Columbia River Project Water Use Plan

Columbia River White Sturgeon Management Plan

White Sturgeon Conservation Aquaculture

Implementation Year 8

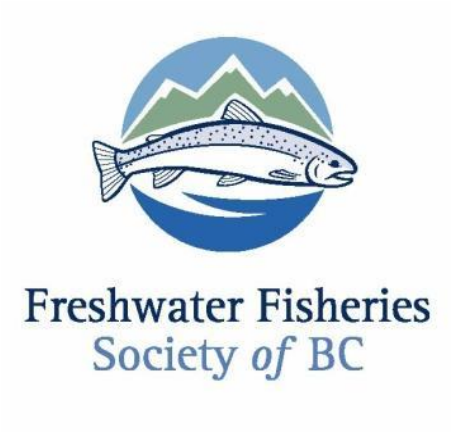
Reference: CLBWORKS-25: Mid-Columbia River White Sturgeon Conservation Aquaculture
CLBWORKS-34: Lower Columbia River White Sturgeon Conservation Aquaculture

Columbia River White Sturgeon Conservation Aquaculture Program 2015

Study Period: May 2015 – May 2016

Freshwater Fisheries Society of British Columbia
Kootenay Trout Hatchery
Fort Steele, British Columbia, V0B 1N0

May 30, 2016



COLUMBIA WHITE STURGEON CONSERVATION AQUACULTURE PROGRAM

KOOTENAY STURGEON HATCHERY

2015 Brood Year
Annual Report

Mike Keehn

May 30, 2016

Executive Summary

Wild juvenile White Sturgeon age classes are lacking in the Upper Columbia River population due to recruitment failure. Accordingly, conservation aquaculture has become a critical component of the Upper Columbia White Sturgeon Recovery Initiative (UCWSRI), with hatchery reared juveniles being released over the last decade into both the lower (since 2001) and Mid-Columbia (since 2007) Rivers in Canada. Conservation aquaculture and release of juvenile White Sturgeon into the mid and lower Columbia Rivers was successful in 2015. Juvenile sturgeon from wild source eggs and larvae were reared at Kootenay Sturgeon Hatchery (KSH) and released into the lower Columbia River, and a portion of 2014 year class progeny from wild broodstock spawning were released into the mid-Columbia.

At the April 2013 UCWSRI Technical Working Group (TWG) meeting, members identified that the conservation aquaculture program should focus on rearing wild caught eggs and larvae in a streamside white sturgeon conservation aquaculture facility (the Facility). The primary goal of the Facility is to augment the genetic diversity of supplemental progeny by representing additional adults spawning in the wild as supported by recent genetic analyses. The Facility is located on the Canadian section of the transboundary reach of the Columbia River near the Waneta spawning area and supports the incubation and hatch of wild caught eggs. Due to the success of the Facility in 2014, the UCWSRI TWG identified that the goal of the program from 2015-2018 would focus on the continued rearing of wild caught eggs and larvae instead of the traditional broodstock program. In addition, the decision was made to hold back a portion of the 2014 year class juveniles destined for the mid-Columbia, to be released at two years of age in the spring of 2016 at a target weight of 300 grams.

The ploidy of wild white sturgeon has previously been determined to be octaploid (8N) in Columbia and Kootenay River populations. Concern was raised when a large number of 12N white sturgeon were discovered in juvenile family groups which were offspring of wild adult Kootenay River White Sturgeon spawned at the Kootenay Tribe of Idaho (KTOI) Sturgeon Hatchery in 2013. The mechanism of this ploidy shift is unknown but it is thought to occur at the fertilization stage. The implications of spontaneous autopolyploidy for the wild population are still being evaluated, however as in previous years the ploidy of all wild progeny white sturgeon being reared at KTH was assessed (n=63) and 12N individuals were not released as a precautionary measure.

Juvenile releases occurred in the spring of 2016 on May 3rd and 5th in the mid-Columbia River and on May 7th in the lower Columbia River. Releases of age-2 juveniles (from broodstock spawned in 2014) in the mid-Columbia River occurred at Shelter Bay Provincial Park near Revelstoke BC (n=1,325). Average fork length and weight of these fish was 39.6 cm and 442 grams, respectively. A total of 76 wild progeny juvenile sturgeon were released into the lower Columbia River (63 from 2015 brood class and 13 from 2014 brood class holdovers) at Beaver Creek below Trail BC at an average fork length and weight of 36.7 cm and 411 grams, respectively. There were school and public release events associated with the sturgeon releases at Beaver Creek near Trail and Shelter Bay near Revelstoke.

Table of Contents

List of Tables

Acknowledgements

This Project is funded by the BC Hydro Water Use Plan for the Columbia River and the Fish and Wildlife Compensation Program on behalf of its program partners BC Hydro, the Province of B.C., First Nations and the public, who work together to conserve and enhance fish and wildlife impacted by the construction of BC Hydro dams.

We also acknowledge the Upper Columbia White Sturgeon Recovery Initiative Technical Working for their contribution to this program.

1. Background

The population of White Sturgeon in the Canadian portion of the Columbia River has been undergoing recruitment failure for several decades (UCWSRI 2012). This was recognized as a critical issue for this population in the early 1990's and resulted in the establishment of the Upper Columbia White Sturgeon Recovery Initiative (UCWSRI) in 2001 and the population being listed as endangered under the Species at Risk Act (SARA) in 2006. Original estimates, based on annual levels of natural recruitment being insufficient for maintaining a self-sustaining population, suggested that the population would become functionally extinct by 2044 (UCWSRI 2002; Hildebrand and Parsley 2014). Accordingly, intervention and monitoring were deemed essential to preclude extinction. An integral part of the original recovery plan was the initiation of a conservation aquaculture program designed to provide artificial recruitment to the population and provide fish for research purposes. The conservation aquaculture program was designed to support the population until such time as stock abundance/age structure and habitat conditions (including spawning, incubation and rearing flows and reservoir levels) can support a self-sustaining population. This program was initiated in 2001 and has stocked sub-yearling juvenile sturgeon annually into the lower Columbia River.

Although construction and operation of dams have been implicated in the decline of white sturgeon in the Columbia River, the mechanisms responsible for recruitment failure have been difficult to ascertain with certainty (Gregory and Long 2008). During development of the Columbia River Water Use Plan (WUP), this uncertainty made it difficult for the WUP Consultative Committee (CC) to develop response measures to address sturgeon declines. The conservation aquaculture program, as delivered under the Columbia River WUP, is divided between two areas of the Columbia River, the lower Columbia River and the Mid-Columbia River. The program goals differ between the two areas. Under operational parameters of the Columbia River Treaty, adequate flow treatments before and during spawning, incubation and drift phases of the life cycle were not seen as feasible in the lower Columbia River downstream of HLK. The CC therefore agreed to a plan which included monitoring to assess trends in population dynamics, research into juvenile habitat use and survival, and an assessment of the feasibility of different management responses. However, it was deemed impossible to deliver this plan without releases of hatchery reared juvenile sturgeon as wild juvenile age classes were lacking and a project (CLBWORKS#34 - Lower Columbia River White Sturgeon conservation aquaculture program) was initiated to provide for dependable financial resources for the maintenance of the aquaculture program for the duration of the Columbia WUP.

In the Mid-Columbia River there were more uncertainties (e.g. biological, operational etc.) during the development of the WUP and the CC report (BC Hydro Columbia White Sturgeon 2012 Annual Report) recognized several possible long term directions for the Mid-Columbia program including:

- Initiate a conservation aquaculture program for development of an Arrow Lakes Reservoir failsafe population.

- Develop a self-sustaining (in the long term) population in a Kinbasket Reservoir/upper Columbia River recovery area.
- Initiate a conservation aquaculture program for development of a Kinbasket Reservoir failsafe (non-reproducing) population.

The CC recommended that the conservation aquaculture strategy for this program be robust enough to allow for the determination of whether or not wild production is possible and where recovery efforts would be best directed in either the Mid-Columbia or Kinbasket. CLBWORKS#24, Mid-Columbia White Sturgeon Experimental Aquaculture, was implemented during the first four years of the program (2008-2011). During this period, the focus was on providing for larval and sub-yearling juvenile releases designed to assist with monitoring habitat selection and use, and early survival. The second phase of the work under project CLBWORKS#25, Mid-Columbia White Sturgeon Conservation Aquaculture, was initiated in 2012 following a technical review of the entire Mid-Columbia White Sturgeon management plan. The results of a review in 2012 were to continue with conservation aquaculture program (2012-2018) in the Mid-Columbia and assess optimal size at release (survival / temperature / growth relationships) by releasing larger sized juveniles compared to those released from 2008-2012.

In discussions at the UCWSRI TWG meetings in 2015, the conservation aquaculture program was redirected to focus efforts on rearing wild caught eggs and larvae, to achieve recovery goals related to genetic diversity as survival of hatchery reared juveniles has been high to date, with an estimated 30,000 juveniles at large in the Transboundary Reach of the Columbia River. The focus on collecting wild caught progeny will be conducted from 2015-2018. In addition, it was decided to hold back approximately half of the 2014 year class white sturgeon from the regular production broodstock program, to be released at a larger size into the mid-Columbia River near Revelstoke BC in the spring of 2015.

The revised objectives of the Columbia River White Sturgeon Aquaculture Program for 2015-2018 are:

- Collection of wild progeny (eggs/larvae) from the lower Columbia River that are reared within the streamside rearing facility until hatch (eggs) and transported to the KSH as larvae before they reach feeding age (i.e. before 7 days of age).
- Size targets:
    - Lower Columbia River: Wild origin progeny are reared at KSH until a minimum of 200 grams and 9 months of age.
    - Mid-Columbia River: Juveniles are reared to a minimum of 300 grams.
- Discontinue broodstock programs.
- The annual marking and tagging of all fish according to protocols, including scute removal, Passive Integrated Transponder (PIT) tagging, sonic tagging and other tagging as may be required for juvenile sturgeon.

- Annual participation in public awareness and educational activities including but not necessarily limited to release events, school events, public events, open houses workshops etc.
- Continued provision of research, testing and pilot programs exploring techniques for improved efficiencies and an ability to provide for broader genetic diversity of released stock.

This report specifically describes the conservation fish culture activities undertaken by the Freshwater Fisheries Society of BC at their Kootenay white sturgeon conservation facility to meet the objectives defined by CLBWORKS#25 and CLBWORKS#34.

2. Broodstock Capture

There was no broodstock collection in 2015. Broodstock collection was conducted from 2001 through 2014 and results of those years are available in earlier reports.

3. Wild Progeny

In the spring of 2014 a streamside rearing facility was piloted on the banks of the Columbia River near Waneta. The facility was constructed within a 14 by 8 foot cargo trailer for ease of transport. The trailer was parked at a streamside location just upstream of Waneta eddy, supplied with power and plumbed to allow river water to be pumped through a series of MacDonald Jar upwellors set up over small rearing troughs. Wild source eggs were collected in river and taken directly to the container to be placed into flowing MacDonald Jars. There they were incubated to hatch and the larvae retained in a compartmentalized collection trough (equipped with Bio balls for cover and hiding) for a maximum of 7 days post-hatch. Larvae need to be in the hatchery for rearing before 10 days of age to ensure they are successfully weaned onto feed, so FFSBC staff made regular trips to the facility to retrieve larvae and transport them back to KTH. A total of 103 larvae were transported to the KSH, from several separate spawning “events” that were estimated to occur at Waneta Eddy (Table 1). At KSH wild larvae were reared in quarantine using the same juvenile rearing techniques and protocols described in section 4.0, and the same marking and tagging protocols described in section 10.2, with the exception of the lateral scute removal, which was done on the right side of the wild progeny fish. No culling of wild progeny took place as it was determined that all available fish would be released. Since there were so few eggs captured from wild spawning events, fish were treated as one group at the hatchery. All mortalities were preserved in ethyl alcohol for DNA samples. All DNA sampling on the released fish was only done when the fish were large enough to have tissue samples taken and preserved without any negative effects.

Table 1 Numbers of wild origin White Sturgeon collected from the lower Columbia River and transported to KSH for rearing in June 2015.

Transport Date	Number of Larvae Transported
19-Jun-15	23
23-Jun-15	77
30-Jun-15	3

4. Juvenile Rearing and Tagging

During the juvenile rearing process, fish are graded based on size to improve growth and survival. At grading, fish were hand-picked into either large or small categories and placed into separate tanks. This was the first time during the rearing process when a complete inventory of fish was established. Numbers for all prior milestones of development were then back-calculated from this point. The splitting of fish between tanks decreases densities and reduces tank effects on growth. Secondly, non-competitive access to feed is important to the smaller, downgraded fish. These fish will recover from any feeding competition and quickly establish a higher growth rate. As post-release survival is estimated to be positively influenced by size at release, it is important that annual size-at-release targets are achieved. As a standard fish culture practice, feed rations are set based on fish biomass (percent feed per day). As biomass increases so does the size and amount of feed provided to ensure consistent growth.

During grading, smaller fish remained in troughs or smaller circular tanks until they caught up on growth. Further grading and culling may occur, but care is taken to ensure that smaller fish are not excluded so that they will contribute to the final release numbers. Culls for population density control occurred equally from all tanks to ensure that artificial genetic selection was minimized to the extent possible. Briefly, fish were randomly selected from rearing containers using small nets and counted out into a vessel containing 500mg/l TMS (tricaine methanesulphonate) according to FFSBC Standard Operation Procedure: Euthanasia. Culling continued until the desired numbers of fish remain in the culture container.

In February of 2016, juvenile sturgeon were individually tagged with a PIT tag into the dorsal musculature at the midpoint between the dorsal and lateral scute line inferior to the anterior margin of the dorsal fin (Figure 1). PIT tag, length and weight data was recorded for each individual fish starting in mid-April, to be as close to release time as possible. This was done to ensure no additional growth occurred in-hatchery that may be attributed to post-release growth. If recaptured in the wild, each individual fish can identified to its release location, date of release, size at release, and family record based on the unique PIT tag number.

5. Juvenile Releases

Survival of wild origin progeny in 2015 was approximately 61% from larval age to release age (n=63). For the lower Columbia, it was determined that wild progeny would be released as close to place of origin as possible, so Beaver Creek below Trail was chosen as the release site. In addition to the 63 juveniles from the 2015 wild progeny collection, 13 juveniles from the 2014 year class wild progeny fish were released. These individuals were deemed too small to be released in the spring of 2015, and were held for an additional year to be grown as large as possible. This meant that a total of 76 wild progeny juveniles were released into the lower Columbia (Table 2). A total of 1,325 juveniles were released into the mid-Columbia reach, at Shelter Bay near Revelstoke BC Table 3). These fish were the portion of the regular hatchery production juveniles that were held over for an extra year and released at approximately 22 months of age. These individuals averaged 447 grams and 39.8 cm fork length, making them the largest juveniles released from the conservation aquaculture program to date. For all releases, juvenile White Sturgeon are transported in FFSBC fish transport vehicles according to UCWSRI TWG transport protocols.

Table 2 Total number of hatchery reared juvenile White Sturgeon released annually into the lower Columbia River in Canada from 2002 – 2016.

Release Year	Fall	Spring	Total
2002		8,671	8,671
2003		11,803	11,803
2004		9,695	9,695
2005	5,039	12,748	17,787
2006	4,042	10,828	14,870
2007	4,029	8,123	12,152
2008		6,448	6,448
2009		4,141	4,141
2010		3,947	3,947
2011		4,010	4,010
2012		4,000	4,000
2013		4,037	4,037
2014		1,801	1,801
2015		7,183	7,183
2016		1,401	1,401
Totals	13,110	98,836	111,946

Table 3. Total number of hatchery reared juvenile White Sturgeon released annually into the mid-Columbia River in Canada from 2007 – 2016. Weight at release is presented as an average across all individuals from within that year class.

Year	Number Released	Cumulative	Weight at Release (g)
2007	6,534	6,534	58.6
2008	8,168	14,702	60.9
2009	9,625	24,327	66.3
2010	7,587	31,914	80.7
2011	6,517	38,431	55.0
2012	1,132	39,563	81.0
2013	5,944	45,507	154.0
2014	6,013	51,520	147.8
2015	3,283	54,803	202.0
2016	1,401	56,204	400.0

Table 4. 2015 Columbia River White Sturgeon juvenile White Sturgeon release summary. Weight and length are presented as an average across all individuals released.

Release Location	Release Date	River km	Number	Weight (g)	Fork Length (cm)	Total weight (kg)
Shelter Bay	03-May-16	179.0	750	451.41	40.25	338.56
Shelter Bay	05-May-16	179.0	575	442.43	39.59	254.4
Beaver Creek (Wild Progeny)	07-May-16	49.0	76	411.58	36.74	31.28

6. Release Events

Each year school and public release events are planned and organized by Angus Glass of the Fish & Wildlife Compensation Program (FWCP) and FFSBC staff, along with the assistance of volunteers from other agencies. The FWCP works on behalf of its partners, BC Hydro, the B.C. Ministry of Environment and Fisheries and Oceans Canada, to conserve and enhance fish and wildlife populations impacted by the construction of BC Hydro dams in the Columbia Basin. The FWCP and BC Hydro are the primary funders for the Columbia River white sturgeon aquaculture program and FWCP is an active partner in the Upper Columbia White Sturgeon Recovery Initiative (UCWSRI). It also recognises that the sturgeon recovery work will take many years and will only be successful if the community and the younger generations become more connected with the fish. With that goal in mind FWCP organized juvenile sturgeon release

events for the public on behalf of the UCWSRI for school children and public in Trail and in Revelstoke.
This year's release event in Shelter Bay saw approximately 200 students attending, while the release event at Beaver Creek had close to 300 students. Public events were also held at each site, and as in years past were very well attended and received.

7. Fish Health Testing Summary

Autopolyploidy Assessment

The ploidy of wild white sturgeon has previously been determined to be 8N in Columbia and Kootenay River populations. Concern was raised when a large number of 12N white sturgeon were discovered in progeny family groups which were derived from wild Kootenay River white sturgeon brood and were being cultured in the artificial rearing environment at the Kootenay Tribe of Idaho's (KTOI) Sturgeon Hatchery. The mechanism of this ploidy shift is unknown but it is thought to occur at the fertilization stage. In partnership with a commercial sturgeon farm and with the assistance of University of California at Davis, blood samples were collected from family groups at KTOI and sent to UC Davis for Flow/Cytometry analysis. Through this process it was determined that some of the family groups at KTOI were composed of up to 50% 12N sturgeon. Given that there are potential implications to the Upper Columbia River recovery program, the Freshwater Fisheries Society, under the direction of the TWG, assessed the ploidy of all wild progeny white sturgeon families being reared at KTH (n=63). From the 63 samples submitted, one fish was confirmed to be 12n. As in previous years, this individual was removed from the group.

For 2014 broodstock origin juveniles, a sample size of 100 slides was submitted from each family group (Appendix 3, Table 2). Only Family 1 was found to have a high percentage of 12N fish. These results were double checked with a second submission of 51 slides (Appendix 3, Table 3). Results were still found to be high. A decision was made by the TWG committee to sample all remaining fish in Family 1 and remove any 12N fish therefore allowing the bulk of the family group to be released into the river population (Appendix 3, Table 4). The final results for Family 1 showed 124 of 1693 (7.3%) fish sampled to be of 12N ploidy. These 124 fish were removed from the population prior to release.

Columbia River White Sturgeon wild progeny were assessed for ploidy levels, with 1,098 slides processed in this group. There is a small group of additional wild larvae that were not sampled at this time as they were too small at time of sampling and are being held over for release in 2017. They will be sampled for ploidy in the summer of 2015. These were 2 of 1098 (0.2%) wild larvae identified to be of 12N ploidy (Appendix 3, Table 5).

It remains undetermined the mechanisms resulting in the 12N ploidy levels and the impact on the wild population long-term. Additional ploidy sampling is also being conducted during stock assessments on the Columbia River to determine the incidences of 12N individuals in both the

wild population and in hatchery origin individuals released before ploidy testing started in the hatchery.

Deformities

Very few deformities were observed in the 2014 year class holdovers. No changes were made in the way of early rearing practices that could account for the low deformity rate. As there were so few deformities seen, monthly deformity checks were discontinued and deformities were then noted when fish were handled during the marking process. No pattern of deformities was observed, the majority noted were minor fin deformities.

8. Permits

In June of 2013 a five year SARA permit was obtained for all the Columbia sturgeon culture activities including adult transport, holding, spawning, rearing, research and releases. This permit is valid to June 2018. All necessary Introductions and Transfer Committee (ITC) permits for adult and juvenile transfers were obtained.

Appendix 1.0 White Sturgeon Sexual Maturity Codes and Description

SexMatCode	Sex	Development State Description
F1	Female	Early developing female; pinkish/beige ovarian tissue with brain-like folds and smooth to rough surface, imbedded in heavy strip of fat tissue. Visible whitish eggs are <0.5mm in diameter. Ovarian tissue of previously spawned fish often appears ragged.
F2	Female	Early "yellow egg" female; Yellowish/beige ovarian tissue with deep "brain-like" folds embedded in extensive fat tissue giving it a bright yellow appearance. Eggs, 1 to 2 mm in diameter with no apparent greyish pigmentation.
F3	Female	Late "yellow egg" female; large yellowish ovaries with deep lateral folds and reduced associated fat. Yellow/greenish to grey eggs 2.5 mm in diameter. May indicate next year spawning.
F4	Female	"Black egg" female; Large dark ovaries filling much of the abdominal cavity. Exhibiting a distinct "bulls-eye". Very little fat, Eggs are still tight in the ovary, dark grey to black, shiny and large, >3 mm in
F5	Female	Spawning female; Loose flocculent-like ovarian tissue with eggs free in body cavity shed in layers from deep ovarian folds. Eggs large, from grey to black, similar to F4.
F6	Female	Post spawn female; ovaries immediately after spawning are folded with a mushy pinkish & flaccid appearance, with little/no associated fat. Displays a characteristic abdominal mid-line depression. Large dark degenerated eggs buried amongst small oocytes.
Fv	Female	Virgin female juvenile; small feathery looking, beige ovarian tissue attached to a thin strip of adipose fat tissue.
M0	Male	Male based on previous capture; general unknown maturity.
M1	Male	Developing male; Testes are tubular to lobed, light to dark grey, and embedded in substantial amounts of fat. Testes moderately to deeply lobed have distinct lateral folds.
M2	Male	Fully developed male; Testes large, cream to whitish in colour, deeply lobed and filling most of the abdominal cavity. If captured during active spawning, may release sperm if stroked posteriorly along the abdomen.
M3	Male	Spent/recovering male; Testes size are much reduced, with very distinct lobes and whitish to cream colour.
Mv	Male	Virgin male juvenile; Testes are ribbon-like in appearance with lateral creases or folds, dark grey to cream coloured attached to a strip of adipose fat tissue.

Appendix 2.0 Research Projects – N/A

Appendix 2.1 DNA SAMPLING

DNA samples were taken from all wild progeny fish, either by preserving mortalities or tissue samples of live fish.

Appendix 3: Fish Health Testing

Table 1: Pre-release sample test for brood year 2014 submitted Feb 19th, 2015.

Case Number	Family ref #	# fish submitted	Virology Salmonid		Virology Sturgeon		Bacteriology	
			CHSE-214	EPC	WSSK	WSGo	TSA	HS
2015-1018 Submission date: Feb 19th, 2015	Mixed all families, 2013 brood year	60 Random sample	Negative No viral or filterable replicating agents detected.	Negative No viral or filterable replicating agents detected.	Negative No viral or filterable replicating agents detected.	Negative No viral or filterable replicating agents detected.	60/60 No pathogenic bacteria detected	60/60 No pathogenic bacteria detected

Table 2: Initial ploidy results for all 2014 CWS family groups based on sample size of 100 fish per family group:

Family	**Date imaged**	**Confirmed 12N slide#'s**	**Total # 12N**
Family 1	Oct 21	20	80%
Family 2	Oct 29	0	100%
Family 3	Nov 13	0	100%
Family 4	Nov 17	0	100%
Family 5	Nov 19	0	100%

Table 3: Ploidy results for Columbia White Sturgeon Family 1 additional 51 slides submitted:

Family	**Date imaged**	**Confirmed 12N slide#'s**	**Total # 12N**
Family 1	Jan 8	5	90%

Table 4: Ploidy results for Family 1 March 31, 2015 pre-release testing.

Ploidy Results for CWS FAM 1 BY 2014
N= 1693 slides

Group	Slide range	Date imaged	Confirmed 12N slide#'s	Total # 12N
GrpA	1-100	Feb 19	**5, 26, 35, 48, 55, 58, 90**	7
GrpB	101-200	Feb 26	**110, 135, 147, 148, 169**	5
GrpC	201-300	Mar 2	**259, 265**	2
GrpD	301-400	Mar 3	**321, 324, 356, 369, 374**	5
GrpE	401-500	Mar 4	**403, 405, 415, 425, 433, 454, 458, 472, 484, 487, 490, 495, 497, 500**	14
GrpF	501-600	Mar 5	**520, 534, 581, 566**	4
GrpG	601-700	Mar 6	**602, 612, 624, 627, 641, 664, 669**	7
GrpH	701-800	Mar 10	**727,732, 743, 757, 782, 790, 792, 799**	8
GrpI	801-900	Mar 11	**806, 820, 836, 852, 860, 882, 884**	7
GrpJ	901-1000	Mar 16	**906, 928, 929, 951, 958, 960, 962, 970, 972, 967, 983, 984, 986**	13
GrpK	1001-1100	Mar 17	**1037, 1041, 1051, 1052, 1094**	5
GrpL	1101-1200	Mar 18	**1115, 1140, 1144, 1161, 1162, 1190, 1194**	7
GrpM	1201-1300	Mar 20	**1237, 1242, 1249, 1250, 1255, 1256, 1259, 1269, 1270, 1285**	10
GrpN	1301-1400	Mar 23	**1302, 1310, 1323, 1335, 1347, 1367, 1384**	7
GrpO	1401-1500	Mar 24	**1408, 1413, 1423, 1426, 1441, 1463, 1466, 1473, 1479, 1492**	10
GrpP	1501-1600	Mar 25	**1511, 1524, 1525, 1529, 1558, 1578**	6
GrpQ	1601-1693	Mar 27	**1605, 1624, 1653, 1660, 1665, 1673, 1687**	7

Total slides = 1693
Total 12N = 124
% 12N = 7.3%

Table 5: Ploidy for Columbia White Sturgeon wild larvae Brood year 2014

April 30, 2015

Ploidy Results for CWS wild larvae BY 2014
N= 1098 slides

Group	Slide range	Date imaged	Confirmed 12N slide#'s	Total # 12N
GrpA	1-100	Apr 15	--	0
GrpB	101-200	Apr 16	--	0
GrpC	201-300	Apr 17	--	0
GrpD	301-400	Apr 20	--	0
GrpE	401-500	Apr 21	**#454, #409**	2
GrpF	501-600	Apr 22	--	0
GrpG	601-700	Apr 24	--	0
GrpH	701-800	Apr 27	--	0
GrpI	801-900	Apr 28	--	0
GrpJ	901-1000	Apr 29	--	0
GrpK	1001-1100	Apr 29	--	0
GrpL	1101-1200			
GrpM	1201-1300			

Total slides = 1098 to date
Total 12N = 2
% 12N = 0.2%

Summary prepared by: **Date prepared:** May 25th, 2015

Sherry Mead
Fish Health Unit Manager
Freshwater Fisheries Society of BC
1080 Wharncliffe Rd
Duncan BC
V9L 2K7
P: 250-737-1444
E: sherry.mead@gofishbc.com