

SKYKOMISH RIVER JUVENILE SALMON OUT-MIGRATION STUDY PROGRESS REPORT February – June 2013

1. Summary of activities completed during the sampling season.

On January 30th installation of the rotary screwtrap began and full trapping operations commenced on February 5th. The 2013 season ended on June 14th. The trap was fished for approximately 1,217.9 hours over 90 days within a 19 week period. 720.6 of those hours were fished at night representing 59.1% of total trapping effort. There were 10 scheduled fishing events that were unfishable during this five month period due to unfavorable sampling conditions (i.e. high debris and discharge levels). During the sampling season 56,664 salmon and trout were captured, counted and released. Unmarked Chinook sub-yearling totaled 2,446 and 201 Chinook yearlings were caught. Unmarked Coho yearlings accounted for 4,443 of this seasons catch. The number of Chinook sub-yearlings caught varies widely from year to year, this years' total is significantly higher than recent years recorded for the trapping project on the Skykomish River due in part to increased trapping efforts, but also due to an apparently strong outmigration of juveniles. The number of unmarked Coho yearling caught is lower than last year, but closely mirrors seasonal averages (Table 2).

During the trapping and handling process a total of 6 salmonid mortalities were reported, of which only 2 were Chinook sub-yearling mortalities. Mortality rates were calculated for all species and cohorts (Table 1). The mortality rate as a percentage of the total catch represents only a slight fraction of 1% of the total catch and is much lower than rates experienced in the past.

Table 1 shows a monthly breakdown of catch numbers for all species, and Table 3 shows statistical weeks (SW) and the corresponding dates for the 2013 sampling season. A preliminary review of the data reveals that catch per unit effort (CPUE) for unmarked Chinook sub-yearlings was the highest during SW 17 when the capture rate was approximately 5 fish per hour. There is a clear ascending trend in the sub yearling Chinook outmigration that began in SW 7 and continued to build until the first peak documented in SW 17. A secondary, slightly smaller peak was recorded during statistical week 22 when again approximately 4 fish were captured per hour (Figure 1). The timing of elevated sub yearling Chinook catch levels appears to be fairly consistent within SW 11 and SW 17 for all years recorded for this project, including 2013. Migration for unmarked Coho yearlings appears to have taken place over a 6 week period. The first peak occurred during SW 18 when approximately 15 fish per hour were captured. Following the peak in SW 18, during SW 19 and 20, approximately 14 and 13 fish per hour were caught respectively. The Coho yearling outmigration as a whole appears to have generally occurred between SW 17 through SW 22 (Figure 1). The timing of yearling Coho outmigration is very consistent from year to year, and the 2013 data is consistent with monitoring trends observed since the beginning of trap operations in 2000. In all years the peak outmigration occurred between SW 18 and SW 22, as was consistent for the 2013 sampling season.

A total of 13 trap efficiency tests (5 with Chinook sub-yearlings and 8 with Coho yearlings) were conducted on 13 different days throughout the 2013 sampling season. During these tests, groups of juvenile salmon were marked (dyed) and released over a mile upstream of the trap site. Following each release, the trap was operated continuously (except during debris removal) for a minimum of 36 hours. Efficiency calculations were then expressed as a percentage based on catch encounters with dyed fish. The results of these tests are still being evaluated, but preliminary calculations suggest that the trap was operating at an efficiency rate of .58% for Chinook sub-yearlings and 1.44% for Coho yearlings during the 2013 sampling period. Sub yearling Chinook efficiency results were much lower than in 2012, and are lower than seasonal averages for the trapping operation at this site in general. The direct cause of this low efficiency rate is unknown, although it may be due to multiple factors. During the 2013 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 occurring. In 2014 further in depth monitoring of the efficiency recapture procedures will be investigated in an attempt to determine causative factors resulting in lowered efficiency rates. Trap efficiency for Coho yearlings observed this year was higher than last season, and is within the average for this project. It is unclear why efficiency rates for yearling Coho were higher than those for sub yearling Chinook, under normal operation this relationship is generally inverse of what we experienced in 2013.

2. Project status and difficulties.

The 2013 field season ran smoothly when it was not affected by fluctuating river discharge levels. All equipment was regularly maintained and inspected throughout the season, and no major equipment failures occurred. Fishing was interrupted on 3 occasions due to high debris and fluctuating river levels. On March 2nd, 2013 two scheduled shifts were cancelled due to rapidly rising river conditions that resulted in elevated debris levels and a potentially hazardous work environment. During this time period, the river level rose 9,530 cfs. Trapping resumed normal operations as scheduled beginning March 5th. On March 13th the guide lines were removed due to forecasted flooding, during this period the river rose rapidly and peaked at 16,800 cfs. The river maintained a fairly high level for nearly a week until March 18th when the lines were reinstalled. During this incident 1 scheduled fishing event had to be cut short and 3 scheduled fishing events were cancelled due to unfishable conditions. The lines were again removed on April 6th due to predicted flooding. The river reached a level of 23,800 cfs. The lines were reinstalled on April 8th and this event resulted in the cancellation of only one scheduled fishing event.

In 2012, another sampling endeavor was added to the regular trapping effort. In cooperation with Washington State Department of Fish and Wildlife, all wild Chinook caught in the trap were clipped for DNA sampling. During the monitoring season approximately 2,446 upper-caudal DNA samples were taken from a mix of sub yearling and yearling unmarked Chinook juveniles.

Finally, one noteworthy anomaly was the capturing of 2 live adult Steelhead in the trap in 2013. This is extremely uncommon using this type of sampling equipment, but does occur infrequently. This is the first time that adult Steelhead have been captured since the beginning of Skykomish trapping operations in 2000. This occurrence likely indicates a strong migratory run of unclipped adult winter Steelhead in the Skykomish system in 2013. Due to the fragile nature of this population, both fish were quickly captured and released unharmed without undergoing any sampling procedures to ensure an expedient return to the river, and minimal out-of-water handling time.

Table 1: Skykomish River trap catch and mortalities 2013

(Data is preliminary)

February

	<i>Chinook</i>					<i>Coho</i>					<i>Steelhead</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>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>	<i>Cut. Trout</i>	<i>Rain. Trout</i>	<i>Trout Fry</i>						
<i>Day</i>	(53.8 hours of effort)																				
Catch	0	0	5	0	2	0	0	9	0	0	0	0	0	0	0	0	16	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
<i>Night</i>	(152.8 hours of effort)																				
Catch	0	0	181	0	176	4	0	982	0	0	0	0	0	0	5	0	1252	8	7	20	1
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monthly Totals	(206.6 hours of effort)																				
Catch	0	0	186	0	178	4	0	991	0	0	0	0	0	0	5	0	1268	8	7	20	1
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

March

	<i>Chinook</i>					<i>Coho</i>					<i>Steelhead</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>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>	<i>Cut. Trout</i>	<i>Rain. Trout</i>	<i>Trout Fry</i>						
<i>Day</i>	(92.5 hours of effort)																				
Catch	1	0	36	0	17	4	0	2991	0	0	1	0	0	0	0	0	3050	0	0	0	0
Morts.	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0
<i>Night</i>	(156.7 hours of effort)																				
Catch	5	1	388	0	624	82	2	17859	0	1	2	0	0	7	1	0	18972	8	40	21	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	(249.2 hours of effort)																				
Catch	6	1	424	0	641	86	2	20850	0	1	3	0	0	7	1	0	22022	8	40	21	0
Morts.	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0

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(Data is preliminary)

April

	<i>Chinook</i>					<i>Coho</i>					<i>Steelhead</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>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>	<i>Cut. Trout</i>	<i>Rain. Trout</i>	<i>Trout Fry</i>							
<i>Day</i>	(169.7 hours of effort)																					
Catch	4	10	218	0	59	40	1	1437	0	0	3	11	1	1	0	0	1785	0	1	0	1	
Morts.	0	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	
<i>Night</i>	(205.8 hours of effort)																					
Catch	141	342	1039	0	1583	1270	360	15442	0	0	17	812	2	0	0	0	21008	10	76	8	1	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Monthly Totals	(375.6 hours of effort)																					
Catch	145	352	1257	0	1642	1310	361	16879	0	0	20	823	3	1	0	0	22793	10	77	8	2	
Morts.	0	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	

May

	<i>Chinook</i>					<i>Coho</i>					<i>Steelhead</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>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>	<i>Cut. Trout</i>	<i>Rain. Trout</i>	<i>Trout Fry</i>							
<i>Day</i>	(108.3 hours of effort)																					
Catch	2	0	92	3	92	78	4	23	0	0	4	3	0	1	0	0	286	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	
<i>Night</i>	(137.8 hours of effort)																					
Catch	47	295	318	8	872	2765	818	207	0	0	107	672	5	0	0	2	6116	7	25	6	1	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Monthly Totals	(246.1 hours of effort)																					
Catch	49	295	410	11	964	2843	822	230	0	0	111	675	5	1	0	2	6402	7	25	6	1	
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

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(Data is preliminary)

June

	<i>Chinook</i>					<i>Coho</i>					<i>Steelhead</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>0+</i>	<i>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>	<i>Cut. Trout</i>	<i>Rain. Trout</i>						
<i>Day</i>	(72.9 hours of effort)																				
Catch	0	8	45	0	45	18	0	1	0	0	0	0	0	0	0	0	117	1	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>	(67.5 hours of effort)																				
Catch	1	3300	124	0	403	182	2	3	0	0	21	24	1	0	0	1	4062	7	12	8	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	(140.4 hours of effort)																				
Catch	1	3308	169	0	448	200	2	4	0	0	21	24	1	0	0	1	4179	8	12	8	0
Morts.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Totals

(1217.8 total hours of effort)

	<i>Chinook</i>					<i>Coho</i>					<i>Steelhead</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>0+</i>	<i>Chum</i>	<i>Pink</i>	<i>Sockeye</i>	<i>Unm Smolts</i>	<i>Mark Smolts</i>	<i>Cut. Trout</i>	<i>Rain. Trout</i>						
Catch	201	3956	2446	11	3873	4443	1187	38954	0	1	155	1522	9	9	6	3	56664	41	161	63	4
Morts.	0	0	2	0	1	1	0	2	0	0	0	0	0	0	0	0	6	0	0	0	0
% Mort	0.00%	0.00%	0.08%	0.00%	0.03%	0.02%	0.00%	0.01%		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%				
% of Total Catch	0.4%	6.9%	4.3%	0.0%	6.8%	7.8%	2.1%	68.4%	0.0%	0.0%	0.3%	2.7%	0.0%	0.0%	0.0%	0.0%	99.5%	0.1%	0.3%	0.1%	0.0%

Table 2. Annual sampling effort and catch totals for unmarked Sub-yearling Chinook and yearling Coho at the Skykomish River rotary screwtrap 2000-2013 (preliminary data).

Year	Effort (hrs)	Chinook	Coho
2000	308.5	1287	5972
2001	900.6	1786	5512
2002	671.7	1093	8851
2003	992.1	3394	8713
2004	1071	951	13949
2005	944.3	2411	3082
2006	1125.3	2928	6218
2007	446.8	1348	3882
2009	686.6	1650	1410
2010	1045.8	1989	1245
2011	666.8	765	1798
2012	1015.7	1323	3005
2013	1217.77	4443	2446

Table 3. Statistical weeks and corresponding dates for 2013 sampling season.

Year	2013			
	StatWeek	BegWeek	MidWeek	EndWeek
2013	6	2/3	2/6	2/9
2013	7	2/10	2/13	2/16
2013	8	2/17	2/20	2/23
2013	9	2/24	2/27	3/2
2013	10	3/3	3/6	3/9
2013	11	3/10	3/13	3/16
2013	12	3/17	3/20	3/23
2013	13	3/24	3/27	3/30
2013	14	3/31	4/3	4/6
2013	15	4/7	4/10	4/13
2013	16	4/14	4/17	4/20
2013	17	4/21	4/24	4/27
2013	18	4/28	5/1	5/4
2013	19	5/5	5/8	5/11
2013	20	5/12	5/15	5/18
2013	21	5/19	5/22	5/25
2013	22	5/26	5/29	5/1
2013	23	6/2	6/5	6/8
2013	24	6/9	6/12	6/15
2013	25	6/16	6/19	6/22
2013	26	6/23	6/26	6/29

Figure 1. Chinook sub-yearling (age 0+) and coho (1+) migration patterns observed during 2013 at the Skykomish River trap, river mile 26.5. (preliminary data).

