2014 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 27th year that intensive, cooperative aerial surveys have been conducted in the Snake River and most major tributaries above Lower Granite Dam and 23rd year for ground surveys in tributaries downstream of Lower Granite Dam. The area immediate below Ice Harbor Dam was surveyed by Anchor QEA and the only lower Snake River dam surveyed in 2014. A total of 6,715 redds were estimated in the Snake River Basin (Table 1), representing the highest estimate since intensive surveys began in 1988. This years' redd estimate was 324 redds more than the previous high estimate of 6,391 redds in 2013. Due to safety concerns and to reduce risks of conducting weekly flights, the number of aerial surveys has been reduced to three or four flights for the last five years in major spawning rivers.

Table 1. Number of fall Chinook salmon redds in the Snake River Basin, 2014 (all aerial counts except as noted, N/S = no survey).

Survey Area	Number of Redds
Snake River	1,966
Snake River (underwater video)	842
Total Snake River	**2,808**
Clearwater River	2,936
Potlatch River	0
N.F. Clearwater River	4
S.F. Clearwater River	65
M.F. Clearwater River	73
Selway River	40
Total Clearwater River Subbasin	**3,118**
Grande Ronde River	340
Wallowa River	N/S
Wenaha River	N/S
Joseph Creek (incidental observation)	2
Total Grande Ronde River Subbasin	**342**
Imnaha River	**103**
Salmon River	**42**
Tucannon River (ground count)	**302***
Asotin Creek (ground count)	N/S
Alpowa Creek (ground count)	N/S
Below Lower Granite Dam	N/S
Below Little Goose Dam	N/S
Below Lower Monumental Dam	N/S
Below Ice Harbor Dam (underwater video)	0
Grand Total Snake River Basin	**6,715**

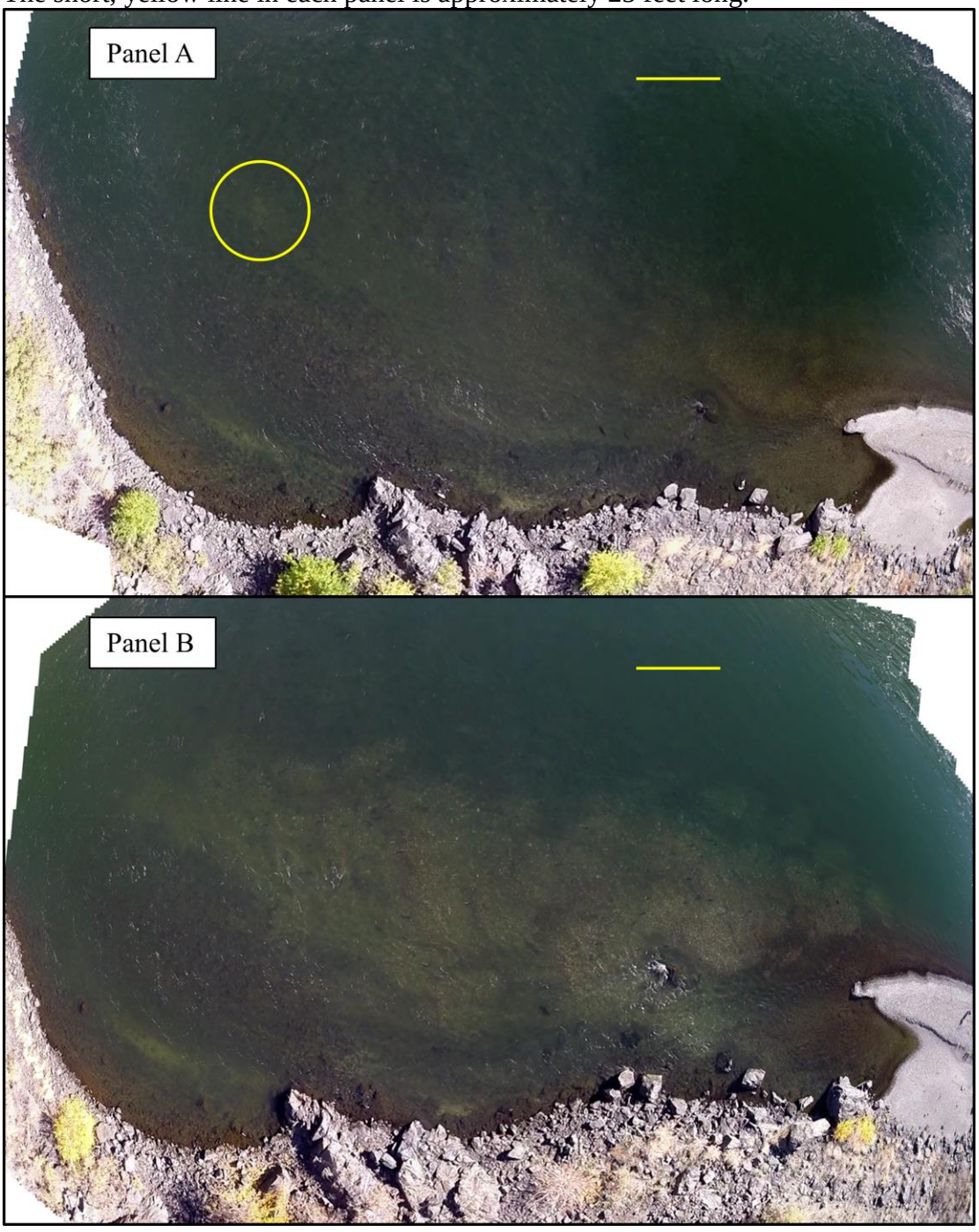
*estimated count.

During aerial, ground, and underwater video counts, IPC and USFWS staff observed a total of 2,808 redds in the mainstem Snake River (Table 1). Fall Chinook salmon aerial redd surveys along the mainstem Snake River were attempted bi-weekly during the spawning season, beginning on 20 October, and ending on 01 December. The aerial surveys attempted to cover the river corridor between Asotin, Washington, and the Hells Canyon Dam (approximately 100 river miles). During the survey flight of 03 November, environmental conditions (very strong winds) caused the flight to be terminated at approximately RM230 (near Sheep Creek); however, the survey was completed on 05 November. Due to inclement weather (very strong winds), the final two surveys (17 November and 01 December) were again terminated near RM230; because of continuing poor weather and other obligations, the final 17 miles (near Sheep Creek up to Hells Canyon Dam) were not surveyed during those two flights. Water clarity between Asotin, WA and the Hells Canyon Dam was generally good to excellent throughout most of the season. However, during the final survey, on 01 December, the main Snake River between Asotin, WA and the Salmon River had elevated turbidity and very poor viewing conditions. Even given the poor water clarity in the lower portion of the river during the final survey, and the inability to complete surveys in the uppermost area of the Snake River during the final two flights, biologists do not believe that many redds were missed. The flows from the Hells Canyon Dam were initially held stable at approximately 8,500 cfs, and were incrementally stepped up to about 9,000 cfs by the end of October, to about 9,200 by 07 November, and finally to about 9,500 cfs by 17 November. The final flow of 9,500 cfs has become the base flow that will be maintained through emergence. Intensive deepwater spawning searches were conducted throughout the main 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. Spawning was estimated to have begun during mid-October (37 redds observed on 20 October), appeared to peak in early November (1,053 new redds observed during the week of 03 November), and was determined to be complete by early December (46 new redds observed on 01 December, the final survey). Approximately 56% of redds observed during aerial surveys were constructed by 05 November. During aerial surveys we observed a total of 1,956 redds, constructed at 117 distinct spawning locations. Due to time constraints, only one comprehensive ground count was conducted at one site within the main Snake River. During that ground check, an additional 10 redds were noted that had not been observed during aerial surveys. The deepwater searches located an additional 842 redds at 46 sites (67 sites were searched). For 2014 the total redd count for the Snake River was 2,808. During the most recent five years (2010 – 2014), the average number of redds occurring in the Snake River (including those found in deep water) has been 2,617, ranging between 1,828 and 2,944. The lowest redd count for the Snake River, since intensive, cooperative surveys began, was 46 redds in 1991, while the highest count was 2,944 redds in 2010.

During the fall of 2014 we continued to test the use of a small unmanned air system (sUAS) for conducting aerial counts and estimates of redds. The six-rotor (hexacopter) sUAS used this year continued to use a digital camera (GoPro Hero) to capture video at index areas within the Snake River. A set of 27 index areas were selected on the Snake River, and these areas contained 36 individual spawning locations. Index areas were selected based on advice from the department of statistics at the University of Idaho. Each area was scheduled to be flown once per week throughout the spawning season. Five weeks of surveys were completed; surveys were begun during the week of 20 October, and were ended during the week of 17 November. Conditions

remained good throughout most of the survey season, and we were able to collect good data throughout the first five weeks of the season. As in previous years, flights were able to be conducted, and useable video was collected, even under adverse conditions of strong wind, which would have otherwise resulted in cancelling a traditional helicopter survey due to safety. Preliminary assessment of the photographic data clearly shows redds (as well as fish) throughout each area (Figure 1); 1,317 redds were counted using the video data from the sUAS. A final comparison with biologists "eyes in the skies", and a total estimate of shallow redds throughout the Snake River, based on the video data, will be forthcoming. The data and results from the past four years of testing the sUAS has been a clear success, and we maintain that this type of technology be adapted for future use, in lieu of helicopter surveys, based on safety and cost.

Figure 1. Examples of panoramic collages constructed from still-grabs obtained from high definition video collected from the sUAS while flying over the Snake River spawning site at RM240.6, on 22 October (panel A), and 12 November (panel B). In panel A there is one redd present; it is very difficult to see, and is located near the downstream end of the site (far left center, circled). In panel B there are 61 redds present, with superimposition clearly occurring. The short, yellow line in each panel is approximately 25 feet long.



During aerial surveys, NPT staff counted a total of 3,118 redds in the Clearwater River Subbasin (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 below Dworshak Dam, the entire Middle Fork Clearwater River (22 miles), lower South Fork Clearwater River (14 miles), and lower Selway River (19 miles). On the lower mainstem Clearwater River up to the mouth of Orofino Creek, there were 234 redds observed during the first survey on 13 October, 1,016 new redds observed on 27 October, and 1,548 new redds observed on 17 November. During the same dates, we observed 0, 1, and 3 redds on the N.F. Clearwater for a total of 4 redds. We did not conduct a final survey scheduled 24 November or afterwards because of rains and turbid water. The upper Clearwater (from Orofino Creek upstream to the M.F. Clearwater), M.F. Clearwater, and the Selway rivers were first surveyed on 15 October and 20, 20, and 7 redds were observed respectively. High winds and rain prevented a survey on the S.F. Clearwater that day. The upper Clearwater, M.F. Clearwater, Selway, and the S.F. Clearwater were all surveyed on 29 October and 19 November. On the upper Clearwater River, there were 56 and 62 new redds for a grand total of 138 redds. On the M.F. Clearwater River, we observed 34 and 19 new redds for a grand total of 73 redds. On the Selway River, we observed 20 and 13 new redds for a grand total of 40 redds. On the S.F. Clearwater River, we observed 48 and 17 redds for a total of 65 redds. No redds were observed on the Potlatch River during the same survey dates as the lower Clearwater. Total redds observed on the entire mainstem Clearwater River was 2,936 redds in about 66 distinct locations. A grand total of 3,118 redds observed in the Clearwater River Subbasin surpassed the previous record of 2,956 redds estimated in 2013 by 162 redds. Survey conditions were excellent on the first survey and declined to good on the second and last survey on lower mainstem Clearwater. Similar survey conditions prevailed on the upper Clearwater, M.F. Clearwater, S.F. Clearwater, and Selway rivers. Since a last scheduled survey was not conducted on the lower Clearwater, along with a peak of 1,551 new redds observed on last 17 November survey, a number of redds were probably missed but not estimated this year. Also, there were about 300 surplus females plus a number of males released from Lyons Ferry Hatchery in the Snake River at Texas Rapids below Little Goose Dam on 18 November. A total of 333 adults were counted in 4 days between 20 to 23 November at Lower Granite Dam and probably spawned somewhere upstream. Not many redds were thought to have been missed in the upper Clearwater River Subbasin and the S.F. Clearwater this year. Throughout the fall Chinook spawning period, Dworshak Reservoir discharges remained stable at 1,600 – 1,700 cfs. Flows on the lower Clearwater (USGS Gauging Station at Spalding, ID) were low during surveys with a low of 3,236 cfs on the 13 October survey, increased to 4,497 cfs on the second survey and decreased to 4,039 on the 17 November survey. Rains pushed flows to 5,550 cfs on 24 November and up to 13,800 cfs on 29 November preventing a last redd survey. In Lapwai Creek, the NPT coho staff reported fall Chinook being trapped in the coho weir just above the mouth and all fall Chinook were released back to the stream below the weir. During 2014, we observed redds in areas on the mainstem Clearwater, S.F. Clearwater, and M.F. Clearwater where no redds had been previously recorded. Since 2010, the mean number of redds occurring in the Clearwater River Subbasin has been 2,315 ranging between 1,621 and 3,118. 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 3,118 redds in 2014.

A total of two aerial surveys conducted by NPT staff on the Grande Ronde River resulted in a total of 340 redds observed (Table 1). Surveys on 22 October and 5 November resulted in 48 and 292 new redds counted, respectively. A last survey scheduled 19 November was not conducted due to rains and turbid water, therefore some redds were thought to have been missed. Redd surveys covered the mouth up to the Wildcat Bridge past the town of Troy (53 miles). Due to budget constraints, 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. There were 2 fall Chinook redds incidentally observed by NPT steelhead project staff on lower Joseph Creek on 10 December and included the basin total (Table 1). A total of 3 PIT tagged fall Chinook (2 from Grande Ronde releases and one from Hells Canyon) were detected at the Joseph Creek PIT tag array near the end of November. On the mainstem Grande Ronde, redds were seen in 54 distinct spawning locations. Survey conditions were excellent on the first survey and good on the last survey. Flows were a low 690 cfs (USGS Gauging Station at Troy, OR) on the first survey and increased to 866 cfs on the second and last survey with decreasing water visibilities. Since 2010, the mean number of redds counted in the Grande Ronde River Subbasin has been 265, ranging from 154 to 340. The lowest redd count for the Grande Ronde Subbasin since intensive surveys began, was zero in 1989 and 1991, while the highest count was 340 in 2014.

One aerial survey conducted 5 November by NPT staff on the Imnaha River resulted in 103 redds observed (Table 1). The first survey scheduled 22 October with the Grande Ronde was cancelled because of increasing high winds and the last survey scheduled 19 November was cancelled because of rains and turbid water. The survey was conducted from the mouth up to the town of Imnaha (19 miles). Flow during the survey was 135 cfs (USGS Gauging Station at Imnaha, OR). Redds were constructed in 36 distinct locations. Since the only survey was conducted early in November, a number of redds were thought to have been missed. Since 2010, the mean number of redds observed in the Imnaha River has been 76, ranging from 24 to 132. 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.

One aerial survey conducted 24 November by NPT staff on the Salmon River resulted in 42 redds observed (Table 1). Only one survey was scheduled this year because of budget constraints. The survey was conducted from the mouth up to French Creek (105 miles). Redds were constructed in 20 distinct locations. Salmon River flow was moderate at 5,410 cfs (USGS Gauging Station at Whitebird, ID) during the survey and conditions were fair, therefore, a few redds were probably missed, especially deep water redds. Since 2010, the mean number of redds occurring in the Salmon River has been 35, ranging between 8 and 60. 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 60 in 2011.

Due to rains and turbid water during the last week of November, a ground survey of lower Alpowa Creek was not conducted this year. A total of 31 redds were observed in the lower Alpowa Creek in 2010, the first year surveyed, while no redds were see in 2011, and 6 redds observed in 2012. Due to late rains and turbid conditions, a survey was not conducted in 2013 as well.

WDFW staff surveyed 92% of the lower 20 miles of the Tucannon River from 27 October until 19 December. Sections with restricted access were estimated using counts from adjacent sections. In 2014, staff counted 264 fall Chinook redds which expand to 302 after all adjustments were made (Table 1). The first redds were observed on 27 October and the peak of spawning occurred during the week of 3 November. Water clarity was good throughout the season. Since 2010, the mean number of redds in the Tucannon was 371, ranging from 302 to 541. The lowest redd count for the Tucannon River was 16 redds in 1987 and the highest estimate was 541 redds in 2012. Surveys on Asotin Creek did not occur during 2014.

Anchor QEA surveyed potential spawning areas below Ice Harbor Dam during November and December 2014 for the U.S. Army Corps of Engineers. Underwater video results showed no fall Chinook redds constructed nor any carcasses observed (Anchor QEA 2014). 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. Normandeau Associates, Inc. surveyed areas around the juvenile collection facility below Lower Granite Dam and counted 5 redds in 2013. 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.bpa.gov. Final report by Anchor QEA can be obtained through the U.S. Army Corps of Engineers, Walla Walla District (Project 141163-01.02). Past reports on fall Chinook salmon spawning areas downstream of Lower Snake River dams can also be obtained through the Corps Walla Walla District.