2018-19 Lower Columbia Fall Chinook Survey Summary

This report provides a brief summary of results from Fall Chinook spawning ground surveys conducted in the Lower Columbia River Evolutionarily Significant Unit (ESU) in the 2018-19 spawning season. Site selection and survey methods mirrored those used for coho spawning ground surveys in the Lower Columbia. This report covers results from spawning surveys selected using a Generalized Random Tessellation Stratified (GRTS) sampling design (Sounhein 2018). Additional long-term standard surveys were also conducted during the 2018-19 season, and those results are reported elsewhere. Plympton Creek is within the Clatskanie population, and the portion of Big Creek below the fish hatchery is within the Big Creek population. However, both are monitored and reported separately here because the high density of fish and hatchery influence present at these sites are uncharacteristic of their respective population areas as a whole.

Survey Effort

- 61 of the attempted 102 survey points were successfully surveyed (60%), see Table 1.
- Non-response sites either had an insufficient number of survey visits (< 4), or incurred gaps between survey visits of more than thirteen days. Poor survey conditions such as turbidity and/or high flows are the most common reasons for these site outcomes. The remaining non-response points were inaccessible due to landowner denials (11 sites).
- All sites selected to be surveyed are believed to be within Fall Chinook spawning habitat.

Table 1. Lower Columbia Fall Chinook ESU, GRTS spawning survey goals and results for number of valid surveys, 2018 run year. Target Response sites are within spawning habitat and were successfully surveyed. Successful surveys were defined as having no gaps of 13 or more days between valid survey dates and no more than one gap of 9 to 12 days, during the period when 90% of the live Chinook were observed for the population.

Stratum	Population	Goal	Target Response 2018	Survey Points Selected 2018
Coast	Youngs Bay	6	11	14
	Big Creek	4	3	3
	Below Hatchery	2	2	2
	Clatskanie	5	3	6
	Plympton	2	2	2
	Scappoose	4	2	7
	Total	**19**	**23**	**34**
Cascade	Clackamas	11	13	18
	Sandy[1]	25	23	36
	Total	**36**	**36**	**54**
Gorge	Lower Gorge	2	1	5
	Hood	2	1	9
	Total	**4**	**2**	**14**
	ESU Total	**59**	**61**	**102**

1 -The Sandy River Population has a relaxed screening process for accepting surveyed sites given the difficulty with survey clarity in this population.

Distribution and Timing

- Live adult Chinook were observed in 65% of the randomly selected survey points surveyed in 2018, which falls in between the prior two years (71% in 2016 and 44% in 2017).

- No Chinook live adults (or carcasses) were observed in the surveys attempted for the Scappoose and Lower Gorge populations in 2018. This is consistent with survey outcomes for the Scappoose population done in 2009 through 2017.
- The number of live adult observations in each population varied considerably, ranging between 0 in the Scappoose population to 4,643 in the Big Creek population. Out of the four surveys in the Clatskanie population, Plympton Creek contributed 3,138 of the 3,144 fish observed. Plympton Creek is within the Clatskanie population, and the portion of Big Creek below the fish hatchery is within the Big Creek population.
- 82% of survey points completed for both the Cascade Strata populations were located on main stem environments (i.e., Sandy R., Clackamas R., Bull Run R., Salmon R., or Zig Zag R.). The number of live adults observed in the Clackamas and Sandy populations is likely an underestimate due to the difficulties of surveying main stem sites (i.e. covering the entire width of river and lack of visibility in deep holes).
- Median peak count (live and dead adults) date ranged from 9/12/18 to 11/8/18 among Lower Columbia populations (Table 2). A spatial pattern is apparent in these peak dates, with generally early peak dates in the Coastal stratum, and later peak count dates in the Cascade and Gorge strata.

Table 2. Total number of Chinook observed and peak count information by Lower Columbia population, 2018. Peak date calculations represent data from all surveys attempted and do not screen for surveys deemed unsuccessful by exclusion criteria. All other data shown in this table are from successful surveys.

Population	No. of Random Survey Points	No. Random Survey Points w/ Live Adults	Total Live Adults Observed	Median Adult Peak Date	Avg. Peak/mile
Youngs Bay	11	10	1461	10/17/2018	67
Big Creek	3	0	0	-	0
Big Creek Hatchery	2	2	4643	9/18/2018	2214
Clatskanie[1]	3	2	6	9/13/2018	1
Plympton Cr	2	1	3138	9/12/2018	575
Scappoose	2	0	0	-	0
Clackamas	13	10	528	10/5/2018	5
Sandy	23	15	1193	11/8/2018	3
Lower Gorge	3	0	0	-	0
Hood	3	2	2	10/31/2018	0

1 = Plympton Creek and Big Creek are within the Clatskanie Population and Big Creek Populations respectively, but the very high hatchery influence at these sites are not found in any other streams in their area. As a result estimates and other reported statistics are shown separately.

Hatchery & Wild Information

- The percentage of unmarked carcasses recovered on the spawning grounds varied between populations from 1% to 98%, with three of the six populations appearing to have a high hatchery influence. The Sandy River and the Clackamas River Populations were the only areas where the percentage of hatchery adults on spawning grounds was less than 10% (Figure 1).
- Of the marked carcasses recovered in Lower Columbia surveys during the 2018 season, one was identified as a Spring Chinook based on the coded wire tag (CWT) recovered. This CWT marked carcass was recovered in the Clackamas Population. This recovery was found in the Eagle Creek Basin of the Clackamas Population on 11/13/2018 which was after the median adult peak date of 10/5/2018 within the Eagle Creek Basin.
- There was only one clipped Chinook this year in the Sandy River Population which had a CWT tag marked Chinook that came from the Big Creek Hatchery.
- All Chinook carcasses recovered on these Fall Chinook surveys, throughout the ESU, are checked

electronically for the presence of a CWT. In 2018, all CWT tags detected were in clipped fish (Table 3).

Figure 1. The percentage of Chinook carcasses observed on GRTS spawning ground surveys in 2018 that were not fin clipped, by Lower Columbia population. The total number of carcasses recovered is also displayed.

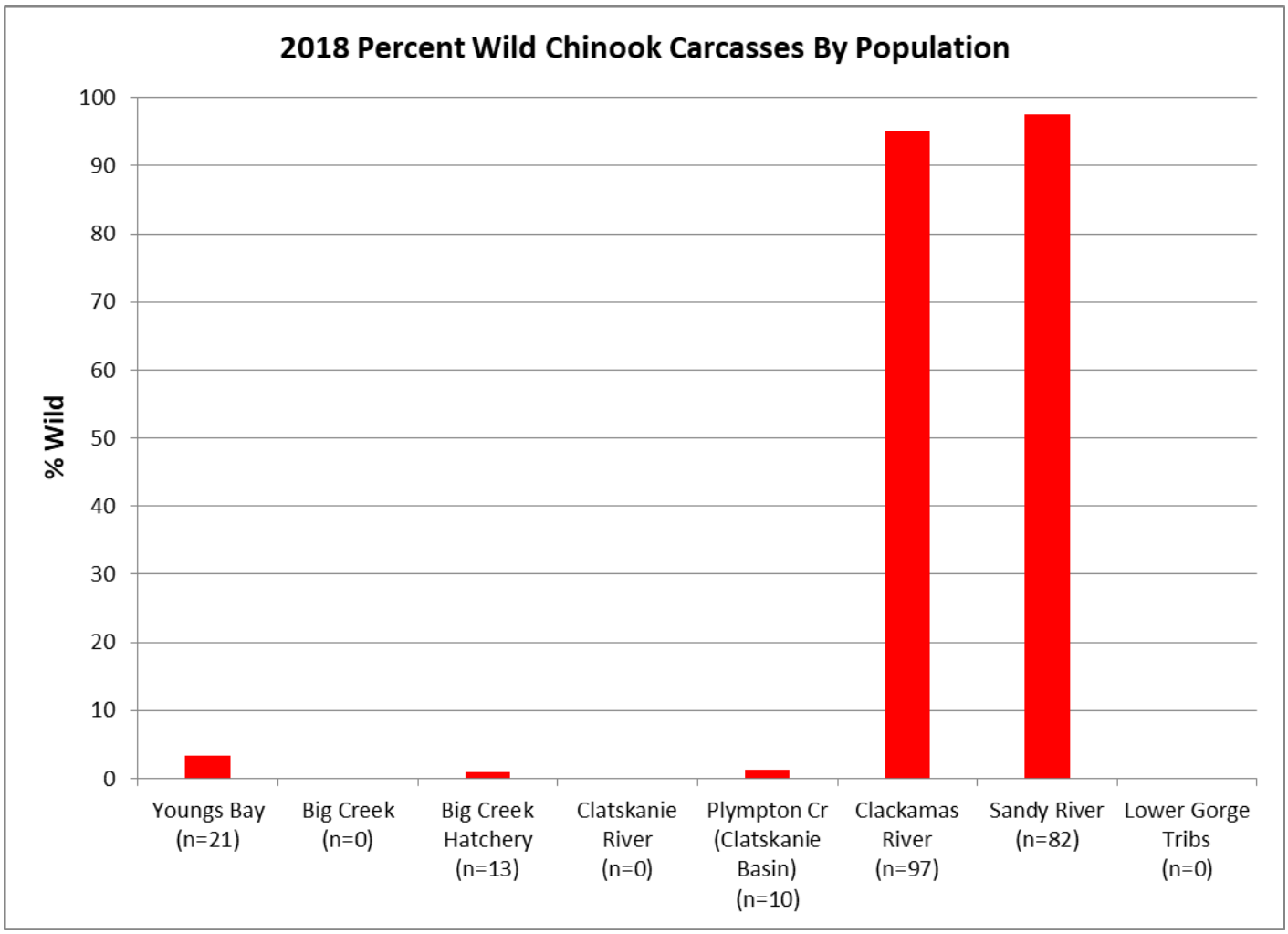

Table 3. The percentage of marked and unmarked carcasses from each population in the Lower Columbia that contained a CWT during 2018. Electronic detection was used on all carcasses to identify the presence of a CWT.

Population Name	% Unmarked fish with CWT tags	% Marked fish with CWT
Youngs Bay	0	3
Big Creek	N/A	N/A
Big Creek (Below Hatchery)	0	3
Clatskanie River	0	
Plympton Creek	0	4
Scappoose River	N/A	N/A
Clackamas River	0	20
Sandy River	0	100
Lower Gorge Tribs	N/A	N/A
Hood River	N/A	N/A

N/A = Not available, there were no carcasses collected in these areas.

Abundance Estimates

- The total estimate for Plympton Creek was right around average for the sub-population at 1,889.
- The Clackamas River had an all-time low total estimate of 709 fish. The wild estimate for Clackamas Fall Chinook was 673 which is a close second to the 2016 estimate of 711.
- The Sandy River wild estimate was 4,347 which is well above the average of 1,643.

Table 4. Preliminary and final results of randomly selected spawning ground surveys for Chinook salmon in the Oregon portion of the Lower Columbia River ESU, run year 2018. Estimates derived using GRTS protocol. Preliminary estimates include all sites which were surveyed ≥ 4 times during the survey season regardless of gaps in survey effort. Final estimates are based on sites that passed qualifying criteria. Qualifying surveys were defined as having no gaps between valid survey dates of 13 or more days, and no more than one gap of 9 to 12 days during the period when 90% of the live Chinook were observed for the stratum in the Coastal and Gorge stratums and by population in the Clackamas and Sandy populations. Estimates of wild spawners derived through application of fin-mark observations. Missing values for populations indicate inadequate samples for determining total and/or wild abundance.

ESU, Stratum, and TRT Population	Survey Effort Number of		Adult Chinook Spawner Abundance			
			Total		Wild	
	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2018 Preliminary						
Lower Columbia ESU	75	92	20,336	21,237	4,199	2,624
Coast Stratum	25	27	16,225	21,070	169	200
Youngs Bay	13	15	2,017	2,191	29	32
Big Creek	3	3	0	0	0	0
Big Creek Hatchery	2	2	12,301	20,956	116	198
Clatskanie River	3	3	19	19	0	0
Plympton Cr	2	2	1,889	0	24	0
Scappoose River	2	2	0	0	0	0
Cascade Stratum	44	60	4,110	2,655	4,031	2,616
Clackamas River	15	24	615	446	583	424
Sandy River	29	36	3,495	2,617	3,447	2,581
Gorge Stratum	6	4	1	1	0	0
Lower Gorge	1	1	0	0	0	0
Hood River	3	3	1	1	0	0
2018 Final						
Lower Columbia ESU	65	80	21,709	21,370	5,194	3,297
Coast Stratum	23	25	16,592	21,107	174	201
Youngs Bay	11	13	2,383	2,523	34	36
Big Creek	3	3	0	0	0	0
Big Creek Hatchery	2	2	12,301	20,956	116	198
Clatskanie River	3	3	19	19	0	0
Plympton Cr	2	2	1,889	0	24	0
Scappoose River	2	2	0	0	0	0
Cascade Stratum	36	51	5,116	3,340	5,020	3,291
Clackamas River	13	23	709	514	673	488
Sandy River	23	28	4,407	3,300	4,347	3,255
Gorge Stratum	6	4	1	1	0	0
Lower Gorge	1	1	0	0	0	0
Hood River	3	3	1	1	0	0

* Survey totals represent the number of random points drawn and not neccesarily the number of individual surveys in each population. As a result, there may be more than one random point per actual survey segment.

Future Monitoring Concerns

- **Fall vs Spring Chinook:** One of the issues that arose while analyzing the live count and carcass data in the Sandy and Clackamas populations was how to separate Fall from Spring Chinook. Our original concept was that we could separate the two runs of fish both temporally and spatially. When data from all available survey years is analyzed together, some evidence of multiple peak dates in spawn timing is evident, but timing is not sufficient within any one year to differentiate these runs. In 2018, genetic samples collected from both Spring and Fall Chinook focused spawning surveys during the 2015 through 2018 run years was analyzed. Results of this analysis indicated that there were spatial-temporal patterns in the distribution of Spring and Fall chinook within the Sandy Basin. The spatial-temporal pattern is as follows: Almost all Spring Chinook in the lower Sandy River (mouth up to the Revenue

Bridge) through October 15th and in the Upper Sandy River through October 31st. Chinook recovered in the lower river after October 15th and in the upper river after October 31st were almost all Fall Chinook. Based on these results, our analysis of Fall Chinook in the Sandy River excluded all data collected before the dates identified within this spatial-temporal pattern.

- **Survey effort:** Hatchery influenced sites such as Plympton Creek and Big Creek require nearly full-time attention by multiple crews to maintain sampling schedules, due to the high volume of carcass recoveries. These surveys draw crews away from other sites, and dilute the ability to detect spawning activity in the other surveys around the area. Additional effort was provided by crews not funded under this project for the 2018-19 spawning year, to assist in conducting these high fish-density sites during the peak of their run.

- **Main stem float surveys:** Since the introduction of this Lower Columbia chinook monitoring in 2009, mainstem sites in the Sandy River Population have been notoriously difficult to keep in a consistent survey rotation. This difficulty in attaining consistent rotations has led to a low level of confidence in Chinook estimates given that chronically turbid surveys on the Lower Sandy River are often excluded from the final estimates. To give a broader consideration to sites that have Chinook data but are not normally used in AUC estimates under the original screening process, sites within the Sandy Population have been included if they have more than 4 valid survey dates. In 2018, this relaxed criteria resulted in a 52% increase in the number of sites utilized in the estimate. Furthermore, 1,140 out of the total 1,193 chinook observed in the Sandy River Population came from surveys now included in the estimation process under these relaxed criteria.

- **Spawning residence time:** A brief review of the Fall Chinook/Tule literature suggests that spawning residence time ranges from 5 to 8 days (Rawding et al. 2006 and Parken et al. 2003). Our crews surveyed under the Coho Salmon criteria of conducting a survey at least once every 10 days. Anecdotal evidence of spawn timing on Plympton Creek suggest that residence times are likely higher than those specified by Rawding, but these patterns remain untested.

Literature Cited

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Sounhein, B., E. Brown, M. Lewis and M. Weeber. 2018. Western Oregon adult Coho Salmon, 2017 spawning survey data report. Monitoring Program Report Number OPSW-ODFW-2018-3, Oregon Department of Fish and Wildlife, Salem, Oregon.