

Tulalip Tribes Natural Resources Department Report

SKYKOMISH RIVER JUVENILE SALMON OUT-MIGRATION STUDY PROGRESS REPORT

February – June 2017

by
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2017



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i. Acknowledgements

The 2017 Skykomish River Juvenile Salmon Out-Migrant Study was made possible by the following funding sources:

- NOAA Pacific Coastal Salmon Recovery Funds
- Washington State Department of Fish and Wildlife
- Pacific Salmon Commission

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1. Introduction

In May of 1999, the National Marine Fisheries Service (NMFS) listed the Puget Sound Chinook salmon as threatened under the federal Endangered Species Act (ESA). This listing included Chinook salmon from the Snohomish River Basin (Skykomish and Snoqualmie populations). Similarly, decreases in many runs of Puget Sound Coho salmon have resulted in a designation as a species of concern under ESA. The recovery of these species depends upon improving the effectiveness of habitat, harvest, and hatchery management across the basin. In order to achieve such improved effectiveness, additional information is necessary to fill important data gaps within the Snohomish system, including information on Chinook and Coho salmon abundance, productivity, spatial structure, and diversity (Snohomish Basin Salmonid Recovery Technical Committee, 2005). Information about the trends and inter-annual variability in these population parameters is critical to inform salmon recovery efforts, provides basic information on the productivity and capacity of the system, and can lead to significant improvements in harvest management modeling and run forecasting. Additionally, the monitoring of production and survival along with other physical, chemical, and biological conditions provides a means to evaluate recovery actions, habitat conditions, and potential ecological trajectories in the basin.

A key project helping to provide information on Snohomish salmon populations has been the operation of two rotary screw traps in the Skykomish and Snoqualmie rivers. Over the last 12 years, these projects involved trapping and enumerating juvenile Chinook and Coho salmon (as well as several un-targeted species) as they emigrate from the Snohomish River Basin to the Puget Sound. The goals of these trapping efforts are to estimate Chinook and Coho salmon natural production, migration patterns, and freshwater survival. These goals are accomplished through the direct quantification of juvenile salmon emigrations, evaluation of trap efficiency, and assessment of influential environmental attributes (Kubo, Finley, Nelson, 2013).

The Tulalip Tribes (TTT) trapping project has been classified on a multi-agency basis as a project of high priority for monitoring juvenile salmonids in the Snohomish River basin. TTT has worked in close collaboration with the Bureau of Indian Affairs (BIA), Washington Department of Fish and Wildlife (WDFW), NOAA Fisheries, University of Washington (UW), Long Live the Kings (LLTK), Seattle City Light (SCL), U.S. Geological Survey (USGS), Northwest Indian Fisheries Commission (NWIFC), Pacific Salmon Commission (PSC), King County Snoqualmie Forum, and other agencies to aid in better co-management of Snohomish basin salmon and steelhead stock assessment monitoring and run forecasting. Cooperative management agreements and in-kind contributions have been made to these agencies regularly from TTT in order to better assist in monitoring the status and trends of Snohomish Basin salmonid stocks.

2. Skykomish River Trapping Site Location and Characteristics

The Skykomish river trap site is located at river mile 26.5 of the Skykomish River (Figure 1). The wetted width of the Skykomish River at this point is ~325 ft. during the spring out-migration period and the channel's bank full width is ~490 ft. The channel's maximum depth at the site is ~5 ft. at summer low-flow level and approaches ~18.5 ft. at bank full depth. Summer low-flow at this location is ~3,030 cfs and mean annual discharge is ~4,070 cfs. The channel gradient is < 1% and substrate is principally gravel and cobble. When fishing; the trap is positioned in the thalweg of river, near the center of the channel. Land use adjacent to the project site is principally agriculture; however, riparian vegetation is relatively intact (with some supplemental plantings). Existing riparian vegetation is primarily cottonwood and alder and planted riparian vegetation includes cedar and spruce. At the immediate trapping site, the right-bank is composed of a gravel bar adjacent to a cottonwood stand. The left bank is just downstream of a hardened section (i.e. riprapped) with planted riparian vegetation integrated into a cottonwood stand. Adjacent to the stand is an active farm. (Kubo, Finley, Nelson, 2013).



Figure 1: Aerial photograph of the trap site at river mile 26.5 on the Skykomish River. The red dot indicates the approximate trap fishing position.

3. Summary of activities completed during the sampling season.

On January 30th, 2017 installation of the rotary screwtrap began and full trapping operations commenced on February 8th. The 2017 season ended on June 22nd. The trap was operated for approximately 844 hours over 97 days within a 20 week period. 496.5 of those hours were fished at night representing 59% of total trapping effort. During the sampling season 33,036 salmon and trout were captured, counted and released. Of those fish, Chum salmon totaled 21,101 accounting for 64% of the total salmonid catch for 2017. Captured unmarked Chinook included 3,838 sub-yearlings and 148 yearlings. The number of Chinook sub-yearlings caught at the Skykomish River trap has varied widely from year to year, with this years' total approximately 214% higher than the project average (2004-2017 average; 1,792). Captured unmarked Coho included 1,676 sub-yearlings and 2,154 yearlings. The number of unmarked Coho yearlings caught in 2017 was 48% lower than the project average (2004-2017 average: 4,505) (Table 1). During the trapping and handling process a total of 48 salmonid mortalities were reported, of which 0 were unmarked Chinook. Mortality as a percentage of the total salmonid catch was approximately 0.15% (Table 7).

Year	Effort (Hours)	0+ Chinook	1+ Coho	Chinook CPUE	Coho CPUE
2000	308.5	1287	5972	4.17	19.36
2001	900.6	1786	5512	1.98	6.12
2002	671.7	1093	8851	1.63	13.18
2003	992.1	3394	8713	3.42	8.78
2004	1071	951	13949	0.89	13.02
2005	944.3	2411	3082	2.55	3.26
2006	1125.3	2928	6218	2.60	5.53
2007	446.8	1348	3882	3.02	8.69
2009	686.6	1650	1410	2.40	2.05
2010	1045.8	1989	1245	1.90	1.19
2011	666.8	765	1798	1.15	2.70
2012	1015.7	1323	3005	1.30	2.96
2013	1217.77	2446	4443	2.01	3.65
2014	888.2	1354	2625	1.52	2.96
2015	1078.7	1418	1596	1.31	1.48
2016	1031.5	490	2137	0.48	2.07
2017	843.4	3838	2154	4.55	2.55
<i>Project Average</i>	879	1792	4505	2.17	5.86

Table 1. Annual sampling effort and catch totals for unmarked Sub-yearling Chinook and yearling Coho at the Skykomish River rotary screwtrap 2000-2017.

Efficiency testing and results.

A total of 8 trap efficiency tests (all 8 with Chinook sub-yearlings) were conducted on 8 different days throughout the 2017 sampling season. One other release was attempted on 3/28 but was ultimately cancelled due to rising river levels requiring the trap to be pulled due to safety concerns. During these tests, groups of hatchery origin juvenile salmon were collected from Wallace River Hatchery, marked with biological dye, and released approximately one mile upstream of the trap site. These releases were conducted weekly throughout the duration of the sampling season until the maximum allowable number of Chinook available from the hatchery had been reached unless the river was deemed unfishable due to flow conditions. Following each release the trap was operated continuously (except during debris removal) for a minimum of 36 hours. Efficiency calculations are expressed as the percentage of captured dyed fish in relation to the total number of dyed fish released. The results of these tests are still being evaluated, but preliminary calculations suggest that the trap was operating at an efficiency rate of 1.16% for Chinook sub-yearlings during the 2017 sampling season (Table 2). Chinook sub-yearling efficiency rates in 2017 were slightly lower than documented seasonal averages (2001-2017 average: 1.32%). During the 2017 season, trapping equipment was inspected and monitored frequently and the trap was found to be in fully operational condition with no escape paths detected and no major equipment malfunctions. Due to very low Coho adult escapement to Wallace Hatchery in 2015, sufficient numbers of 1+ Coho were not available for use by Tulalip in our efficiency releases. Due to this fish shortage, no efficiency trials were conducted using 1+ Yearling Coho in 2017 at the Skykomish trap site.

This is the first time in project history that hatchery Coho were not readily available to conduct efficiency releases. This is a direct reflection of critically low Coho escapement numbers to the Snohomish Basin in brood year 2015.

Year	River	Release Date	0+ CK Eff	1+ CO Eff
2017	Skykomish	3/22/2017	0.19%	
2017	Skykomish	3/28/2017	omitted	
2017	Skykomish	4/5/2017	0.40%	
2017	Skykomish	4/11/17	1.05%	
2017	Skykomish	4/18/2017	1.35%	
2017	Skykomish	4/25/2017	1.10%	
2017	Skykomish	5/9/2017	0.95%	
2017	Skykomish	5/17/2017	3.08%	
		2016 Avg. Total	1.16%	N/A

Table 2. Efficiency Release dates, species, and capture percentages for the Skykomish River smolt trap, 2017.

In 2015 Snohomish County Public Utility District (PUD) began conducting similar efficiency releases at their smolt trap on the Sultan River. The Sultan trap site is approximately 7.8 river miles upstream from the Skykomish trap and is located on the Sultan River approximately 0.2 river miles upstream from the confluence of the Sultan and Skykomish. A total of 32 PUD efficiency tests were conducted in 2017 using a mix of natural origin Chum fry, sub-yearling Chinook, and hatchery origin (adipose fin clipped) sub-yearling Chinook taken from the Wallace River Hatchery. The PUD release protocol at the Sultan trap is fairly consistent with the protocol utilized at Tulalip's Skykomish trap. The natural origin species are marked with biological dye, and released upstream, this dye is residually present long enough (approximately 36 hours) that encounters with dyed fish from the Sultan River have occurred frequently at the Skykomish site since the beginning of these efficiency trials in 2015. Because Tulalip is conducting releases using the same Wallace hatchery sub-yearling Chinook all ad-clipped sub-yearlings were released undyed by PUD. This allows the PUD trap operators to identify their released fish (there are no ad-clipped fish present in the Sultan system upstream of the trap site) without interfering with Tulalip's ongoing release and trapping efforts occurring downstream. Sub-yearling Chinook volitional releases do not occur from Wallace River Hatchery until June (annually) so it is assumed that any ad-clipped sub-yearling Chinook (dyed or otherwise) are from either PUD or Tulalip's release group(s). Also, because the fish are released undyed it is also possible to differentiate these fish from (a) Tulalip efficiency release sub-yearling chinook dyed with biological dye, and (b) other natural origin fish in the system. Preliminary analysis of the data indicates that fish from all 3 cohorts of PUD Sultan River releases are frequently encountered at the Skykomish trap site. This is particularly true for outmigrating dyed Chum salmon which were encountered most frequently (Table 3).

Summed 2017 Sultan Efficiency			
	Chinook 0+ UM	Chum 0+	Chinook 0+ ADCL
<i>Total Rel. 2017</i>	1916	1302	2250
<i>Total Recap. 2017</i>	5	11	16
Eff. %	0.26%	0.84%	0.71%

Table 3. Average efficiency percentage of encounter at the Skykomish trap for efficiency releases conducted at the the Sultan River smolt trap, 2017.

Release group size and flow conditions at the time of each release likely are the primary factors effecting catch percentages of Sultan release fish. Small release group sizes for natural origin Chinook and Chum likely play a role in low overall incidence of encounter for these release groups. Average efficiency recapture percentages appear to closely correlate to percentages calculated during Tulalip efficiency releases for sub-yearling outmigrant fish. Adipose fin-clipped sub-yearling Chinook encounters showed an average of 0.71% compared to 1.16% calculated in Tulalips 0+ Chinook efficiency releases for 2017. During 7 of the 32 total efficiency trails conducted by PUD the Tulalip smolt traps were not fishing due to hydrologic conditions. These 7 releases have been omitted from the final calculations for efficiency in 2017. Further, one efficiency trail was conducted on June, 12th by PUD using adipose clipped 0+ Chinook from Wallace Hatchery. Due to the fact that volitional 0+ Chinook releases begin from Wallace hatchery on June, 1st, annually, it is impossible to differentiate between fish released from the Sultan River and other Wallace origin hatchery Chinook

following June, 1st. For this reason, the 750 adipose clipped Chinook released by PUD on June, 12th have also been omitted from these final findings.

Catch Per Unit of Effort (CPUE) analysis.

A preliminary review of the data reveals that CPUE for unmarked Chinook sub-yearlings was the highest during Statistical Week (SW) 15 when the capture rate was approximately 15 fish per hour. CPUE for 0+ Chinook was fairly consistent from SW 7-23 with a very heavy and distinct 5 week peak in the outmigration of fish from Statistical Weeks 13-18. Following the CPUE peak for 0+ Chinook in SW 13, catches dropped off before a secondary peak was seen in week 17 (Figure 3). The 2017 peak outmigration timing for sub-yearling Chinook was consistent with observed seasonal norms occurring between SW11 and SW17 for all recorded years. The sub-yearling Chinook outmigration occurred over a relatively extended period, while migration for unmarked Coho yearlings was more abbreviated, taking place over a 5 week period from SW16 to 22. The peak for Coho yearlings occurred during SW19 when approximately 10 fish per hour were captured. The timing of the yearling Coho outmigration is very consistent from year to year, and the 2017 data is consistent with monitoring trends observed since the beginning of trap operations in 2001. In all years the peak outmigration occurred between SW18 and SW22, as was observed in the 2017 sampling season. Table 7 shows a monthly breakdown of catch numbers for all species and Table 5 shows calendar weeks and the corresponding dates.

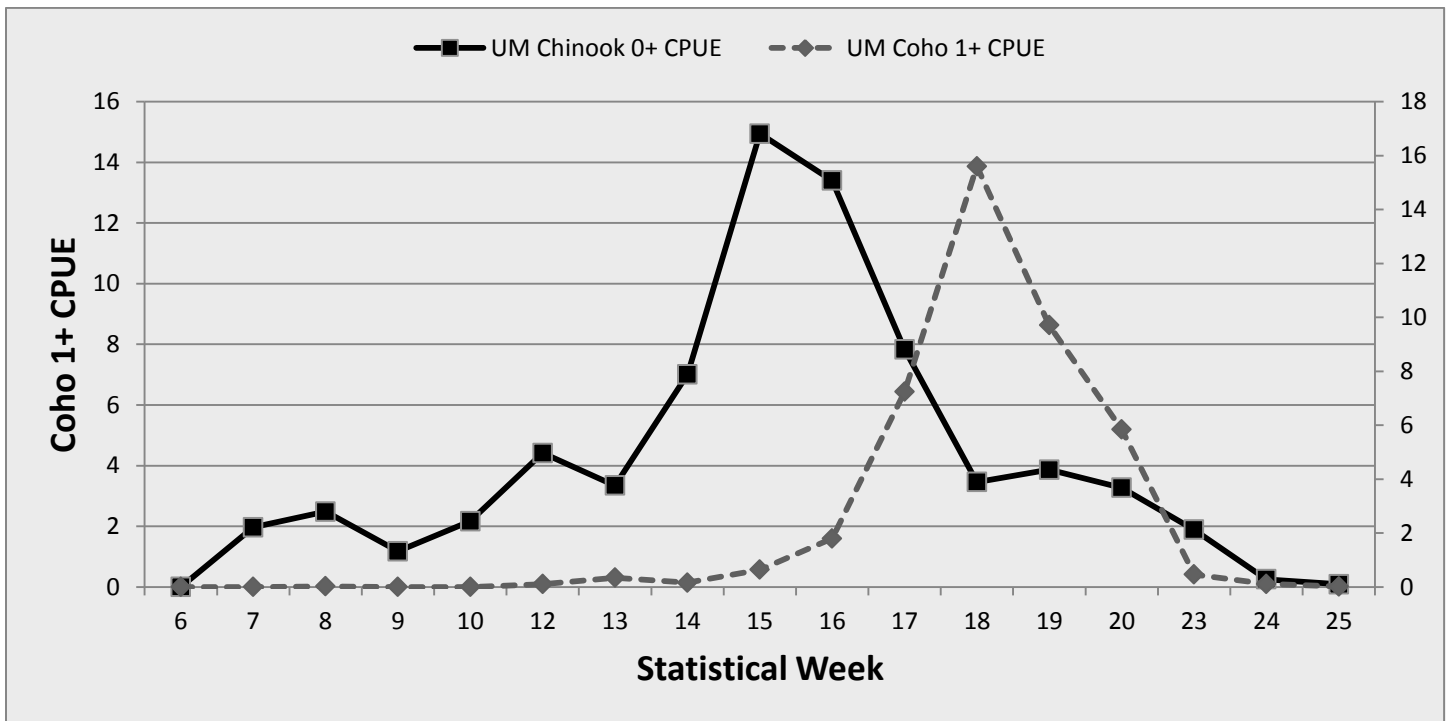


Figure 3. Chinook sub-yearling (age 0+) and coho (1+) migration patterns observed at the Skykomish River trap, February, 8th – June 22nd, 2017.

2017 Trap Sampling Season				
Year	StatWeek	BegWeek	MidWeek	EndWeek
2017	5	1/29/2017	2/1/2017	2/4/2017
2017	6	2/5/2017	2/8/2017	2/11/2017
2017	7	2/12/2017	2/15/2017	2/18/2017
2017	8	2/19/2017	2/22/2017	2/25/2017
2017	9	2/26/2017	3/1/2017	3/4/2017
2017	10	3/5/2017	3/8/2017	3/11/2017
2017	11	3/12/2017	3/15/2017	3/18/2017
2017	12	3/19/2017	3/22/2017	3/25/2017
2017	13	3/26/2017	3/29/2017	4/1/2017
2017	14	4/2/2017	4/5/2017	4/8/2017
2017	15	4/9/2017	4/12/2017	4/15/2017
2017	16	4/16/2017	4/19/2017	4/22/2017
2017	17	4/23/2017	4/26/2017	4/29/2017
2017	18	4/30/2017	5/3/2017	5/6/2017
2017	19	5/7/2017	5/10/2017	5/13/2017
2017	20	5/14/2017	5/17/2017	5/20/2017
2017	21	5/21/2017	5/24/2017	5/27/2017
2017	22	5/28/2017	5/31/2017	6/3/2017
2017	23	6/4/2017	6/7/2017	6/10/2017
2017	24	6/11/2017	6/14/2017	6/17/2017
2017	25	6/18/2017	6/21/2017	6/24/2017

Table 5. Statistical weeks and corresponding dates for 2017 sampling season.

In general, average salmonid CPUE and total catch on the Skykomish trap have exhibited seasonal variability throughout the duration of the project due to fluctuating sampling conditions and the strength of a given years outmigrant cohort. Analysis of seasonal CPUE averages for sub-yearling Chinook indicate that the catch rates in 2017 was over two times the project average (2017 CPUE; 4.55, Project Average CPUE; 2.17), and 2017 was the all-time project high for CPUE (Figure 4). Taking into account seasonal variability and sampling conditions, the total annual catch and CPUE for sub-yearling Chinook seem to display annual variability, but no clear positive or negative trend. In 2007 the trap was moved upstream from RM 23 to its current location at RM 26.5. This relocation likely plays a direct role in lower overall encounters at the smolt trap from 2007 to present. This is likely due to the exclusion of the Woods Creek drainage from the sample, as well as decreasing the overall drainage area sampled.

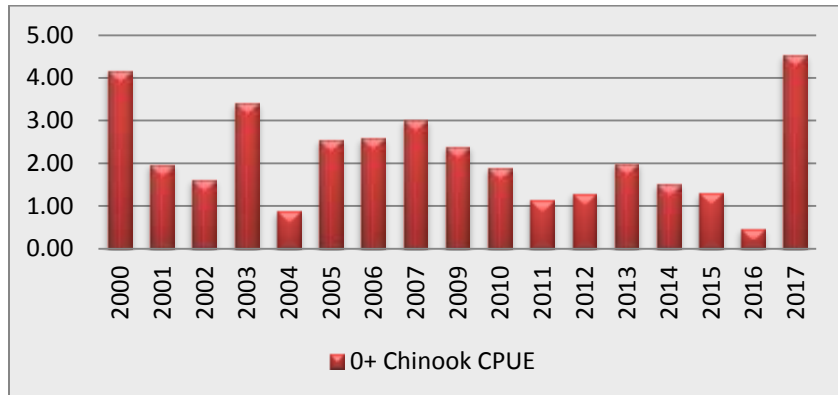


Figure 4. Sub-yearling Chinook average CPUE at the Skykomish trap; 2001-2017.

Yearling Coho catch rates dropped off significantly starting in 2009, and in 2010 the lowest documented average CPUE of 1.19 occurred (Figure 5). The overall decline in Coho catch rates is likely primarily due to the relocation of the trap site to RM 26.5 in 2007 below the Woods Creek drainage. Woods Creek is a very effective Coho producing waterbody, and has been excluded from the data following the traps relocation in 2007. 2008 data is not present due to unforeseen complications that halted the Skykomish trap operations in 2008. Since 2009, yearling Coho catch rates have remained fairly consistent both in total catch and CPUE. In 2017 the average yearling Coho CPUE was fairly consistent with project averages since the relocation of the site in 2007. The 2017 1+ Coho CPUE was approximately 6.25% higher than documented averages at 2.55 yearling Coho per hour sampled (Post-2007 project average CPUE; 2.4 fish per hour). Yearling Coho annual catch and CPUE seem to display annual variability, but no clear positive or negative trend. CPUE's have been fairly consistent year over year since the traps relocation in 2007 with 2010 being the lowest recorded year (1.19) and 2013 being the highest (3.65).

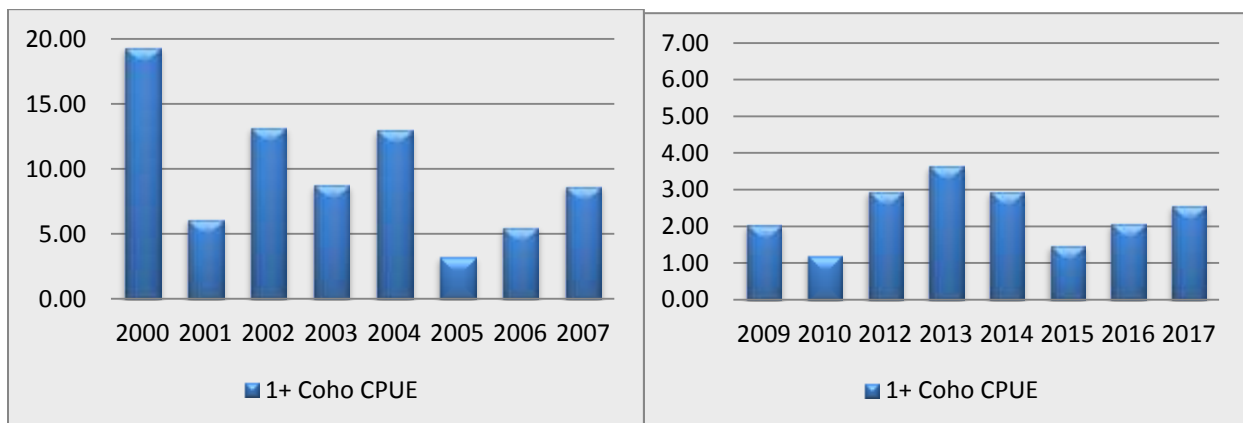


Figure 5. Yearling Coho average CPUE at the Skykomish trap by year; 2000-2017 (pre 2007 site relocation [left], and post 2007 site relocation[right])

3.1 Additional Studies

Genetic Mark Recapture Parentage Assignment - WDFW

Beginning in 2012 under a funded cooperative management agreement with WDFW, TTT began assisting in a basin-wide genetic mark and recapture (GMR) study being conducted by WDFW. DNA samples were collected at the Skykomish trap site for genetic parentage-assignment analyses of juvenile Chinook salmon in an attempt to further evaluate stock-specific production estimates and abundance. Under the WDFW GMR project protocol all unmarked (adipose intact) Chinook (both 0+ and 1+ size classes) caught in the trap were caudal clipped for DNA sampling.

In 2017, juvenile Chinook salmon were captured in eight-foot screw traps operated at RM 25 on the Skykomish River. Captured individuals were netted from the live box and held in five-gallon buckets. Fish were placed into a dishpan where they were identified to species, and examined for marks (adipose fin clips, CWT). Unmarked/untagged Chinook were measured and FL recorded in millimeters. For DNA parentage analysis, a small piece of caudal fin tissue was collected from all unmarked/untagged subyearling Chinook juveniles and immediately stored in 95% ethanol at ambient temperatures. Unmarked and untagged subyearling Chinook were presumed to be of natural-origin given that all regional hatchery Chinook production is marked through a combination of adipose fin clips and CWTs, less a very small proportion that end up not being marked due to clip and tag loss (Seamons, et. al, 2015). In 2017, approximately 3,555 upper-caudal DNA samples were taken from a mix of sub-yearling and yearling unmarked Chinook juveniles. This number is the current all-time project high dating back to beginning of the GMR study at the Skykomish in 2012. Samples taken in 2017 are 65% greater than the next closest year, 2013. The 3,555 samples taken in 2017 is over two times higher than the project sample average of 1,761 samples.

Skykomish River	
Year	Chinook Samples Taken
2012	1,345
2013	2,324
2014	1,333
2015	1,444
2016	566
2017	3,555
Total to Date	10,567

Table 6. GMR Sample Totals 2012-2016.

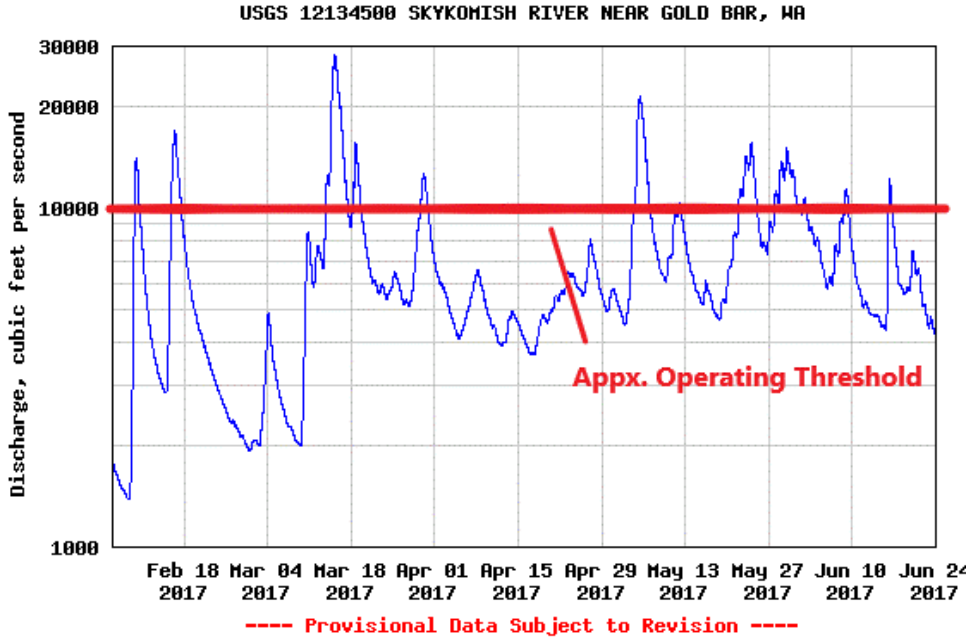
4. Project status and difficulties.

In terms of trap operation the 2017 trapping season presented continuous difficulties. Record snowpack coupled with record lowland precipitation resulted in frequent high and unstable sampling conditions. In total, 30 scheduled sampling events were cancelled due to unsafe/unfavorable fishing conditions (i.e. high debris and discharge levels beyond threshold operation limits of the equipment). In addition to these 30 sampling events that were cancelled, an additional 3 scheduled shifts were cut short, or were altered in duration due to rising river levels. These missed sampling events would have potentially equated to approximately 350+ hours of fishing effort that was ultimately missed in 2017. As a function of total trapping effort these 350 hours represent approximately 40% of the total 844 hours that the Skykomish trap was fished effectively in 2017. Three consecutive sampling events were cancelled during SW 7 from February 16-17th due to unfavorable sampling conditions. Normal operation re-commenced during SW 8 on Monday, February 20th. Hydrologic conditions again dramatically increased during SW 11 and approximately 5 consecutive sampling events were ultimately cancelled resulting in no effort occurring during SW 11. Sampling was suspended March 13th and did not recommence until the beginning of SW 12 on Monday, March 20th. On Friday, March 24th trapping efforts were again abandoned earlier than anticipated due to a rising hydrograph and unsafe sampling conditions. Normal operations recommenced Monday, March 27th, however trapping was again halted due to hydrologic conditions on Tuesday, March 29th. Following the suspension of effort on the 29th, the trap did not fish for the remainder of SW 13. Normal operations re-commenced Monday, April 3rd and SW 14 was fished as scheduled with no incidents. On Thursday, April 27th (SW 17) the trap was again pulled earlier than scheduled due to rising river conditions, and subsequently one scheduled shift was cancelled the following day, Friday the 28th. Normal operations recommenced

Monday, May 1st (SW 18), however sampling was once again abandoned during that same week on Thursday, May 4th again due to unfishable flow levels. Fishing commenced during SW 19 on Monday, May 8th, but was once again suspended Friday, May 12th due to river level. Trapping commenced during SW 20 on Monday, May 15th and SW 20 was fished without incident. Unfortunately, the river level once again reached unfishable levels during SW 21 and sampling was suspended once again on Monday, May 22nd. No fishing occurred at the Skykomish location during SW 21 and SW 22, and fishing did not recommence until SW 23 on Monday, June 5th. Ultimately sampling was once again suspended on Thursday, June 8th. SW 24 and 25, the final weeks of sampling in 2017, were fished as scheduled and without incident.

Despite the hydrological difficulties in 2017 the catch numbers, particularly for Chinook salmon, were remarkably good. It is likely that a large portion of outmigrating Chinook salmon (and other salmonid species) were missed due to sampling cancellations, and it can be inferred that both the total catch numbers as well as CPUE would have been even higher than what is documented here if so many shifts had not been ultimately cancelled due to river conditions. It is likely that stable late-fall/early-winter hydrology coupled with low temperatures and record breaking mountain snowpack directly resulted in overall favorable rearing conditions for salmon in 2017 resulting in a significantly improved egg to fry survival for most outmigrant cohorts.

Aside from the aforementioned scheduling difficulties, all trapping equipment including the trap itself, the boat, and all associated supplies were in full working order and operated as expected throughout the duration of the 2017 season with no down-time associated directly with equipment failure.



Hydrograph imagery provided by U.S. Geological Survey. <http://nwis.waterdata.usgs.gov>

5. References

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- Seamons, T., Crewson, M., Whitney, J., Verhey, P. 2015 Progress Report: Genetic-based abundance estimates for Snohomish River Chinook Salmon. Washington Department of Fish and Wildlife. Olympia, WA; Tulalip Tribes, Tulalip WA.
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October, 2017.

1/9/2018

Table 1: Skykomish River trap catch and mortalities 2017

(Data is preliminary)

February																					
	<i>Chinook</i>				<i>Coho</i>			<i>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Steelhead</i>		<i>Cut. Trout</i>	<i>Rain. Trout</i>	<i>Trout Fry</i>	<i>Dolly/Bull Trout</i>	<i>Total Salmonid Catch</i>	<i>Juv. Lamp.</i>	<i>Dace spp.</i>	<i>Sculpin spp.</i>	<i>Stickle-back</i>
	<i>Unm 1+</i>	<i>Mark 1+</i>	<i>Unm 0+</i>	<i>Mark 0+</i>	<i>0+</i>	<i>Unm 1+</i>	<i>Mark 1+</i>				<i>Unm Smolts</i>	<i>Mark Smolts</i>									
<i>Day</i>		(36.7 hours of effort)																			
Catch	0	0	12	0	0	0	0	59	0	0	0	0	0	0	0	0	71	1	1	0	0
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Night</i>		(92.3 hours of effort)																			
Catch	0	0	234	0	16	1	0	854	2	0	0	0	0	0	0	0	1108	11	9	10	1
Morts.	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0
Monthly Totals		(129.1 hours of effort)																			
Catch	0	0	246	0	16	1	0	913	2	0	0	0	0	0	0	0	1179	12	10	10	1
Morts.	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0
March																					
	<i>Chinook</i>				<i>Coho</i>			<i>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Steelhead</i>		<i>Cut. Trout</i>	<i>Rain. Trout</i>	<i>Trout Fry</i>	<i>Dolly/Bull Trout</i>	<i>Total Salmonid Catch</i>	<i>Juv. Lamp.</i>	<i>Dace spp.</i>	<i>Sculpin spp.</i>	<i>Stickle-back</i>
	<i>Unm 1+</i>	<i>Mark 1+</i>	<i>Unm 0+</i>	<i>Mark 0+</i>	<i>0+</i>	<i>Unm 1+</i>	<i>Mark 1+</i>				<i>Unm Smolts</i>	<i>Mark Smolts</i>									
<i>Day</i>		(52.8 hours of effort)																			
Catch	3	0	55	0	9	0	0	778	0	0	0	0	0	0	0	0	845	1	0	0	0
Morts.	0	0	1	0	0	0	0	4	0	0	0	0	0	0	0	0	5	0	0	0	0
<i>Night</i>		(102.7 hours of effort)																			
Catch	0	0	418	0	126	11	0	6737	3	0	1	0	3	0	0	0	7300	8	9	4	0
Morts.	0	0	3	0	2	0	0	1	0	0	0	0	0	0	0	0	6	0	0	0	0
Monthly Totals		(155.5 hours of effort)																			
Catch	3	0	473	0	135	11	0	7515	3	0	1	0	3	0	0	0	8145	9	9	4	0
Morts.	0	0	4	0	2	0	0	5	0	0	0	0	0	0	0	0	11	0	0	0	0

Table 1: Skykomish River trap catch and mortalities 2017

(Data is preliminary)

April																					
	<i>Chinook</i>				<i>Coho</i>			<i>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Steelhead</i>		<i>Cut. Trout</i>	<i>Rain. Trout</i>	<i>Trout Fry</i>	<i>Dolly/Bull Trout</i>	<i>Total Salmonid Catch</i>	<i>Juv. Lamp.</i>	<i>Dace spp.</i>	<i>Sculpin spp.</i>	<i>Stickleback</i>
	<i>Unm 1+</i>	<i>Mark 1+</i>	<i>Unm 0+</i>	<i>Mark 0+</i>	<i>0+</i>	<i>Unm 1+</i>	<i>Mark 1+</i>				<i>Unm Smolts</i>	<i>Mark Smolts</i>									
<i>Day</i>		(81.3 hours of effort)																			
Catch	0	19	259	0	72	37	0	780	0	0	1	21	0	0	0	0	1164	0	8	0	0
Morts.	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0
<i>Night</i>		(147.4 hours of effort)																			
Catch	4	486	2187	3	959	461	21	11177	0	0	240	554	11	0	0	0	16103	3	63	3	0
Morts.	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0
Monthly Totals		(228.7 hours of effort)																			
Catch	4	505	2446	3	1031	498	21	11957	0	0	241	575	11	0	0	0	17267	3	71	3	0
Morts.	0	0	7	0	2	0	0	1	0	0	0	0	0	0	0	0	10	0	0	0	0
May																					
	<i>Chinook</i>				<i>Coho</i>			<i>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Steelhead</i>		<i>Cut. Trout</i>	<i>Rain. Trout</i>	<i>Trout Fry</i>	<i>Dolly/Bull Trout</i>	<i>Total Salmonid Catch</i>	<i>Juv. Lamp.</i>	<i>Dace spp.</i>	<i>Sculpin spp.</i>	<i>Stickleback</i>
	<i>Unm 1+</i>	<i>Mark 1+</i>	<i>Unm 0+</i>	<i>Mark 0+</i>	<i>0+</i>	<i>Unm 1+</i>	<i>Mark 1+</i>				<i>Unm Smolts</i>	<i>Mark Smolts</i>									
<i>Day</i>		(79.8 hours of effort)																			
Catch	4	0	130	0	32	106	26	92	0	0	0	17	1	0	0	0	408	0	3	0	0
Morts.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
<i>Night</i>		(83.8 hours of effort)																			
Catch	11	3	441	0	283	1511	2262	605	0	0	36	222	4	0	0	0	5378	2	47	1	0
Morts.	0	0	14	0	2	0	0	3	0	0	0	0	0	0	0	0	19	0	0	0	0
Monthly Totals		(163.5 hours of effort)																			
Catch	15	3	571	0	315	1617	2288	697	0	0	36	239	5	0	0	0	5786	2	50	1	0
Morts.	0	0	15	0	2	0	0	3	0	0	0	0	0	0	0	0	20	0	0	0	0

Table 1: Skykomish River trap catch and mortalities 2017

(Data is preliminary)

June																					
	<i>Chinook</i>				<i>Coho</i>			<i>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Steelhead</i>		<i>Cut. Trout</i>	<i>Rain. Trout</i>	<i>Trout Fry</i>	<i>Dolly/Bull Trout</i>	<i>Total Salmonid Catch</i>	<i>Juv. Lamp.</i>	<i>Dace spp.</i>	<i>Sculpin spp.</i>	<i>Stickle-back</i>
	<i>Unm 1+</i>	<i>Mark 1+</i>	<i>Unm 0+</i>	<i>Mark 0+</i>	<i>0+</i>	<i>Unm 1+</i>	<i>Mark 1+</i>				<i>Unm Smolts</i>	<i>Mark Smolts</i>									
<i>Day</i>		(96.4 hours of effort)																			
Catch	4	1	14	8	21	6	3	3	0	0	0	3	0	0	0	0	63	3	0	0	0
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Night</i>		(70.3 hours of effort)																			
Catch	122	0	88	180	158	21	0	16	0	0	9	0	2	0	0	0	596	8	15	4	1
Morts.	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
Monthly Totals		(166.7 hours of effort)																			
Catch	126	1	102	188	179	27	3	19	0	0	9	3	2	0	0	0	659	11	15	4	1
Morts.	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0

Totals																					
(843.4 total hours of effort)																					
	<i>Chinook</i>				<i>Coho</i>			<i>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Steelhead</i>		<i>Cut. Trout</i>	<i>Rain. Trout</i>	<i>Trout Fry</i>	<i>Dolly/Bull Trout</i>	<i>Total Salmonid Catch</i>	<i>Juv. Lamp.</i>	<i>Dace spp.</i>	<i>Sculpin spp.</i>	<i>Stickle-back</i>
	<i>Unm 1+</i>	<i>Mark 1+</i>	<i>Unm 0+</i>	<i>Mark 0+</i>	<i>0+</i>	<i>Unm 1+</i>	<i>Mark 1+</i>				<i>Unm Smolts</i>	<i>Mark Smolts</i>									
Catch	148	509	3838	191	1676	2154	2312	21101	5	0	287	817	21	0	0	0	33036	37	155	22	2
Morts.	1	0	30	0	6	0	0	11	0	0	0	0	0	0	0	0	48	0	0	0	0
% Mort	0.68%	0.00%	0.78%	0.00%	0.36%	0.00%	0.00%	0.05%	0.00%	#Num!	0.00%	0.00%	0.00%	#Num!	Num!	#Num!	0.15%				
% of Total Catch	0.4%	1.5%	11.5%	0.6%	5.0%	6.5%	7.0%	63.5%	0.0%	0.0%	0.9%	2.5%	0.1%	0.0%	0.0%	0.0%	99.3%	0.1%	0.5%	0.1%	0.0%