2015-16 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 Evolutionarily Significant Unit (ESU) in the 2015-16 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 conducted in the 2015-16 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

- 42 of the attempted 85 survey points were successfully surveyed (49%), see Table 1.
- The majority of non-response sites either had an insufficient number of survey visits conducted (need ≥ 4 visits), 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 contributors to these site outcomes. The remaining non-response sites were inaccessible due to landowner denial (eight 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, 2015 run year. Target Response sites are within spawning habitat and were successfully surveyed in terms of survey qualification protocol. 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 2015	Survey Points Selected 2015
Coast	Youngs Bay	6	8	9
	Big Creek	4	5	5
	Clatskanie *	5	3	5
	Scappoose	4	3	8
	Total	**19**	**19**	**27**
Cascade	Clackamas	11	13	16
	Sandy	25	7	35
	Total	**36**	**20**	**51**
Gorge	Lower Gorge	2	3	5
	Hood	2	0	2
	Total	**4**	**3**	**7**
	ESU Total	**59**	**42**	**85**
* The Clatskanie total includes one site from the Plympton Creek sub-population.				

Distribution and Timing

- Live adult Chinook were observed in 65% of the randomly selected survey points surveyed in 2015, which is slightly down in comparison to the last two years (72% in 2013 and 74% in 2014). 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 2015. This is consistent with survey outcomes for this area in 2009-2014.
- The number of live adult observations in each population varied considerably, ranging between 0 in the Scappoose population to 5,816 on Plympton Creek. Out of the four surveys in the Clatskanie population, Plympton Creek contributed all but 10 of the 5,826 fish observed.
- More than 89% of surveys 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 adult peak count (live and dead) date ranged from 9/21/15 to 11/17/15 among Lower Columbia populations (Table 2). Within this date range there appears to be a spatial pattern showing a slight separation in the median adult peak count of chinook. The Coastal stratum appears to peak first with a median stratum date of 10/7/15, while the median adult peak count date for the Cascade and Gorge strata was 10/21/15 and 11/7/15 respectively.

Table 2. Total number of Chinook observed and peak information by Lower Columbia population, 2015. Peak date calculations represent data from all surveys attempted and do not screen for surveys deemed unsuccessful by Area Under the Curve criteria. All other data shown in this table are from successful surveys.

Population	No. of Random Survey Points	No. Random Survewy Points w/ Live Adults	Total Live Adults Observed	Median Adult Peak Date	Avg. Peak/mile
Youngs Bay	8	7	1040	10/13/2015	44
Big Creek[1]	5	5	1378	9/21/2015	146
Clatskanie[2]	2	2	10	9/30/2015	4
Plympton Cr	1	1	5816	9/23/2015	1182
Scappoose	3	-	0	-	0
Clackamas	13	6	244	10/20/2015	6
Sandy	7	4	174	11/3/2015	14
Lower Gorge	3	2	2	11/17/2015	1
Hood[3]	-	-	-	-	-

1 = The avg. peak/mile for Big Creek population without the surveys directly below the Big Creek Hatchery is 10.
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.

H:W Information

- The percentage of carcasses recovered on the spawning grounds which were unmarked varied between populations from 9% to 100%, with three of the six populations appearing to have a high hatchery influence. The Sandy River population was the only area where the percentage of hatchery adults on spawning grounds was less than 10% (Figure 1). It is however important to note that the 100% Wild calculation for the Sandy River population was based off of a sample of 8 carcasses for this year. Since this sample is below our minimum sample size of 10, we included live observations, which results in a wild proportion of 91.5%.
- Of the marked carcasses recovered in Lower Columbia surveys during the 2015 season three were identified as spring Chinook based on the coded wire tag (CWT) recovered. These CWT marked

carcasses were recovered on Plympton Creek in the Clatskanie Population.

- Of the non-adipose fin clipped Chinook carcasses recovered in Plympton Creek 43% had a coded wire tag, indicating that a relatively high percentage 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 2015 that were not adipose fin clipped, by Lower Columbia population. The total number of carcasses recovered is also displayed.

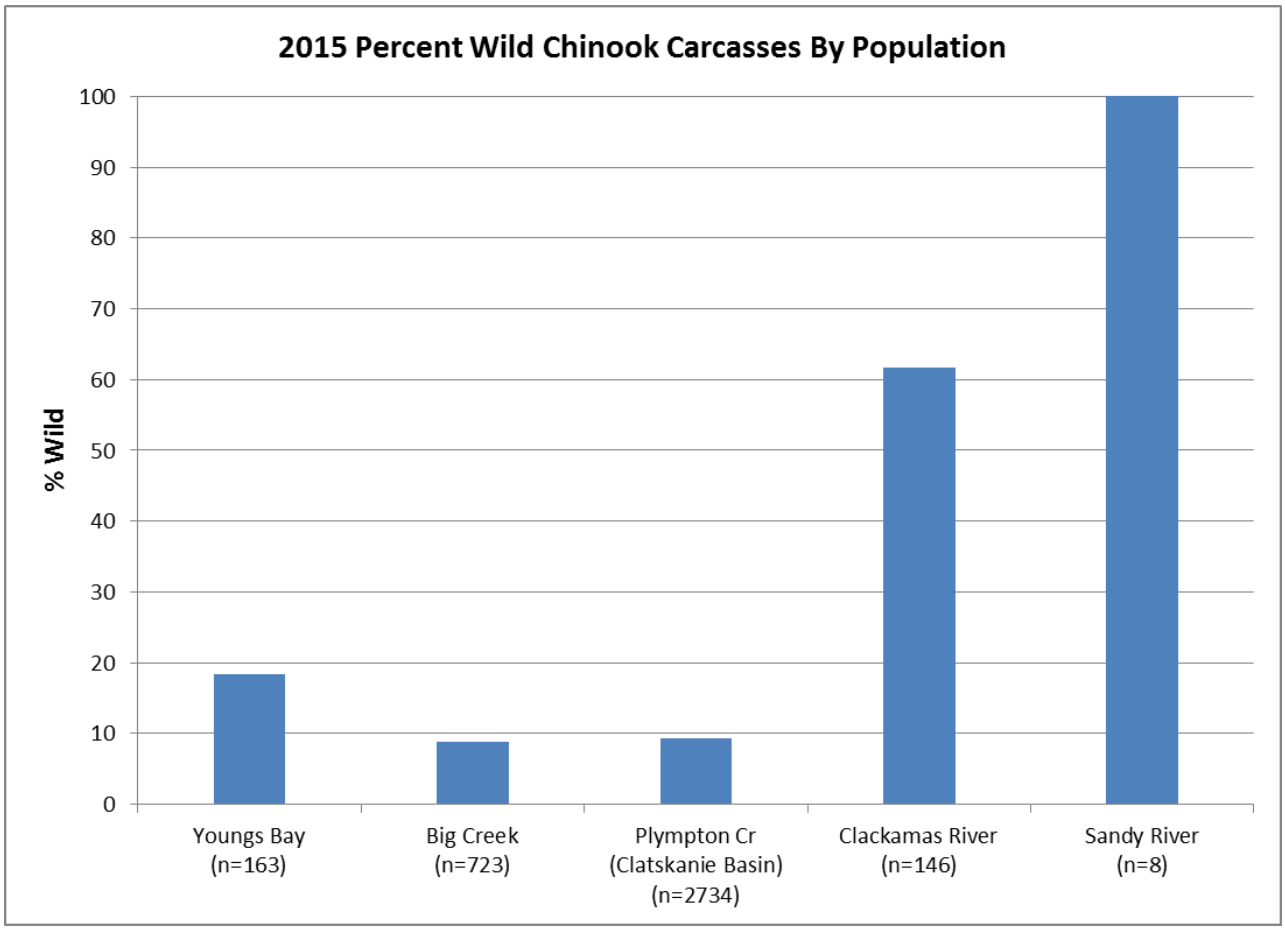

Table 3. The percentage of marked and unmarked carcasses from each population in the Lower Columbia that contained a CWT during 2015. Electronic detection was used on all carcasses to identify the presence of a CWT.

Population Name	% unmarked fish with CWT tags	% Marked fish with CWT
Youngs Bay	3	1
Big Creek	16	3
Clatskanie River *	N/A	N/A
Plympton Creek	43	6
Scappoose River *	N/A	N/A
Clackamas River	0	0
Sandy River	0	0
Lower Gorge Tribs. *	0	0
Hood River [1]	N/A	N/A

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

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 2015. 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. 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
2015 Preliminary						
Lower Columbia ESU	56	67	9,593	3,455	1,691	1,210
Coast Stratum	22	21	8,050	3,183	382	141
Youngs Bay	8	10	2,026	746	382	141
Big Creek	5	4	2,586	3,094	0	0
Clatskanie River	2	2	57	0	-	-
Plympton Cr	1	1	3,381	0	0	0
Scappoose River	6	4	0	0	-	-
Cascade Stratum	31	45	1,536	1,344	1,309	1,202
Clackamas River	14	23	286	280	179	175
Sandy River	17	22	1,250	1,314	1,131	1,189
Gorge Stratum	3	1	7	7	-	-
Lower Gorge	3	1	7	7	-	-
Hood River	-	-	-	-	-	-
2015 Final						
Lower Columbia ESU	43	53	10,557	4,569	2,580	2,996
Coast Stratum	20	21	8,050	3,183	382	141
Youngs Bay	8	10	2,026	746	382	141
Big Creek	5	4	2,586	3,094	0	0
Clatskanie River	2	2	57	0	-	-
Plympton Cr	1	1	3,381	0	0	0
Scappoose River	3	3	0	0	-	-
Cascade Stratum	20	31	2,500	3,278	2,198	2,993
Clackamas River	13	22	308	302	192	189
Sandy River	7	9	2,192	3,264	2,006	2,987
Gorge Stratum	3	1	7	7	-	-
Lower Gorge	3	1	7	7	-	-
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 apparent 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 2015-16 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 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.