

2016-17 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 2016-17 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 2016-17 season, and those results are reported elsewhere. No Fall Chinook surveys were conducted for the Upper Gorge population because points were pulled at the Lower Columbia Coho population complex scale. The Upper Gorge is included within the Hood River Coho population for this summary. 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

- 45 of the attempted 90 survey points were successfully surveyed (50%), 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 (five 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, 2016 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 stratum.

Stratum	Population	Goal	Target Response 2016	Survey Points Selected 2016
Coast	Youngs Bay	6	4	9
	Big Creek	4	4	4
	Clatskanie *	5	6	8
	Scappoose *	4	0	6
	Total	19	14	27
Cascade	Clackamas	11	11	17
	Sandy	25	17	40
	Total	36	28	57
Gorge	Lower Gorge	2	3	6
	Hood	2	0	0
	Total	4	3	6
ESU Total		59	45	90
* The Clatskanie total includes two sites from the Plympton Creek sub-population.				
* Sites pulled in the Scappoose population did not meet No AUC criteria.				

Distribution and Timing

- Live adult Chinook were observed in 71% of the randomly selected survey points surveyed in 2016, which is consistent in comparison to the last two years (74% in 2014 and 65% in 2015). This comparison differs from what is listed in previous yearly summaries which compared chinook occupancy based on surveys and not randomly selected points within survey segments.
- No Chinook live adults (or carcasses) were observed in the surveys attempted for the Scappoose population in 2016. This is consistent with survey outcomes for this area in 2009-2015.
- The number of live adult observations in each population varied considerably, ranging between 0 in the Scappoose population to 2,924 in Plympton Creek. Out of the four surveys in the Clatskanie population, Plympton Creek contributed all but 1 of the 2,925 fish observed.
- More than 82% of survey points completed for both the Clackamas and Sandy 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 9/8/16 to 10/25/16 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 9/24/16, while the median adult peak count date in the Cascade and Gorge strata was somewhat later (10/25/16 and 10/10/16 respectively).

Table 2. Total number of Chinook observed and peak information by Lower Columbia population, 2016. 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	4	4	104	10/2/2016	19
Big Creek ¹	4	3	356	10/10/2016	20
Clatskanie ²	4	1	1	9/8/2016	0
Plympton Cr	2	2	2924	9/21/2016	466
Scappoose	0	0	0	-	0
Clackamas	11	9	639	10/25/2016	4
Sandy	17	13	284	10/25/2016	6
Lower Gorge	3	0	0	10/10/2016	1
Hood ³	0	0	0	-	0

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.

3 = The Hood population complex is a combination of both Upper Gorge and Hood population surveys.

Hatchery & Wild Information

- The percentage of unmarked carcasses recovered on the spawning grounds varied between populations from 6% to 100%, with three of the six populations appearing to have a high hatchery influence. The Sandy River and the Lower Gorge population 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 2016 season, one was identified as a spring Chinook based on the coded wire tag (CWT) recovered. This CWT marked

carcass was recovered in the Youngs River in the Youngs Bay Population.

- Of the unclipped Chinook carcasses recovered in Plympton Creek, 21% had a CWT, indicating that a portion of unmarked fish in this area are of hatchery origin (Table 3). 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 2016 that were not fin clipped, by Lower Columbia population. The total number of carcasses recovered is also displayed.

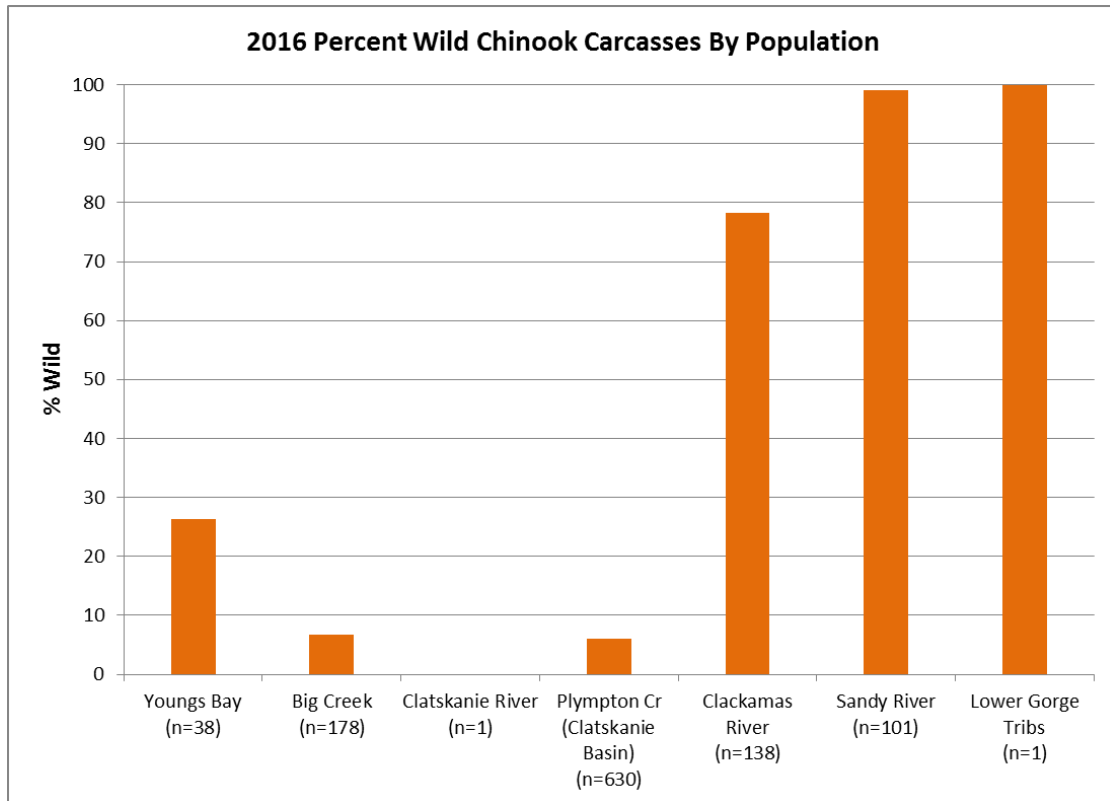


Table 3. The percentage of marked and unmarked carcasses from each population in the Lower Columbia that contained a CWT during 2016. Electronic detection was used on all carcasses to identify the presence of a CWT.

PopulationName	% Unmarked fish with CWT tags	% Marked fish with CWT
Youngs Bay	0	2
Big Creek	17	2
Clatskanie River	0	100
Plympton Creek	21	2
Scappoose River	N/A	N/A
Clackamas River	0	0
Sandy River	0	0
Lower Gorge Tribs	0	0
Hood River	N/A	N/A

* = There were no carcasses collected in the Scappoose population, and no marked carcasses were collected in the Lower Gorge and Hood River populations. Only one carcass was found in the Clatskanie population which was a marked carcass.

Abundance Estimates

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 2016. 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
2016 Preliminary						
Lower Columbia ESU	65	79	5,042	901	1,895	483
Coast Stratum	21	20	3,416	742	425	123
Youngs Bay	7	7	1,112	500	258	116
Big Creek	4	4	582	549	45	42
Clatskanie River	4	4	4	6	-	-
<i>Plympton Cr</i>	2	2	1,719	0	122	0
Scappoose River	4	3	0	0	-	-
Cascade Stratum	40	57	1,626	511	1,471	467
Clackamas River	15	24	676	323	529	253
Sandy River	25	33	951	396	942	393
Gorge Stratum	4	1	0	0	-	-
Lower Gorge	4	1	0	0	-	-
Hood River	0	0	0	0	0	0
2016 Final						
Lower Columbia ESU	45	53	5,277	1,075	2,346	724
Coast Stratum	14	14	3,073	751	354	132
Youngs Bay	4	4	768	513	187	125
Big Creek	4	4	582	549	45	42
Clatskanie River	4	4	4	6	-	-
<i>Plympton Cr</i>	2	2	1,719	0	122	0
Scappoose River	-	-	-	-	-	-
Cascade Stratum	28	37	2,204	769	1,992	711
Clackamas River	11	20	910	447	711	349
Sandy River	17	17	1,294	626	1,281	620
Gorge Stratum	3	1	0	0	-	-
Lower Gorge	3	1	0	0	-	-
Hood River	0	0	0	0	0	0
* 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. However, no money is currently dedicated for analysis of these samples.
- **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 2016-17 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.