Tulalip Tribes Natural Resources Department Report

SKYKOMISH RIVER JUVENILE SALMON OUT-MIGRATION STUDY PROGRESS REPORT

February – June 2015

by
Matt Pouley
Todd Zackey

2015

Tulalip Natural Resources Division
6406 Marine Dr.
Tulalip, WA 98271

i. Acknowledgements
The 2015 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

Table of Contents

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), 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 February 2nd, 2015 installation of the rotary screwtrap began and full trapping operations commenced on February 12th. The 2015 season ended on June 5th due to drought conditions resulting record low river levels and limited catch. The trap was operated for approximately 1079 hours over 87 days within an 18 week period. 705.4 of those hours were fished at night representing 65.4% of total trapping effort. No scheduled fishing events were deemed unfishable during this five month period due to unfavorable sampling conditions (i.e. high debris and discharge levels). During the sampling season 35,792 salmon and trout were captured, counted and released. Of those fish, Chum salmon totaled 29,834 accounting for 83% of the total salmonid catch for 2015. Captured unmarked Chinook included 1,418 sub-yearlings and 35 yearlings. The number of Chinook sub-yearlings caught at the Skykomish River trap has varied widely from year to year, with this years' total falling 19% lower than the project average (2004-2015 average; 1,743). Captured unmarked Coho included 1,440 sub-yearlings and 1,596 yearlings. The number of unmarked Coho yearlings caught in 2015 was 67% lower than the project average (2004-2015 average: 4,820) (Table 1). During the trapping and handling process a total of 279 salmonid mortalities were reported, of which 7 were Chinook. Mortality as a percentage of the total salmonid catch was approximately 0.7%. Of the 279 mortalities, 260 were Chum accounting for 93% of the total salmonid mortality in 2015 (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
Project Average		*1743*	*4820*	2.12	6.33

Table 1. Annual sampling effort and catch totals for unmarked Sub-yearling Chinook and yearling Coho at the Skykomish River rotary screwtrap 2000-2015.

A total of 15 trap efficiency tests (7 with Chinook sub-yearlings and 9 with Coho yearlings) were conducted on 15 different days throughout the 2015 sampling season. 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 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, but preliminary calculations suggest that the trap was operating at an efficiency rate of 1.96% for Chinook sub-yearlings and 1.08% for Coho yearlings during the 2015 sampling season (Table 2). Chinook sub-yearling efficiency rates in 2015 were slightly higher than documented seasonal averages (2001-2012 average: 1.5%), whereas Coho efficiency rates were consistent with observed averages at this site (2001-2012 average: 1.2%). During the 2015 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
2015	Skykomish	2/25/2015	***2.26%***	
2015	Skykomish	3/3/2015	***2.30%***	
2015	Skykomish	3/11/2015	***2.56%***	
2015	Skykomish	3/17/2015	***1.42%***	
2015	Skykomish	3/25/2015	***0.75%***	
2015	Skykomish	3/31/2015	***1.31%***	
2015	Skykomish	4/8/2015	***3.12%***	
2015	Skykomish	4/14/2015		***4.03%***
2015	Skykomish	4/22/2015		***1.45%***
2015	Skykomish	4/28/2015		***1.01%***
2015	Skykomish	5/6/2015		***1.06%***
2015	Skykomish	5/12/2015		***0.50%***
2015	Skykomish	5/20/2015		***0.15%***
2015	Skykomish	5/26/2015		***0.30%***
2015	Skykomish	6/3/2015		***0.15%***
		2015 Avg. Total	1.96%	1.08%

Table 2. Efficiency Release dates, species, and capture percentages for the Skykomish River smolt trap, 2015.

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 12 PUD efficiency tests were conducted using a mix of natural origin Chum, sub-yearling Chinook salmon, and hatchery origin 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 Chum and Chinook 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 occurred frequently at the Skykomish site. 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 May or 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-yearing 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; often to a degree greater than or equal to the efficiency calculations performed through Tulalip's own efficiency testing. This is particularly true for outmigrating dyed Chum which were encountered most frequently. Table 3 indicated dates of PUD releases and the number of fish released for each species each day, Table 4 shows the corresponding catch percentages for each cohort.

Date	Wild CK	Chum	0+ ADCL CK
23-Feb-15	91	260	
10-Mar-15	121	1815	
16-Mar-15	506	4890	
17-Mar-15			750
23-Mar-15	90	1918	
24-Mar-15	30	401	
30-Mar-15	212	1548	
31-Mar-15			750
6-Apr-15	213	1059	
13-Apr-15	225	424	750
20-Apr-15	99	230	
25-Apr-15			750

Table3. Release dates, species, and number of fish released from the Sultan River, 2015.

Release Date (2015)	Species	Eff. %
23-Feb	Chinook	**0%**
	Chum	**1.92%**
10-Mar	Chinook	**0%**
	Chum	**0.88%**
16-Mar	Chinook	**0%**
	Chum	**0%**
17-Mar	0+ ADCL Chinook	**0.13%**
23-Mar	Chinook	**0%**
24-Mar	Chum	**1.59%**
30-Mar	Chinook	**0%**
	Chum	**1.30%**
31-Mar	0+ ADCL Chinook	**1.20%**
6-Apr	Chinook	**2.34%**
	Chum	**1.30%**
13-Apr	0+ ADCL Chinook	**2.80%**
	Chum	**1.17%**
	Chinook	**0%**
20-Apr	Chinook	**0%**
	Chum	**0%**
25-Apr	0+ ADCL Chinook	**0%**
	Chum Avg.	**0.91%**
	Chinook Avg.	**0%**
	0+ ADCL Chin Avg.	**1.03%**

Table 4. Release date, and corresponding average efficiency percentage of encounter at the Skykmoish trap for efficiency release fish from the Sultan River, 2015.

Release group size and flow conditions at the time of each release likely are the primary factors effecting catch percentages of Sultan release group fish. Instances of both of these factors were demonstrated during the 2015 season. Flow levels likely adversely affected the catch rates for the release occurring on March 16th as river conditions were nearing the maximum velocity threshold for safety due to heavy rains. Further, the release size on April 20th was small (only 99 Chinook, and 230 Chum) which is likely why no fish were encountered. Consistently small release group size (a product of the low number of fish encountered on the Sultan trap) for natural origin sub-yearling Chinook is likely the driving force for extremely low instances of encounter with this particular release cohort. It is unclear why no fish were encountered from the April 25th releases as flow levels and release size were both at normal levels. Preliminary analysis of this data suggests three potential trends:

(1) The outmigration speed of sub-yearling juveniles appears to occur quite rapidly through this portion of the system which may represent a localized behavior, or summarize sub-yearling salmonid outmigration from the Skykomish as a whole. Many of the recaptures encountered from the Sultan trap made the 8 river mile journey within the first 24 hours. In all instances no fish were encountered beyond the 36 hour threshold for the biological dyes observable timing. In several instances fish were encountered the same sampling day, often within 12 hours of their original release from the Sultan site.
(2) Average efficiency recapture percentages appear to closely correlate to percentages calculated during Tulalip efficiency releases for sub-yearling outmigrant fish. Both natural origin Chum and ad-clipped Chinook recapture rates were approximately 1%.
(3) The distance at which efficiency releases are conducted for Tulalip's trapping purposes may be open to further interpretation due primarily to the apparent speed at which these cohorts are exiting the system.

2015 was the first year for recapture encounters from the Sultan trap site. The first dyed fish were encountered without prior notice and it was not until later communication with PUD that categorical documentation of these release fish began. Because of this, it is likely that Sultan River release fish were missed, or not catalogued, during the earlier releases in February-March, 2015. Going forward further communication with PUD and observations of trends in recapture encounters from their trap will represent a high priority at the Skykomish site. This information may help to better understand the trends mentioned above, as well as continue to document trapping efficiencies on the whole.

A preliminary review of the data reveals that catch per unit effort (CPUE) for unmarked Chinook sub-yearlings was the highest during Statistical Week (SW) 15 when the capture rate was approximately 3.5 fish per hour. CPUE for 0+ Chinook was fairly uniform and exhibited a slow ascending trend beginning in SW 8 and continuing until the eventual peak in SW 15. It appears that an undetermined proportion of the early 0+ Chinook outmigration may have occurred prior to the installation of the traps in 2015. This is likely due in part to an abnormally warm and dry winter, lower than average river flow levels, and higher river temperatures resulting in earlier than normal Chinook emergence timing. Following the CPUE peak for 0+ Chinook in SW 15, catches dropped off dramatically and abruptly (Figure 3). The 2015 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 SW15 to 19. 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 2015 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 2015 sampling season. Table 7 shows a monthly breakdown of catch numbers for all species and Table 5 shows calendar weeks and the corresponding dates.

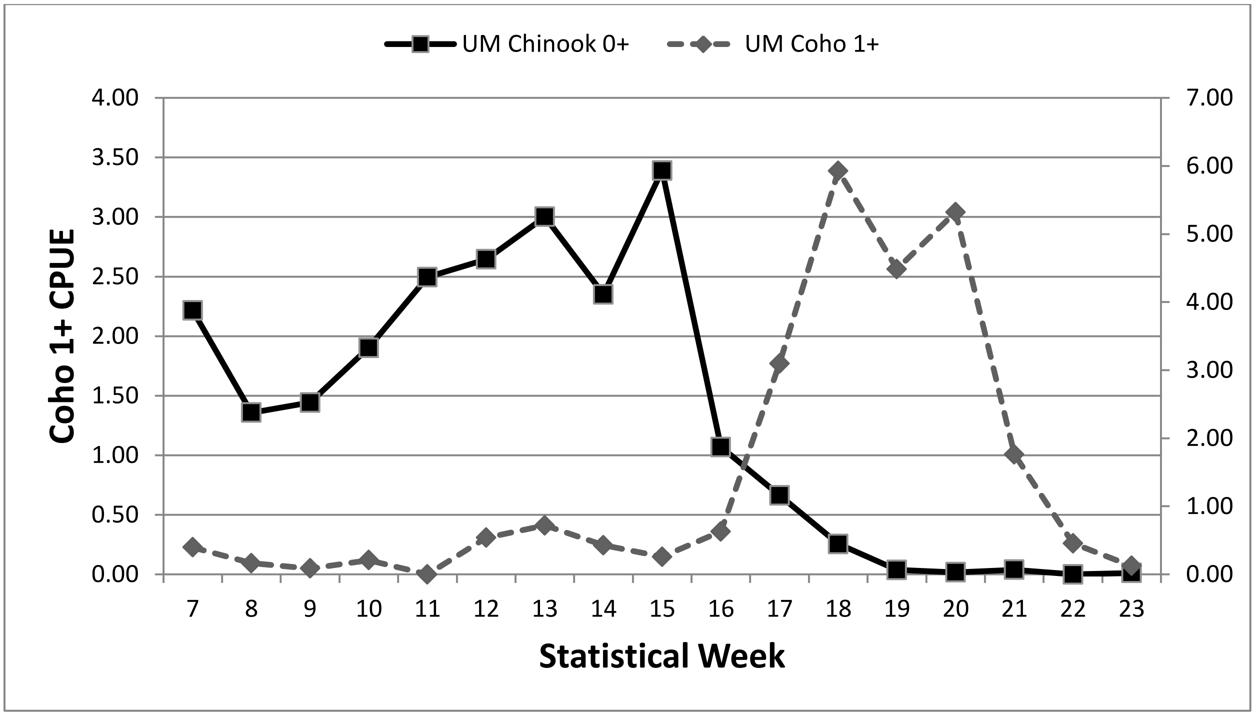

Figure 3. Chinook sub-yearling (age 0+) and coho (1+) migration patterns observed at the Skykomish River trap, February, 8th – June 5th, 2015.

		2015		
Year	StatWeek	BegWeek	MidWeek	EndWeek
2015	7	2/8/2015	2/11/2015	2/14/2015
2015	8	2/15/2015	2/18/2015	2/21/2015
2015	9	2/22/2015	2/25/2015	2/28/2015
2015	10	3/1/2015	3/4/2015	3/7/2015
2015	11	3/8/2015	3/11/2015	3/14/2015
2015	12	3/15/2015	3/18/2015	3/21/2015
2015	13	3/22/2015	3/25/2015	3/28/2015
2015	14	3/29/2015	4/1/2015	4/4/2015
2015	15	4/5/2015	4/8/2015	4/11/2015
2015	16	4/12/2015	4/15/2015	4/18/2015
2015	17	4/19/2015	4/22/2015	4/25/2015
2015	18	4/26/2015	4/29/2015	5/2/2015
2015	19	5/3/2015	5/6/2015	5/9/2015
2015	20	5/10/2015	5/13/2015	5/16/2015
2015	21	5/17/2015	5/20/2015	5/23/2015
2015	22	5/24/2015	5/27/2015	5/30/2015
2015	23	5/31/2015	6/3/2015	6/6/2015

Table 5. Statistical weeks and corresponding dates for 2015 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 and yearling Coho in 2015 indicate a lower than average capture rate for both of these species (Table 1).

The average CPUE for Chinook at the Skykomish site has displayed annual variance throughout the project duration (Figure 4). The overall CPUE for sub-yearling Chinook in the Skykomish River in 2015 was 38% lower than project average at approximately 1.31 fish per hour of effort (Project average; 2.12) . 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. The decreasing aspect of the linear trend line presented in Figure 4 is likely due to very high CPUE rates encountered in 2000 and 2003 which do not, in general, reflect the overall averages for the project. 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.

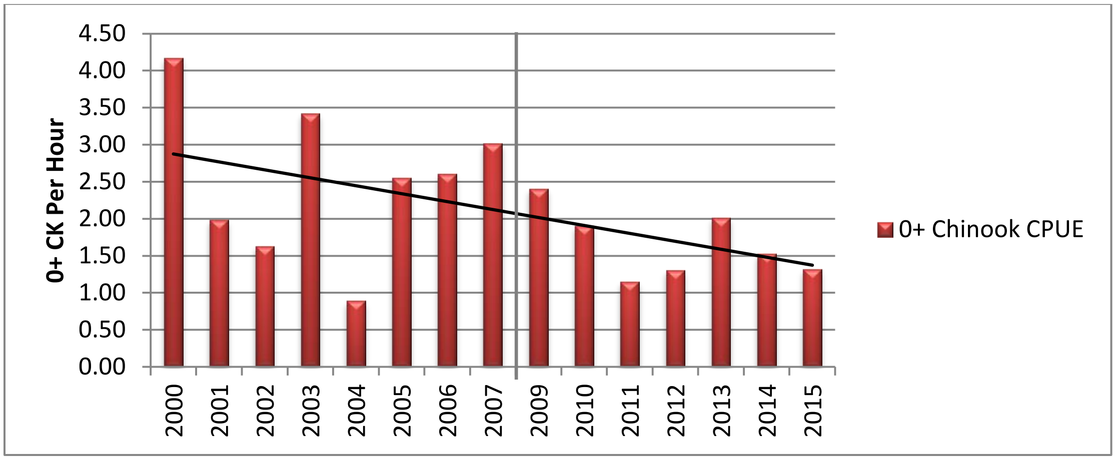

Figure 4. Sub-yearling Chinook average CPUE at the Skykomish trap; 2001-2015.

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 a direct product of the relocation of the trap to RM 26.5 in 2007. Woods Creek is a very effective Coho producing drainage, 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 2015 the average yearling Coho CPUE was 77% lower than documented averages at 1.48 yearling Coho per hour sampled (Project average; 6.33 fish per hour). This number is likely due to a combination of a smaller outmigrant cohort size in 2015, and a much higher average CPUE's from 2000-2007 prior to the traps relocation. Aside from the apparent drop in catch rates from 2007 forward, yearling Coho annual catch and CPUE seem to display annual variability, but no clear positive or negative trend. The decreasing aspect of the linear trend line presented in Figure 4 is likely due to the high CPUE from 2007 prior.

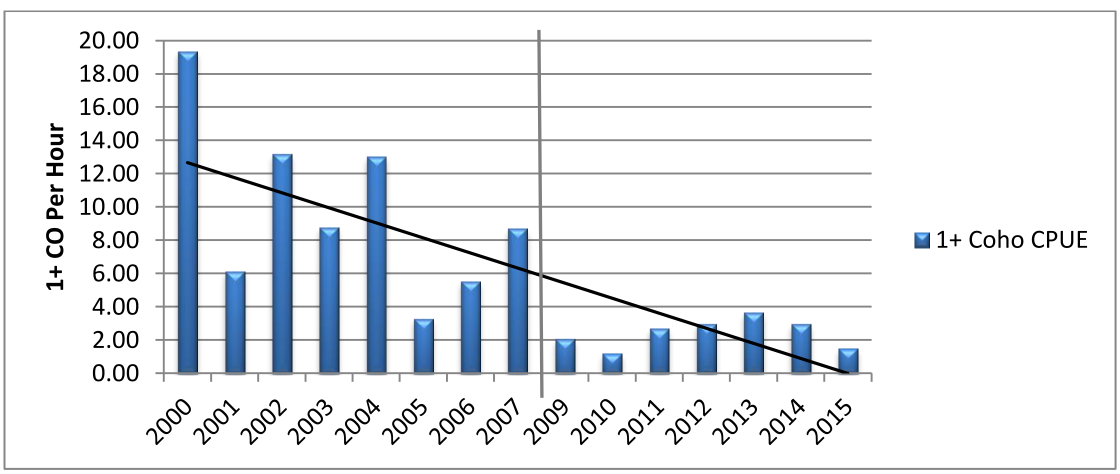

Figure 5. Yearling Coho average CPUE at the Skykomish trap by year; 2000-2015.

3.1 Additional Studies

Genetic Mark Recapture Parantage 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 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 clipped for DNA sampling.

In 2015, 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 2015, approximately 1,453 upper-caudal DNA samples were taken from a mix of sub-yearling and yearling unmarked Chinook juveniles. This number closely matches project averages dating back to beginning of the GMR study at the Skykomish in 2012 (Table 6).

Skykomish River	
Year	**Chinook Samples Taken**
2012	1,345
2013	2,324
2014	1,333
2015	1,444
Total to Date	6,446

Table 6. GMR Sample Totals 2012-2015

Salish Sea Marine Survival Project

Beginning in 2014 Tulalip has made in-kind contributions to an international study lead by Long Live the Kings (LLTK) and the Pacific Salmon Foundation (PSF) of Canada examining the primary factors affecting the survival of juvenile salmon and steelhead in the Salish Sea. According to the Salish Sea Marine Survival Project Website the aim of the project is to:

> *Leverage human and financial resources from the United States and Canada to determine the primary factors affecting the survival of juvenile salmon and steelhead in the Salish Sea. It is the largest and most important research of its kind in the shared waters of British Columbia and Washington State, addressing a key uncertainty impeding salmon recovery and sustainable fisheries. The project will, for the first time, undertake a comprehensive study of the physical, chemical and biological factors impacting salmon survival, in order to improve our collective understanding of salmon in saltwater, facilitating smarter management and stronger returns.*
>
> *Over 40 organizations, representing diverse philosophies and encompassing most of the region's fisheries and marine research and management complex, are working together on this massive transboundary effort. And, the Pacific Salmon Foundation (PSF) and Long Live the Kings (LLTK) are coordinating it. (http://www.marinesurvivalproject.com).*

One aspect of the bottom-up sampling approach of the study is aimed to evaluate the role and drivers of juvenile size-selective mortality rates through the use of scale sample analysis. In cooperation with LLTK and NOAA fisheries TTT took scale samples from juvenile Chinook and Coho salmon at the Skykomish River smolt trap. Chinook scale samples taken for the WDFW GMR were shared between LLTK and WDFW to facilitate the needs of both groups, and in addition to these samples TTT also sampled and provided scales from juvenile Coho salmon at the Skykomish trap in both 2014 and 2015. In 2015, 36 scale samples were collected from juvenile Chinook salmon, and 57 scale samples were collected from juvenile Coho. In addition to the scale samples taken, caudal tissue sample for DNA analysis was taken from 1,457 juvenile Chinook.

4. Project status and difficulties.

In terms of trap operation the 2015 trapping season went very well. Total trapping effort (approximately 1100 hours) and sample scheduling were not adversely impacted by variability in weather conditions and hydrology. In past seasons, hazardous river conditions and flooding have caused cancellations and unscheduled gaps in trap operation. In 2015 the Skykomish River was hit with record breaking drought conditions, low snow pack, and high temperatures resulting in the lowest recorded river levels in existing records. Low cone rotation speeds in the spring, the result of low flow conditions in the River, likely played a role in the comparatively low yearling Coho CPUE rates experienced in 2015, but were likely not the main driving force behind these lower than usual encounter rates. Yearling Coho catch efficiency rates closely matched the project average, and the lower than normal encounter rates are likely primarily due to a smaller overall outmigrant cohort size in 2015. These low flow rates were, however, primarily responsible for the completion of the season on June 5th at which point the thalweg of the river was below the minimum required level to successfully deploy the trap cone. Although the season ended earlier than is generally anticipated, the sampling window captured both the peak of the Chinook and Coho outmigration window. 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 2015 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.

Snohomish Basin Salmonid Recovery Technical Committee. 2005. Snohomish River Basin ecological analysis for salmonid conservation. Snohomish County Public Works, Surface Water Management, Everett, WA.

Prepared by:
Matt Pouley, Field Projects Coordinator
The Tulalip Tribes, Cultural & Natural Resources Department
November, 2015

Table 7: Skykomish River trap catch and mortalities 2015

(Data is preliminary)

February

	Chinook					*Coho*					*Steelhead*										
	Unm 1+	*Mark 1+*	*Unm 0+*	*Mark 0+*	*0+*	*Unm 1+*	*Mark 1+*	*Chum*	*Pink*	*Sockeye*	*Unm Smolts*	*Mark Smolts*	*Cut. Trout*	*Rain. Trout*	*Trout Fry*	*Dolly/ Bull Trout*	*Total Salmonid Catch*	*Juv. Lamp.*	*Dace spp.*	*Sculpin spp.*	*Stickle-back*
Day			(37.4 hours of effort)																		
Catch	0	0	4	0	2	0	0	27	0	0	0	0	0	0	0	0	33	0	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
Night			(104.9 hours of effort)																		
Catch	1	0	207	0	28	20	2	975	5	0	0	0	0	0	0	0	1238	12	3	7	1
Morts.	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	4	0	0	0	0
Monthly Totals		(142.3 hours of effort)																			
Catch	1	0	211	0	30	20	2	1002	5	0	0	0	0	0	0	0	1271	12	3	7	1
Morts.	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	4	0	0	0	0

March

	Chinook					*Coho*					*Steelhead*										
	Unm 1+	*Mark 1+*	*Unm 0+*	*Mark 0+*	*0+*	*Unm 1+*	*Mark 1+*	*Chum*	*Pink*	*Sockeye*	*Unm Smolts*	*Mark Smolts*	*Cut. Trout*	*Rain. Trout*	*Trout Fry*	*Dolly/ Bull Trout*	*Total Salmonid Catch*	*Juv. Lamp.*	*Dace spp.*	*Sculpin spp.*	*Stickle-back*
Day			(76.8 hours of effort)																		
Catch	0	0	61	0	68	7	0	1314	0	0	0	0	0	0	0	0	1450	0	0	1	0
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Night			(213.3 hours of effort)																		
Catch	7	0	704	14	848	105	8	20690	0	0	1	0	3	0	1	1	22382	9	21	9	0
Morts.	0	0	5	0	0	0	0	257	0	0	0	0	0	0	0	0	262	0	0	0	0
Monthly Totals		(290.1 hours of effort)																			
Catch	7	0	765	14	916	112	8	22004	0	0	1	0	3	0	1	1	23832	9	21	10	0
Morts.	0	0	5	0	0	0	0	257	0	0	0	0	0	0	0	0	262	0	0	0	0

Table 7: Skykomish River trap catch and mortalities 2015

(Data is preliminary)

April

	Chinook Unm 1+	Chinook Mark 1+	Chinook Unm 0+	Chinook Mark 0+	Chinook 0+	Coho Unm 1+	Coho Mark 1+	Chum	Pink	Sockeye	Steelhead Unm Smolts	Steelhead Mark Smolts	Cut. Trout	Rain. Trout	Trout Fry	Dolly/ Bull Trout	Total Salmonid Catch	Juv. Lamp.	Dace spp.	Sculpin spp.	Stickle-back
Day (111.5 hours of effort)																					
Catch	1	0	23	1	42	8	0	272	1	0	0	0	0	0	0	0	348	0	0	1	0
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Night (189.0 hours of effort)																					
Catch	8	172	411	27	394	619	30	6271	0	0	4	181	4	0	0	0	8121	1	26	4	0
Morts.	0	0	0	0	0	12	0	1	0	0	0	0	0	0	0	0	13	0	0	0	0
Monthly Totals (300.5 hours of effort)																					
Catch	9	172	434	28	436	627	30	6543	1	0	4	181	4	0	0	0	8469	1	26	5	0
Morts.	0	0	0	0	0	12	0	1	0	0	0	0	0	0	0	0	13	0	0	0	0

May

	Chinook Unm 1+	Chinook Mark 1+	Chinook Unm 0+	Chinook Mark 0+	Chinook 0+	Coho Unm 1+	Coho Mark 1+	Chum	Pink	Sockeye	Steelhead Unm Smolts	Steelhead Mark Smolts	Cut. Trout	Rain. Trout	Trout Fry	Dolly/ Bull Trout	Total Salmonid Catch	Juv. Lamp.	Dace spp.	Sculpin spp.	Stickle-back
Day (111.6 hours of effort)																					
Catch	0	0	3	0	3	5	3	3	0	0	0	0	0	0	0	0	17	1	0	1	0
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Night (153.0 hours of effort)																					
Catch	14	1	4	3	53	822	105	281	0	0	4	110	3	0	0	0	1400	14	32	10	0
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monthly Totals (264.6 hours of effort)																					
Catch	14	1	7	3	56	827	108	284	0	0	4	110	3	0	0	0	1417	15	32	11	0
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 7: Skykomish River trap catch and mortalities 2015

(Data is preliminary)

June

	Chinook					*Coho*					*Steelhead*										
	Unm 1+	*Mark 1+*	*Unm 0+*	*Mark 0+*	*0+*	*Unm 1+*	*Mark 1+*	*Chum*	*Pink*	*Sockeye*	*Unm Smolts*	*Mark Smolts*	*Cut. Trout*	*Rain. Trout*	*Trout Fry*	*Dolly/ Bull Trout*	*Total Salmonid Catch*	*Juv. Lamp.*	*Dace spp.*	*Sculpin spp.*	*Stickle-back*
Day (36.0 hours of effort)																					
Catch	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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
Night (45.2 hours of effort)																					
Catch	3	0	1	784	2	10	0	1	0	0	0	1	0	0	0	0	802	2	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
Monthly Totals (81.2 hours of effort)																					
Catch	4	0	1	784	2	10	0	1	0	0	0	1	0	0	0	0	803	2	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

Totals

(1078.7 total hours of effort)

	Chinook					*Coho*					*Steelhead*										
	Unm 1+	*Mark 1+*	*Unm 0+*	*Mark 0+*	*0+*	*Unm 1+*	*Mark 1+*	*Chum*	*Pink*	*Sockeye*	*Unm Smolts*	*Mark Smolts*	*Cut. Trout*	*Rain. Trout*	*Trout Fry*	*Dolly/ Bull Trout*	*Total Salmonid Catch*	*Juv. Lamp.*	*Dace spp.*	*Sculpin spp.*	*Stickle-back*
Catch	35	173	1418	829	1440	1596	148	29834	6	0	9	292	10	0	1	1	35792	39	83	33	1
Morts.	0	0	7	0	0	12	0	260	0	0	0	0	0	0	0	0	279	0	0	0	0
% Mort	0.00%	0.00%	0.49%	0.00%	0.00%	0.75%	0.00%	0.87%	0.00%		0.00%	0.00%	0.00%		0.00%	0.00%	0.77%				
% of Total Catch	0.1%	0.5%	3.9%	2.3%	4.0%	4.4%	0.4%	83.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	99.6%	0.1%	0.2%	0.1%	0.0%