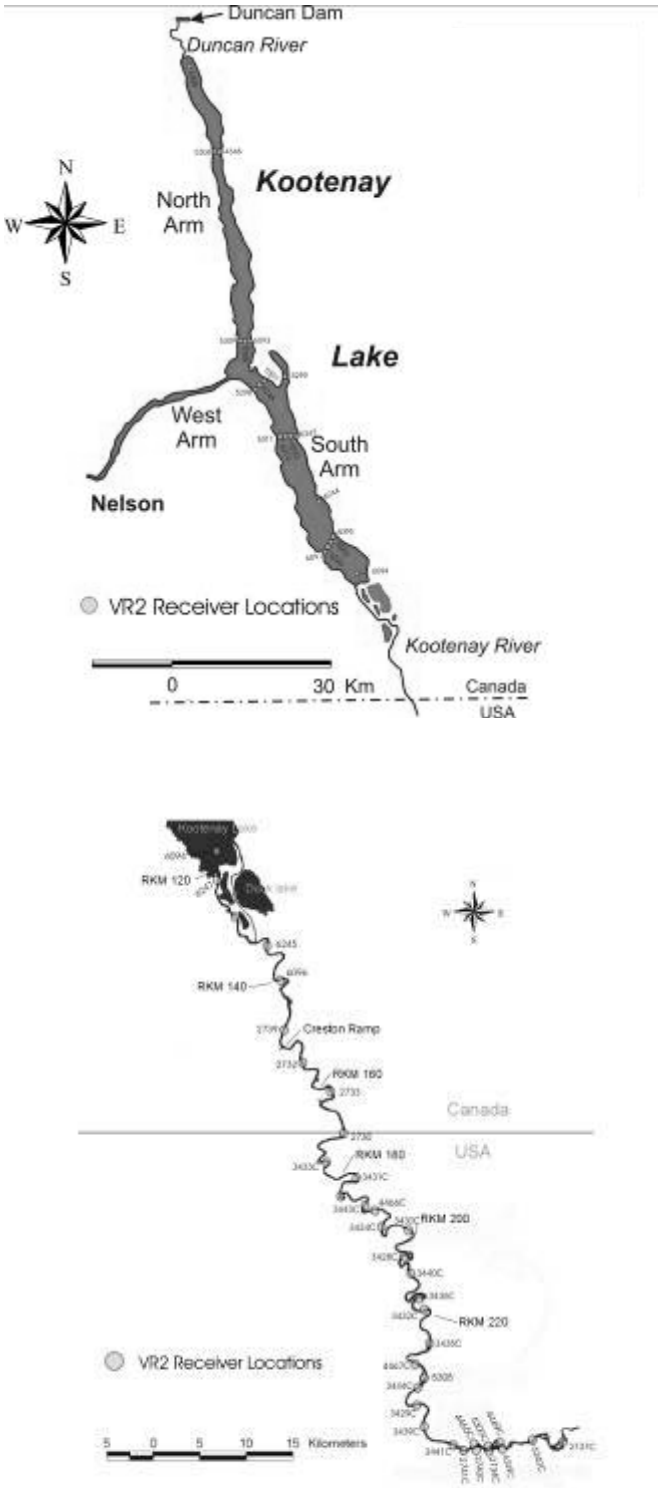


Figure 4. Location of Vemco VR2 receivers in Kootenai River/Lake system, Idaho and British Columbia, Canada, 2009.

LITERATURE CITED

Beer, K. E. 1981. Embryonic and larval development of white sturgeon (Acipenser transmontanus). Master's Thesis. University of California at Davis.

Bonde, T. H., and R. M. Bush. 1975. Kootenai River water quality investigations, Libby Dam pre-impoundment study 1967-1972. U.S. Army Corps of Engineers.

Conte, F. S., S. I. Doroshov, P. B. Lutes, and M. E. Strange. 1988. Hatchery manual for the white sturgeon (Acipenser transmontanus) with application to other North American Acipenseridae. Publication 3322. Agriculture and Natural Resources, University of California, Oakland.

Ireland, S. C., R. C. P. Beamesderfer, V. L. Paragamian, V. D. Wakkinen, and J. T. Siple. 2002. Success of hatchery-reared juvenile white sturgeon (Acipenser transmontanus) following release in the Kootenai River, Idaho, USA. Journal of Applied Ichthyology 18:642-650.

Kock, T. J., J. L. Congleton, and P. J. Anders. 2006. Effects of sediment cover on survival and development of white sturgeon embryos. North American Journal of Fisheries Management 26:134–141.

Lewandowski, C. 2009. Kootenai Tribal White Sturgeon Hatchery Broodstock Spawning and Evaluation Report. Kootenai Tribe of Idaho, Bonners Ferry, Idaho.

McCabe, G. T., and L. G. Beckman. 1990. Use of an artificial substrate to collect white sturgeon eggs. California Fish and Game 76 (4):248-250.

McDonald, R. R., G. J. Barton, J. M. Nelson, and V. L. Paragamian. 2006. Modeling hydraulic and sediment transport processes in white sturgeon spawning habitat on the Kootenai River: proceeding in the Joint 8th Federal Interagency Sedimentation and 3rd Federal Interagency Hydrologic Modeling Conference, 8 p.

Northcote, T. C. 1973. Some impacts of man on Kootenay Lake and its salmonids. Great Lakes Fishery Commission, Technical Report Number 2, Ann Arbor, Michigan.

Paragamian, V. L., G. Kruse, and V. D. Wakkinen. 1996. Kootenai River white sturgeon investigations. Idaho Department of Fish and Game. Prepared for Bonneville Power Administration. Annual Progress Report, Project 88-65, Boise.

Paragamian, V. L., G. Kruse, and V. Wakkinen. 2001. Spawning habitat of Kootenai River white sturgeon, post-Libby Dam. North American Journal of Fisheries Management 21:10-21.

Paragamian, V. L., and V. D. Wakkinen. 2002. Temporal distribution of Kootenai River white sturgeon spawning events and the effect of flow and temperature. Journal of Applied Ichthyology 18:542-549.

Paragamian, V. L., G. Kruse, and V. Wakkinen. 2002. Spawning location and movement of Kootenai River white sturgeon. Journal of Applied Ichthyology 18:608-616.

Paragamian, V. L., R. McDonald, G. John Nelson, and G. Barton 2009. Kootenai River velocities, depth, and white sturgeon spawning site selection – a mystery unraveled? Journal of Applied Ichthyology 25:640-646.

Parsley, M. J., L. G. Beckman, and G. T. McCabe, Jr. 1993. Spawning and rearing habitat use by white sturgeons in the Columbia River downstream from McNary Dam. Transactions of the American Fisheries Society 122:217-227.

Partridge, F. 1983. Kootenai River Fisheries Investigations. Idaho Department of Fish and Game. Job Completion Report, Project F-73-R-5, Boise.

Rust, P. J., and V. D. Wakkinen. 2007. Kootenai River white sturgeon spawning and recruitment evaluation. Annual Progress Report for the period May 1, 2005 - April 30, 2006. Idaho Department of Fish and Game. Prepared for Bonneville Power Administration. IDFG Report Number 07-23, Boise. 44 pp.

Rust, P. J., V. D. Wakkinen, and T. Kiser. 2007. Kootenai River white sturgeon spawning and recruitment evaluation. Annual Progress Report for the period May 1, 2006 - April 30, 2007. Idaho Department of Fish and Game. Prepared for Bonneville Power Administration. IDFG Report Number 07-54, Boise. 51 pp.

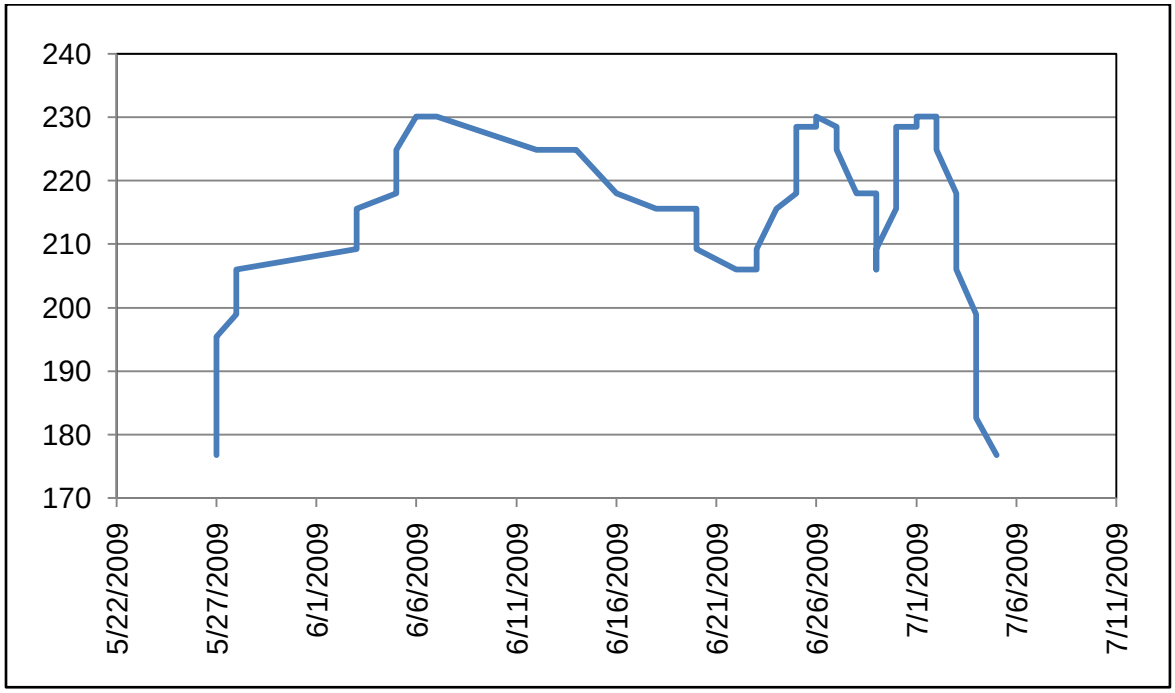
USFWS. 2006. Biological Opinion on Federal Columbia River Power System Operations. U.S. Fish and Wildlife Service. Portland, Oregon. 153 pp. Plus appendices.

Van Eenennaam, J. P., and S. I. Doroshov. 1988. Effects of age and body size on gonadal development of Atlantic sturgeon. Journal of Fish Biology 53:624–637.

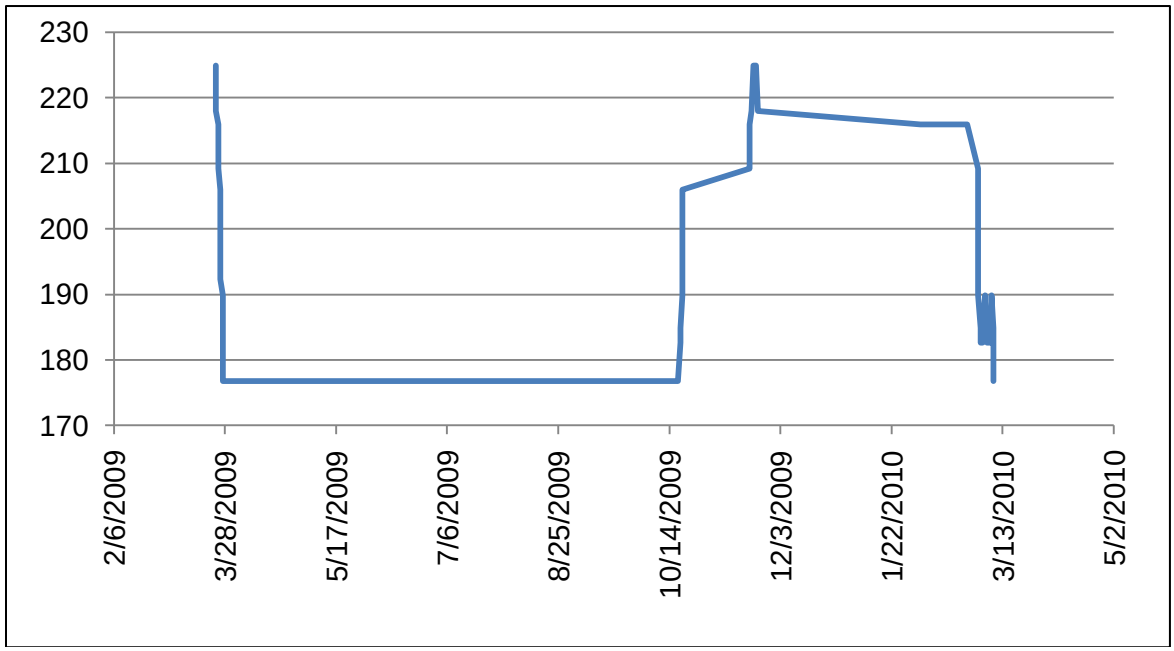
APPENDICES

Appendix 1. Movement above Bonners Ferry, Idaho for six adult female white sturgeon believed to have spawned in 2009. X-axis denotes date; Y-axis denotes river kilometer.

Transmitter 52, stage F-4 on August 26, 2003

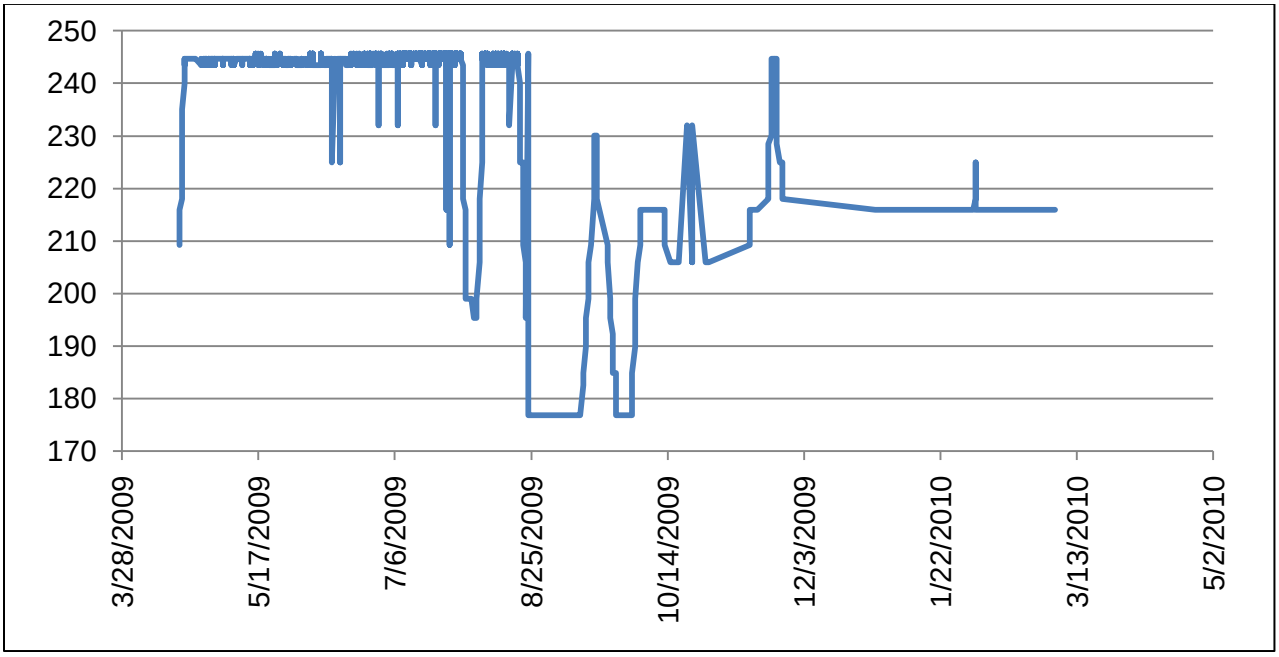


Transmitter 267, stage F-4 on September 27, 2005

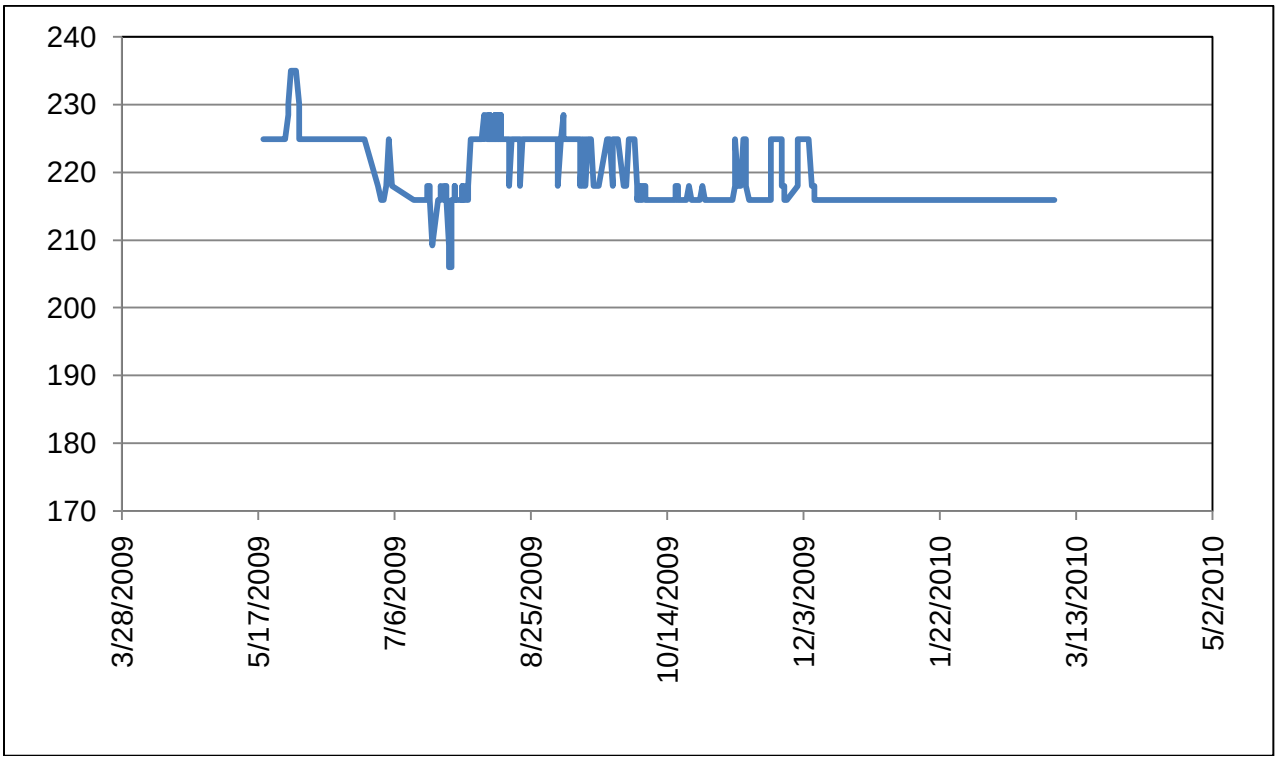


Appendix 1. Continued.

Transmitter 417, stage F-4 on February 24, 2009

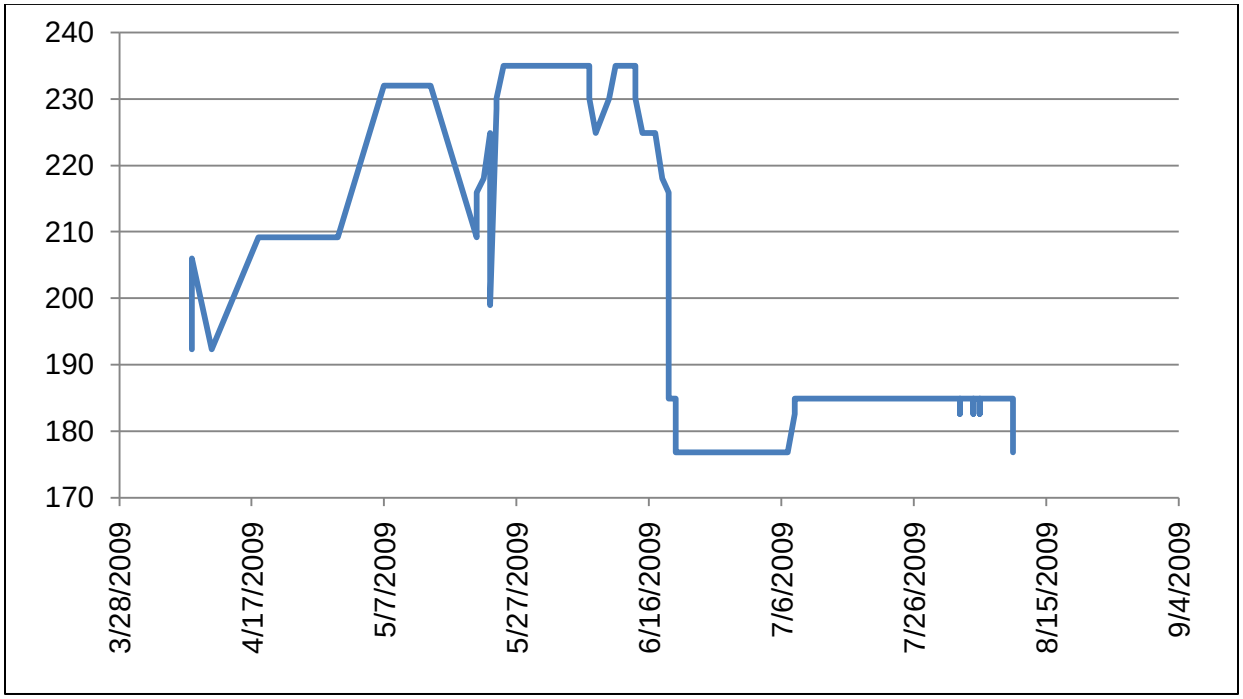


Transmitter 402, stage F-4 on April 21, 2009

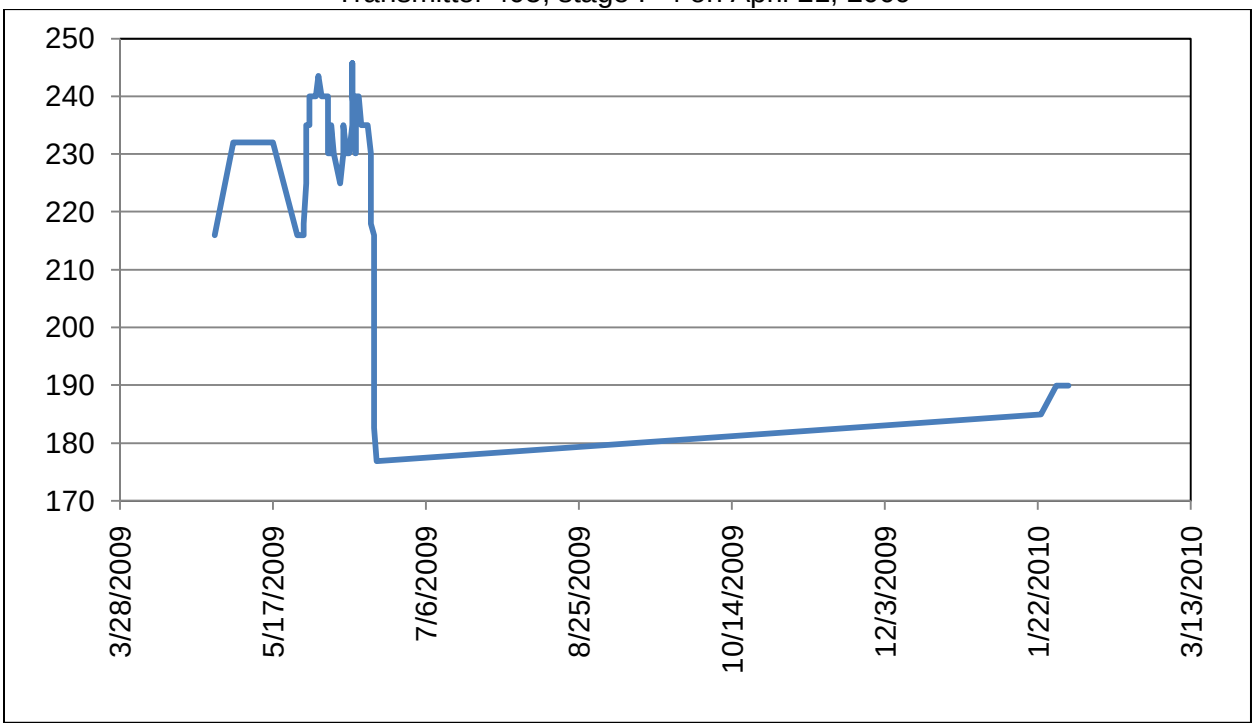


Appendix 1. Continued.

Transmitter 406, stage F-4 on April 7, 2009



Transmitter 405, stage F-4 on April 21, 2009



Appendix 2. Chronology of white sturgeon free embryo releases in 2009, Kootenai River.

1st/Last Hatch Dates	Family #	Parents		# Eggs	% Neurala-tion	# Free Embryo [a]	Release Date	Rkm/ Site	Release Coords.		# Larvae	Water Temp C	Leonia Flow (cfs)	Stage (ft.)	Secchi (m)	Velocity (f/s)		
		Female (Fish #)	Male (Fish #)						East.	North.						Surf	.2	.8
6/12 6/15	FD8A	1BF27 2FF8A (586)	1BF277 FD8A (2345)	70000	19	14000	6/18	255.4	558242	5394794	11000	10	27000	18.9	2.2	2.46	2.53	1.65
6/14 6/17 [c]	591D	1BF27 4CADA (65485)	1BF278 591D (2301)	20000	95	19000					16000							
6/17 6/21	4134	1BF27 80DC9 (77663)	1BF278 4134 (1846)	98000	98	96040	6/22	258.5	559686	5395885	93040	11	22000	17.5	4	1.69	1.36	0.82
6/21 6/25	5C37	1BF27 84B3E (416)	1BF278 5C37 (456)	93420	99	92486	6/25	251.0	555137	5394409	89486	12	15200	15.4	3	0.47	0.59	0.40
6/25 6/29	20C4	1BF27 8092B (2356)	1BF278 20C4 (740)	100000	99	99000	6/29	262.5	563116	5395748	86000	13	15200	15.6	NA	2.74	2.83	2.52
								230.6	544578	5401602	10000					0.31	0.34	0.18
6/25 6/30	0751	1BF27 8260D (2304)	1BF278 0751 (7767)	76380	99	75616	6/29	230.6	544578	5401602	62616	13	15200	15.6	NA	0.31	0.34	0.18
								270.0	566904	5390347	10000					2.10	2.24	1.72
6/27 6/29	493D	1BF27 81785 (2274)	7F7E6E 493D (379)	55500	93	51615	6/30 & 7/2	274.8	6/30 274.8: 569305 7/2 274.8: 569368	6/30 274.8: 5386810 7/2 274.8: 5386729	23615	13	6/30 14900 7/2 13100	6/3014.9 7/2 14.5	3	6/302.38 7/2 2.07	6/30 2.75 7/2 2.50	6/30 2.17 7/2 2.26
								306.5 [d]			25000							
	B4FD		1BF272 B4FD (77682)	123025	91	111953		274.8			83953							
								306.5 [d]			25000							
	BB7C	1BF27 803F8 (454)	1BF272 BB7C (872)	97375	85	82769		274.8			54769							
								306.5 [d]			25000							
	0938		1BF278 0938 (939)	73800	95	70110		274.8			42110							
								306.5 [d]			25000							
NA 7/5	E40D	1BF27 806F1 (77662)	1BF272 E40D (77686)	45510	99	45055	7/6	251.0	555136	5394409	42055	15	10700	13.5	NA	0.26	0.19	0.24
	78BC		1BF272 78BC (126)	48175	92	44321					41321							
		Totals		901185		801965					765965							

[a] Approximately 3,000 free embryos from each family were held for hatchery rearing and later hatchery release.

[b] Two- to four-day larvae.

[c] There were 20,000 additional eggs (family KT 0F64). Hatching success was 0.5% (100 eggs). These larvae were held for rearing at the Kootenai Tribal Hatchery and none were released.

[d] There were no GPS coordinates or velocity measurements recorded for this location.

Appendix 3. Numbers and recapture rates of hatchery produced white sturgeon juveniles (progeny of wild brood stock) released into the Kootenai River and Kootenay Lake in Idaho, Montana, and British Columbia between 1990 and December 2009 (from Kootenai Tribe of Idaho and Idaho Department of Fish and Game Annual Reports 1990-2009). This table includes tagged and/or measured fish only.

Year class	Hatchery facility[a]	Release number	Mean total length (mm) at release (S.D.)	Mean weight (g) at release (S.D.)	Release season and year	Number recaptures	Percent of all recaptures
1990	KTOI	14	456.9 (53.0)	320.8 (112.3)	Summer 1992	10	0.17%
1991	KTOI	104	254.7 (17.3)	66.1 (13.1)	Summer 1992	117	1.97%
1992	KTOI	123	482.6 (113.0)	549.3 (482.9)	Fall 1994	116	1.95%
1995	KTOI[b]	0	--	--	?	43	0.72%
1995	KTOI	1,075	228.5 (27.0)	47.3 (16.6)	Spring 1997	509	8.56%
1995	KTOI	884	343.6 (43.7)	148.0 (64.0)	Fall 1997	465	7.82%
1995	KTOI	97	410.7 (68.2)	288.5 (137.8)	Summer 1998	67	1.13%
1995	KTOI	25	581.5 (40.5)	863.3 (197.9)	Summer 1999	14	0.24%
1998	KTOI	309	260.1 (41.9)	79.0 (44.4)	Fall 1999	64	1.08%
1999	KTOI	828	256.1 (22.2)	70.6 (18.2)		166	2.79%
1999	KH	1,358	248.1 (32.9)	67.2 (27.6)	Fall 2000	420	7.06%
1999	KH	1,583	306.5 (40.4)	55.9 (39.5)		648	10.90%
1999	KTOI	491	284.3 (54.4)	107.6 (60.1)	Spring 2001	45	0.76%
1999	KT[b]	0	--	--	?	3	0.05%
1999	?[b]	0	--	--	?	43	0.72%
2000	KTOI	2,286	244.0 (38.9)	64.2 (31.0)		123	2.07%
2000	KH	1,654	240.0 (23.2)	57.7 (16.4)	Fall 2001	195	3.28%
2000	KH	2,209	283.1 (28.7)	99.3 (30.2)	Spring 2002	16	0.27%
2000	KH	30	365.4 (14.0)	195.3 (19.9)	Summer 2002	0	0.00%
2000	KTOI	214	409.4 (53.5)	294.1 (109.8)	Fall 2002	32	0.54%
2000	KTOI[c]	907	333.1 (36.0)	190.8 (60.0)	Jan. 2003	132	2.22%
2000	KTOI[d]	10	557.7 (28.4)	87.6 (18.4)	Feb. 2004	0	0.00%
2000	KTOI[l]	3	662 (6.01)	425 (66.1)	Summer 2006	1	0.02%
2000	?[b]	0	--	--	?	25	0.42%
2001	KH	4,469	227.4 (24.2)	51.6 (16.6)		13	0.22%
2001	KTOI	2,672	200.1 (37.9)	33.0 (15.6)	Fall 2002	102	1.72%
2001	KH	1,715	257.1 (26.4)	71.8 (24.2)	April 2003	10	0.17%
2001	KTOI[l]	1	570.0	750.0	Summer 2006	0	0.00%
2001	KH	1	560	1152	Spring 2009	0	0.00%
2001	KH	0	--	--	?	1	0.02%
2001	?[b]	0	--	--	?	2	0.03%
2002	KH	5,864	217.3 (25.2)	41.3 (14.2)	May 2003	36	0.61%
2002	KTOI	856	214.0 (43.8)	41.9 (22.6)	Oct. 2003	0	0.00%
2002	KTOI[e]	550			Nov. 2003	0	0.00%
2002	KTOI	3,852	215.4 (37.3)	43.4 (20.0)	Late wtr. 2003	6	0.10%
2002	KTOI	3,663	214.2 (54.8)	43.1 (27.2)	Late wtr.'03-early wtr. '04	9	0.15%
2002	KTOI[l]	1	55.0	740.0	Summer 2006	0	0.00%
2002	?[b]	0	--	--	?	14	0.24%
2003	KH	9,020	222.8 (25.7)	48.9 (24.4)	Spring 2004	657	11.05%
2003	KH[f]	19	229.5 (26.7)	51.9 (18.5)	Sept. 2004	0	0.00%
2003	KTOI	3,519	226.9(46.3)	55.4(31.6)	Late wtr. 2004	2	0.03%
2003	KTOI[l]	3	43.7 (2.8)	346.7 (49.3)	Summer 2006	0	0.00%
2003	?[b]	0	--	--	?	13	0.22%
2004	KH[g]	2,038	196.2(27.7)[h]	57.4(33.0)	Spring 2005	35	0.59%
2004	KT	1	510	490	Wtr 2007	0	0.00%
2004	KH	5	452(22.8)	563(116.5)	Spring 2009	0	0.00%
2004	?[b]	0			?	53	0.89%
2005	KH[l]	14	298.6(14.1)[h]	174.2(27.8)	Spring 2006	0	0.00%
2005	KH[g]	1,765	197.8(24.5)[h]	54.2(22.4)		44	0.74%

Appendix 3. Continued.

Year class	Hatchery facility[a]	Release number	Mean total length (mm) at release (S.D.)	Mean weight (g) at release (S.D.)	Release season & year	Number recaptures	Percent of all recaptures
2005	KTOI[j]	510	171.0(47.0)	26.8(19.9)	Fall 2006	4	0.07%
2005	KH	1	330	22.5	Spring 2009	0	0.00%
2005	KH[b]	0			?	4	0.07%
2005	?[b]	0			?	81	1.36%
2006	KH[g,k]	600	148.8(10.8)[h]	22.9(5.4)	Fall 2006	0	0.00%
2006	KH[g]	1,877	182.2(15.0)[h]	43.8(11.7)		30	0.50%
2006	KH[g,k]	1,000	184.4(15.9)[h]	45.6(11.5)	Spring 2007	1	0.02%
2006	KT[g]	4,922	170.8(30.2)	21.8(10.8)	Wtr 2007	1	0.02%
2006	KH[b]	0	--	--	?	6	0.10%
2006	?[b]	0	--	--	?	65	1.09%
2007	KH	2,167	241.3(23.8)[h]	91.6(26.8)	Spring 2008	7	0.12%
2007	KT[g]	884	163.1(28.2)	21.5(9.8)		0	0.00%
2007	KT[k]	203	99.4(13.7)	6.4(5.3)	Fall 2008	169	2.84%
2008	KH[h]	9,982	197.8(35.1)	56.1(19.2)	Spring 2009	0	0.00%
2008	KT[g]	3,875	194.1(51.6)	32.4(18.8)	Fall 2009	4	0.07%
2008	?[b]	0	--	--	?	2	0.03%
?	KH[l]	0	--	--	?	2	0.03%
?	KT[l]	0	--	--	?	1318	22.17%
?	?[l]	0	--	--	?	10	0.17%
Total marked		**80,253**	--	--	--	**5,945**	

[a] Hatchery facility refers to the rearing hatchery: Kootenai Tribal Hatchery in Idaho (KTOI) or Kootenay Hatchery in British Columbia (KH).
[b] Year class determined by scute removal; fish had shed PIT or PIT was not matched in database.
[c] Eleven fish held over for later upriver release with transmitters (only 10 released with transmitters).
[d] These fish were released upriver (rkm 306.5) with sonic and radio tags.
[e] No measurements available; exact number not known, approximate is 550; NRND (number recaptured cannot be determined).
[f] These fish were first taken to Kokanee Creek Provincial Park, then released in September 2004.
[g] Additional fish were released with no measurements taken or PIT tags added.
[h] Value given is mean fork length (mm).
[i] These fish were released upriver (299.0 and 258.7), six of them with Vemco sonic tags.
[j] There were 200 additional fish held over at KTOI hatchery for Biopar study.
[k] These fish did not have a PIT tag added and were all given fish # 999; NRND.
[l] These fish were untraceable as to brood year, rearing facility, release date, and/or family.

Appendix 4. Juvenile hatchery releases with no tag added or measurements taken through fall 2009: combined hatcheries.

Year class	Hatchery facility[a]	Release number	Release season and year
2004	KTOI	3,000	Fall 2004
2004	KTOI	1,275	Late wtr. '04-early wtr. '05
2004	KTOI	17,723	Spring 2005
2004	KH	3,440	Spring 2005
2004	KTOI	8,637	Summer 2005
2005	KTOI	6,200	Fall 2005
2005	KTOI	3,947	Spring 2006
2005	KH	13,665	Spring 2006
2006	KH	6,900	Fall 2006
2006	KTOI	6,175	Fall 2006
2006	KH	5,800	Spring 2007
2006	KTOI	12,973	Spring 2007
2007	[b]	0	
2008	KTOI	882	Fall 2009
Total		90,617	

[a] Hatchery facility refers to the rearing hatchery: Kootenai Tribal Hatchery in Idaho (KTOI) or Kootenay Hatchery in British Columbia (KH).

[b] There were no 2007 year class fish that were not tagged or measured.

Appendix 5. Year class, number captured, capture locations, fork length (cm), total length (cm), and weight (kg) of hatchery released juvenile sturgeon captured with gill net from Kootenai River, Idaho through 2009.

Year class	Number captured	Capture rkm	Fork length (cm)	Total length (cm)	Weight (kg)
	1	120.0	76.5	88.0	3.00
	3	205.0	61.0-81.4	74.0-95.0	1.75-2.70
	2	215.4	55.4-66.2	66.2-78.1	1.86
1990	1	215.6	65.2	76.0	2.00
	1	215.7	69.0	82.0	2.25
	1	225.1	65.8	77.0	1.95
	1	Unknown	66.5	76.1	1.95
	1	118.0	95.0	110.5	5.65
	3	119.0	73.0-85.0	85.5-98.0	1.10-4.50
	1	119.5	75.0	88.5	--
	5	120.0	63.0-107.0	73.5-126.0	1.60-8.0
	4	121.0	67.0-95.0	77.2-92.0	2.10-4.65
	1	134.0	82.0	94.5	4.1
	1	140.0	70.4	83.2	--
	1	190.0	70.0	83.0	2.20
	1	192.0	35.1	40.8	0.16
	1	203.4	56.0	64.0	1.05
	4	203.5	52.0-72.0	61.0-83.0	0.95-2.70
	1	204.5	64.0	76.0	--
	1	204.7	60.0	68.8	1.36
	23	205.0	26.5-84.0	30.5-100.0	0.11-3.60
	1	205.4	51.0	60.0	1.10
1991	4	205.5	47.0-76.0	56.0-89.1	0.69-3.10
	5	215.0	40.0-53.0	47.0-62.0	0.14-0.70
	1	215.3	47.0	56.0	0.70
	1	215.4	64.2	75.4	2.15
	18	215.5	46.0-74.0	54.0-85.1	0.21-2.85
	8	215.6	41.0-57.0	48.0-66.2	0.43-1.80
	4	215.7	39.0-61.0	46.0-72.0	1.05-1.60
	3	216.0	44.0-53.0	51.0-61.0	0.50-0.88
	1	217.1	33.0	42.0	0.49
	1	224.6	48.0	58.0	0.65
	1	224.7	46.0	55.0	0.70
	2	224.9	42.0-73.5	50.0-84.8	0.45-2.80
	10	225.0	38.0-60.5	45.0-70.0	0.40-1.65
	3	225.1	39.0-49.6	46.0-58.0	0.40-0.78
	2	225.5	50.0-52.0	55.0-61.0	1.90-1.95
	1	227.0	36.0	43.0	0.52
	2	227.5	63.0-73.0	74.0-88.0	2.0-3.0
	1	244.5	--	35.0	0.07
	3	118.0	80.0-97.5	95.0-110.0	3.4-5.95
	4	119.0	61.0-102.0	69.0-118.0	1.20-5.50
	3	120.0	45.0-104.0	52.0-123.0	2.20-8.0
1992	3	121.0	77.0	92.0	3.19
	1	123.0	78.0	90.5	3.3
	1	134.0	77.1	90.5	2.95
	1	161.0	67.3	77.5	2.10
	1	174.3	56.0	62.0	1.06

	1	182.5	51.5	59.0	0.78
	1	190.3	61.2	71.0	1.53
	1	190.4	73.0	86.0	4.25
	1	203.4	74.0	85.0	5.20
	4	203.5	52.0-66.0	62.0-75.0	1.55-1.90
	1	204.0	59.0	69.5	1.50
	1	204.3	64.5	75.0	1.77
	1	204.7	65.8	75.6	1.60
	17	205.0	49.0-68.6	58.0-79.2	2.00
	1	205.3	50.0	90.0	1.80
	2	205.4	62.0-65.3	75.0-75.2	1.83
	6	205.5	49.0-69.0	57.0-79.1	0.20-3.50
	1	205.6	54.0	64.0	--
	1	208.0	70.4	79.4	1.90
	1	210.5	66.3	75.6	1.80
	1	215.0	50.0	59.0	0.70
	2	215.1	59.0-67.90	67.5-81.0	1.11-2.10
	1	215.3	58.0	66.5	1.20
	12	215.5	50.2-72.5	57.9-83.5	0.11-2.13
	8	215.6	45.0-62.0	52.0-75.0	0.48-2.40
	6	215.7	42.0-66.0	49.0-77.0	1.05-2.30
	1	215.8	57.0	65.0	1.08
	1	215.9	63.0	75.0	1.35
	2	216.0	49.0-67.5	56.0-78.6	0.70-1.78
	1	216.9	64.0	75.0	2.3
	2	217.1	30.0-36.0	35.0-44.0	0.35-0.51
	1	224.5	56.5	66.5	1.16
	2	224.9	50.0-69.5	61.0-80.5	1.30-1.68
	7	225.0	31.0-76.2	37.0-88.3	0.35-2.58
	5	225.1	47.0-62.0	56.0-73.0	0.60-1.30
	1	227.0	66.0	80.0	1.70
	1	227.4	59.1	62.0	1.00
	1	227.8	42.0	49.0	0.90
	2	229.0	46.0	55.0	0.55
	1	231.0	66.0	77.0	2.0
	1	231.1	71.0	85.0	2.3
	5	118.0	63.1-74.0	72.6-84.6	1.8-3.05
	3	119.0	49.0-58.0	56.5-67.1	0.70-1.27
	19	120.0	56.5-90.0	65.5-104.3	0.83-4.65
	30	121.0	43.9-83.3	50.0-97.5	0.53-4.5
	7	123.0	65.2-88.5	70.1-100.2	1.30-5.35
	6	130.0	38.0-85	43.9-97.0	0.46-4.10
	3	134.0	49.0-70.5	57.0-81.3	0.73-2.4
	1	137.0	50.9	59.2	0.76
	1	141.0	53.8	60.4	0.83
1995	1	144.3	39.8	45.3	0.38
	2	144.5	29.0-45.5	33.5-52.0	0.14-0.56
	5	145.0	42.5-85.1	50.0-99.7	0.50-4.6
	1	157.0	54.1	62.6	0.99
	1	157.5	33.2	37.3	0.18
	3	161.0	45.6-51.0	51.8-59.5	0.44-.70
	2	163.0	35.2-49.1	41.7-56.9	0.24-0.73
	1	174.5	52.4	60.7	0.77
	1	176.0	33.9	40.0	0.20
	4	176.3	24.7-49.3	40.0-58.1	0.15-0.68
	4	176.4	42.5-51.0	50.0-59.0	0.42-0.71

2	176.5	39.3-44.1	46.2-53.0	0.33-0.48
2	177.3	37.9-45.0	43.7-52.0	0.28-0.49
1	184.9	44.2	51.0	0.31
2	185.0	39.1-58.3	43.3-68.5	0.33-1.25
1	189.9	51.5	59.5	0.74
18	190.0	31.0-62.0	36.0-72.3	0.15-1.41
4	190.1	36.8-54.0	43.9-63.5	0.28-0.87
2	190.3	27.2-48.5	31.7-56.0	0.15-0.63
1	190.4	43.0	50.5	0.47
2	190.5	53.3-62.4	62.4-73.1	0.90-1.53
1	191.9	35.7	41.3	0.20
2	192.0	34.7-61.4	38.2-71.8	0.18-1.49
1	192.1	36.1	42.0	0.25
1	193.0	65.0	75.5	1.61
1	193.2	69.9	79.5	2.31
3	195.7	35.5-50.0	42.0-57.0	0.24-0.65
2	195.8	47.5-49.0	55.5-57.0	0.64-1.34
1	195.9	43.0	50.5	0.42
1	203.3	39.3	45.5	0.34
2	203.4	33.2-37.0	38.5-42.9	0.25-0.36
7	203.5	36.5-49.8	42.5-57.5	0.28-0.60
6	204.0	37.9-61.0	43.5-70.0	0.27-1.39
1	204.1	39.0	45.0	0.35
1	204.3	44.0	51.0	0.35
3	204.7	43.0-54.3	49.8-63.6	0.43-1.00
5	204.8	35.4-50.3	41.2-58.4	0.26-0.67
7	204.9	35.2-48.0	41.2-55.2	0.20-0.62
170	205.0	30.8-70.2	35.0-82.5	0.13-2.30
3	205.3	38.0-50.0	44.0-51.0	0.30-0.76
10	205.4	36.0-50.5	42.2-58.5	0.28-0.78
33	205.5	26.0-62.1	31.0-71.8	0.08-1.50
19	207.0	45.8-73.0	52.5-83.9	0.54-2.19
3	207.5	44.6-59.7	51.3-68.7	0.47-1.18
2	207.8	28.4-39.5	33.0-45.9	0.15-0.3
3	213.2	37.0-58.1	43.0-67.0	0.30-1.17
1	213.5	58.6	67.6	1.13
52	215.0	33.1-70.0	37.8-81.1	0.10-3.0
9	215.1	36.1-49.5	41.1-58.2	0.25-0.69
6	215.2	25.0-47.0	30.0-55.5	0.05-0.55
23	215.4	31.2-49.0	36.5-56.4	0.20-0.75
149	215.5	25.5-64.8	29.1-74.0	0.06-1.32
41	215.6	30.0-48.9	34.2-56.8	0.13-0.60
61	215.7	25.0-54.8	29.0-63.8	0.05-0.93
9	215.8	25.0-50.2	30.0-58.4	0.08-0.68
2	216.0	40.5-45.6	47.3-52.5	0.39-0.53
4	219.0	22.0-58.4	25.3-67.4	0.10-1.18
2	219.8	28.7-33.5	33.5-39.0	0.13-0.25
1	220.0	32.5	38.0	0.24
4	222.0	25.9-30.5	30.0-35.0	0.20-0.30
1	222.7	33.0	38.2	0.20
1	224.0	61.2	70.9	1.32
1	224.5	39.0	45.4	0.34
4	224.6	29.4-37.4	33.0-42.0	0.15-0.35
13	224.7	29.8-50.9	34.4-58.7	0.16-0.95
16	224.8	31.9-50.1	36.2-59.3	0.18-0.76
24	224.9	30.4-64.0	34.2-74.0	0.15-1.70

	111	225.0	21.0-66.6	24.0-78.0	0.05-4.0
	34	225.1	28.0-55.4	32.0-64.2	0.09-1.20
	2	225.2	24.0-27.0	28.0-32.0	0.05
	1	225.4	37.1	43.0	0.20
	1	226.1	45.3	52.3	0.53
	5	227.0	29.5-51.0	33.5-61.0	0.10-1.00
	3	227.2	33.0-35.0	38.0-40.5	0.20
	6	227.3	30.0-34.5	34.5-39.0	0.10-0.20
	11	227.4	22.7-41.4	33.0-48.6	0.10-0.45
	2	227.8	48.3-51.5	54.8-60.2	0.65-0.78
	1	229.0	59.0	69.0	5.0
	1	229.7	46.3	53.5	0.55
	2	229.8	39.9-42.3	46.6-50.1	0.35-0.38
	1	230.0	64.0	75.0	--
	1	230.5	51.5	60.3	0.75
	2	230.8	29.0-36.3	35.0-41.3	0.13-0.25
	3	230.9	27.9-47.5	32.3-55.0	0.13-0.68
	1	234.1	38.0	44.4	0.30
	1	234.2	66.0	77.0	1.0
	3	234.3	33.2-35.0	37.0-39.0	0.16-0.19
	2	234.4	25.0-37.0	29.0-42.0	0.09-0.20
	5	234.5	224.0-52.0	27.0-60.2	0.06-0.83
	1	235.5	34.2	39.0	0.21
	1	236.0	33.2	38.8	0.20
	1	237.0	48.9	55.7	0.60
	1	241.5	31.0	36.0	0.14
	3	244.0	56.8-66.0	66.2-76.3	0.98-1.67
	10	244.4	24.9-44.0	28.8-50.5	0.06-0.55
	18	244.5	24.8-48.2	33.3-56.6	0.10-0.65
	2	244.6	31.5-33.0	36.6-38.8	0.13-0.20
	1	244.7	--	61.4	0.85
	1	244.8	45.1	52.6	0.60
	3	245.0	46.4-63.7	67.0-73.6	1.02-1.08
	1	278.8	61.3	71.4	1.49
	1	285.0	65.3	75.1	1.54
	8	Unknown	21.5-55.5	25.5-65.3	0.06-1.13
	1	145.0	28.5	31.1	0.13
	2	150.0	32.0-56.6	40.5-66.5	0.23-1.10
	1	193.5	50.0	57.6	0.71
	1	204.0	38.4	44.4	0.28
	11	205.0	30.0-59.1	35.0-69.4	0.13-1.28
	2	207.0	45.2-58.4	53.1-69.1	0.53-1.34
	1	213.2	35.5	41.5	0.24
	1	213.5	37.7	43.2	0.28
	7	215.0	36.1-61.1	52.0-71.5	0.51-1.51
1998	6	215.5	22.6-46.6	26.7-52.5	0.08-0.34
	1	215.7	33.2	38.7	0.20
	1	224.0	32.5	38.7	0.20
	1	224.8	36.0	41.7	0.30
	6	224.9	30.0-51.0	35.1-60.2	0.12-0.83
	8	225.0	27.0-56.9	31.6-66.0	0.06-1.25
	2	225.1	27.7-27.8	32.0-32.4	0.10-0.14
	1	226.1	36.1	41.8	0.28
	1	227.4	25.7	30.5	0.07
	1	227.8	28.4	33.1	0.13
	2	229.8	22.5-25.6	26.4-30.2	0.06-0.10

	1	230.0	54.0	63.7	1.10
	2	230.9	23.5-25.0	28.0-29.5	0.07-0.08
	4	244.5	40.7-67.2	47.4-79.0	0.35-4.12
	55	118.0	42.3-74.0	49.5-86.6	0.47-3.25
	2	119.0	--	39.0-45.2	0.24-0.38
	71	120.0	29.1-86.5	33.9-95.2	0.16-4.10
	112	121.0	29.5-85.5	34.0-100.0	0.17-4.30
	18	123.0	32.1-70.2	37.5-81.0	0.19-2.5
	17	130.0	27.6-53.0	31.8-61.8	0.12-0.90
	9	134.0	31.3-40.5	36.5-47.0	0.17-0.38
	5	137.0	28.3-71.4	33.4-83.0	0.14-2.40
	2	141.0	48.8-56.0	57.1-65.2	0.60-1.0
	1	144.1	--	37.0	0.20
	11	145.0	26.5-56.0	31.1-65.6	0.11-1.20
	1	147.0	22.4	25.9	0.10
	5	150.0	37.5-45.1	43.6-52.6	0.35-0.58
	4	152.7	37.8	39.5	0.24
	1	154.3	22.2	26.7	0.10
	2	154.5	26.4	31.2	0.10-0.12
	6	157.0	31.2-50.0	36.9-58.7	0.19-0.80
	16	161.0	27.4-54.0	31.9-63.0	0.13-1.05
	2	163.0	29.0	33.7	0.15
	8	165.0	27.2-51.2	31.0-59.8	0.14-0.90
	2	167.0	32.1-32.7	37.1-38.1	0.16-0.20
	1	169.0	26.0	30.2	0.15
	4	169.6	20.8-22.7	24.5-26.5	0.05-0.10
	1	170.2	37.2	44.4	0.20
	1	173.2	--	41.5	0.30
	1	174.0	46.0	53.7	0.55
1999	2	174.2	45.2-51.9	52.2-59.8	0.54-0.83
	31	174.5	24.1-33.4	28.3-38.9	0.04-0.20
	1	175.2	--	31.0	0.13
	1	176.1	35.7	42.4	0.25
	1	176.4	26.5	30.5	0.10
	3	176.5	24.5-51.1	28.5-59.8	0.07-0.75
	1	176.9	31.3	36.3	0.17
	5	182.0	30.1-38.5	35.6-44.5	0.15-0.29
	5	185.0	44.1-53.9	50.7-62.9	0.5-0.95
	1	189.9	29.0	34.0	0.13
	45	190.0	23.0-59.0	26.5-70.0	0.06-0.87
	2	190.1	27.0-29.0	31.0-33.0	0.10-0.14
	2	190.2	23.5-31.0	28.0-36.0	0.07-0.15
	8	190.3	27.0-41.5	31.1-49.1	0.10-0.36
	5	190.4	27.0-36.0	31.0-41.5	0.10-0.20
	3	190.5	47.1-49.5	54.6-57.4	0.57-0.69
	5	192.0	28.5-43.0	33.0-49.9	0.15-0.35
	3	193.0	46.5-49.2	54.3-57.3	0.61-0.76
	2	193.5	48.3-48.7	55.4-56.5	0.48-0.62
	4	195.7	22.3-32.0	25.9-37.0	0.08-0.20
	12	195.8	24.5-36.0	28.6-42.0	0.07-0.31
	14	195.9	22.5-33.5	26.5-39.2	0.04-0.68
	6	196.0	25.5-33.5	30.0-38.5	0.05-0.23
	8	203.5	27.5-52.5	32.1-60.7	0.12-0.73
	11	204.0	30.5-51.5	35.6-59.7	0.15-86
	3	204.7	26.3-31.7	29.8-38.0	0.11-0.21
	1	204.8	29.0	34.0	0.12

	4	204.9	27.6-32.4	32.0-37.9	0.11-0.19
	270	205.0	19.5-64.9	28.5-75.7	0.05-1.71
	1	205.3	28.0	32.0	0.10
	1	205.4	24.0	29.3	0.05
	49	205.5	25.6-51.5	29.1-60.0	0.11-0.88
	45	207.0	34.4-55.1	40.1-64.2	0.45-0.98
	1	207.5	48.2	55.1	0.74
	7	208.0	27.1-35.1	31.4-41.5	0.12-0.23
	4	213.2	29.6-40.6	33.6-47.3	0.15-0.35
	1	213.5	31.0	36.1	0.18
	121	215.0	34.5-56.4	39.6-69.3	0.23-1.07
	1	215.4	--	35.5	0.10
	83	215.5	20.9-44.5	31.5-52.6	0.14-0.50
	1	216.0	28.9	33.6	0.11
	1	219.0	51.4	59.0	0.70
	1	219.5	36.0	41.2	0.30
	6	224.7	22.6-30.0	24.9-34.9	0.05-0.15
	8	224.8	25.0-27.4	28.5-32.2	0.08-0.12
	14	224.9	26.9-43.5	30.9-50.7	0.10-0.67
	41	225.0	23.2-56.5	26.1-64.5	0.07-1.03
	1	225.1	26.5	30.7	0.12
	4	230.0	27.0-44.0	26.6-51.2	0.08-0.47
	4	230.9	25.0-27.5	29.0-32.0	0.10-0.14
	2	231.0	25.5-285	30.0-33.5	0.10-0.14
	4	244.0	42.3-55.1	49.3-63.6	0.47-1.20
	14	244.5	27.5-57.5	27.3-66.8	0.10-1.17
	1	244.6	--	44.0	0.28
	1	245.0	47.1	54.0	0.58
	91	Unknown	19.0-39.0	22.0-44.2	0.05-0.90
	1	76.0	25.6	31.0	0.11
	19	118.0	36.9-67.0	42.1-77.7	0.29-1.65
	39	120.0	26.3-76.2	30.9-87.5	0.12-2.95
	58	121.0	26.4-74.6	30.4-82.5	0.12-2.45
	12	123.0	29.5-64.8	34.3-77.0	0.14-1.94
	17	130.0	25.1-46.5	29.3-55.3	0.09-0.55
	2	134.0	36.5-42.5	42.5-49.2	0.25-0.48
	2	137.0	28.2-42.0	32.6-48.3	0.11-0.51
	3	141.0	30.8-39.0	34.8-46.0	0.14-0.31
	4	145.0	31.1-33.0	33.2-38.3	0.15-0.24
	3	150.0	29.3-33.5	34.0-44.3	0.19-0.26
	4	157.0	23.5-27.8	27.0-31.9	0.09-0.11
	9	161.0	21.8-33.4	24.5-39.0	0.07-0.24
2000	3	163.0	25.5-29.0	29.6-33.5	0.13-0.14
	9	165.0	26.0-31.0	29.7-35.6	0.09-0.17
	4	167.0	27.2-35.5	31.4-41.5	0.10-0.26
	1	170.2	27.9	32.2	0.50
	4	174.0	38.9-53.0	44.8-61.0	0.34-0.86
	1	174.2	38.0	43.9	0.32
	2	182.0	29.2-29.4	33.5-34.7	0.13-0.15
	2	185.0	40.0-41.9	46.3-48.8	0.36-0.38
	7	190.0	26.1-46.7	30.6-53.8	0.09-0.74
	2	190.3	25.5-29.0	30.9-33.6	0.09-0.14
	2	190.5	39.5-40.9	45.6-47.9	0.43-0.45
	2	192.0	30.0	35.0	0.14-0.16
	4	193.0	38.6-70.5	44.4-80.5	0.32-2.08
	3	193.2	36.1-49.8	41.7-57.9	0.30-0.78

	6	193.5	37.4-45.8	42.2-52.6	0.14-0.51
	5	195.8	26.5-34.2	32.3-40.2	0.11-0.27
	2	204.0	37.0-46.1	43.1-53.3	0.03-0.43
	103	205.0	21.0-51.0	26.2-60.4	0.05-0.77
	26	205.5	24.1-42.7	28.0-49.2	0.08-0.42
	19	207.0	33.6-48.9	38.5-57.6	0.30-0.66
	2	208.0	25.6-32.0	30.0-37.5	0.10-0.19
	1	210.0	34.2	40.4	0.25
	10	213.2	26.0-35.3	30.2-41.1	0.10-0.29
	4	213.5	28.0-32.5	32.0-38.6	0.12-0.19
	36	215.0	30.2-49.0	33.8-57.4	0.14-0.78
	1	215.2	--	33.0	0.10
	25	215.5	25.1-37.7	27.3-44.0	0.09-0.30
	1	219.0	38.7	45.4	0.37
	6	224.0	29.6-38.0	34.3-44.0	0.15-0.31
	9	224.9	32.2-39.0	37.7-45.5	0.23-0.44
	34	225.0	26.1-51.4	30.5-59.6	0.09-0.97
	1	227.8	24.3	27.8	0.09
	1	230.5	32.9	37.5	0.21
	3	244.0	38.7-47.9	45.6-55.8	0.38-0.69
	6	244.5	33.6-59.9	49.5-68.8	0.54-1.42
	1	245.0	45.3	52.3	0.56
	3	Unknown	28.0-32.2	32.4-38.0	0.12-0.18
	4	118.0	36.6-64.1	43.0-73.4	0.27-1.95
	7	120.0	42.8-54.3	49.6-63.4	0.51-1.00
	19	121.0	41.5-73.5	48.6-83.2	0.40-2.55
	6	123.0	26.2-65.5	31.3-76.0	0.09-2.08
	1	145.0	70.0	81.0	2.20
	1	161.0	18.9	21.9	0.04
	1	185.0	39.5	46.1	0.46
	2	190.0	31.5-40.8	36.6-47.9	0.19-0.36
	1	192.0	34.9	39.4	0.22
	2	195.8	21.9	25.2	0.06
	2	203.5	40.9-42.0	47.6-49.1	0.18-0.34
	3	204.0	35.5-38.0	41.8-44.2	0.25-0.30
2001	17	205.0	25.0-46.6	28.2-54.2	0.08-0.64
	3	205.5	23.6-29.1	27.2-33.7	0.08-0.13
	7	207.0	35.3-47.4	41.3-54.5	0.41-0.57
	1	207.5	--	25.6	0.05
	1	213.2	23.0	26.5	0.07
	1	213.5	24.5	28.9	0.09
	24	215.0	28.9-48.5	30.9-56.1	0.14-0.67
	7	215.5	21.2-29.3	24.4-33.8	0.05-0.15
	2	224.0	22.9-26.1	26.6-30.4	0.07-0.09
	3	224.9	22.3-29.0	25.8-33.2	0.06-0.20
	9	225.0	18.2-36.0	20.6-42.5	0.04-0.27
	1	228.5	22.7	26.6	0.06
	2	244.0	44.1-44.9	51.6	0.52
	1	244.5	40.0	47.1	0.34
	2	118.0	51.5-53.0	61.0-62.8	0.89-1.10
	5	120.0	26.0-72.8	30.1-84.8	0.10-2.60
	21	121.0	24.5-75.0	27.5-86.8	0.09-3.10
2002	7	123.0	26.0-77.0	30.1-89.2	0.08-2.85
	4	130.0	22.0-67.0	25.7-78.2	0.07-2.30
	1	134.0	24.0	27.9	0.09
	1	137.0	26.4	30.6	0.10

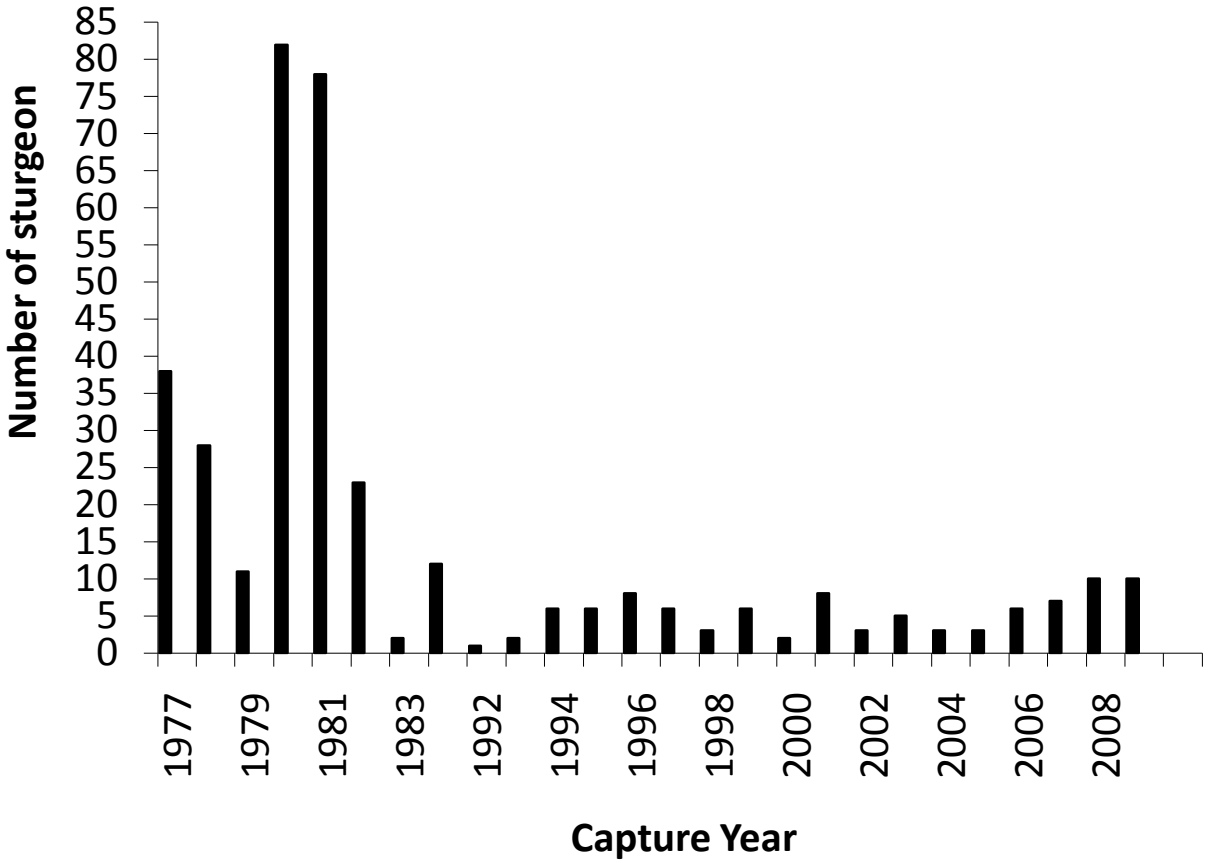
	4	145.0	20.8-23.4	24.1-27.1	0.05-0.08
	4	161.0	24.1-57.2	27.8-67.0	0.07-1.14
	2	163.0	19.0-21.9	22.2-25.2	0.030.06
	3	165.0	22.2-23.6	26.1-27.3	0.05-0.07
	2	167.0	15.0-21.0	17.6-24.0	0.03-0.05
	1	176.5	34.4	40.2	0.24
	1	177.5	36.6	41.9	0.31
	1	185.0	42.7	50.1	0.47
	1	190.0	29.3	33.5	0.14
	1	205.0	27.5	31.6	0.11
	2	205.5	27.7	31.4	0.10-0.13
	1	207.0	35.0	40.2	0.24
	1	225.0	40.0	46.0	0.44
	4	118.0	33.8-36.0	39.0-42.0	0.21-0.27
	14	120.0	30.0-59.3	35.0-69.2	0.13-1.40
	78	121.0	21.0-65.2	24.8-75.5	0.08-1.75
	13	123.0	22.5-59.8	26.1-70.2	0.06-1.90
	45	130.0	20.2-68.0	23.4-79.5	0.04-2.00
	26	134.0	19.5-41.5	23.0-48.3	0.05-0.38
	14	137.0	21.3-36.9	24.6-44.0	0.04-0.31
	19	141.0	18.0-40.5	21.5-48.3	0.03-0.39
	1	144.5	--	43.1	0.26
	71	145.0	19.0-48.0	22.1-56.0	0.04-0.68
	39	150.0	17.8-41.5	20.8-48.2	0.03-0.47
	6	157.0	20.6-39.0	24.1-45.5	0.07-0.34
	54	161.0	19.5-35.0	22.8-41.5	0.04-0.29
	14	163.0	20.9-36.6	23.8-42.5	0.04-0.33
	21	165.0	20.7-42.5	24.0-49.3	0.05-0.46
	8	167.0	14.9-35.5	17.1-41.6	0.02-0.29
	2	170.0	35.4-36.9	40.7-43.4	0.15-0.19
2003	4	174.0	37.1-41.1	43.5-48.2	0.31-0.41
	1	176.5	35.5	40.9	0.27
	14	185.0	23.9-41.8	29.649.1	0.13-0.43
	1	188.0	32.5	37.7	0.21
	21	190.0	28.0-42.7	32.7-49.4	0.13-0.50
	5	190.5	33.5-42.8	39.2-50.2	0.23-0.46
	3	192.0	25.8-27.2	29.6-31.7	0.09-0.11
	5	193.0	27.4-42.9	38.1-50.0	0.20-0.52
	2	193.2	38.4-42.5	44.7-49.6	0.35-0.43
	4	193.5	31.9-39.5	37.4-47.0	0.12-0.36
	3	203.5	33.5-44.1	39.3-50.9	0.24-0.43
	4	204.0	31.0-35.7	36.1-41.5	0.02-0.22
	55	205.0	23.5-47.5	27.2-55.1	0.08-0.58
	34	207.0	32.1-44.4	38.0-58.6	0.22-0.47
	4	207.5	33.2-45.1	39.0-52.9	0.22-0.49
	62	215.0	22.5-47.9	26.5-55.7	0.07-0.64
	15	225.0	25.8-44.5	29.7-51.8	0.11-0.55
	1	230.0	31.2	36.8	0.18
	2	244.0	38.0-40.1	43.4-46.8	0.31-0.40
	2	244.5	41.1-48.8	49.1-56.4	0.46-0.77
	1	245.0	32.4	37.9	0.17
	1	118.0	27.9	32.1	0.11
	2	121.0	42.0-50.0	49.3-58.0	0.55-0.74
2004	1	123.0	28.0	32.1	0.12
	7	130.0	23.6-36.0	27.5-42.7	0.08-0.26
	1	134.0	23.8	28.4	0.07

	5	141.0	20.5-21.5	23.1-25.3	0.04-0.06
	11	145.0	19.0-29.1	22.0-34.1	0.02-0.14
	4	150.0	17.8-31.0	21.0-35.1	0.04-0.15
	2	157.0	25.5-28.0	29.6-30.5	0.08-0.12
	5	161.0	24.0-29.2	27.9-34.2	0.07-0.14
	2	165.0	28.0-30.0	32.6-35.2	0.11-0.15
	1	167.0	29.0	33.4	0.12
	1	185.0	36.2	42.0	0.30
	1	190.0	32.1	37.3	0.13
	3	193.0	31.2-33.6	35.5-39.3	0.18-0.23
	1	193.5	32.3	38.1	0.19
	2	204.0	25.9-30.0	30.0-33.5	0.09-0.12
	6	205.0	23.0-32.5	25.0-39.8	0.07-0.18
	3	207.0	28.0-33.0	32.7-38.5	0.13-0.20
	1	215.0	32.9	37.9	0.22
	1	215.5	35.5	41.9	0.25
	6	225.0	25.6-33.0	26.0-39.6	0.06-0.23
	9	244.0	21.5-47.2	25.3-54.9	0.06-0.50
	6	244.5	25.4-50.0	29.9-58.0	0.09-0.81
	5	245.0	34.2-38.6	40.3-44.9	0.21-0.29
	1	245.5	46.9	55.1	0.68,m
	2	120.0	23.1-25.4	27.3-29.5	0.06-0.08
	5	121.0	40.5-50.0	47.0-58.4	0.37-0.80
	4	130.0	23.3-24.8	26.8-29.6	0.06-0.17
	1	134.0	22.6	26.5	0.06
	4	137.0	25.9-28.0	30.0-33.2	0.07-0.12
	10	141.0	20.5-26.5	24.0-30.9	0.04-0.10
	17	145.0	19.5-29.5	23.2-34.0	0.04-0.11
	2	150.0	27.7-30.0	32.7-35.2	0.12-0.16
	1	157.0	25.5	30.7	0.09
	9	161.0	21.3-31.0	22.9-36.1	0.05-0.18
	2	163.0	20.9-24.1	24.5-28.8	0.04-0.09
	6	165.0	23.0-31.3	27.0-36.3	0.06-0.17
	1	167.0	31.0	36.0	0.16
	1	177.5	31.4	37.1	0.17
2005	3	190.0	20.8-27.8	23.2-32.1	0.05-0.09
	1	190.5	30.6	36.1	0.16
	3	192.0	22.6-24.3	26.9-27.6	0.06-0.08
	3	193.0	30.4-32.7	35.8-38.3	0.15-0.19
	1	193.5	26.2	29.5	0.08
	9	204.0	19.5-25.5	22.6-29.2	0.03-0.08
	3	205.0	20.5-36.0	23.7-42.7	0.05-0.26
	2	207.0	25.0-36.3	28.9-43.2	0.06-0.28
	4	215.0	28.6-35.0	33.2-40.5	0.12-0.24
	3	225.0	20.0-22.7	24.3-26.0	0.06-0.07
	3	229.0	25.1-28.6	29.5-33.0	0.08-0.13
	1	235.0	29.9	35.0	0.13
	3	244.0	32.6-39.4	39.5-46.5	0.21-0.39
	25	244.5	18.5-46.6	21.1-56.1	0.03-0.58
	4	245.0	21.6-33.5	25.2-39.3	0.06-0.18
2006	1	120.0	35.5	41.3	0.25
	3	121.0	36.0-45.0	43.0-52.3	0.33-0.51
	1	123.0	24.5	28.5	0.09
	2	141.0	22.5-24.0	26.0-28.2	0.07-0.08
	2	145.0	26.9-36.3	31.1-42.3	0.10-0.26

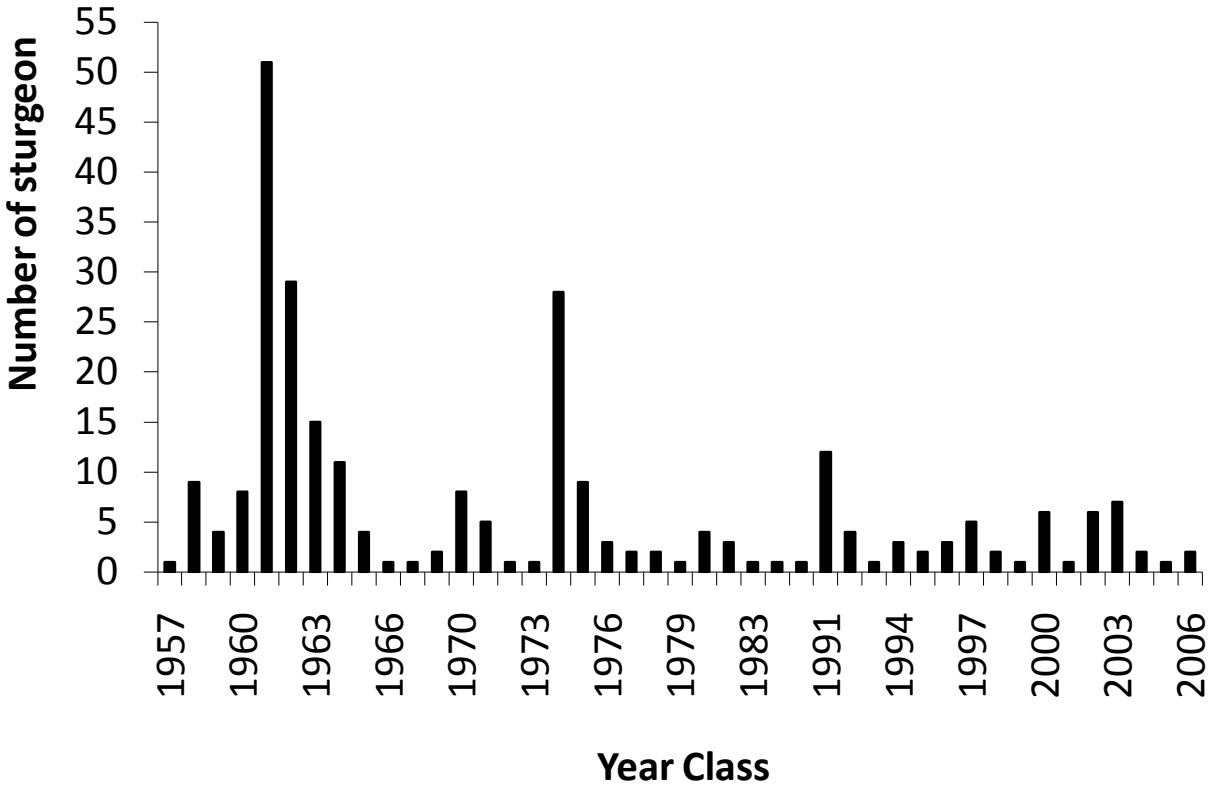
	2	150.0	22.4-23.0	26.4-26.6	0.07-0.08
	1	165.0	27.5	32.2	0.10
	3	190.0	30.7-33.4	35.4-38.9	0.16-0.20
	7	193.5	14.9-30.3	17.4-35.1	0.01-0.10
	1	205.0	26.3	28.5	0.96
	1	240.5	24.0	27.0	0.08
	4	244.0	29.1-30.2	33.1-35.1	0.14-0.17
	3	244.5	19.6-27.4	23.6-32.3	0.05-0.12
	7	245.0	23.8-27.6	27.9-39.6	0.04-0.11
2007	1	121.0	--	--	--
	1	130.0	30.0	35.6	0.16
	2	137.0	27.5-28.9	32.6-34.0	0.12-0.13
	7	145.0	26.0-30.8	30.5-36.3	0.07-0.15
	1	163.0	28.0	32.8	0.12
	2	165.0	29.0-33.5	33.8-38.7	0.12-0.18
	1	174.0	30.1	34.69	0.14
	1	174.2	20.9	24.0	0.07
	5	176.5	20.2-31.6	23.7-36.7	0.14-0.94
	1	185.0	29.4	34.3	0.13
	4	190.0	22.8-30.6	26.5-35.3	0.07-0.16
	2	193.0	27.4-31.7	31.9-36.9	0.12-0.16
	1	199.5	30.1	35.6	0.15
	7	205.0	27.8-30.1	33.0-35.4	0.13-0.15
	4	207.0	21.6-31.4	26.4-36.8	0.07-0.16
	1	215.0	31.1	36.3	0.17
	1	225.0	29.0	34.2	0.12
	16	244.0	23.9-31.5	28.3-36.3	0.08-0.16
	14	244.5	20.8-33.9	25.3-39.5	0.05-0.21
2008	3	141.0	26.5-27.5	31.0-32.5	0.08-0.09
	31	145.0	18.0-31.3	21.1-36.5	0.2-0.15
	38	150.0	20.1-27.0	22.3-31.5	0.05-0.11
	8	157.0	21.5-25.5	24.2-30.3	0.04-0.09
	3	161.0	25.2-32.2	30.3-38.2	0.07-0.19
	4	165.0	24.0-28.6	27.7-33.2	0.06-0.10
	2	174.2	22.2-22.3	26.0-26.2	0.06-0.07
	1	176.5	23.1	27.0	0.06
	3	190.0	23.5-28.9	28.2-34.0	0.08-0.13
	1	193.2	22.9	27.2	0.08
	2	193.5	27.1-28.2	31.6-33.3	0.10-0.11
	5	199.5	23.5-26.8	28.0-31.1	0.07-0.10
	33	205.0	23.2-29.8	27.3-39.9	0.07-0.94
	9	207.0	24.7-28.4	28.8-33.0	0.07-0.92
	4	225.0	25.1-29.9	28.0-35.2	0.09-0.14
	26	244.5	20.3-29.4	23.5-33.9	0.05-0.80
Unknown year class	4	118.0	44.5-60.0	51.5-69.2	0.52-1.80
	28	120.0	34.0-80.9	39.3-93.4	0.21-3.60
	127	121.0	24.5-77.0	28.5-91.0	0.08-3.25
	34	123.0	27.2-85.4	31.8-98.6	0.12-4.25
	45	130.0	18.0-71.5	21.8-81.7	0.03-2.40
	8	134.0	21.4-99.0	25.1-111.0	0.05-4.25
	19	137.0	22.5-94.2	26.0-114.5	0.07-0.69
	39	141.0	19.5-77.5	23.0-90.0	0.04-3.20
	68	145.0	19.5-70.9	22.8-82.0	0.04-2.30
	27	150.0	20.3-33.0	23.4-39.3	0.05-0.22
	11	157.0	21.6-33.8	24.1-40.0	0.06-0.21
	21	161.0	22.1-36.3	25.9-43.0	0.07-0.28

	7	163.0	18.5-34.7	21.0-40.7	0.03-0.22
	42	165.0	16.8-49.5	19.0-57.1	0.03-0.76
	8	167.0	15.4-40.0	17.8-46.0	0.02-0.35
	4	170.0	24.8-32.0	29.2-37.7	0.05-0.11
	6	174.0	27.0-35.4	31.4-41.4	0.12-0.26
	19	174.2	23.6-85.6	29.0-41.8	0.12-0.29
	22	176.5	28.3-52.2	32.6-60.3	0.12-0.95
	3	177.5	31.2-36.8	35.8-43.4	0.16-0.28
	5	182.0	26.2-33.5	30.5-38.8	0.10-0.21
	41	185.0	25.9-53.5	30.1-59.6	0.04-1.05
	4	188.0	26.3-34.0	30.2-39.3	0.06-0.19
	36	190.0	20.5-48.5	24.7-56.2	0.06-0.59
	22	190.5	26.9-38.9	31.5-44.0	0.10-0.41
	11	192.0	21.4-33.0	24.6-38.8	0.03-0.20
	57	193.0	20.3-46.5	26.2-53.7	0.07-0.57
	19	193.2	25.5-36.9	30.1-44.2	0.10-0.30
	39	193.5	13.6-45.7	16.0-52.9	0.01-0.42
	1	195.8	34.2	38.0	0.20
	7	203.5	25.0-65.9	30.0-75.7	0.07-1.42
	4	204.0	21.2-72.5	25.0-84.8	0.05-0.56
	124	205.0	15.4-85.5	17.2-99.0	0.01-4.48
	6	205.5	33.4-35.0	38.1-40.7	0.16-0.33
	104	207.0	22.9-76.1	26.2-88.5	0.05-2.63
	10	207.5	25.6-43.0	30.0-49.5	0.05-0.47
	101	215.0	24.0-72.0	28.5-92.0	0.06-1.22
	1	215.4	61.0	72.0	1.10
	9	215.5	21.8-51.0	24.7-58.3	0.07-0.90
	2	219.5	30.9-33.0	35.5-36.7	0.20-0.23
	3	224.9	30.0-36.1	34.6-40.7	0.13-0.26
	63	225.0	23.1-52.1	26.7-61.3	0.07-0.74
	1	227.0	106.0	126.0	--
	1	228.7	29.0	33.0	--
	1	230.0	30.0	35.0	0.13
	1	235.0	27.5	33.1	0.12
	1	241.0	24.7	29.0	0.05
	18	244.0	22.4-63.7	25.4-73.9	0.06-1.44
	47	244.5	19.1-48.4	22.0-55.3	0.04-0.84
	40	245.0	20.8-62.4	22.3-72.5	0.03-1.40
	1	Unknown	24.0	27.2	0.08
Total	5945				

Appendix 6. Number by age class of wild juvenile white sturgeon captured in the Kootenai River, Idaho since 1977.



Appendix 7. Number of wild juvenile white sturgeon captured annually in the Kootenai River, Idaho, since 1977 (no sampling occurred between 1981 and 1988).



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