

Tulalip Tribes Natural Resources Department Report

SNOQUALMIE RIVER JUVENILE SALMON OUT-MIGRATION STUDY PROGRESS REPORT

February – June 2016

by
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i. Acknowledgements

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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 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), 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. Snoqualmie River Trapping Site Location and Characteristics.

The Snoqualmie trap is located on the Snoqualmie River in Duvall, WA in a straight section of the channel which flows in a northerly direction at river mile 12.2. The Snoqualmie River at this point has a wetted width of ~142 ft., bank full width of ~210 ft, maximum bank full depth of ~23.5 ft, and a summer low-flow level of ~5 ft. Water surface velocity is ~3-4 ft./sec., summer low flow discharge is ~847 cfs, and mean annual discharge is ~3,800 cfs. The channel gradient is <1% and the substrate is principally sand and silt with some gravel and cobble on the western side of the channel. The land use adjacent to the trap is principally agriculture with riparian vegetation limited to the banks (e.g. <30 ft.). The riparian zone principally consists of grass, shrubs, and a few scattered willow and cottonwood trees. At the immediate trap site, the left bank is composed of a steep slope vegetated with mixed deciduous trees and an understory of blackberry and salmonberry (leading to West Snoqualmie Valley Rd NE). The right bank is steeply cut and leads to an active horse and cattle pasture. Riparian vegetation on the right bank is principally blackberry with an occasional alder and cottonwood. In 2003, the landowner had a fence built around the pasture on the right bank creating a buffer zone of ~50 ft. between the pasture and the river bank. This buffer was planted with an assortment of native riparian vegetation. (Kubo, Finley, Nelson, 2013).



Figure 1. Aerial photograph of the trap site at river mile 12.2 on the Snoqualmie River in Duvall, WA. The red dot indicates the approximate trap fishing position.

3. Summary of activities completed during the sampling season.

On February 1st installation of the rotary screwtrap began and full trapping operations commenced on February 9th. The season ended on June 16th. The trap was fished for approximately 1112 hours over 128 days within an 18 week period. 717 of those hours were fished at night representing 64.5% of total trapping effort. Approximately 6 consecutive sampling events were cancelled during SW 8 between February 14-20 due to unfavorable sampling conditions (i.e. high debris and discharge levels). During the sampling season 7,156 salmon and trout were captured, counted and released. Of that number, 5,749 were Pink salmon fry accounting for 80% of the total catch. Captured unmarked Chinook included 44 sub-yearlings and 8 yearlings. The number of Chinook sub-yearlings caught at the Snoqualmie River trap has varied widely from year to year, with the catch in 2016 being the lowest documented in project history; 90% lower than the project average (2001-2015 average; 444). Captured unmarked Coho included 809 yearlings and 47 sub-yearlings. The number of unmarked Coho yearlings caught is 31.5% lower than the project average (2001-2015 average: 1,181) (Table 1). During the trapping and handling process a total of 3 salmonid mortalities were reported. Mortality as a percentage of the total salmonid catch was approximately 0.0004% considerably below project averages (Table 5).

Year	Effort (Hours)	0+ Chinook	1+ Coho	Chinook CPUE	Coho CPUE
2001	509	619	553	1.22	1.09
2002	780.3	653	1894	0.84	2.43
2003	945.5	882	1305	0.93	1.38
2004	1056	611	1127	0.58	1.07
2005	1017.8	677	1187	0.67	1.17
2006	992	761	2023	0.77	2.04
2007	509.5	120	615	0.24	1.21
2008	317.9	163	587	0.51	1.85
2009	632.1	259	754	0.41	1.19
2010	1157.8	357	1149	0.31	0.99
2011	500.8	284	1662	0.57	3.32
2012	847.2	377	1384	0.44	1.63
2013	1217.93	615	1718	0.50	1.41
2014	796.8	196	1084	0.25	1.36
2015	1017	82	678	0.08	0.67
2016	1112	44	809	0.04	0.73
<i>Project Average</i>		419	1158	0.52	1.47

Table 1. Annual sampling effort and catch totals for sub-yearling Chinook and yearling Coho at the Snoqualmie River Rotary screwtrap 2001-2016 (preliminary data).

A total of 15 trap efficiency tests (7 with Chinook sub-yearlings and 8 with Coho yearlings) were conducted on 15 different days throughout the 2016 sampling season (Table 2.). During these tests, groups of hatchery origin juvenile salmon were collected from Wallace River Hatchery, marked with biological dye, and released over a mile upstream of the trap site. These releases were conducted weekly throughout the duration of the sampling season unless the river was deemed unfishable. 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; however preliminary calculations suggest that the trap was operating at an efficiency rate of 1.31% for Chinook sub-yearlings and 0.35% for Coho yearlings during the 2016 sampling season (Table 2). The 2016 sub-yearling Chinook efficiency is close to the documented seasonal average for this trapping location (2001-2016 average: 1.34%, Table 3), whereas Coho efficiency rates were considerably lower than expected norms observed at this site (2001-2016 average: 0.68%, Table 4). On 05/26/16 a release was attempted, but ultimately failed due to a high mortality rate. The cause of the die off was very likely high temperatures and this release was omitted from the release data that has been presented, this release has been omitted from the report. During the 2016 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.

Year	River	Release Date	0+ CK Eff	1+ CO Eff
2016	Snoqualmie	3/2/2016	2.69%	
2016	Snoqualmie	3/8/2016	0.89%	
2016	Snoqualmie	3/16/2016	1.00%	
2016	Snoqualmie	3/22/2016	0.55%	
2016	Snoqualmie	3/30/2016	0.70%	
2016	Snoqualmie	4/5/2016	1.40%	
2016	Snoqualmie	4/13/2016	1.95%	
2016	Snoqualmie		4/19/2016	0.10%
2016	Snoqualmie		4/27/2016	0.75%
2016	Snoqualmie		5/3/2016	0.52%
2016	Snoqualmie		5/11/2016	0.40%
2016	Snoqualmie		5/17/2016	0.15%
2016	Snoqualmie		5/26/2016	omitted
2016	Snoqualmie		6/8/2016	0.45%
2016	Snoqualmie		6/14/2016	0.07%
2016 Avg. Total			1.31%	0.35%

Table 2. Efficiency release dates and re-capture (efficiency) percentages at the Snoqualmie trap site; 2016.

Release Date	Total Number of Releases	Total Release (R)	Total Recovered (r)	% Recovered
2004	4	5175	75	1.45%
2005	5	5900	99	1.68%
2006	3	3091	45	1.46%
2007	2	2579	33	1.28%
2009	3	3176	60	1.89%
2010	4	4287	60	1.40%
2011	2	2347	30	1.28%
2012	4	7987	200	2.50%
2013	5	9993	58	0.58%
2014	5	10138	71	0.70%
2015	7	13988	196	1.40%
2016	7	14,007	184	1.31%
Total	27	82668	1111	1.34%

Table 2. Sub-yearling Chinook release summary and recapture efficiency percentages by year, 2004-2016.

Release Date	Total Number of Releases	Total Release (R)	Total Recovered (r)	% Recovered
2002	4	2262	10	0.44%
2003	4	4020	30	0.75%
2004	2	1810	10	0.55%
2005	2	2191	13	0.59%
2006	3	3984	35	0.88%
2007	2	2193	62	2.83%
2009	2	2294	23	1.00%
2010	3	2536	23	0.91%
2011	4	3738	29	0.78%
2012	3	3982	21	0.53%
2013	8	15925	109	0.68%
2014	7	14,107	82	0.58%
2015	7	13,933	90	0.65%
2016	7	13,229	47	0.36%
All Project Total	29	86204	584	0.68%

Table 4. Yearling Coho release summary and recapture efficiency percentages by year, 2002-2016.

After a preliminary review of the data catch per unit effort (CPUE) for wild Chinook sub-yearlings was extremely low and sporadic throughout the duration of the 2016 season. Due to the overall low CPUE for sub-yearling Chinook a true peak in outmigration timing is difficult to clearly identify. The timing of this peak has varied from year to year, and does not exhibit the observed consistency documented for yearling Coho in the Snoqualmie. The Coho yearling outmigration peak demonstrated a bi-modal pattern with the first peak occurring in SW 17 when 3.00 fish per hour were captured, and the second higher peak occurring in SW 19 when 3.5 fish per hour were captured (Figure 2). The timing of this peak is consistent with the timing observed in all other years of the trapping project which generally occurs during SW 18-20. Table 5 shows a monthly breakdown of catch numbers for all species and Table 3 shows statistical weeks and the corresponding dates.

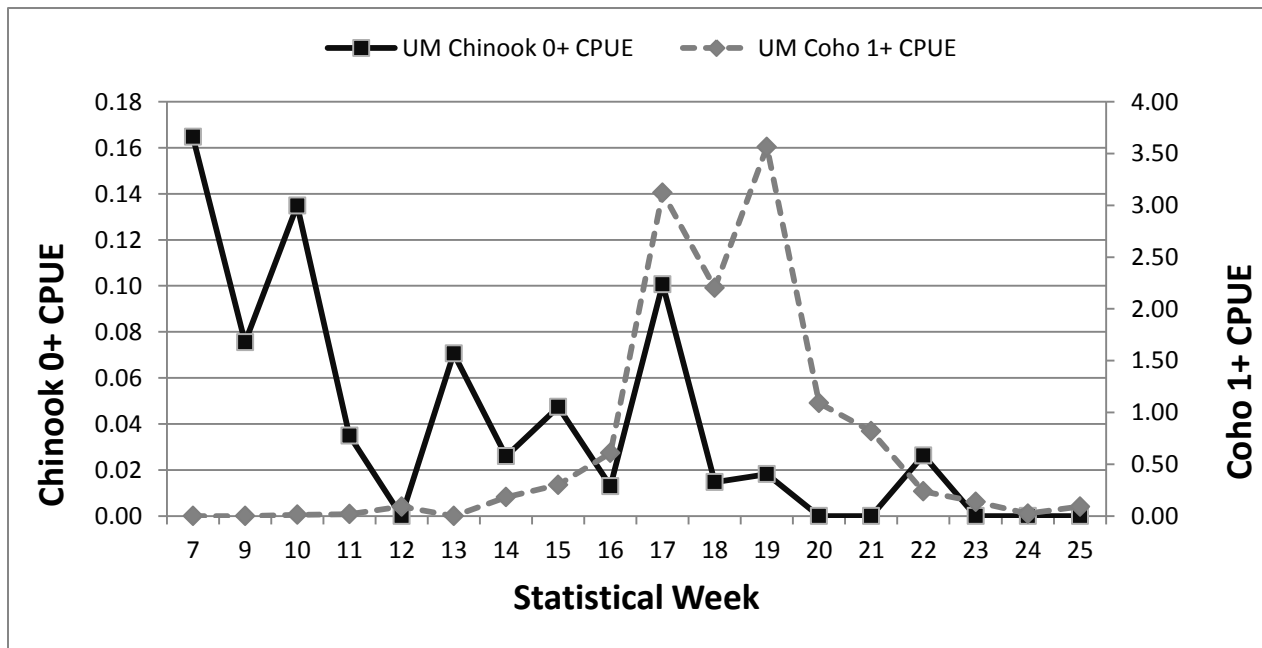


Figure 2. Chinook sub-yearling (age 0+) and coho yearling (age 1+) migration patterns observed during 2016 at the Snoqualmie River trap, river mile 12.2 (preliminary data).

2016 Trap Sampling Season				
Year	StatWeek	BegWeek	MidWeek	EndWeek
2016	7	2/7/2016	2/13/2016	2/10/2016
2016	8	2/14/2016	2/19/2016	2/17/2016
2016	9	2/21/2016	2/27/2016	2/24/2016
2016	10	2/28/2016	3/5/2016	3/2/2016
2016	11	3/6/2016	3/12/2016	3/9/2016
2016	12	3/13/2016	3/19/2016	3/16/2016
2016	13	3/20/2016	3/26/2016	3/23/2016
2016	14	3/27/2016	4/2/2016	3/30/2016
2016	15	4/3/2016	4/9/2016	4/6/2016
2016	16	4/10/2016	4/16/2016	4/13/2016
2016	17	4/17/2016	4/23/2016	4/20/2016
2016	18	4/24/2016	4/30/2016	4/27/2016
2016	19	5/1/2016	5/7/2016	5/4/2016
2016	20	5/8/2016	5/14/2016	5/11/2016
2016	21	5/15/2016	5/21/2016	5/18/2016
2016	22	5/22/2016	5/28/2016	5/25/2016
2016	23	5/29/2016	6/4/2016	6/1/2016
2016	24	6/5/2016	6/11/2016	6/8/2016
2016	25	6/12/2016	6/18/2016	6/15/2016
2016	26	6/19/2016	6/25/2016	6/22/2016

Table 3. Statistical weeks and corresponding dates for 2016 sampling season.

In general, salmonid catch rates on the Snoqualmie trap have exhibited seasonal variability throughout the duration of the project primarily due to fluctuating sampling conditions and the strength of a given years outmigrant cohort. Analysis of seasonal CPUE averages for sub-yearling Chinook and yearling Coho in 2016 indicate a lower than normal capture rate for both of these species with sub-yearling Chinook numbers falling significantly lower than project averages (Table 1, Figure 3).

The overall CPUE for sub-yearling Chinook in the Snoqualmie River was alarmingly low in both 2015 and 2016 at approximately .08 and .04 fish per hour of effort respectively representing the lowest annual encounter rates in project history (2001-2016). The 2016 CPUE is approximately 93% lower than the project average for sub-yearling Chinook (Project average; 0.55 fish per hour). Chinook efficiency rates closely matched seasonally documented averages and likely did not play a role in the lower overall sub-yearling Chinook catches in 2016. Lower CPUE and a lower overall total catch are likely primarily due to a small overall outmigrant cohort for sub-yearling Chinook in 2016. Taking into account seasonal variability and sampling conditions, the total annual catch rates and CPUE for sub-yearling Chinook have both exhibited a clear gradual decreasing trend throughout the project duration (Figure 3).

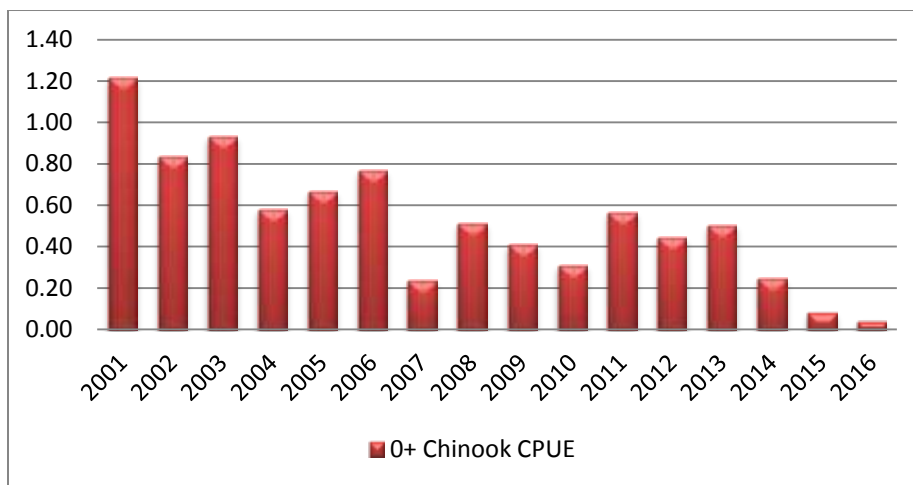


Figure 3. Sub-yearling Chinook average CPUE at the Snoqualmie trap; 2001-2016.

Yearling Coho catch rates have in general remained fairly consistent throughout the project duration with some observed seasonal variability dependent upon river conditions and the size of a given years outmigrant cohort (Figure 4). In 2016 the average yearling Coho CPUE was 55% lower than documented averages at .69 yearling Coho per hour sampled (Project average; 1.52 fish per hour). Yearling Coho catches in 2016 were the second lowest recorded in project history (2001-2016). This number is likely due to a combination of lower overall yearling Coho efficiency rates and a smaller outmigrant cohort size in 2016. Yearling Coho total annual catch, and CPUE averages do not show a clear increasing or decreasing trend at the Snoqualmie trap and appear to be remaining fairly steady with considerable seasonal variability (Figure 4).

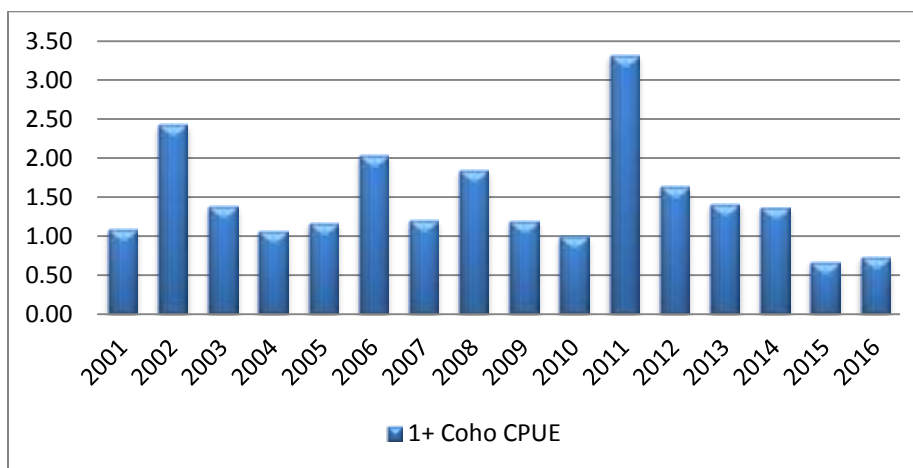


Figure 4. Yearling Coho average CPUE at the Snoqualmie trap; 2001-2016.

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 basinwide genetic mark and recapture (GMR) study being conducted by WDFW. DNA samples were collected at the Snoqualmie trap site for genetic parentage-assignment analyses of juvenile Chinook salmon in an attempt to further evaluate stock-specific production estimates and abundance. Under WDFW GMR project protocol all unmarked (adipose intact) Chinook (both 0+ and 1+ size classes) caught in the trap were clipped for DNA sampling. During the 2016 monitoring season approximately 50 upper-caudal DNA samples were taken from a mix of sub-yearling and yearling unmarked Chinook juveniles. This number accounts for the lowest number of Chinook DNA samples taken to date at the Snoqualmie trap, and is significantly lower than previous years dating back to 2012.

In 2016, juvenile Chinook salmon were captured in eight-foot screw traps operated at RM 12 on the Snoqualmie 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 2016, 52 upper-caudal DNA samples were taken from a mix of sub-yearling and yearling unmarked Chinook juveniles. This number is significantly lower than project averages dating back to beginning of the GMR study at the Snoqualmie in 2012 and is represents the lowest recorded incidence of Chinook encounters to date (Table 4).

Snoqualmie River	
Year	Chinook Samples Taken
2012	376
2013	844
2014	305
2015	90
2016	52
Total to Date	1,615

Table 4. GMR Sample Totals 2012-2016

4. Project status and difficulties.

In terms of trap operation the 2016 trapping season went very well. Total trapping effort (approximately 1100 hours) and sample scheduling were minimally impacted by variability in weather conditions and hydrology with the exception of cancellations that occurred during SW 8. On February 16th the Snoqualmie peaked at just over 20,000 cfs and it did not return to fishable levels until SW 9. Following this brief cancellation, the trap was not adversely affected by hydrology and river conditions for the remainder of the 2016 sampling season. Low river levels resulting in low cone rotation speeds in the spring likely played a role in the comparatively low yearling Coho CPUE rates experienced in 2016, but were likely not the main driving force behind these lower than usual encounter rates. Warm ambient temperatures and other stressors (feeding prior to transport) strongly impacted the survival or transported yearling Coho during several release events. Attempts were made with minimal success to cool the water in the transport tote with ice shavings during several of the releases. Efficiency percentages in general have suffered at the Snoqualmie site in recent years, and the key driving factor(s) behind this decrease is yet unknown. Slight alterations were made in releasing protocol (e.g. using ice, using more or less bismark dye, using the boat to shuttle fish from the shore to the thalweg, etc.) and adjustments were made to trapping equipment (e.g. changes in fishing position, adjustments to cone connection to increase rotation speed, adjustments in aspect of fishing position in the channel) in an attempt to boost efficiency percentages, but efforts have thus far failed. The overall low catch rates, particularly those of sub-yearling Chinook and sub-yearling Coho are likely a direct product of unprecedented drought conditions in the summer of 2015 coupled immediately with record breaking high flows in the fall and winter of the same year. The 2015 salmon escapement throughout the Snohomish basin was met with unparalleled challenges in spawning success and the subsequent rearing success of the 2016 progeny resulting in a severely depleted outmigrating sub-yearling population. 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 2016 season.

5. References

- Kubo, J., Finley, K., Nelson K. 2013. 2000-2012 Skykomish and Snoqualmie Rivers Chinook and Coho Salmon Out-Migration Study. Tulalip Tribes Natural Resource Division, Tulalip WA.
- 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, 2016*

Table 1: Snoqualmie River trap catch and mortalities 2016

(Data is preliminary)

February

	<i>Chinook</i>		<i>Coho</i>		<i>Chum</i>	<i>Pink</i>	<i>Steelhead</i>		<i>Resident Resident Resident</i>	<i>Cut./Rain. Trout Rainbow</i>	<i>Total Salmonid Fry/Parr</i>	<i>Catch</i>	<i>Lamp</i>	<i>Sculpin spp. Sunfish</i>	<i>Stickle-Stickle-spp.</i>	<i>back</i>
	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>0+</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>								
<i>Day</i>	(26.0 hours of effort)															
Catch	6	0	3	0	0	138	0	0	0	0	147	0	1	0	0	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<i>Night</i>	(75.6 hours of effort)															
Catch	4	0	11	1	7	453	0	0	0	0	476	35	0	2	0	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Monthly Totals	(101.6 hours of effort)															
Catch	10	0	14	1	7	591	0	0	0	0	623	35	1	2	0	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

March

	<i>Chinook</i>		<i>Coho</i>		<i>Chum</i>	<i>Pink</i>	<i>Steelhead</i>		<i>Resident Resident Resident</i>	<i>Cut./Rain. Trout Rainbow</i>	<i>Total Salmonid Fry/Parr</i>	<i>Catch</i>	<i>Lamp</i>	<i>Sculpin spp. Sunfish</i>	<i>Stickle-Stickle-spp.</i>	<i>back</i>
	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>0+</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>								
<i>Day</i>	(100.6 hours of effort)															
Catch	3	0	1	3	29	1572	0	0	0	0	1619	0	0	0	0	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<i>Night</i>	(227.7 hours of effort)															
Catch	16	0	17	17	94	2772	1	0	0	1	3027	40	0	6	0	
Morts.	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	
Monthly Totals	(328.3 hours of effort)															
Catch	19	0	18	20	123	4344	1	0	0	1	4646	40	0	6	0	
Morts.	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	

Table 1: Snoqualmie River trap catch and mortalities 2016

(Data is preliminary)

April

	<i>Chinook</i>		<i>Coho</i>		<i>Chum</i>	<i>Pink</i>	<i>Steelhead</i>		<i>Resident Resident Resident</i>	<i>Cut./Rain. Trout Rainbow</i>	<i>Total Salmonid Fry/Parr</i>	<i>Catch</i>	<i>Lamp</i>	<i>Sculpin spp. Sunfish</i>	<i>Stickle-Stickle-spp.</i>	<i>back</i>
	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>0+</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>								
<i>Day</i>	(102.2 hours of effort)															
Catch	3	0	1	35	35	442	0	0	0	0	529	7	0	0	21	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<i>Night</i>	(185.8 hours of effort)															
Catch	9	2	1	400	51	372	4	12	0	0	904	129	1	3	175	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Monthly Totals	(288.0 hours of effort)															
Catch	12	2	2	435	86	814	4	12	0	0	1433	136	1	3	196	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

May

	<i>Chinook</i>		<i>Coho</i>		<i>Chum</i>	<i>Pink</i>	<i>Steelhead</i>		<i>Resident Resident Resident</i>	<i>Cut./Rain. Trout Rainbow</i>	<i>Total Salmonid Fry/Parr</i>	<i>Catch</i>	<i>Lamp</i>	<i>Sculpin spp. Sunfish</i>	<i>Stickle-Stickle-spp.</i>	<i>back</i>
	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>0+</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>								
<i>Day</i>	(108.5 hours of effort)															
Catch	1	0	6	10	1	0	0	0	0	0	26	7	0	0	29	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<i>Night</i>	(165.2 hours of effort)															
Catch	2	5	2	334	5	0	17	2	0	0	401	218	0	5	222	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Monthly Totals	(273.7 hours of effort)															
Catch	3	5	8	344	6	0	17	2	0	0	427	225	0	5	251	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table 1: Snoqualmie River trap catch and mortalities 2016

(Data is preliminary)

June

	<i>Chinook</i>		<i>Coho</i>		<i>Chum</i>	<i>Pink</i>	<i>Steelhead</i>		<i>Resident Resident Resident</i>	<i>Cut./Rain. Trout Rainbow</i>	<i>Total Salmonid Fry/Parr</i>	<i>Catch</i>	<i>Lamp</i>	<i>Sculpin spp. Sunfish</i>	<i>Stickle-Stickle-spp.</i>	<i>back</i>
	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>0+</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>								
<i>Day</i>	(54.8 hours of effort)															
Catch	0	0	0	0	0	0	0	0	0	0	4	8	0	0	9	
Morts.	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	
<i>Night</i>	(65.8 hours of effort)															
Catch	0	1	5	9	0	0	0	0	0	1	23	137	0	1	81	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Monthly Totals	(120.5 hours of effort)															
Catch	0	1	5	9	0	0	0	0	0	1	27	145	0	1	90	
Morts.	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	

Totals

(1112.0 total hours of effort)

	<i>Chinook</i>		<i>Coho</i>		<i>Chum</i>	<i>Pink</i>	<i>Steelhead</i>		<i>Resident Resident Resident</i>	<i>Cut./Rain. Trout Rainbow</i>	<i>Total Salmonid Fry/Parr</i>	<i>Catch</i>	<i>Lamp</i>	<i>Sculpin spp. Sunfish</i>	<i>Stickle-Stickle-spp.</i>	<i>back</i>
	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>1+</i>	<i>0+</i>	<i>0+</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>								
Catch	44	8	47	809	222	5749	22	14	0	2	7156	581	2	17	537	
Morts.	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	
Mortality Rate	0.00%	0.00%	0.00%	0.00%	0.45%	0.00%	0.00%	0.00%	0.00%	0.00%	0.04%					
% of Total Catch	0.5%	0.1%	0.6%	9.7%	2.7%	68.8%	0.3%	0.2%	0.0%	0.0%	85.6%	7.0%	0.0%	0.2%	6.4%	