

2017-18 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 2017-18 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. Additional long-term standard surveys were also conducted during the 2017-18 season, and those results are reported elsewhere. No Fall Chinook surveys were conducted in the Lower Gorge and Hood River population due to the lack of access from the Eagle Creek fire in the summer of 2017. Plympton Creek is within the Clatskanie population, but is reported separately here because the high density and hatchery influence present at this site is uncharacteristic of the population area as a whole.

Survey Effort

- 57 of the attempted 92 survey points were successfully surveyed (62%), 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 denial (11 sites).
- All sites selected to be surveyed are believed to be within Fall Chinook spawning habitat.
- No sites were surveyed in the Gorge Stratum in 2017 due to access restrictions after a large fire in the area the previous summer.

Table 1. Lower Columbia Fall Chinook ESU, GRTS spawning survey goals and results for number of valid surveys, 2017 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 2017	Survey Points Selected 2017
Coast	Youngs Bay	6	10	10
	Big Creek	4	5	5
	Clatskanie	5	5	7
	<i>Plympton</i>	2	2	2
	Scappoose	4	2	7
	Total	19	24	31
Cascade	Clackamas	11	13	18
	Sandy	25	20	34
	Total	36	33	52
Gorge	Lower Gorge	2	0	5
	Hood	2	0	4
	Total	4	0	9
	ESU Total	59	57	92

Distribution and Timing

- Live adult Chinook were observed in 44% of the randomly selected survey points surveyed in 2017, which is lower in comparison to the last two years (65% in 2015 and 71% in 2016).

- No Chinook live adults (or carcasses) were observed in the surveys attempted for the Scappoose population in 2017. This is consistent with survey outcomes for this area in 2009-2016.
- The number of live adult observations in each population varied considerably, ranging between 0 in the Scappoose population to 3,700 in Plympton Creek. Out of the five surveys in the Clatskanie population, Plympton Creek contributed all of the 3,700 fish observed.
- 86% 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 9/26/17 to 10/17/17 among Lower Columbia populations (Table 2). A spatial pattern is apparent in these peak dates, with the Coastal stratum appearing to peak first with a median date of 9/26/17, while the median adult peak count date in the Clackamas and Sandy populations was somewhat later (10/11/16 and 10/17/16 respectively).

Table 2. Total number of Chinook observed and peak count information by Lower Columbia population, 2017. 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	10	8	1215	9/26/2017	45
Big Creek ¹	5	2	949	9/27/2017	68
Clatskanie ²	5	0	0	-	0
Plympton Cr	2	1	3700	9/27/2017	897
Scappoose	2	0	0	-	0
Clackamas	13	4	40	10/11/2017	2
Sandy	20	10	229	10/17/2017	13
Lower Gorge	0	0	0	-	N/A
Hood	0	0	0	-	N/A

¹ = The avg. peak/mile for Big Creek population without the surveys directly below the Big Creek Hatchery is 1.

² = Plympton Creek is within the Clatskanie Population, but the very high hatchery influence at this site is not found in any other streams in this 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 92%, with three of the six populations appearing to have a high hatchery influence. The Sandy River was the only area 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 2017 season, one was identified as a spring Chinook based on the coded wire tag (CWT) recovered. This CWT marked carcass was recovered in the Sandy Population. This recovery was made on 10/09/2017 which was before the median adult peak date of 10/17/2017 for the Sandy River Population.
- Of the clipped Chinook carcasses recovered in the Sandy River population, 14% had a CWT. All Chinook carcasses recovered on these Fall Chinook surveys, throughout the ESU, are checked electronically for the presence of a CWT.

Figure 1. The percentage of Chinook carcasses observed on GRTS spawning ground surveys in 2017 that were not fin clipped, by Lower Columbia population. The total number of carcasses recovered is also displayed.

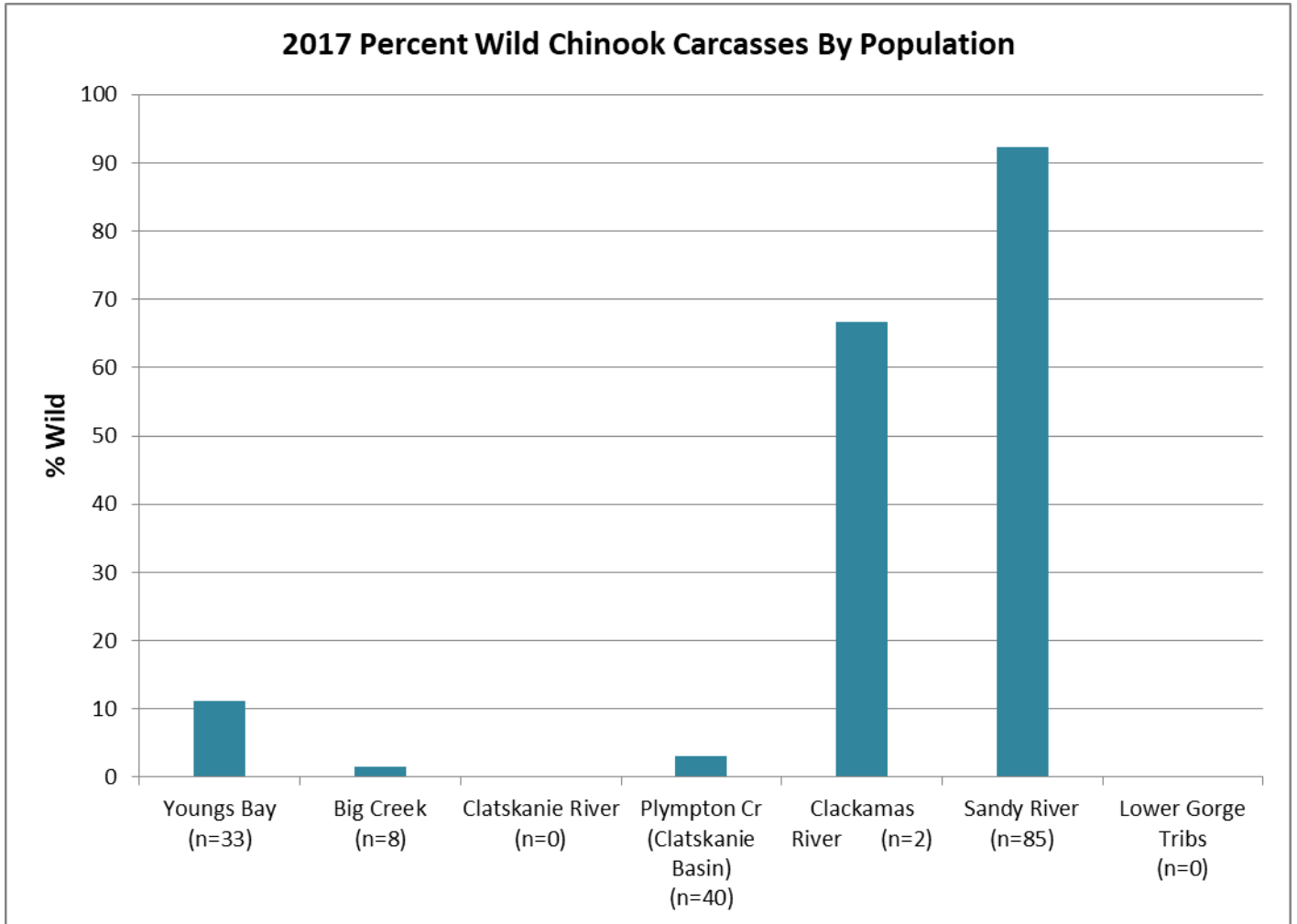


Table 3. The percentage of marked and unmarked carcasses from each population in the Lower Columbia that contained a CWT during 2017. Electronic detection was used on all carcasses to identify the presence of a CWT.

PopulationName	% Unmarked fish with CWT tags	% Marked fish with CWT
Youngs Bay	0	1
Big Creek	0	0
Clatskanie River	0	-
Plympton Creek	0	1
Scappoose River	N/A	N/A
Clackamas River	0	0
Sandy River	0	14
Lower Gorge Tribs	N/A	N/A
Hood River	N/A	N/A

* = There were no carcasses collected in the Scappoose population, and no surveys were conducted in the Lower Gorge and Hood River populations.

Abundance Estimates

- The total estimate for Plympton creek was right around average for the sub-population at 2,098.
- The Clackamas River had an all-time low total estimate of 90 fish. The wild estimate for Clackamas fall Chinook was 34, which ties 2011 as the lowest wild estimate since monitoring began in 2009.
- The Sandy River wild estimate was 1403 which was below the average of 1673.

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 2017. 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 stratum 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		Adult Chinook Spawner Abundance			
	Number of		Total		Wild	
	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2017 Preliminary						
Lower Columbia ESU	66	84	6,773	2,629	1,602	935
Coast Stratum	24	24	5,304	2,448	250	200
Youngs Bay	10	10	1,927	2,064	186	200
Big Creek	5	4	1,279	1,317	0	0
Clatskanie River	5	5	0	0	-	-
<i>Plympton Cr</i>	2	2	2,098	0	63	0
Scappoose River	2	2	0	0	-	-
Cascade Stratum	42	60	1,469	959	1,352	914
Clackamas River	14	21	84	41	31	16
Sandy River	28	39	1,385	958	1,321	914
Gorge Stratum	-	-	-	-	-	-
Lower Gorge	-	-	-	-	-	-
Hood River	-	-	-	-	-	-
2017 Final						
Lower Columbia ESU	57	69	6,899	2,769	1,687	1,230
Coast Stratum	24	24	5,304	2,444	250	199
Youngs Bay	10	10	1,927	2,058	186	199
Big Creek	5	4	1,279	1,317	0	0
Clatskanie River	5	5	0	0	-	-
<i>Plympton Cr</i>	2	2	2,098	0	63	0
Scappoose River	2	2	0	0	-	-
Cascade Stratum	33	45	1,595	1,303	1,437	1,214
Clackamas River	13	20	90	45	34	17
Sandy River	20	25	1,505	1,302	1,403	1,214
Gorge Stratum	-	-	-	-	-	-
Lower Gorge	-	-	-	-	-	-
Hood River	-	-	-	-	-	-

* Survey totals represent the number of random points drawn and not necessarily 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 hope was that we could separate 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 addition, considerable variability exists between when Chinook arrive and where they spawn. We have also been unable to differentiate Fall versus Spring Chinook carcass recoveries based on morphological characteristics. We are collecting fin-samples (for DNA analysis) in the Sandy basin in coordination with the Willamette Spring Chinook project. Preliminary analysis of this effort suggest that Spring and Fall Chinook spawning areas are largely segregated (Spring dominate the basin above the Salmon River confluence, while Fall dominate the basin below Marmot Dam Site). However, more analysis is required for a full understanding of the dynamics between these populations.
- **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 2017-18 spawning year with high fish-density sites during the peak of their run.
- **Main stem float surveys:** We continue to have trouble keeping main stem float surveys on the Sandy River Population in rotation. Multiple survey gaps exist for those surveys due to high flows and visibility issues. It is our opinion that these survey methods are not well suited to this environment, and alternate methods may be required to reach monitoring goals within the Sandy Basin. The Hood River Basin provides even greater challenges, as it combines inaccessible areas with similar survey conditions.
- **Spawning residence time:** A brief review of the Fall Chinook/Tule literature suggests that spawning residence time ranges from 5 – 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

- Parken, C.K., R.E. Bailey, and J.R. Irvine. 2003. Incorporating uncertainty into area under the curve and peak count salmon escapement estimation. *North American Journal of Fisheries Management* 23: 78–90.
- Rawding, D., T. Hillson, B. Glaser, K. Jenkins, and S. VanderPloeg. 2006. Abundance and spawning distribution of Chinook salmon in Mill, Abernathy, and Germany Creeks during 2005. Washington Department of Fish and Wildlife. Vancouver, WA.