2019-20 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) during the 2019-20 spawning season. Site selection and survey methods mirrored those used for coho spawning ground surveys in the same area. This report covers results from spawning surveys selected using a Generalized Random Tessellation Stratified (GRTS) sampling design (Stevens 2002). Additional, long-term, index sites were also surveyed during the 2019-20 season; those results are not reported here. Plympton Creek, within the Clatskanie population, and the lower portion of Big Creek below the hatchery, within the Big Creek population are monitored and reported separately. This is due to the high density of hatchery fish present at these sites, which are uncharacteristic of their respective population areas as a whole.

Survey Effort

- Seventy-three (72%) of the attempted 102 sites were successfully surveyed (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 elevated turbidity and/or high flows are the most common reasons for site loss. Some non-response sites (13) were inaccessible due to landowner denials.

Table 1. Lower Columbia Fall Chinook ESU, site goals and results for the number of valid target responses, 2019 run year. Target Response sites are within spawning habitat and were successfully surveyed. Successful sites 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 2019	Survey Points Attempted 2019
Coast	Youngs Bay	6	6	13
	Big Creek	4	4	4
	Below Hatchery	-	2	2
	Clatskanie	5	3	5
	Plympton Creek	-	2	2
	Scappoose	4	3	7
	Total	**19**	**20**	**33**
Cascade	Clackamas	11	14	19
	Sandy[1]	25	34	42
	Total	**36**	**48**	**61**
Gorge	Lower Gorge	2	2	4
	Hood	2	3	4
	Total	**4**	**5**	**8**
	ESU Total	**59**	**73**	**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 40% of the randomly selected sites that were successively surveyed in 2019, which is the lowest on record since 2011).

- Other than in the portion of Big Creek downstream of Big Creek hatchery, no adult Chinook (live or carcasses) were observed in the Big Creek population in 2019.
- The number of live adult observations in each population varied considerably, ranging between 0 in the greater Big Creek population to 2,972 on Plympton Creek. Only two live chinook were observed in the Clatskanie population outside of Plympton Creek.
- 88% of the sites surveyed in the two Cascade Strata populations were located on main stem rivers (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 large rivers (i.e. covering the entire width of river and lack of visibility in deep holes).
- Median peak count date ranged from 9/17/19 to 11/15/19 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, 2019. Peak dates are from all sites attempted. All other data are from target response sites.

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	6	2	4	10/14/2019	0
Big Creek[1]	4	0	0	-	0
Big Creek Hatchery	2	1	654	9/19/2019	138
Clatskanie[1]	3	1	2	9/30/2019	1
Plympton Cr	2	1	2972	9/17/2019	446
Scappoose	3	0	0	-	0
Clackamas	14	6	704	10/16/2019	7
Sandy	34	16	2136	11/15/2019	7
Lower Gorge	2	1	30	10/15/2019	22
Hood	3	1	4	10/31/2019	1

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 carcasses recovered on the spawning grounds which were marked in each population varied from 2% to 99%,
- Of the six populations, only the Sandy River and the Clackamas River recorded percentage of hatchery adults on spawning grounds less than 10% (Figure 1).
- All Chinook carcasses recovered, throughout the ESU, are checked electronically for the presence of a CWT. In 2019, all CWT tags detected were in clipped fish (Table 3).
- Based on coded wire tags (CWT), no Spring Chinook were recovered during the 2019 season.

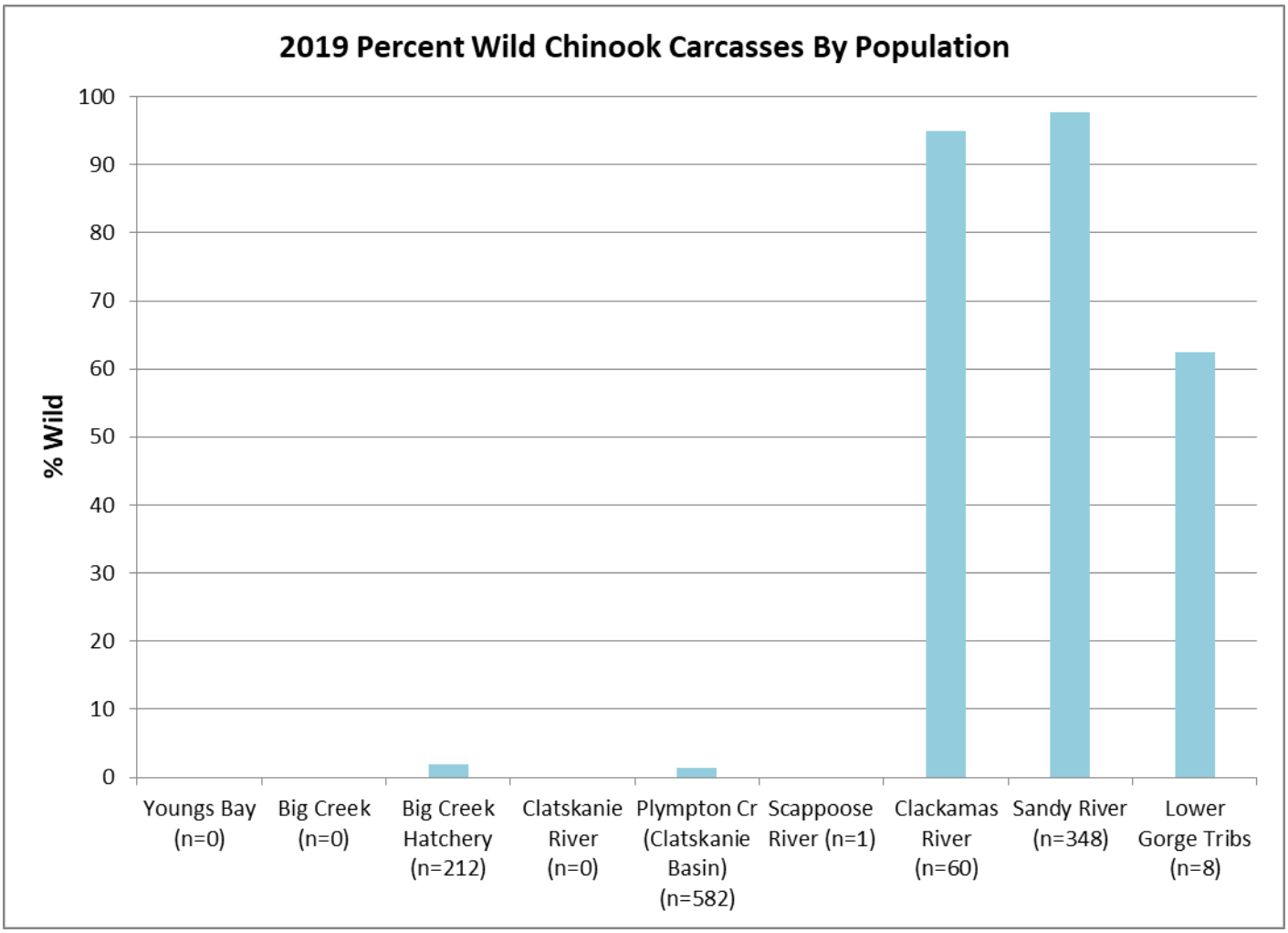

Figure 1. The percentage of Chinook carcasses observed on GRTS spawning ground surveys in 2019 that were not fin clipped, by Lower Columbia population. n = number of carcasses recovered.

Table 3. The percentage of marked and unmarked carcasses with CWT from each population in the Lower Columbia, 2019. 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		
Big Creek		
Big Creek (Below Hatchery)	0	7.7%
Clatskanie River		
Plympton Creek	0	9.4%
Scappoose River		0
Clackamas River	0	0
Sandy River	0	0
Lower Gorge Tribs	0	0
Hood River		

Null Cells = zero carcasses collected in these areas.

Abundance Estimates

Table 4. Final results of randomly selected spawning ground surveys for Chinook salmon in the Oregon portion of the Lower Columbia River ESU, run year 2019. Final estimates are based on sites that passed gap check criteria. Qualifying sites 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. Estimates of wild spawners were derived through application of fin-mark observations. Missing values indicate inadequate samples for determining total and/or wild abundance.

		Survey Effort		Adult Chinook Spawner Abundance			
		Number of		Total		Wild	
Monitoring Area	Population	Surveys	Miles	2019	5-Yr Avg	2019	5-Yr Avg
Coast Strata	Youngs Bay	6	5	15	1817	-	181
	Big Cr	4	4	0	-	0	51
	Below Big Creek Hatchery	2	2	936	-	19	-
	Clatskanie	3	3	9	26	-	-
	Plympton Creek	2	2	1,782	2,740	23	65
	Scappoose	3	2	0	0	0	0
	Total	**20**	**18**	**2,743**	**8,520**	**41**	**279**
Cascade Strata	Clackamas	14	23	928	440	880	347
	Sandy	34	49	2,508	2,138	2,449	1,920
	Total	**48**	**72**	**3,436**	**2,578**	**3,329**	**2,268**
Gorge Strata	Lower Columbia Gorge	2	1	138	-	**92**	-
	Hood River	3	3	5	-	0	-
	Total	**5**	**4**	**143**	**-**	**92**	**-**
ESU	**Total**	**74**	**95**	**6,322**	**11,100**	**3,482**	**2,547**

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. Genetic samples collected from both Spring and Fall Chinook 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 2019-20 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. In 2019, all sites surveyed met base level survey gap criteria thus not requiring a relaxed criteria to be implemented.

- **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

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.

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Stevens, D.L. 2002. Sampling design and statistical analysis methods for integrated biological and physical monitoring of Oregon streams. OPSW-ODFW-2002-07, Oregon Department of Fish and Wildlife, Salem, Oregon.