2017 Snake River Fall Chinook Salmon Spawning Summary

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Fall Chinook Salmon redd surveys were conducted cooperatively by biologists from the Idaho Power Company (IPC), Nez Perce Tribe (NPT), U.S. Fish and Wildlife Service (USFWS), and Washington Department of Fish and Wildlife (WDFW). This was the 30th year that intensive, cooperative aerial surveys have been conducted in the Snake River and most major tributaries above Lower Granite Dam and 26th year for ground surveys in tributaries downstream of Lower Granite Dam. No underwater spawning surveys were conducted below any of the four lower Snake River dams during 2017. A total of 4,596 redds was estimated in the Snake River Basin during 2017 (Table 1), representing the seventh highest estimate since intensive surveys began in 1988. This years' redd estimate was 1,830 fewer redds than in 2016 and 4,750 fewer redds than in 2015 when a record high of 9,346 redds was estimated. Due to safety concerns and to reduce risks of conducting weekly manned helicopter flights, the number of aerial surveys have been reduced to three or four flights for the last seven years in most rivers.

Table 1. Number of fall Chinook Salmon redds in the Snake River Basin, 2017 (all manned helicopter counts except as noted, N/S = no survey).

Survey Area	Number of Redds
Snake River (sUAS)	1,489*
Snake River (underwater video)	380
Total Snake River	**1,869***
Clearwater River	1,839*
Potlatch River	60
N.F. Clearwater River	2*
S.F. Clearwater River	105
M.F. Clearwater River	22
Selway River	67
Total Clearwater River Subbasin	**2,095***
Grande Ronde River	280
Wallowa River	N/S
Wenaha River	N/S
Joseph Creek	N/S
Total Grande Ronde River Subbasin	**280**
Imnaha River	**15**
Salmon River	**10**
Tucannon River (ground count)	**327***
Asotin Creek (ground count)	N/S
Alpowa Creek (ground count)	N/S
Below Lower Snake River dams (underwater video)	N/S
Grand Total Snake River Basin	**4,596***

*estimated number.

During aerial and underwater video counts, IPC and USFWS staff observed an estimated total of 1,869 redds in the main stem Snake River (Table 1). This was the third year that surveys along the main Snake River were accomplished only with a small unmanned aircraft system (sUAS); no helicopter surveys were attempted. As such, the total shallow water redd number was estimated based on a sampling protocol established by IPC in cooperation with the USFWS and IMB Solutions in Moscow. For the sUAS survey samples, 36 individual sites were flown four times (every other week) during the spawning season, beginning the week of 23 October 2017, and ending during the week of 04 December 2017. The total number of new redds was compiled for each of the 36 sample sites, for each survey, and that provided a total number of redds present at each site that could be incorporated into an estimation model for the entire river (Table 2). Our sUAS sample surveys went well. The total number of redds observed at the 36 sample sites was 675, and the estimated total number of shallow redds within the main Snake River was 1,489. We estimated 515 (standard error 25.8) redds in the reach downstream of the Salmon River, and 974 (standard error 76.5) redds in the reach upstream of the Salmon River.

Spawning was estimated to have begun during mid-October (150 redds observed during the week of 23 October), appeared to peak in early November (414 new redds observed during the week of 06 November), declined the third week in November (94 new redds observed during the week of 20 November), and was determined to be complete by early December (17 new redds observed during the week of 04 December, the final sample surveys).

Intensive deepwater spawning searches were conducted throughout the main Snake River corridor, using remote underwater video cameras, in areas too deep to be viewed from the air. The deepwater searches began in mid-November, and were completed in early December. The deepwater searches located an additional 380 redds at 38 sites (63 sites were searched).

Hells Canyon Dam flows were held between approximately 8,500 and 9,500 cfs throughout the spawning season. While flows exceeded 9,000 cfs (up to 9,500 cfs) the last week of the spawning period, most spawning was already completed. A base flow of 9,000 cfs will be maintained through emergence.

For 2017, the total redd count for the Snake River was 1,869. During the most recent five years (2013 – 2017), the average number of redds occurring in the Snake River (including those found in deep water) has been 2,494, ranging between 1,869 and 3,155. The lowest redd count for the Snake River, since intensive, cooperative surveys began, was 46 redds in 1991, while the highest count is 3,155 redds observed in 2015.

Table 2. Number of weekly new redds and season total redds counted at each sample site using the sUAS, Fall Chinook Salmon spawning season, Oct – Dec 2017.

River Mile	Week 1 New Redds	Week 2 New Redds	Week 3 New Redds	Week 4 New Redds	Total Redds
148.5	2	1	1	0	4
149.8	0	0	0	0	0
152.3	14	30	33	3	80
154.7	0	0	0	0	0
155.6	0	0	0	0	0
162.5	0	17	8	1	26

163.7	0	0	0[1]	0	0
165.3	4	10	0	1	15
165.8	18	33	12	0	63
168.7	4	23	3	0	30
178.5	1	0	0[2]	0	1
179.6	8	10	0	0	18
181.7	3	8	1	0	12
182.3	0	1	0[2]	0	1
183.5	4	5	0	0	9
187.5	3	10	0	0	13
191.7	0	0	0	0	0
193.6	0	32	5	5	42
198.8	6	17	5	1	29
203.1	0	5	0[2]	1	6
205.3	3	25	1	0	29
206.5	0	22	1	0	23
211.9	12	7	4	0	23
212.3	0	5	0[2]	0	5
213.3	0	2	0	0	2
217.3	9	49	7	0	65
218.1	0	0	0[2]	0	0
218.7	22	37	4	0	63
226.7	0	0	0	0	0
228.4	0	0	0	0	0
235.0	2	3	0	0	5
237.0	14	16	0	1	31
238.6	8	14	3	1	26
240.4	13	7	0	3	23
244.2	0	0	0	0	0
244.5	0	25	6	0	31
Total	150	414	94	17	675

Week 1 = 23, 24, 25 Oct Week 2 = 6, 7, 8 Nov
Week 3 = 20, 21, 22 Nov Week 4 = 4, 5, 6 Dec

[1] No flight - High winds and rain
[2] No flight - Time constraints

IPC also used the sUAS to aide in a pilot carcass recovery project for 2017. With the help of the U.S. Geological Survey and their sUAS, Chinook carcasses were collected that were spotted both with our sUAS and from boat while traveling. Tissue was collected from each carcass with the intent to extract DNA and determine hatchery or natural parentage. The Fall Chinook Recovery Plan includes an option to limit the number of hatchery fish released into the upper Hells Canyon Reach (upstream of the Salmon River). This option would designate the Upper Reach of Hells Canyon to be managed for a high percentage of natural spawning Chinook. The carcass recovery project offers a low-cost method to monitor and assess this option by determining the proportion of hatchery vs natural origin spawners. The first season was a success with about 80 carcasses recovered between the Salmon River and Hells Canyon Dam. Taking DNA from carcasses of various stages of decay includes some risk that the DNA will be decayed as well and not allow for the analysis. We will find out in a couple months if the analysis worked.

During traditional manned helicopter surveys, NPT staff estimated a total of 2,125 redds in the Clearwater River Subbasin in 2017 (Table 1). Redd searches covered the entire Clearwater River from the Clearwater Paper Mill in Lewiston, Idaho to the forks of the South Fork and Middle Fork Clearwater rivers (71 miles), lower Potlatch River (4 miles), about one half mile of the lower North Fork Clearwater River above the mouth, the entire Middle Fork Clearwater River (22 miles), lower South Fork Clearwater River (14 miles), and lower Selway River (19 miles). Lower mainstem Clearwater, N.F. Clearwater, and Potlatch rivers were surveyed on 9 October, 23 October, and 6 November resulting in 150, 145, and 727 new fall Chinook redds counted respectively in the lower Clearwater. There was only one redd observed in the N.F. Clearwater on the second survey and 60 redds observed in the Potlatch River on the last survey. Subsequent upper mainstem Clearwater River (from Orofino Creek upstream to the M.F. Clearwater) surveys conducted 10 October, 30 October, and 8 November resulted in three, 16, and 13 redds observed, respectively, for a total of 1,054 redds counted in the entire mainstem Clearwater. Due to rains and turbid water, a scheduled 20 November final survey on the lower Clearwater River was not conducted. To estimate potential redds missed on the mainstem Clearwater and N.F., we averaged previous 5 years' of actual counts up to 6 November and calculated a percentage of overall redds counted to that date (57.3%), then applied that percentage to 1,054 to get an estimate of 1,839 redds (Table 1), or 785 redds missed. We also applied this percentage to the N.F. Clearwater to get an estimate of two redds. We believe this is a conservative estimate since conditions were only "good" on 6 November and new redds in deep water spawning areas were difficult to see.

The M.F. Clearwater, Selway, and S.F. Clearwater rivers were surveyed on the same dates as the upper Clearwater River on 10 October, 30 October, and 8 November, however, the S.F. Clearwater was only surveyed in an extended section from Mount Idaho Grade down to Harpster on the second survey date because of low fuel reserves. On the M.F. Clearwater River, we observed 3, 12, and 7 new redds, respectively, for a total of 22 redds (Table 1). On the Selway River, we observed 0, 58, and 9 new redds, respectively, for a total of 67 redds. On the S.F. Clearwater River, we observed 0, 6, and 99 new redds, respectively, for a total of 105 redds. The last 8 November S.F. Clearwater survey was extended from Harpster up to Mill Creek (Rm 32.3) in which a total of 13 redds were counted in the extended search area. We may have missed a few redds in the upper Clearwater tributaries since 8 November was the last scheduled survey date and spawning seemed to be delayed somewhat this year compared to past years.

This year's estimate of 2,095 redds in the Clearwater River Subbasin was the fifth highest redd count and/or estimate since aerial surveys began in 1988 and 1,606 redds less than the estimated number last year. Survey conditions were excellent on the first survey, poor on the second survey because of rains and turbid water, and improved to good on the third survey. Persistent rains prevented conducting the last 20 November scheduled survey on the mainstem Clearwater. Excellent survey conditions prevailed on the M.F. Clearwater, S.F. Clearwater, and Selway rivers.

Throughout the fall Chinook Salmon spawning period, Dworshak Reservoir discharges remained fairly stable (1,600 – 1,800 cfs). Flows on the lower Clearwater (USGS Gauging Station at Spalding, ID) began with a moderate 3,720 cfs on 9 October, increased to 6,280 on 23 October, and decreased to 4,240 cfs on 6 November. During 2017, we observed a greater proportion of

redds around the Hog Islands than what had been previously recorded in the lower Clearwater River. Since 2013, the mean number of redds occurring in the Clearwater River Subbasin has been 3,402 ranging between 2,095 in 2017 and 5,082 in 2015. The lowest redd count for the Clearwater River Subbasin, since intensive surveys began was 4 redds in both 1990 and 1991, while the highest count was 5,082 redds in 2015.

Three manned aerial surveys conducted by NPT staff on the Grande Ronde River resulted in a total of 280 redds observed (Table 1). Surveys on 18 October, 1 November, and 16 November resulted in 23, 105 and 152 new redds counted, respectively. Redd surveys covered the mouth up to the Wildcat Bridge just past the town of Troy (53 miles). An extended survey covering the upper Grande Ronde River up to the Wallowa River, lower Wallowa River, and lower Wenaha River was not conducted this year. We did not receive any reports of spawning fall Chinook in Joseph Creek on the lower Grande Ronde. Due to early rains, survey conditions were only fair on all three surveys, therefore, a few redds may have been missed. Flows were a moderate 1,530 cfs (USGS Gauging Station at Troy, OR) on the first survey and decreased to 1,170 cfs on the last survey. Since 2013, the mean number of redds counted in the Grande Ronde River Subbasin has been 334, ranging from 255 to 415. The lowest redd count for the Grande Ronde Subbasin since intensive surveys began, was zero in 1989 and 1991, while the highest count was 415 in 2016.

Two manned aerial surveys were conducted by NPT staff on the Imnaha River resulted in 15 redds observed (Table 1). Surveys were conducted from the mouth up to the town of Imnaha (19 miles). Surveys on 18 October and 8 November resulted in 1 and 14 new redds counted, respectively. A scheduled survey on 1 November was cancelled because of high winds. Survey conditions were good on both surveys. Since a later survey was not conducted after 8 November, some redds may have been missed. Flows were a low 159 cfs on the first survey and 168 cfs on the last survey at Imnaha, OR (IPC stream flow website). Since 2013, the mean number of redds observed in the Imnaha River has been 54, ranging from 15 to 103. The lowest redd count for the Imnaha River, since intensive surveys began, was zero redds in 1994 while the highest count was 132 in 2010.

Two manned aerial survey conducted 16 October and 15 November by NPT staff on the Salmon River resulted in 10 redds observed (Table 1). The first survey was conducted from the mouth up to French Creek (105 miles), however, the second survey was conducted only up to the mouth of Slate Creek because of high winds. Salmon River flows were slightly higher than normal and measured 5,680 cfs on the first survey and 6,030 on the last survey (USGS Gauging Station at Whitebird, ID). Survey conditions were good on both surveys but not excellent, therefore, a few deep water redds were probably missed. Since 2013, the mean number of redds occurring in the Salmon River has been 52, ranging between 10 and 142. The lowest redd count for the Salmon River, since intensive surveys began in 1992, was zero redds in both 1999 and 2000, while the highest count was 142 in 2015.

Due to rains and turbid water during early November, a ground survey of lower Alpowa Creek was not conducted this year. A total of 31 redds were observed by NPT staff in the lower Alpowa Creek in 2010, the first year surveyed by NPT staff, while no redds were seen in 2011,

and 6 redds observed in 2012. Due to late rains and turbid conditions, surveys have not been conducted since 2012.

Due to cold weather during November and high turbid waters in December, WDFW staff periodically conducted ground surveys on the lower 33.6 miles of the Tucannon River. The Tucannon River was surveyed from 30 October until 8 December. Sections with restricted access were estimated using counts from adjacent sections, and adjustments were made for weeks the surveys were not performed based on proportions of redds built in the same time frame in prior years. In 2017, staff counted 176 fall Chinook redds which expand to 327 after all adjustments were made (Table 1). The first redds were observed during the week of 30 October and the peak of spawning occurred during the week of 13 November. Prior to the high flow events, visibility was excellent due to low flows. Since 2013, the mean number of redds in the Tucannon was 358, ranging from 269 to 506. The lowest redd count for the Tucannon River was 16 redds in 1987 and the highest estimate was 541 redds in 2012.

No spawning ground surveys were conducted in the lower Asotin Creek during 2017. WDFW staff counted 53 redds in the lower 3.1 miles of Asotin Creek during 2014, which was the highest redd count since surveys began. The second highest count was 30 redds in 2012.

Similar to 2015 and 2016, there were no underwater camera surveys conducted below any of the four lower Snake River dams during 2017 (E. Hockersmith, USACE personal communication). Past underwater video results showed no fall Chinook redds below Ice Harbor Dam, the only dam surveyed, in 2014. Normandeau Associates, Inc surveyed areas around the juvenile collection facility below Lower Granite Dam and observed 5 redds in 2013. Previous fall Chinook redd surveys have been intermittent based on funding during recent years, typically not all dams were surveyed, and redds numbers tended to be low. There were no surveys conducted in either 2010 or 2012. There were 10 redds observed by Battelle Pacific Northwest Laboratory below Lower Monumental Dam during 2011, the only dam surveyed that year. During 2008, areas below all lower Snake River dams were surveyed by Battelle with no redds observed below Ice Harbor and Little Goose, 7 redds counted below Lower Monumental, and 8 redds counted below Lower Granite.

Final results will be provided in annual reports to Bonneville Power Administration. Past reports can be found at www.cbfish.org. Past reports below the lower Snake River dams can be obtained through the U.S. Army Corps of Engineers, Walla Walla District.