

2020 SCOTT RIVER JUVENILE SALMONID OUTMIGRANT STUDY



Prepared by

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ABSTRACT

The 2020 Scott River Juvenile Salmonid Outmigrant Study is part of the ongoing work conducted by the California Department of Fish and Wildlife, Yreka Fisheries Program and Shasta Valley Resource Conservation District on the Shasta and Scott Rivers in Siskiyou County, California. The Scott River rotary screw trap project has been in operation since 2000. One rotary screw trap was operated on the Scott River from February 10 to June 21, 2020 to sample all age classes of emigrating Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*Oncorhynchus kisutch*), and steelhead trout (*Oncorhynchus mykiss*). Mark and recapture trials were conducted multiple times per week to determine trap efficiencies and weekly population estimates. Established age-length cutoffs for each species were used to determine the age of the fish captured. In-stream conditions such as flow and water temperature were also monitored. Weekly estimates for the smolt class of all target species were compared to previous results to evaluate multi-year population trends. Additionally, using multi-year seasonal production estimates and Coho Salmon adult returns to the Scott River, adult survival and smolt production estimates were calculated. For the period sampled in 2020, we estimated that a total of 391,643 0+, and 2,000 1+ Chinook Salmon; 105 0+ and 14,628 1+ Coho Salmon; and 291,431 0+, 81,916 1+, 31,845 2+, and five 3+ steelhead trout emigrated from the Scott River.

INTRODUCTION

Monitoring of adult salmonids on the Scott River was initiated as part of the Klamath River Project in 1978 (Knechtle and Chesney 2012). Annual juvenile salmonid monitoring started in 2001, with the installation of the Scott River rotary screw trap (RST). In 2005, Coho Salmon of the Southern Oregon/Northern California Coast Evolutionary Significant Unit (SONCC ESU) were listed as a threatened species from the Oregon border to Punta Gorda, California under the California Endangered Species Act (CESA). This report includes estimates of the number of Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*Oncorhynchus kisutch*), and steelhead trout (*Oncorhynchus mykiss*) emigrating from the Scott River, Siskiyou County, California between February 10 and June 21, 2020. Monitoring juvenile salmonid out migration is not only necessary to assess the status of the species, but has implications for current and future efforts to sustain and restore these populations. Monitoring efforts will only become increasingly imperative with future changes in water management and watershed dynamics in the Klamath River Basin.

The specific goals of the 2020 out migration monitoring project were:

- To inform the agencies and stakeholders about the effectiveness of restoration projects that are intended to increase juvenile salmonid production and survival.
- To determine abundance and timing of all age classes of juvenile salmonids emigrating from the Scott River between February 03 and June 29, 2019.
- To estimate the weekly mean fork lengths and ages of salmonids in the catch from a measured sub-sample.
- To estimate weekly rotary trap efficiencies for all age classes of Chinook Salmon, Coho Salmon, and steelhead trout in the catch and produce weekly production estimates for each age class.
- To monitor stream flow and temperature at the traps.

METHODS

Study Area

The Scott River is one of nine major tributaries to the Klamath River and is the second largest below the Iron Gate Dam. The river flows 93 kilometers (km) through Siskiyou County before it enters the Klamath River at river kilometer (RK) 222. The system is predominantly precipitation-fed from snowmelt and rain in the valley and surrounding mountains. The basin is approximately 2,103 km². It is bound by the Siskiyou Mountains to the north, Scott Bar Mountains and Scarface Ridge to the east, Marble Mountains to the west, and Scott Mountains to the south. The South Fork and East Fork Scott Rivers converge near the town of Callahan to form the Scott River which then flows north through Scott Valley to 34 RK near United States Geological Survey (USGS) gauging station #11519500. The lower 34 RK flows west to northeast through a relatively steep mountainous canyon that is primarily under management of US Forest Service,

Klamath National Forest, Major tributaries that contribute to the Scott River around Scott Valley include the East Fork Scott River, South Fork Scott River, Sugar Creek, French Creek, Etna Creek, Kidder Creek, Shackleford Creek, Patterson Creek, and Moffett Creek (CDFW 2017).

Aquatic habitat for anadromous fish species in the Scott River watershed has been severely altered due to agricultural practices, groundwater pumping, timber harvest, mining, and rural residential development (Van Kirk and Naman 2008, NOAA 2012). Natural factors such as warm dry weather in the summer and fall, seasonal flooding and erosive soils when combined with anthropogenic impacts results in degraded spawning and rearing habitat for anadromous fish species.

The Scott River RST site is approximately 7 RK upstream of the confluence with the Klamath River and 1.6 km SW from the town of Scott Bar (41.76, -123.01; Figure 1). The USGS station #11519500 is located about 25 RK upstream from the RST site and has been in operation since 1941, totaling 76 years of data.

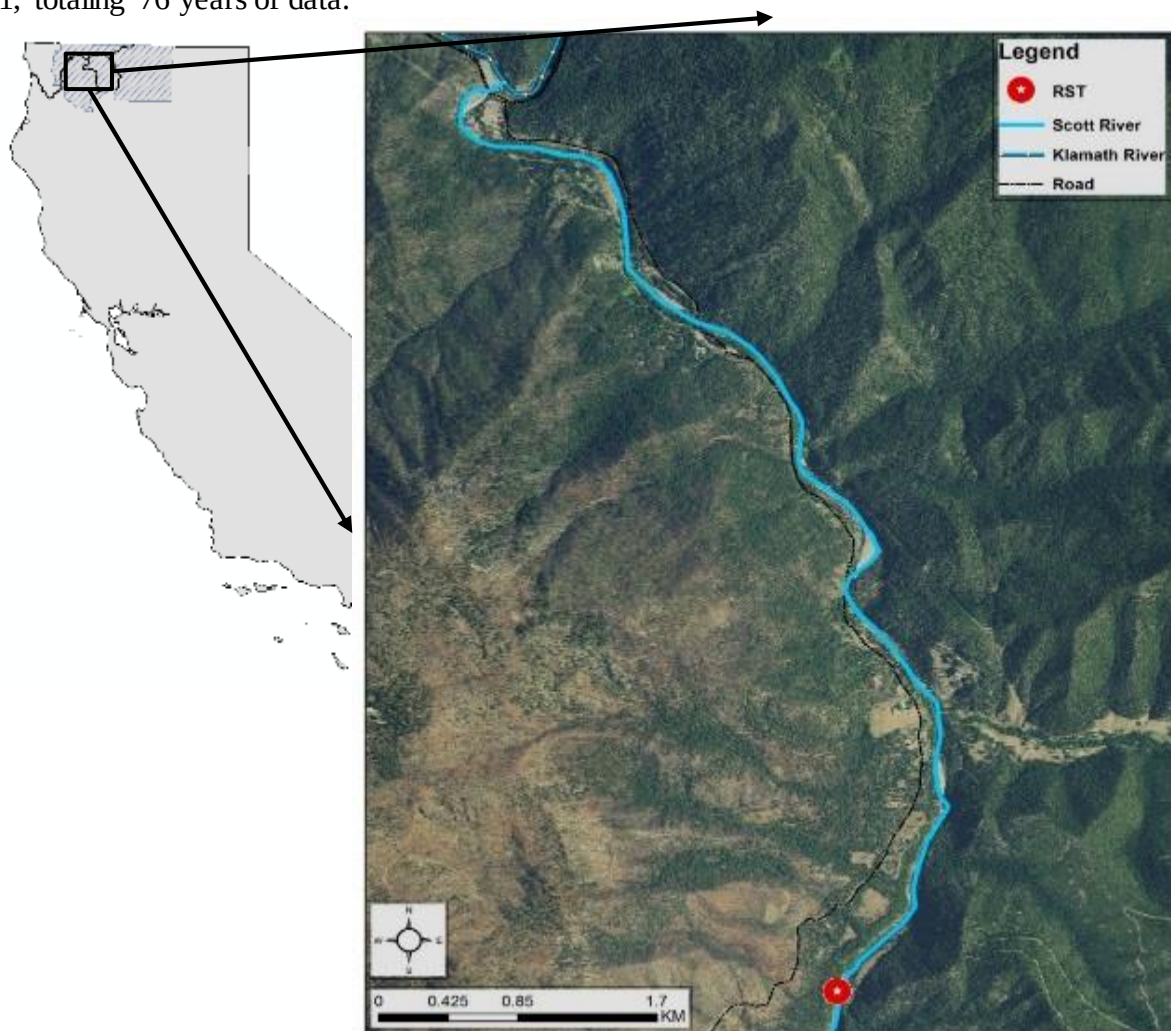


Figure 1. General location for Scott 8' rotary screw trap, approximately 7 RK from the confluence of the Klamath River.

Trap Operation

The Scott River was sampled with an eight-foot RST manufactured by EG Solutions, Corvallis, Oregon. The trap was fitted with a specially modified, extended live car with the dimensions of 15' x 3'4" x 1'10", and was placed on river left. The trap was set for operation on February 10, 2020. The catch in the trap was processed daily at approximately 0900 and cleared of any remaining debris before departure.

Water Temperature and Flow Monitoring

Hourly water temperatures were recorded in Celsius (°C) using a waterproof temperature logger (Model U22-001, Onset Computer Corporation, Bourne, Massachusetts) attached to the 8' trap. The logger was deployed on February 8, 2020 and continued to operate up through June 24, 2020. Water temperature data were compared to temperature thresholds identified in Stenhouse et al. (2012) to calculate percentages of the season where water temperatures were in the optimal (10 - 15°C), suboptimal (15 - 20°C), and detrimental (>20°C) levels for juvenile salmonid survival. Weekly average temperature (WAT) and weekly maximum temperature (WMT) were calculated as 7-day moving averages.

Stream flow measurements were obtained from USGS stream gauge #11519500, Scott River, Fort Jones, California. This gauge is located approximately 34 RK upstream of the confluence with the Klamath River and records stream flow and gauge height every 15 minutes. Stream flow data presented in this report are preliminary and subject to revision.

The water velocity entering the cone was measured daily at the beginning and end of each 24-hour sampling interval using a model 2030R flow meter manufactured by General Oceanics (Miami, Florida). Velocity measurements were used to calculate the total volume of water sampled for each set, in million cubic feet (MCF).

Trap Efficiency Determinations, Production Estimates, and Multi-Year Estimates

All target and non-target species were identified and counted. A mark-recapture technique was used to estimate trap efficiency and produce an estimate with a 95% confidence interval for each week (Carlson 1998). Trap efficiency trials were conducted Monday through Friday to determine the mean weekly trap efficiency for 0+ and 1+ Chinook Salmon, 0+ and 1+ Coho Salmon, and 0+, 1+, 2+, and 3+ steelhead trout. A sample of 0+ salmonids were dyed in a solution of 0.6 – 1.2 grams of Bismarck Brown Y (Alfa Aesar, Ward Hill, Massachusetts). The number of fish marked in this manner depended on fish size, water temperature, and other stress factors. As these factors increased, the number of fish selected for marking was reduced. 1+, 2+, and 3+ aged fish were marked with a caudal fin margin clip. An upper caudal, lower caudal, and upper/lower caudal fin clip were used in a weekly rotation to identify recaptured fish from the

week they were marked. Age 1+ Coho Salmon caudal clippings were retained as tissue samples and dried on blotter paper to be kept for future genetic analyses.

For each trial, the dyed and clipped salmonids were transported 0.5 RK upstream from the trap, and hand released. One of the assumptions of the model is that once the marked salmonids are released, they mix freely with the unmarked fish in the population. The number of marked fish in the following day's catch, divided by the total number marked on the day prior, produced the trap efficiency estimates.

In weeks when fish mark-released, but none were recaptured, the average trap efficiency for the season (the seasonal trap efficiency) was used. It is generally assumed that due to the smaller catch totals on the Scott River RST that this method results in an underestimation of the total population (ODFW 2018). A confidence interval for the seasonal population estimate cannot be calculated when using this method within a species and age class. Additionally, if the calculated lower confidence limit for the estimate was negative, zero was substituted for the negative limit.

A trap efficiency of approximately 10% is preferred and allows for weekly estimations of production with an acceptable confidence interval without trapping more fish than necessary. Trap efficiency can be manipulated by changing the volume of water sampled. This can be done by moving the trap out of the thalweg.

Efforts to develop annual estimates of 0+ Chinook Salmon produced in the Scott River began in 2001. Estimates for 1+ Coho Salmon emigrating started in 2003 and estimates of yearling Coho Salmon produced per adult began in 2003. Annual estimates of 2+ steelhead trout were first calculated in 2004. The multi-year production estimates reported here are limited to years in which the methods and the period sampled are comparable. Annual estimates are a summation of weekly trapping data, expanded using trap efficiencies. Additionally, to generate weekly (7-day) population estimates, the original population estimate was multiplied by ratio of number of days in the week to number of days the trap was in operation for that given week. Confidence intervals (95%) are available for week estimates except weeks without recapture data.

Bio-Sampling

Sub-samples of fish were processed daily for bio-data which consisted of fork length, life stage, and age (Appendix 1). Up to 25 individuals of each age class of steelhead trout and Coho Salmon, as well as 50 0+ and 15 1+ Chinook Salmon were sampled daily. This task involved anesthetizing the sub-sample of fish in a CO₂ water bath. The fish were anesthetized within 45 seconds to one minute. All sedated fish were measured, aged, attributed a life stage, and scales were collected from up to ten fish of each age class per week. Scale sample collection was avoided for all 0+ salmonids as well as 1+ Coho Salmon.

Age-length cutoffs developed in 2007 were used to estimate ages of salmonids in the catches (Appendix 2). These cutoffs were determined by calculating the ages of scales in the 2001-2007 collection. Individual scale samples were visually examined and categorized into brood years using scale age-estimation methods (Van Oosten 1957, Chilton and Beamish 1982, Casselman 1983). Fork length intervals for each age class were determined for appropriate time periods and updated throughout the season to create the age-length cutoffs used. These intervals are not absolutes and as a result of variable growth, some individuals may be older or younger than the cutoff fork lengths predict. Weekly mean fork lengths with standard deviation were calculated and sample size, as well as minimum and maximum sizes were recorded.

Scales were collected from fish representing a range of fork lengths within each age class. Scales were taken from the left side of the fish in a region located between the dorsal fin and the adipose fin, above the lateral line. Once the scales were collected, they were then added to a multi-year scale collection library from which the age-length cutoffs were derived. After each fish was sampled it was placed into a well aerated recovery bucket containing Stress Coat® Water Conditioner by Mars Fishcare North America, Inc. (Chalont, Pennsylvania), to aid quick recovery.

Data Entry and Analysis

All data from field forms were entered into Microsoft Access database software. Summary tables were created in Access and exported to Microsoft Excel, where data were broken down by species and age class. Temperature data were downloaded in the field and then uploaded into HOBOWare Pro version 2.7.3 (Onset Corp.). These data were then exported to Excel for analysis.

RESULTS

Trap Operation

The Scott River RSTs were operated from Julian Week (JW) 6 (first set on February 10, 2020) through 25 (last day of operation was June 21, 2020; Appendix 3). The 8' trap operated for 1,951 hours. Volume of water fished was an estimated 128.06 million cubic feet of water (Table 1). Low flows occasionally required the cone to be partially raised to prevent the cone from making contact with the bed of the river. Water volume sampled during these times is an estimated because the volume sampling equations assume that half of the cone is submerged.

Table 1. Scott River time fished and water volume fished for the 8' trap by JW in 2020.

Scott River, 2020			
Julian Week	Calendar Date	Water Volume Fished (MCF)	Time Fished (Hours)
5	Jan 29 - Feb 04	—	—
6	Feb 05 - Feb 11	1.56	24.33
7	Feb 12 - Feb 18	5.93	90.58
8	Feb 19 - Feb 25	6.65	168.58
9	Feb 26 - Mar 04	5.20	143.78
10	Mar 05 - Mar 11	4.93	119.92
11	Mar 12 - Mar 18	5.16	127.22
12	Mar 19 - Mar 25	2.99	80.03
13	Mar 26 - Apr 01	3.76	114.83
14	Apr 02 - Apr 08	3.89	114.65
15	Apr 09 - Apr 15	4.97	114.05
16	Apr 16 - Apr 22	6.45	114.27
17	Apr 23 - Apr 29	10.16	114.37
18	Apr 30 - May 06	5.35	72.78
19	May 07 - May 13	14.38	168.13
20	May 14 - May 20	5.02	94.92
21	May 21 - May 27	11.19	169.42
22	May 28 - Jun 03	9.95	119.33
23	Jun 04 - Jun 10	10.52	167.58
24	Jun 11 - Jun 17	7.05	167.75
25	Jun 18 - Jun 24	2.96	96.0
Total		128.06	1951.20

Water Temperature and Flow Monitoring

Daily average stream temperatures ranged from 4.5°C in February and increased to >22°C for portions of June (Figure 2). Minimum stream temperature was 4.12°C (recorded on February 10, 2020), and maximum stream temperature was 24.5°C (recorded on June 23, 2020). This is consistent with past study years where water temperatures increased from an average daily temperature of <5°C in late winter to >20°C in late spring/early summer. Temperatures >20.3°C are considered detrimental for juvenile salmonid growth and survival (Stenhouse et al. 2012). Temperatures rose above 20°C for 9 days during the trapping season.

Average monthly stream temperatures during the trapping season ranged from 6.0 – 17.6 °C (Table 2). The maximum weekly average water temperature (MWAT) was 20.4 °C, and the maximum weekly maximum temperature (MWMT) was 22.6 °C, both occurred on during JW 25 (Table 3).

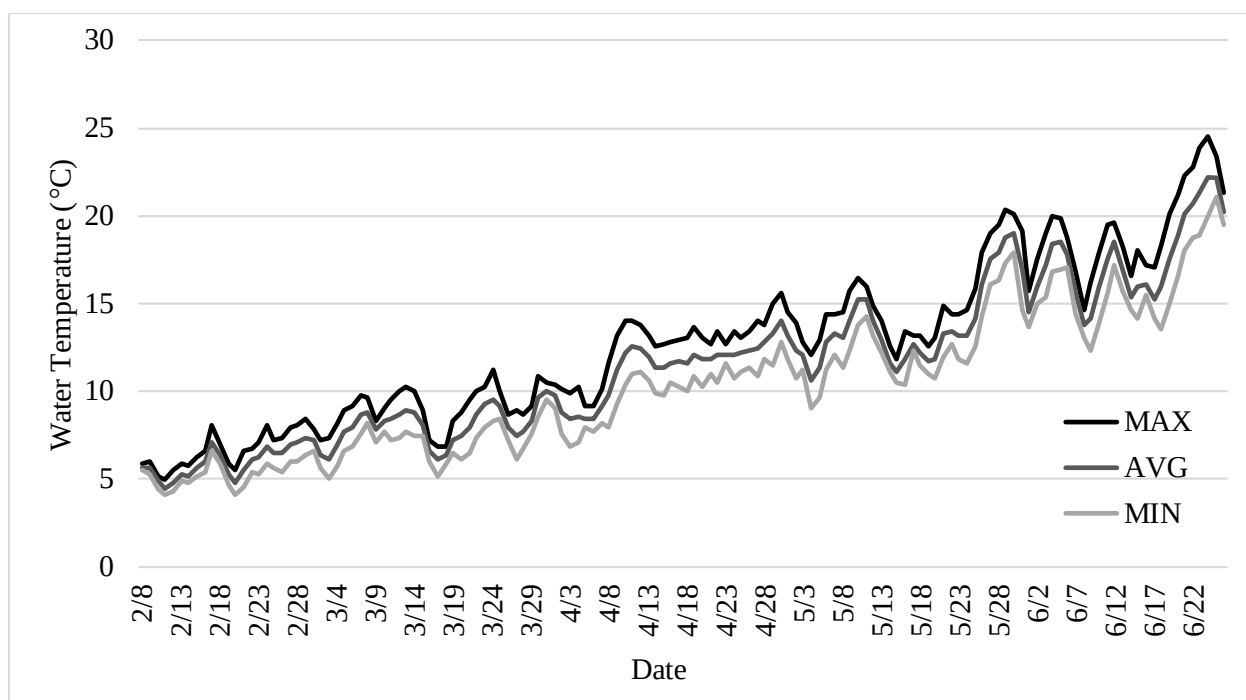


Figure 2. Scott River, 2020. Maximum, minimum and average daily water temperatures. The average daily stream temperature increased over the duration study period in 2020.

Table 2. Monthly average (avg.) water temperature (°C) with the maximum and minimum of the daily averages for each month.

Month	Dates	Days (n)	Water Temperature (°C)		
			Max Daily Avg.	Monthly Avg.	Min Daily Avg.
Feb	2/8-2/29	22	7.4	6.0	4.5
Mar	3/1-3/31	31	10.0	8.1	6.1
Apr	4/1-4/30	30	14.0	11.4	8.4
May	5/1-5/31	31	19.0	13.8	10.6
Jun	6/1-6/24	24	22.2	17.6	13.7

Table 3. Water temperature parameters from February 8 (JW6) – June 24, 2020 (JW 25) at the Scott River RST. MWAT, MWMT, annual maximum (Max.), and annual minimum (Min.) were calculated. Hours and percentage of total hours logged to date are given at four different temperature ranges. Number of days with temperatures >20°C and average (Avg.) daily duration in hours (hrs.) of temperatures above 20° C are also given.

Location	Parameter	°C	JW	Date	Hours at 0-10° C	1402	42.2%
Scott RST	MWMT	22.57	25	6/24	Hours at 10-15° C	1245	37.5%
Year	MWAT	20.41	25	6/24	Hours at 15-20° C	571	17.2%
2020	Annual Max	24.51	25	6/23	Hours >20° C	105	3.2%
Logger S/N	Annual Min	4.12	6	2/10	Days with temps >20° C		9
10709899	Total hours logged to date			3,323	Avg duration temps >20° C		12

Average monthly streamflows for 2020 from February – June were 273, 191, 306, 423, and 213 cubic feet per second (cfs). Compared to the last 19 years of trap operation, flows were consistently below 50% of average. (Table 4).

Table 4. Scott River 2001 – 2020 Average Monthly Flow

Year	2001-2020 Scott River, Average Monthly Flow Data During Months Sampled				
	Feb	Mar	Apr	May	Jun
2001	127	386	276	401	50
2002	644	570	1018	707	395
2003	4406	1200	1199	1502	1047
2004	1082	1185	1050	969	412
2005	492	549	649	1453	656
2006	2343	1101	1360	2344	1155
2007	524	1074	634	539	142
2008	497	749	657	1459	568
2009	287	613	497	929	309
2010	437	529	863	1123	1617
2011	529	1168	1452	1204	1580
2012	293	789	1630	1134	410
2013	365	552	788	500	129
2014	488	845	310	131	44
2015	2235	582	253	157	80
2016	1341	2331	1511	937	307
2017	N/A	N/A	N/A	N/A	N/A
2018	321	385	918	475	104
2019	839	983	1994	1311	664
2020	273	191	306	423	213
Avg. flow 2001-2020	922	831	914	931	520
2020 % of Avg.	30%	23%	33%	45%	41%

Flows peaked during JW 18 at 757 cfs on April 30, 2020. The flow was lowest during JW 25 with a minimum of 74.5 cfs on June 24, 2020. Later in the summer, mean base flow have been documented at less than 10 cfs due to decreasing snowpack and precipitation, along with increased water demands (CDFW 2016). The increase in water use along with water temperatures has resulted in the repeated occurrence of fish stranding, reduction of rearing habitat, and mortality (Figure 3; NOAA 2012)

This year the screw trap had to be adjusted frequently by moving them closer or farther away from the bank and tethering in the front and back of the trap to achieve positions that best increased trap efficiency.

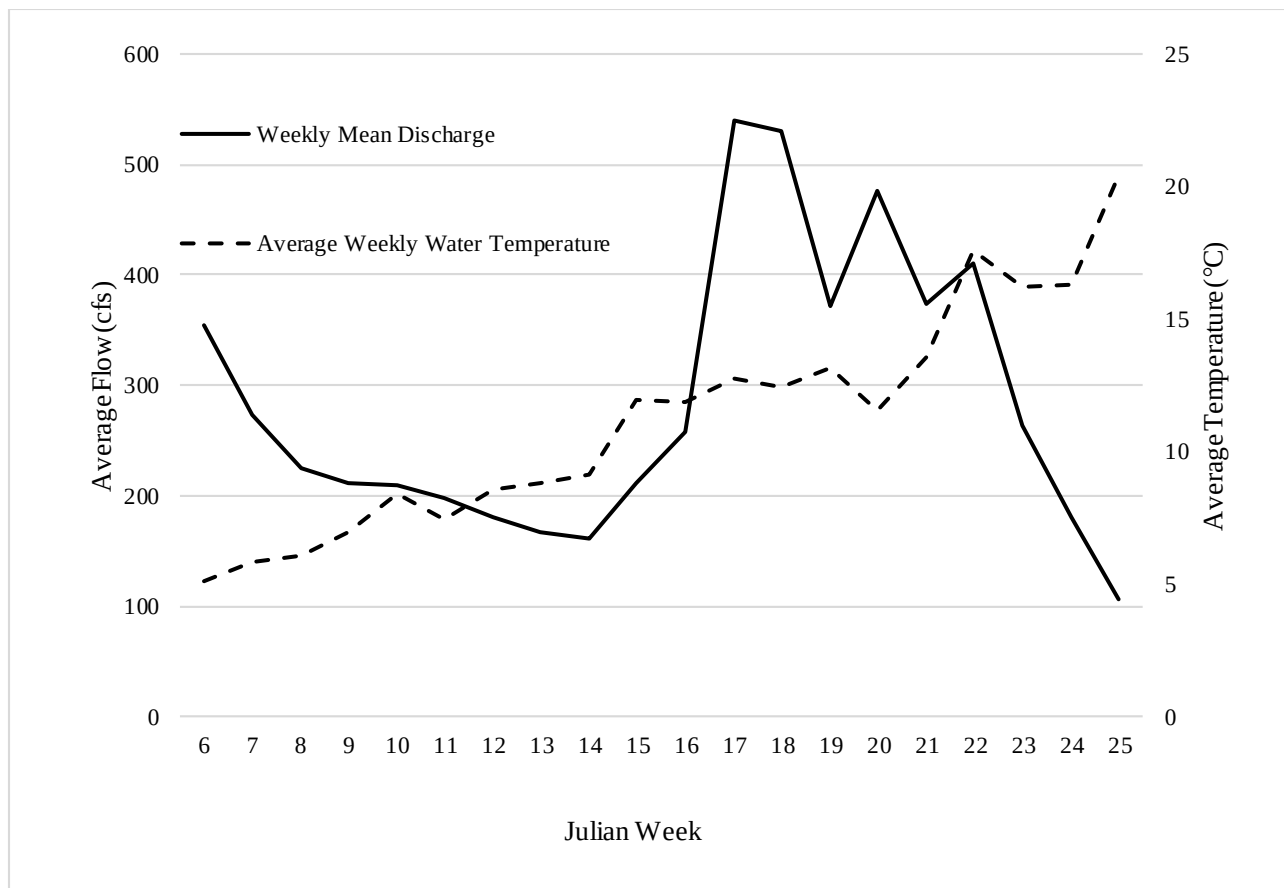


Figure 3. Average weekly flow and average water temperature from JW 6 – 25 on the Scott River. Flow measurements were from USGS gauge #11517500. Temperatures were downloaded from HOBOWare Pro version 2.7.3 that was installed on the RST, starting in JW 6 (February 8, 2020).

Trap Efficiency Determinations, Production Estimates, and Bio-sampling

Chinook Salmon: 0+

A total of 8,478 0+ Chinook Salmon were sampled on the Scott River RSTs with a seasonal trap efficiency of 4.78%, which was used for JW 10, 18, and 25 (Table 5). Weekly trap efficiencies ranged from 0.19%-8.49% (Figure 4). The population estimate for 0+ Chinook Salmon emigrating out of the system in 2020 was 391,643. Peak emigration occurred during JW 23 (June 04 – June 10, 2020) during which, an estimated 189,372 Chinook Salmon (48.4% of the estimated population) emigrated (Figure 5). An estimated 64.9% of 0+ Chinook Salmon emigrated out of the system by April 1st, when most diversions start, as allotted by the Scott River Adjudication Decree (No. 30662).

Table 5. Catch Table for 0+ Chinook Salmon, Scott River 2020

Julian week	Live fish trapped ¹	Mortalities	Adjusted total trapped ²	Volume sampled, MCF	Adjusted marked & released ³	Recaptured	Trap efficiency ⁴	Weekly population estimate ⁵	Lower CI	Upper CI
6	0	0	0	1.56	0	0	–	–	–	–
7	21	0	21	5.93	0	0	0.00%	37**	37	37
8	46	0	46	6.65	0	0	0.00%	46**	46	46
9	58	0	58	5.20	0	0	0.00%	68**	68	68
10	66	2	68	4.93	34	0	4.78%*	1,992	0	5,267
11	177	9	186	5.12	91	3	3.30%	5,989	2,283	9,696
12	141	4	145	2.99	26	1	3.85%	4,568	2,421	6,714
13	663	7	670	3.76	487	35	7.19%	12,715	9,824	15,606
14	222	3	225	3.89	92	4	4.35%	5,859	2,566	9,152
15	821	3	824	4.97	451	29	6.43%	17,381	13,082	21,680
16	1161	5	1166	6.45	518	44	8.49%	18,827	15,042	22,612
17	1089	19	1108	10.16	634	50	7.89%	19,314	15,636	22,992
18	443	0	443	5.35	205	0	4.78%*	21,625	0	147,937
19	920	8	928	14.37	686	33	4.81%	18,751	12,585	24,918
20	639	2	641	5.02	250	8	3.20%	31,284	20,329	42,240
21	390	1	391	11.19	259	9	3.47%	10,166	4,200	16,132
22	459	10	469	9.95	316	9	2.85%	20,814	12,076	29,552
23	725	9	734	10.52	515	1	0.19%	189,372	0	403,542
24	295	14	309	7.05	236	5	2.12%	12,206	3,192	21,219
25	40	6	46	2.96	28	0	4.78%*	1,684	0	3,520
Totals	8,376	102	8,478	128.02	4,828	231	4.78 %	391,643	–	–

¹ Does not include recaptured fish.

² Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of the Julian week.

³ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁴ Trap efficiency equals # recaptured fish/# marked released.

⁵ Weekly population estimate multiplied by ratio of days in the week to days trap was operated for that given week.

* Estimated weekly population based on seasonal trap efficiency (adjusted total trapped/average trap efficiency)

** Adjusted total trapped was used for weekly totals when fish were not marked for recaptured.

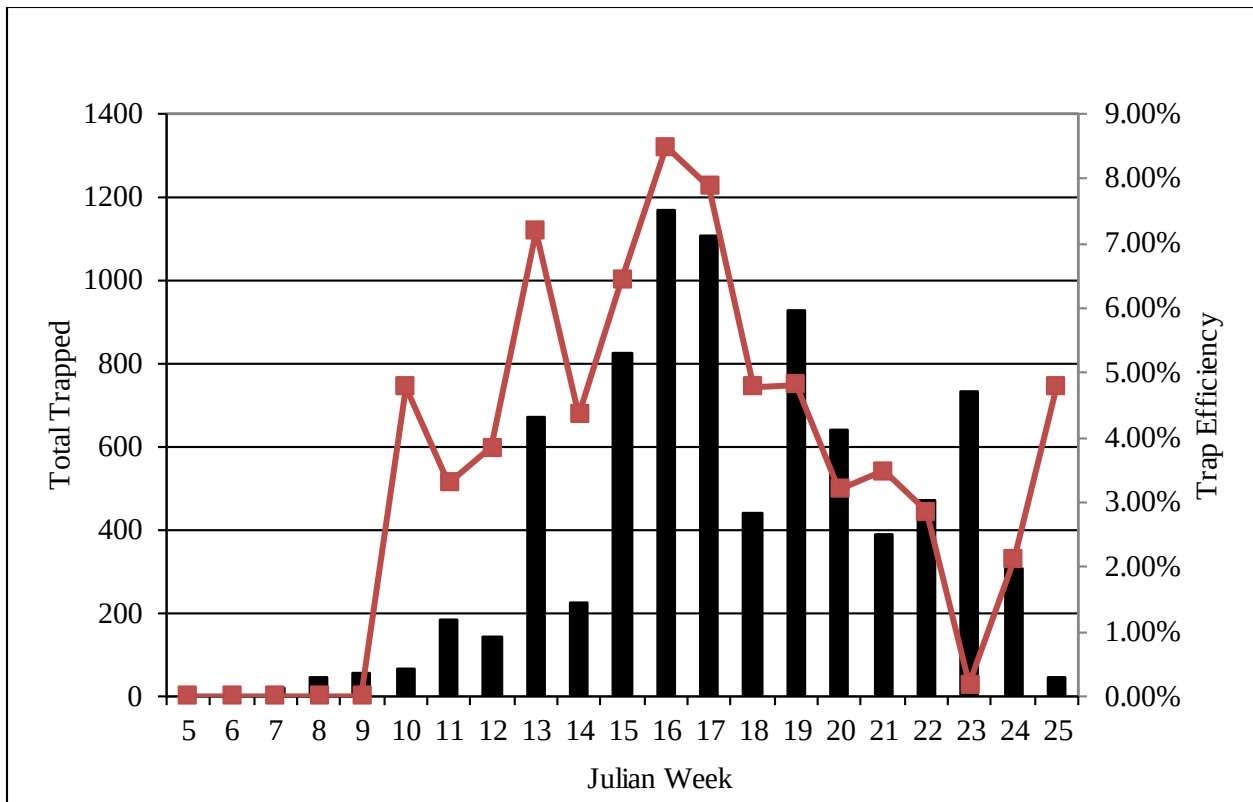


Figure 4. Total 0+ Chinook Salmon sampled on Scott River from JW 6 – JW 25 was 8,428 with weekly trapping efficiencies ranging from 0.19%-8.49%. Seasonal trapping efficiency was 4.78% and used for JW 16, 18, 20, 22, and 24.

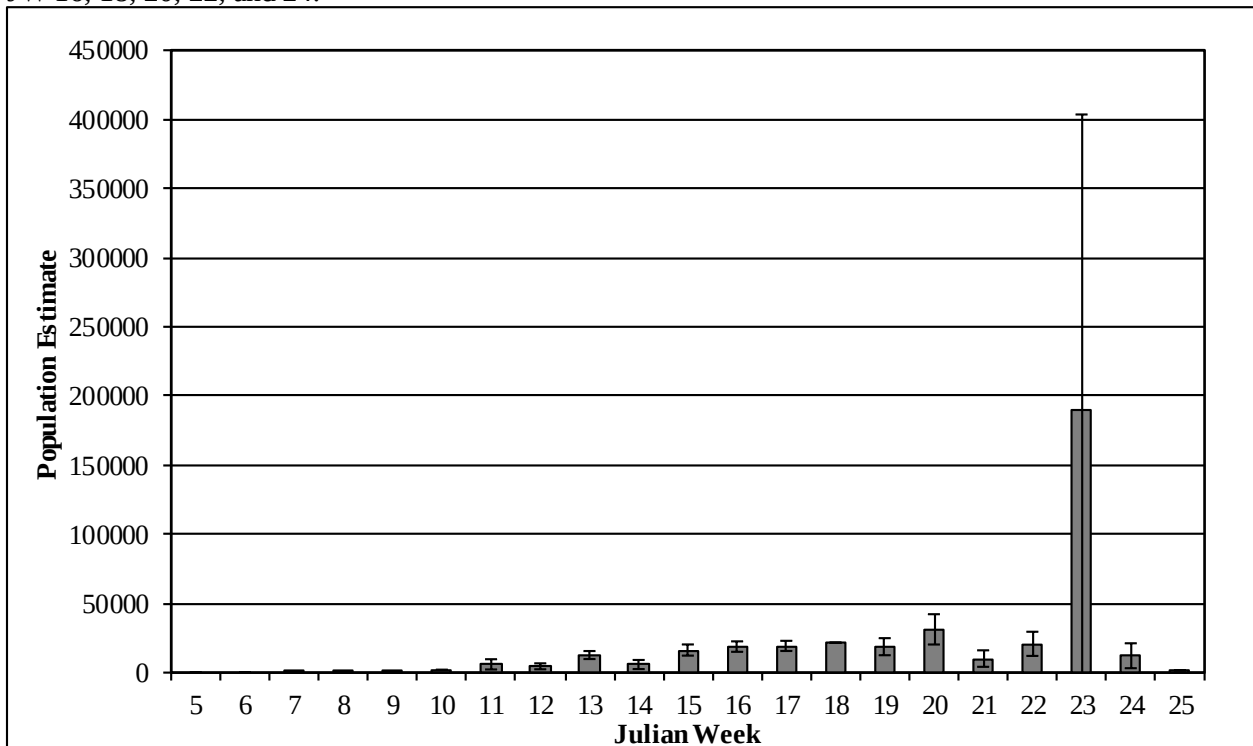


Figure 5. Population estimate with 95% confidence interval (CI, error bars only present when season trap efficiency was not used) for 0+ Chinook Salmon on Scott River. Total population estimate was 391,643.

Chinook Salmon: 1+

A total of 27 1+ Chinook Salmon were sampled on the Scott River (Table 6). Weekly trap efficiencies ranged from 5.26-100%. Seasonal trap efficiency was 5.26% and was used for JW 6-9, 11, 13 and 21 (Figure 6). The population estimate for 1+ Chinook emigrating out of the watershed in 2020 was 2,000. Peak emigration was JW 6 (February 5-11, 2020), with an estimated 1,729 (86.5% of the estimated population) emigrating out of the Scott River during that week (Figure 7). An estimated 99% emigrated out of the system by April 1.

Table 6. Catch Table 1+ Chinook Salmon, Scott River 2020

Julian week	Live fish trapped ¹	Mortalities	Adjusted total trapped ²	Volume sampled, MCF	Adjusted marked & released ³	Recaptured	Trap efficiency ⁴	Weekly population estimate ⁵	Lower CI	Upper CI
6	13	0	13	1.56	9	0	5.26%*	1,729	1,552	1,906
7	4	0	4	5.93	3	0	5.26%*	133	112	154
8	2	0	2	6.65	2	0	5.26%*	38	30	46
9	1	0	1	5.20	1	0	5.26%*	22	19	25
10	0	0	0	4.93	0	0	—	—	—	—
11	1	0	1	5.12	1	0	5.26%*	27	24	29
12	0	0	0	2.99	0	0	—	—	—	—
13	1	0	1	3.76	1	0	5.26%*	27	24	29
14	1	0	1	3.89	1	1	100.00%	1	1	1
15	2	0	2	4.97	0	0	0.00%	3**	3	3
16	0	0	0	6.45	0	0	—	—	—	—
17	1	0	1	10.16	0	0	0.00%	1**	1	1
18	0	0	0	5.35	0	0	—	—	—	—
19	0	0	0	14.37	0	0	—	—	—	—
20	0	0	0	5.02	0	0	—	—	—	—
21	1	0	1	11.19	1	0	5.26%*	19	16	22
22	0	0	0	9.95	0	0	—	—	—	—
23	0	0	0	10.52	0	0	—	—	—	—
24	0	0	0	7.05	0	0	—	—	—	—
25	0	0	0	2.96	0	0	—	—	—	—
Totals	27	0	27	128.02	19	1	5.26%	2,000	1,782	2,216

¹ Does not include recaptured fish.

² Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of the Julian week.

³ Adjusted marked & released includes fish marked minus marked fish caught after the end of the week

⁴ Trap efficiency equals # recaptured fish/# marked released.

⁵ Weekly population estimate multiplied by ratio of days in the week to days trap was operated for that given week

* Estimated weekly population based on seasonal trap efficiency (adjusted total trapped/average trap efficiency)

** Adjusted total trapped was used for weekly totals when fish were not marked for recaptured.

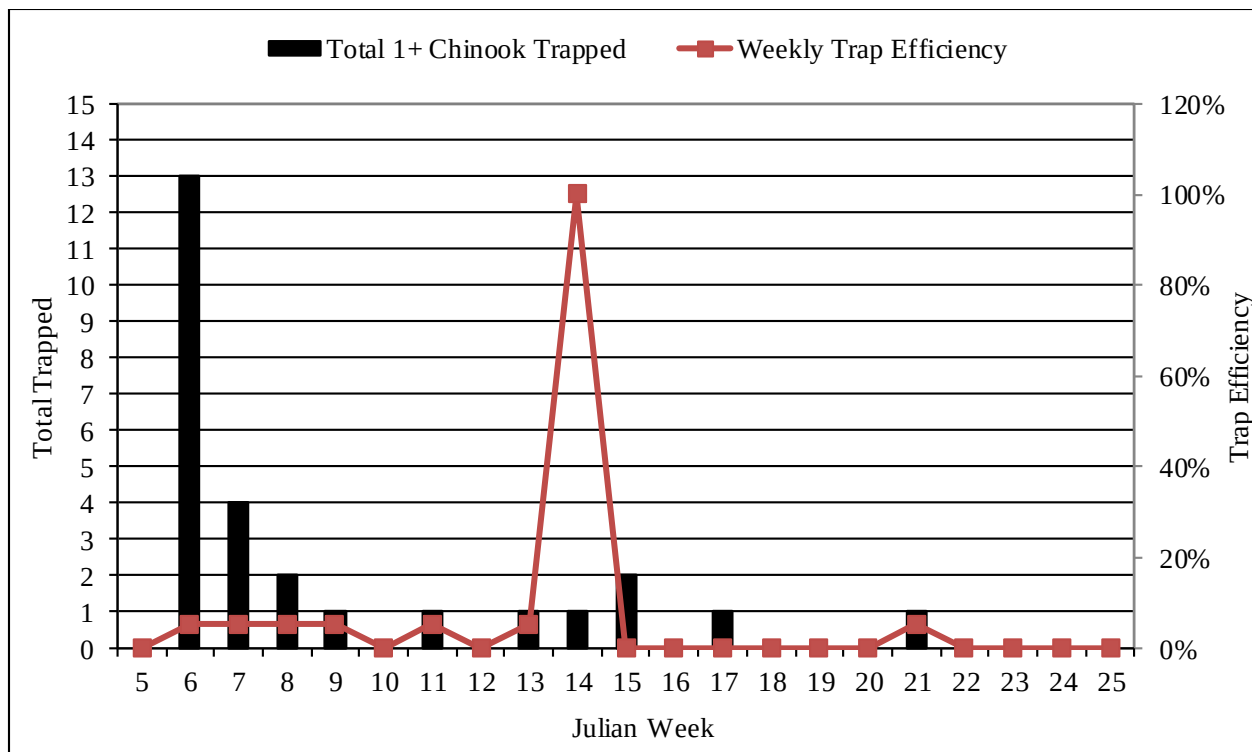


Figure 6. Total age 1+ Chinook Salmon sampled on Scott River from JW 6 – JW 25 was 27. Seasonal trap efficiency was 5.26% and was used for JW 6-9, 11, 13 and 21.

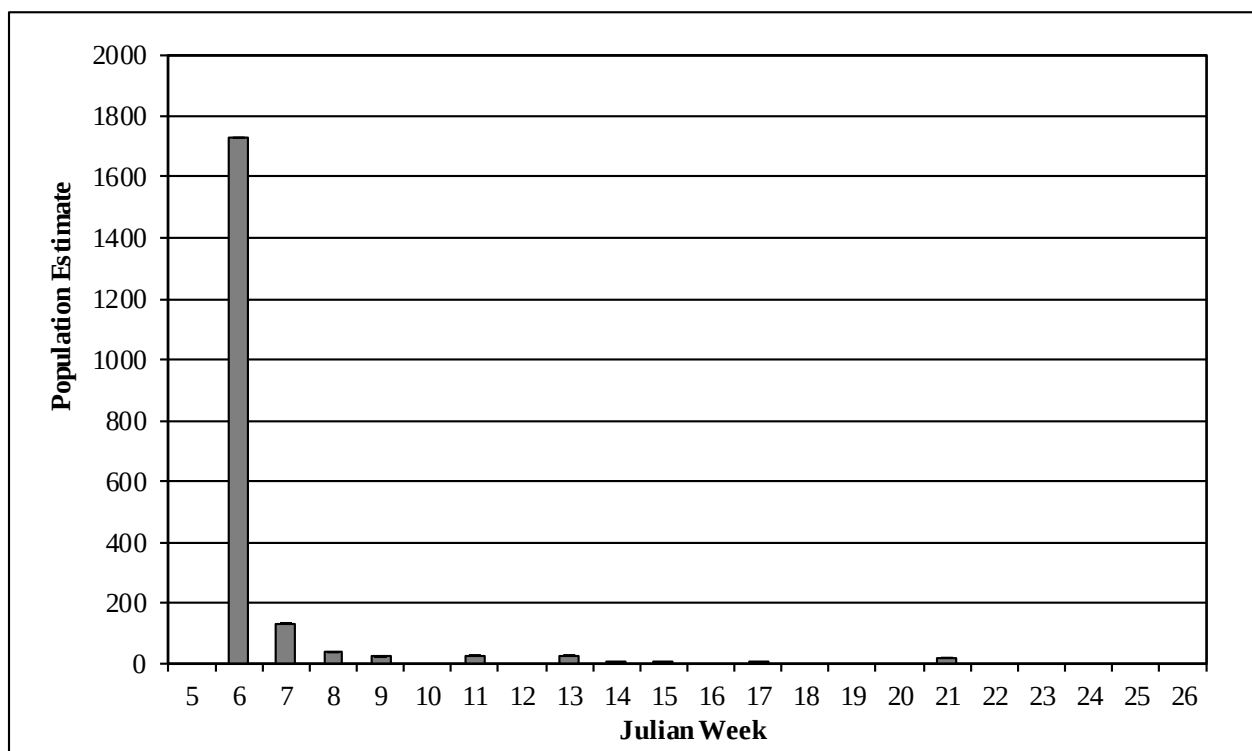


Figure 7. Population estimate with 95% confidence interval (CI, error bars only present when season trap efficiency was not used) for age 1+ Chinook Salmon on Scott River. Total population estimate was 2,000.

Bio-Sampling: 0+ and 1+ Chinook Salmon

A total of 1,468 0+ and 27 1+ Chinook Salmon were measured and aged for bio-sampling (Figure 8, Appendix 4-6). Average fork lengths (FL) for the approximate 10th, 50th and 90th cumulative catch percentiles for 0+ Chinook Salmon were 35, 54 and 84 mm, respectively. No scale or tissue samples were taken from 0+ Chinook Salmon and 16 scale samples were taken from 1+ Chinook Salmon.

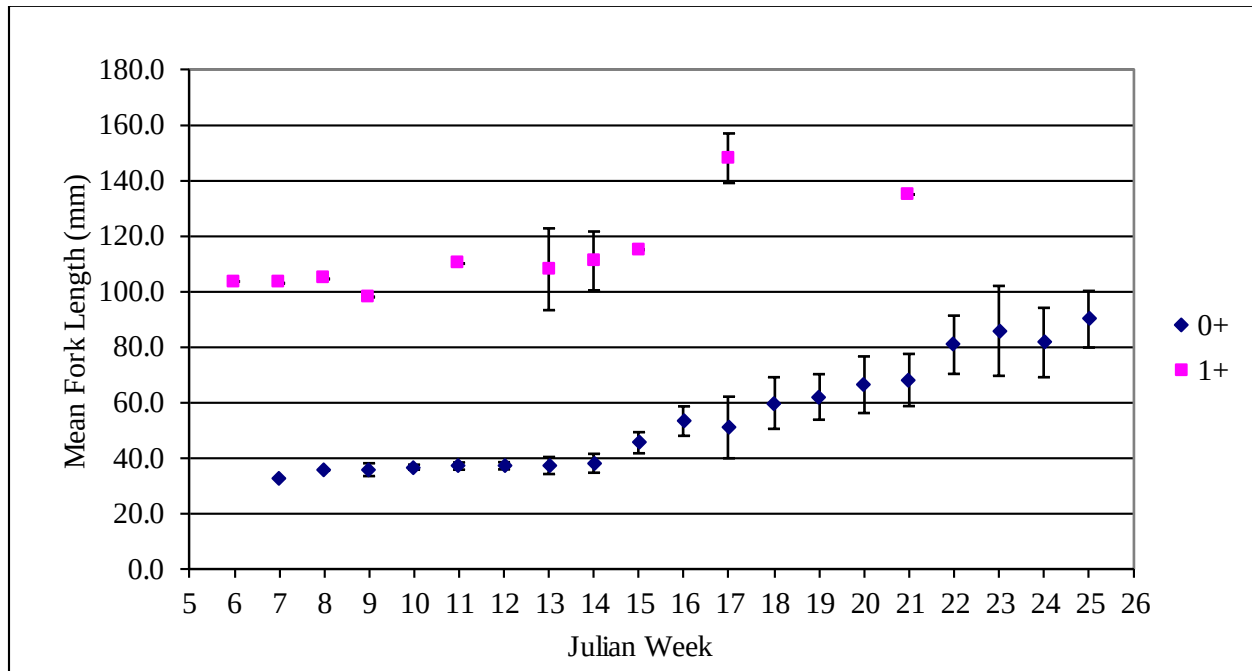


Figure 8. 0+ and 1+ Chinook Salmon weekly mean fork lengths, Scott River, with one standard deviation.

Coho Salmon: 0+

A total of 91 0+ Coho Salmon were sampled on the Scott River (Table 7). Due to low catch numbers, no 0+ Coho were marked for recapture (Figure 9). The population estimate for 0+ Coho Salmon emigrating out of the system was 105. Peak emigration occurred during JW 21 (May 21-27, 2020), with an estimated 28 0+ Coho Salmon (26.7% of the estimated population) emigrating out during that week (Figure 10). An estimated 0.0% emigrated out of the system by April 1st.

Table 7. Catch Table 0+ Coho Salmon, Scott River, 2020

Julian week	Live fish trapped ¹	Mortalities	Adjusted total trapped ²	Volume sampled, MCF	Adjusted marked & released ³	Recaptured	Trap efficiency ⁴	Weekly population estimate ⁵	Lower CI	Upper CI
6	0	0	0	1.56	0	0	–	–	–	–
7	0	0	0	5.93	0	0	–	–	–	–
8	0	0	0	6.65	0	0	–	–	–	–
9	0	0	0	5.20	0	0	–	–	–	–
10	0	0	0	4.93	0	0	–	–	–	–
11	0	0	0	5.12	0	0	–	–	–	–
12	0	0	0	2.99	0	0	–	–	–	–
13	0	0	0	3.76	0	0	–	–	–	–
14	0	0	0	3.89	0	0	–	–	–	–
15	4	0	4	4.97	0	0	–	6**	6	6
16	10	0	10	6.45	0	0	–	14**	14	14
17	0	0	0	10.16	0	0	–	–	–	–
18	0	0	0	5.35	0	0	–	–	–	–
19	2	0	2	14.37	0	0	–	2**	2	2
20	2	0	2	5.02	0	0	–	4**	4	4
21	28	0	28	11.19	0	0	–	28**	28	28
22	16	0	16	9.95	0	0	–	22**	22	22
23	27	0	27	10.52	0	0	–	27**	27	27
24	2	0	2	7.05	0	0	–	2**	2	2
25	0	0	0	2.96	0	0	–	–	–	–
Totals	91	0	91	128.02	0	0	–	105	105	105

¹ Does not include recaptured fish.

² Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of the Julian week.

³ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁴ Trap efficiency equals # recaptured fish/# marked released.

⁵ Weekly population estimate multiplied by ratio of days in the week to days trap was operated for that given week.

** Adjusted total trapped was used for weekly totals when fish were not marked for recaptured.

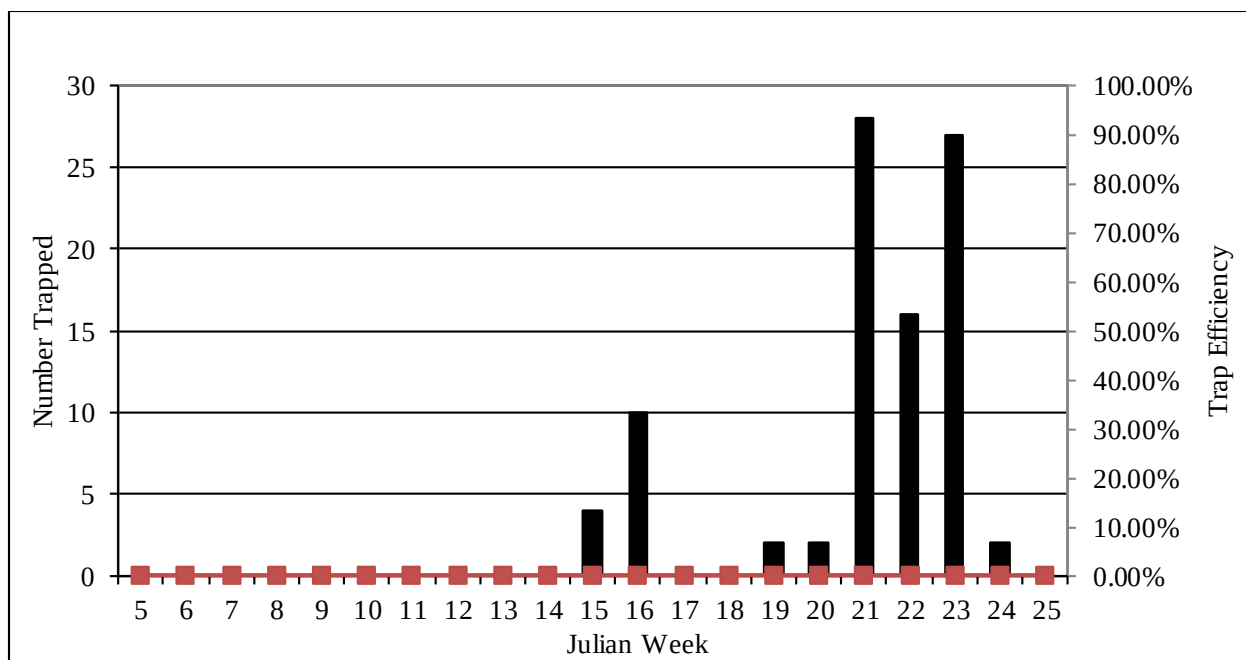


Figure 9. Total 0+ Coho Salmon sampled on Scott River from JW 6 – JW 25 was 91. No fish were marked for recapture, so seasonal and weekly trap efficiencies were 0.0%.

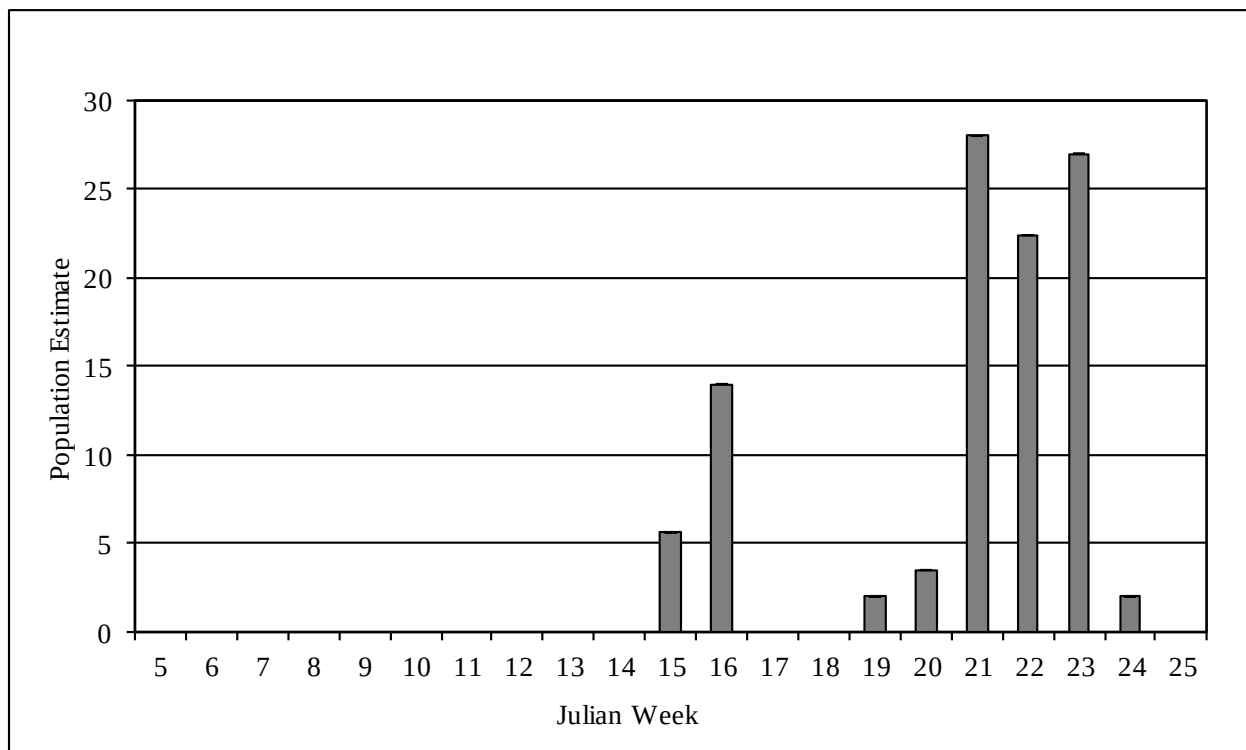


Figure 10. Population estimate with 95% confidence interval for 0+ Coho Salmon on Scott River. Total population estimate was 105.

Coho Salmon: 1+

A total of 417 1+ Coho Salmon were sampled on the Scott River with a seasonal trap efficiency of 2.61%, which was used for JW 10-19 (Table 8). Weekly trap efficiencies ranged from 2.61%-14.3% (Figure 11). Population estimate for 1+ Coho Salmon emigrating out of the system in 2020 was 14,628. Peak emigration occurred during JW 18 (April 30 – May 6, 2020) with an estimated 4,471 (31% of the estimated population) emigrating out of the Scott River during that week (Figure 12). An estimated 16.1% Coho smolts emigrated out of the system by April 1st. Nine Coho Salmon sampled in the RST were identified as being tagged with a passive integrated transponder. PIT tagging efforts were carried out by the Scott River Watershed Council.

Table 8. Catch Table 1+ Coho Salmon, Scott River 2020

Julian week	Live fish trapped ¹	Mortalities	Adjusted total trapped ²	Volume sampled, MCF	Adjusted marked & released ³	Recaptured	Trap efficiency ⁴	Weekly population estimate ⁵	Lower CI	Upper CI
6	0	0	0	1.56	0	0	–	–	–	–
7	25	0	25	5.93	0	0	0.00%	44**	44	44
8	32	1	33	6.65	14	2	14.29%	165	14	316
9	17	1	18	5.20	9	1	11.11%	105	9	201
10	7	0	7	4.93	7	0	2.61%	375*	298	453
11	6	0	6	5.12	1	0	2.61%	322*	309	335
12	6	0	6	2.99	1	0	2.61%	537*	524	549
13	15	0	15	3.76	13	0	2.61%	805*	515	1,095
14	15	0	15	3.89	6	0	2.61%	805*	666	944
15	25	0	25	4.97	8	0	2.61%	1,341*	1,041	1,641
16	27	1	28	6.45	15	0	2.61%	1,502*	890	2,114
17	29	1	30	10.16	11	0	2.61%	1,609*	1,123	2,094
18	50	0	50	5.35	24	0	2.61%	4,471*	2,756	6,185
19	59	4	63	14.37	6	0	2.61%	2,414*	1,844	2,984
20	39	0	39	5.02	0	0	0.00%	68**	68	68
21	29	1	30	11.19	0	0	0.00%	30**	30	30
22	19	1	20	9.95	0	0	0.00%	28**	28	28
23	6	0	6	10.52	0	0	0.00%	6**	6	6
24	1	0	1	7.05	0	0	0.00%	1**	1	1
25	0	0	0	2.96	0	0	–	–	–	–
Totals	407	10	417	128.02	115	3	2.61%	14,628	10,166	19,088

¹ Does not include recaptured fish.

² Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of the Julian week.

³ Adjusted marked & released includes fish marked during the week minus marked fish caught after end of week.

⁴ Trap efficiency equals # recaptured fish/# marked released.

⁵ Weekly population estimate multiplied by ratio of days in the week to days trap was operated for that given week.

* Estimated weekly population based on seasonal trap efficiency (adjusted total trapped/average trap efficiency)

** Adjusted total trapped was used for weekly totals when fish were not marked for recaptured.

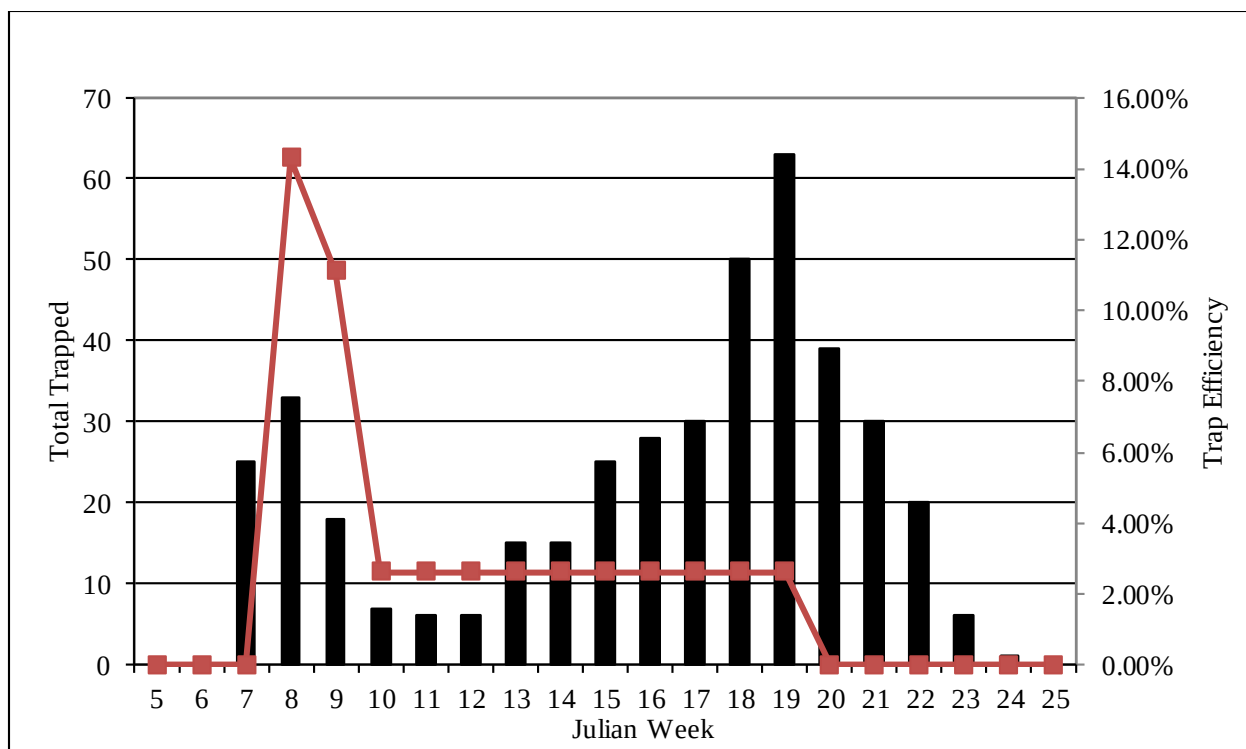


Figure 11. Total 1+ Coho Salmon sampled on Scott River from JW 6 – JW 25 was 417 with the weekly trapping efficiencies ranging from 2.61%-14.3%. Seasonal trapping efficiency was 2.61% and used for JW 10-19.

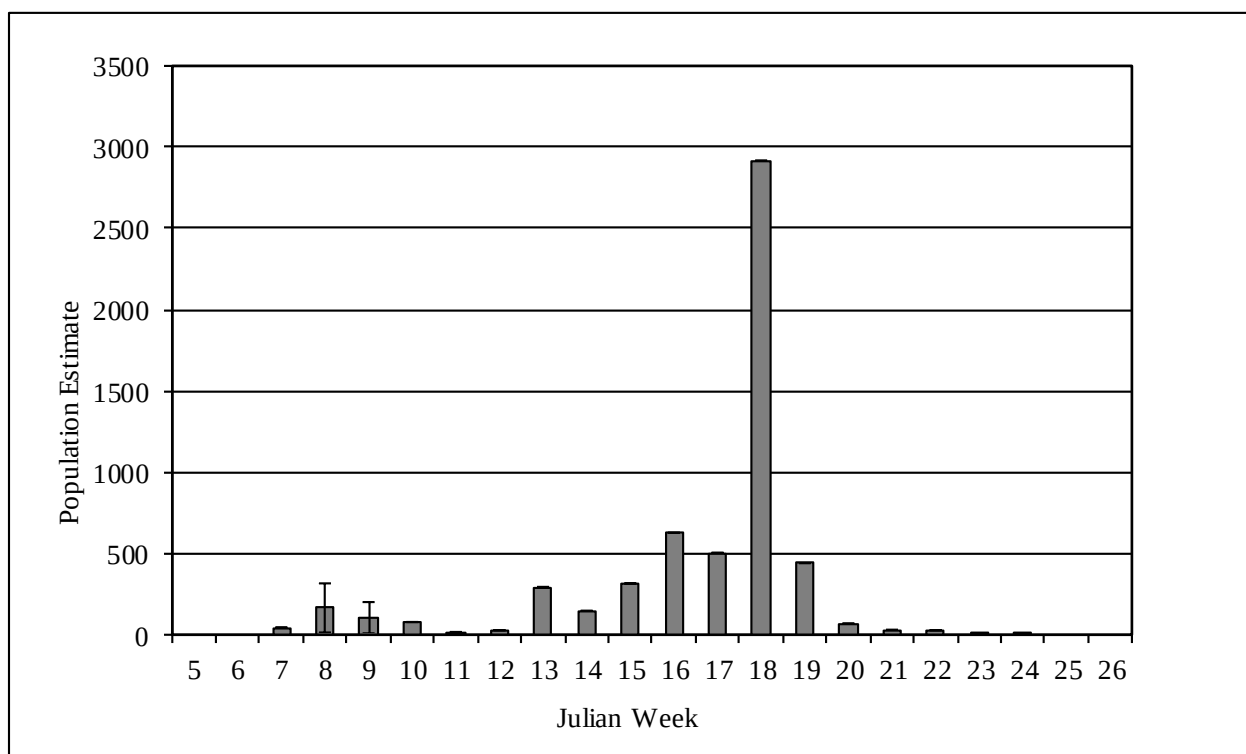


Figure 12. Population estimate with 95% confidence interval (CI, error bars only present when season trap efficiency was not used) for 1+ Coho Salmon on the Scott River. Total population estimate was 14,628

Bio-Sampling: 0+ and 1+ Coho Salmon

25 0+ and 323 1+ Coho Salmon were measured and aged for bio-sampling (Figure 13, Appendix 6-7). Average fork lengths for the approximate 10th, 50th and 90th cumulative catch percentiles for 1+ Coho Salmon were 93, 109 and 125 mm respectively. No scales or tissue samples were taken from 0+ Coho Salmon. 26 tissue samples were taken from 1+ Coho Salmon.

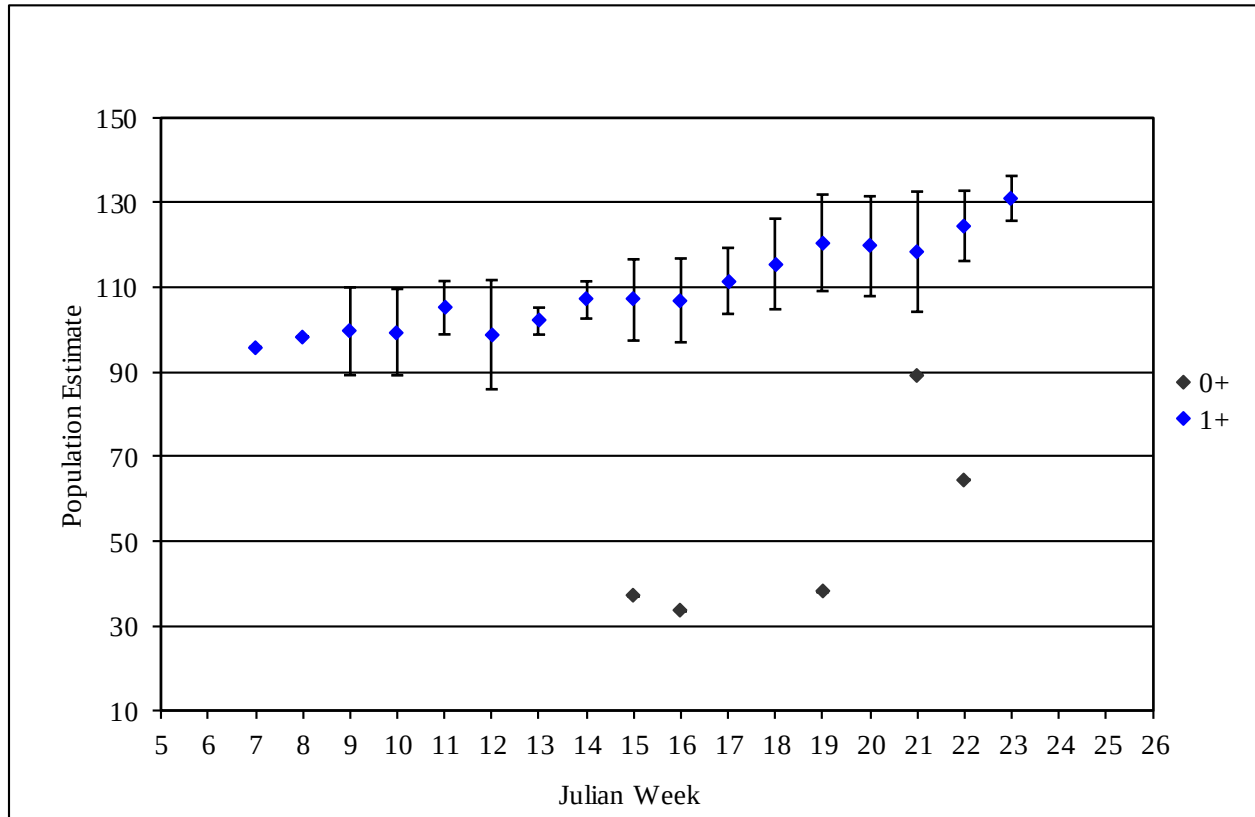


Figure 13. Scott River 0+ and 1+ Coho Salmon weekly mean fork lengths, Scott River.

Steelhead Trout: 0+

A total of 1,209 0+ steelhead trout were sampled on the Scott River with a seasonal trap efficiency of 0.37%, which was used for JW 16-17, 19, and 24-25 (Table 9). Weekly trap efficiencies ranged from 0.37% - 1.35% (Figure 14). A total of 291,431 0+ steelhead trout were estimated emigrating out of the Scott River in 2020. Peak emigration was JW 24 (June 11 - 17, 2020), with an estimated 84,324 steelhead trout (28.9% of the estimated population) emigrating out of the Scott River during that week (Figure 15). Less than 1% of the population were estimated to have emigrated before April 1st.

Table 9. Catch Table 0+ steelhead trout, Scott River 2020

Julian week	Live fish trapped ¹	Mortalities	Adjusted total trapped ²	Volume sampled, MCF	Adjusted marked & released ³	Recaptured	Trap efficiency ⁴	Weekly population estimate ⁵	Lower CI	Upper CI
6	0	0	0	1.56	0	0	–	–	–	–
7	0	0	0	5.93	0	0	–	–	–	–
8	0	0	0	6.65	0	0	–	–	–	–
9	0	0	0	5.20	0	0	–	–	–	–
10	0	0	0	4.93	0	0	–	–	–	–
11	28	0	28	5.12	0	0	0.00%	39**	39	39
12	1	0	1	2.99	0	0	0.00%	2**	2	2
13	5	0	5	3.76	0	0	0.00%	7**	7	7
14	0	0	0	3.89	0	0	–	–	–	–
15	5	0	5	4.97	0	0	0.00%	7**	7	7
16	76	2	78	6.45	23	0	0.37%*	29,513	26,957	32,069
17	52	1	53	10.16	8	0	0.37%*	20,054	19,424	20,683
18	21	0	21	5.35	0	0	0.00%	49**	49	49
19	140	2	142	14.37	72	0	0.37%*	38,378	24,060	52,696
20	50	0	50	5.02	0	0	0.00%	88**	88	88
21	182	0	182	11.19	74	1	1.35%	49,189	41,528	56,850
22	145	1	146	9.95	75	1	1.33%	7,767	1,530	14,004
23	54	1	55	10.52	0	0	0.00%	55**	55	55
24	310	2	312	7.05	179	0	0.37%*	84,324	6,582	162,066
25	128	3	131	2.96	114	0	0.37%*	61,959	41,092	82,826
Totals	1,197	12	1,209	128.02	545	2	0.37%	291,431	161,420	421,441

¹ Does not include recaptured fish.² Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of the Julian week.³ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.⁴ Trap efficiency equals # recaptured fish/# marked released.⁵ Weekly population estimate multiplied by ratio of days in the week to days trap was operated for that given week.

* Estimated weekly population based on seasonal trap efficiency (adjusted total trapped/average trap efficiency)

** Adjusted total trapped was used for weekly totals when fish were not marked for recaptured.

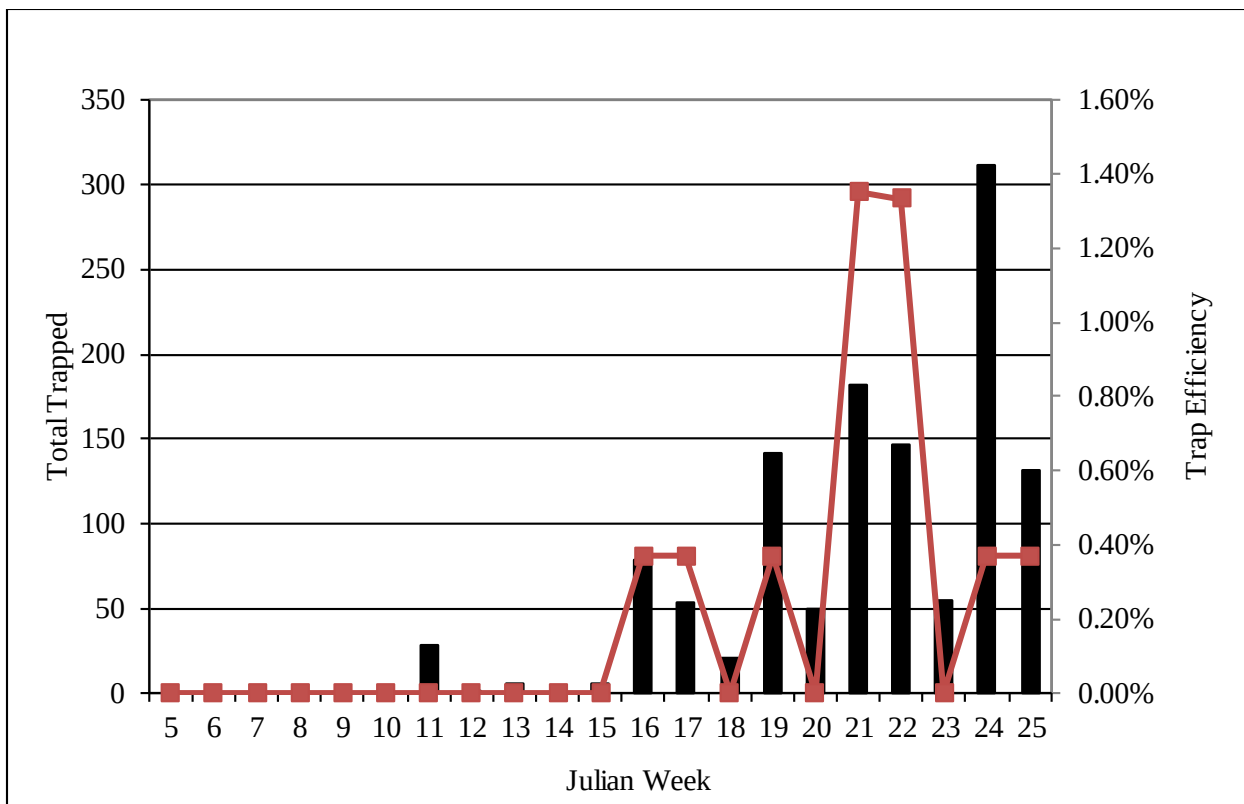


Figure 14. Total 0+ steelhead trout sampled on Scott River from JW 6 – JW 25 was 1,209. Seasonal trap efficiency was 0.37% and was used for JW 16-17, 19, and 24-25.

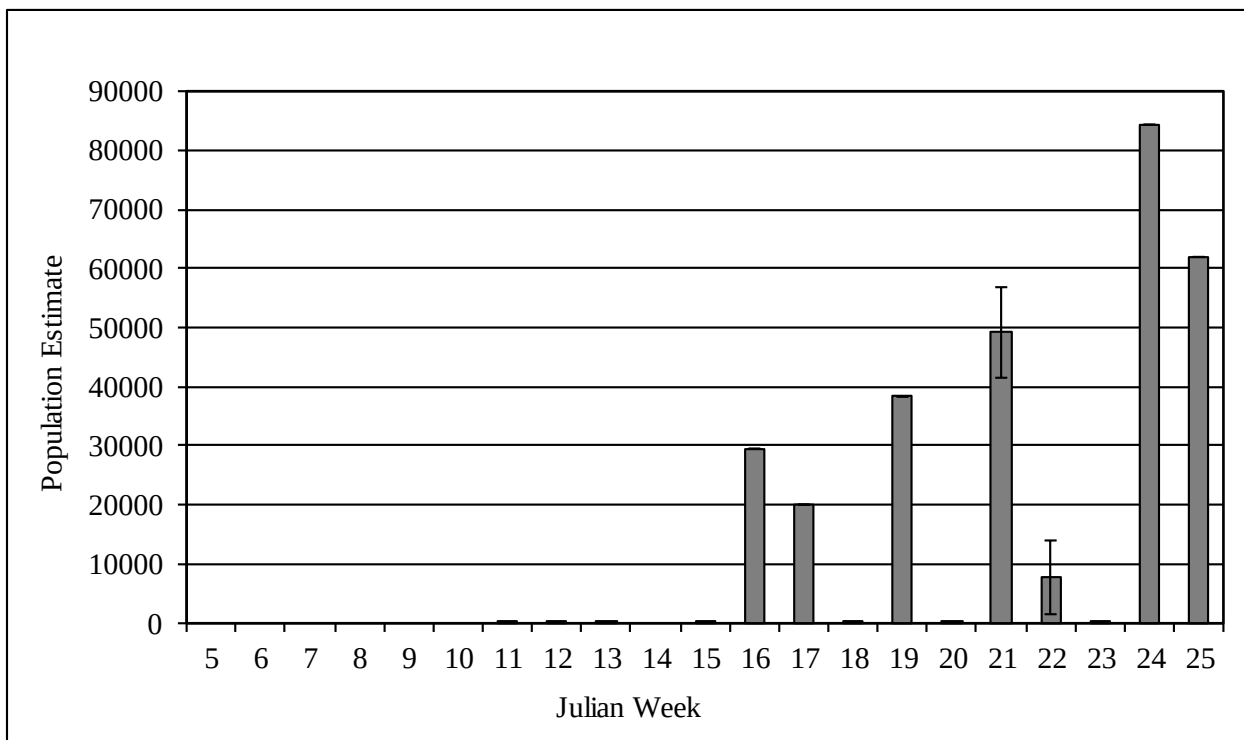


Figure 15. Population estimate with 95% confidence interval (CI, error bars only present when season trap efficiency was not used) for 0+ steelhead trout on the Scott River. Total population estimate was 291,431.

Steelhead Trout: 1+

A total of 1,181 1+ steelhead trout were sampled on the Scott River with a seasonal trap efficiency of 1.54% (Table 10), which was used for JW 7, 10-12, 14-16, 18-20, and 22-23. Weekly trap efficiencies ranged from 1.54%- 12.5% (Figure 16). The population estimate for 1+ steelhead trout emigrating out of the Scott River watershed in 2020 was 81,916. Peak emigration was JW 16 (April 16 – 22, 2020), with an estimated 18,546 (22.6% of the population) emigrating out of the Scott during that period (Figure 17). An estimated 27.8% emigrated out of the system by April 1st.

Table 10. Catch Table 1+ steelhead trout, Scott River 2020

Julian week	Live fish trapped ¹	Mortalities	Adjusted total trapped ²	Volume sampled, MCF	Adjusted marked & released ³	Recaptured	Trap efficiency ⁴	Weekly population estimate ⁵	Lower CI	Upper CI
6	8	0	8	1.56	8	1	12.50%	252	212	292
7	36	2	38	5.93	17	0	1.54%*	4,319	3,386	5,252
8	48	0	48	6.65	38	1	2.63%	936	0	1,989
9	28	2	30	5.20	17	2	11.76%	210	41	379
10	11	0	11	4.93	9	0	1.54%*	1,000	849	1,151
11	23	0	23	5.12	15	0	1.54%*	2,092	1,587	2,596
12	58	1	59	2.99	8	0	1.54%*	8,939	8,239	9,639
13	134	0	134	3.76	79	2	2.53%	5,003	1,529	8,476
14	79	0	79	3.89	51	0	1.54%*	7,182	1,508	12,856
15	134	0	134	4.97	73	0	1.54%*	12,181	0	25,882
16	203	1	204	6.45	103	0	1.54%*	18,546	0	47,880
17	146	2	148	10.16	72	2	2.78%	5,042	1,551	8,533
18	25	0	25	5.35	16	0	1.54%*	3,787	3,204	4,370
19	41	6	47	14.37	23	0	1.54%*	3,052	1,505	4,599
20	15	2	17	5.02	5	0	1.54%*	1,932	1,799	2,065
21	75	5	80	11.19	30	1	3.33%	1,240	0	2,614
22	35	8	43	9.95	9	0	1.54%*	3,909	3,337	4,481
23	33	2	35	10.52	13	0	1.54%*	2,273	1,609	2,937
24	11	1	12	7.05	0	0	0.00%	12**	12	12
25	4	2	6	2.96	0	0	0.00%	11**	11	11
Totals	1,147	34	1,181	128.02	586	9	1.54%	81,916	–	–

¹ Does not include recaptured fish.

² Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of the Julian week.

³ Adjusted marked & released includes fish marked during the week minus marked fish caught after end of week.

⁴ Trap efficiency equals # recaptured fish/# marked released.

⁵ Weekly population estimate multiplied by ratio of days in the week to days trap was operated for that given week.

* Estimated weekly population based on seasonal trap efficiency (adjusted total trapped/average trap efficiency)

** Adjusted total trapped was used for weekly totals when fish were not marked for recaptured.

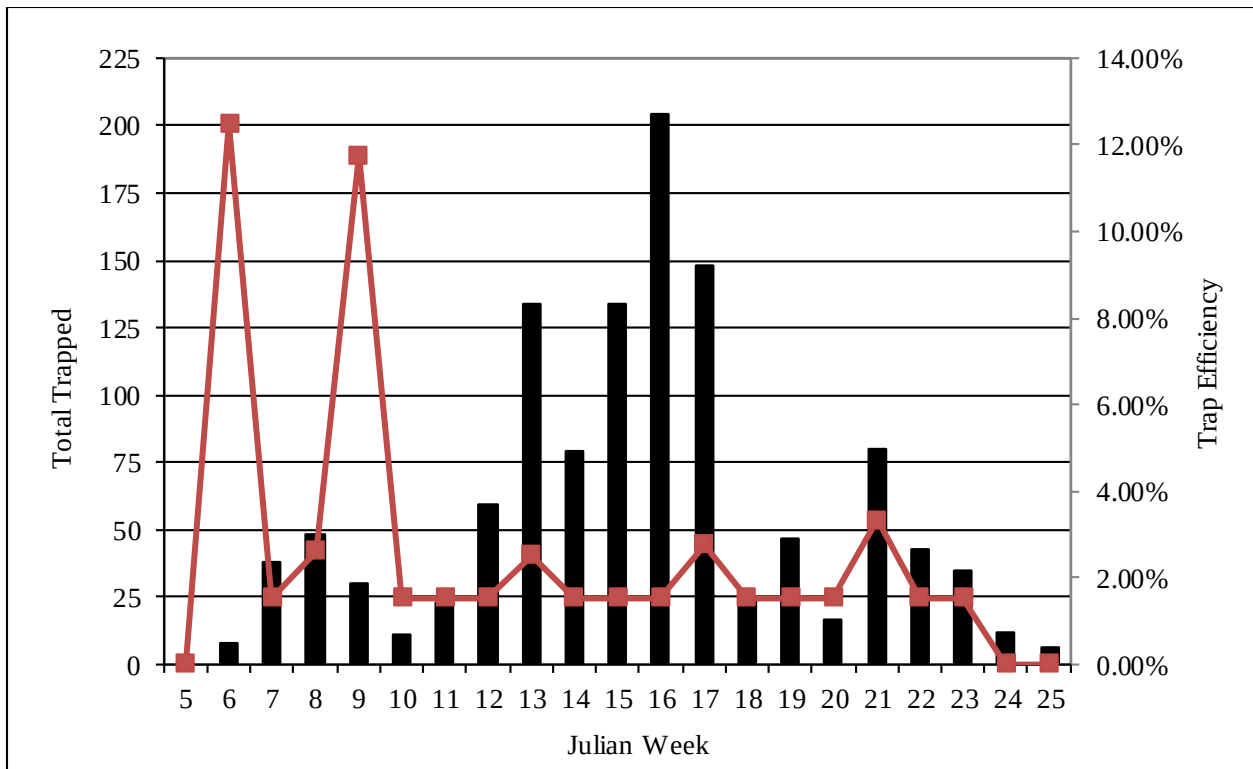


Figure 16. Total 1+ steelhead trout sampled on Scott River from JW 6 – JW 25 was 1,181 with weekly trapping efficiencies ranging from 1.54%- 12.5%. Seasonal trapping efficiency was 1.54% and used for JW 7, 10-12, 14-16, 18-20, 22-23.

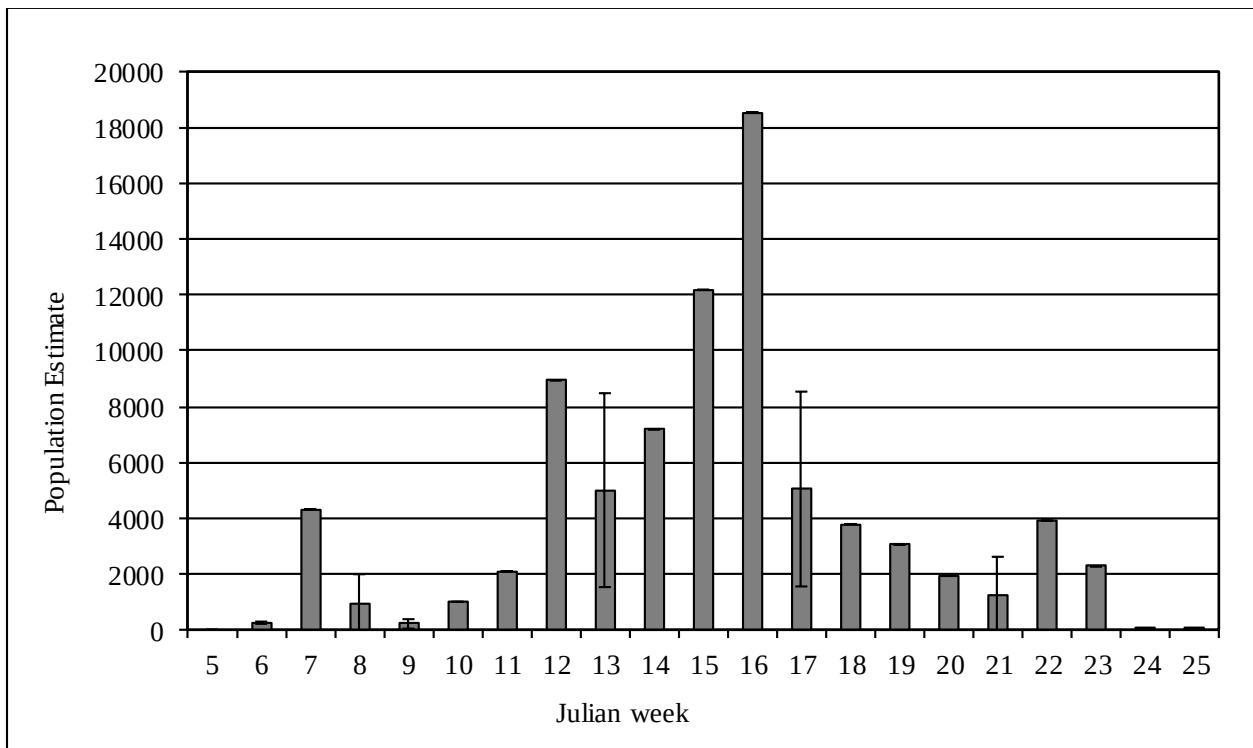


Figure 17. Population estimate with 95% confidence interval (CI, error bars only present when season trap efficiency was not used) for 1+ steelhead trout on the Scott River. Total population estimate was 81,916.

Steelhead Trout: 2+

A total of 232 2+ steelhead trout were sampled on the Scott River (Table 11). Seasonal trap efficiency was 0.91% and was used for JW 7-18 and 20-23 (Figure 18). Weekly trap efficiency ranged from 0.91% - 7.14%. The population estimate for 2+ steelhead trout emigrating out of the Scott River in 2020 was 31,845. Peak emigration was JW 16 (April 16 - 22, 2020), with an estimated 9,538 (30.0% of the population) emigrating during that week (Figure 19). An estimated 16.1% emigrated out of the system by April 1.

Table 11. Catch Table 2+ steelhead trout, Scott River 2020

Julian week	Live fish trapped ¹	Mortalities	Adjusted total trapped ²	Volume sampled, MCF	Adjusted marked & released ³	Recaptured	Trap efficiency ⁴	Weekly population estimate ⁵	Lower CI	Upper CI
6	0	0	0	1.56	0	0	—	—	—	—
7	2	0	2	5.93	1	0	0.91%*	385	380	390
8	2	0	2	6.65	1	0	0.91%*	220	215	225
9	6	0	6	5.20	3	0	0.91%*	769	738	800
10	4	0	4	4.93	3	0	0.91%*	616	595	637
11	5	0	5	5.12	4	0	0.91%*	769	735	803
12	2	0	2	2.99	1	0	0.91%*	513	509	518
13	12	0	12	3.76	8	0	0.91%*	1,847	1,700	1,993
14	22	0	22	3.89	10	0	0.91%*	3,385	3,058	3,712
15	35	1	36	4.97	16	0	0.91%*	5,538	4,704	6,373
16	61	1	62	6.45	26	0	0.91%*	9,538	7,243	11,833
17	13	0	13	10.16	2	0	0.91%*	2,001	1,955	2,046
18	2	2	4	5.35	1	0	0.91%*	1,027	1,018	1,035
19	28	0	28	14.37	14	1	7.14%	210	-19	439
20	13	0	13	5.02	8	0	0.91%*	2,501	2,342	2,659
21	14	0	14	11.19	7	0	0.91%*	1,538	1,388	1,688
22	5	0	5	9.95	3	0	0.91%*	769	742	795
23	2	0	2	10.52	2	0	0.91%*	220	212	228
24	0	0	0	7.05	0	0	—	—	—	—
25	0	0	0	2.96	0	0	—	—	—	—
Totals	228	4	232	128.02	110	1	0.91%	31,845	—	—

¹ Does not include recaptured fish.

² Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of the Julian week.

³ Adjusted marked & released includes fish marked during the week minus marked fish caught after end of week.

⁴ The seasonal trap efficiency was <1%. As a result, the seasonal trap efficiency was not substituted for the weeks where there were no recaptures.

⁵ Weekly population estimate is Adjusted Total Trapped*(Adjusted Mark Released +1)/(Recaptures +1), then multiplied by ratio of days in the week to days trap was operated for that given week.

* Estimated weekly population based on seasonal trap efficiency (adjusted total trapped/average trap efficiency)

** Adjusted total trapped was used for weekly totals when fish were not marked for recaptured.

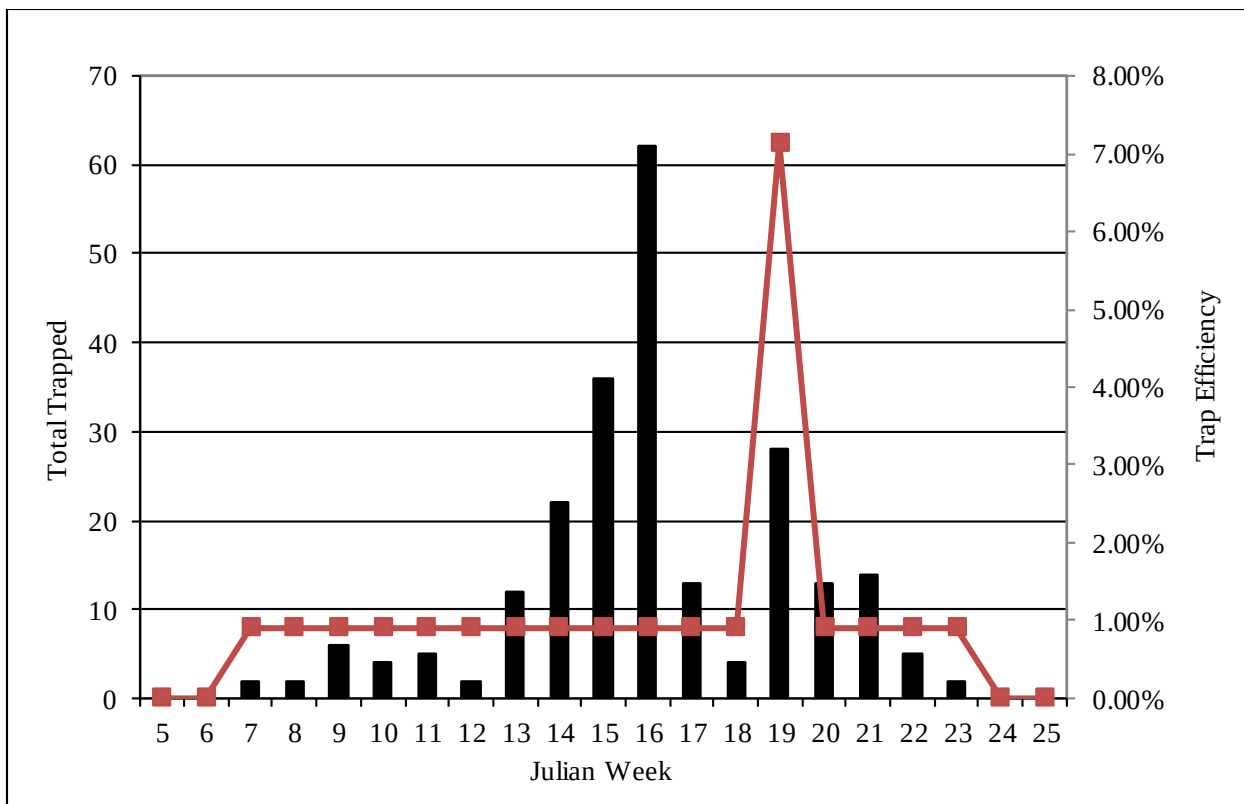


Figure 18. Total 2+ steelhead trout sampled on Scott River from JW 6 – JW 25 was 232. Seasonal trap efficiency was 0.91% and was used for JW 7-18 and 20-23.

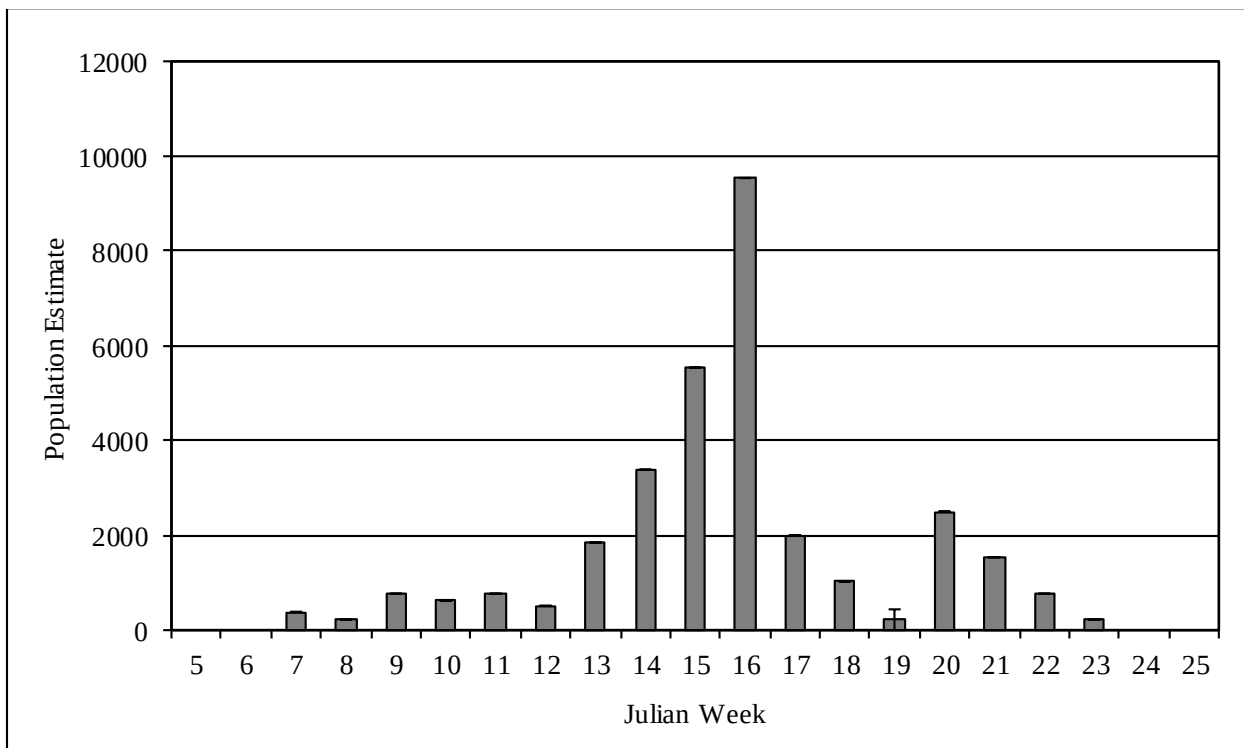


Figure 19. Population estimate with 95% confidence interval (CI, error bars only present when season trap efficiency was not used) for 2+ steelhead trout on the Scott River. Total population estimate was 31,845.

Steelhead Trout: 3+

Five 3+ steelhead were trapped during the 2020 season: one during JW 14, two during JW 16, and two during JW 18. None of these fish were marked for recapture.

Bio-Sampling: 0+, 1+, 2+, and 3+ Steelhead Trout

A total of 155 0+, 890 1+, 210 2+ and four 3+ steelhead trout were measured and aged in the sub-sample (Figure 20-21, Appendix 8-11). Average fork lengths for the approximate 10th, 50th and 90th cumulative catch percentiles for 2+ steelhead trout were 115, 139 and 186 mm respectively. Scale samples taken from 54 1+, and 15 2+ steelhead trout.

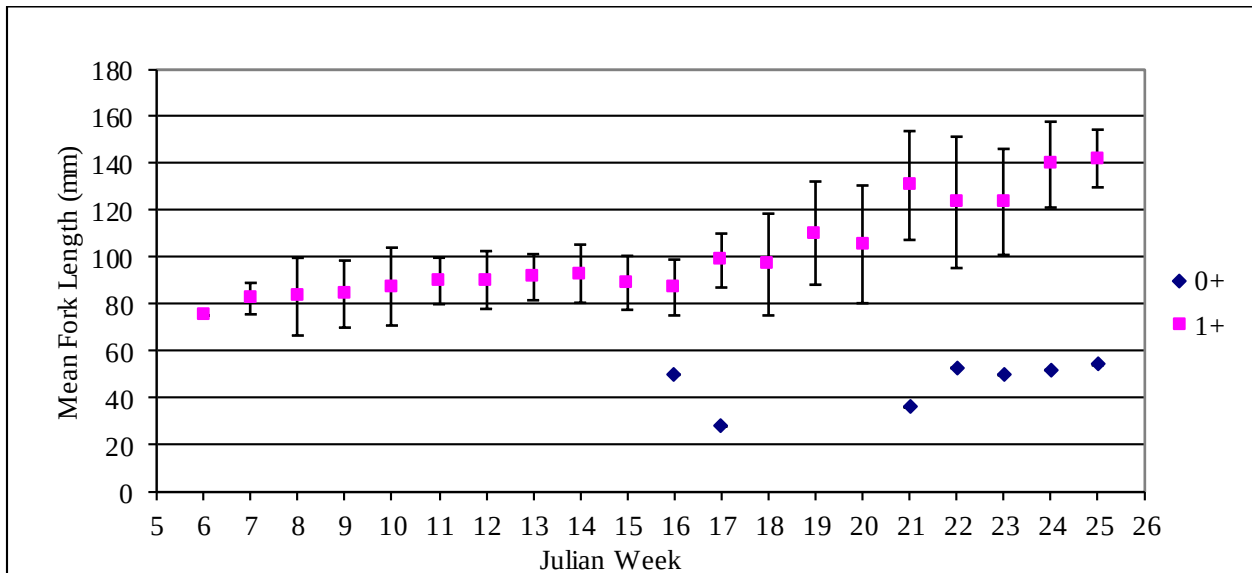


Figure 20. 0+ and 1+ steelhead trout, weekly mean fork lengths, Scott River, with one standard deviation.

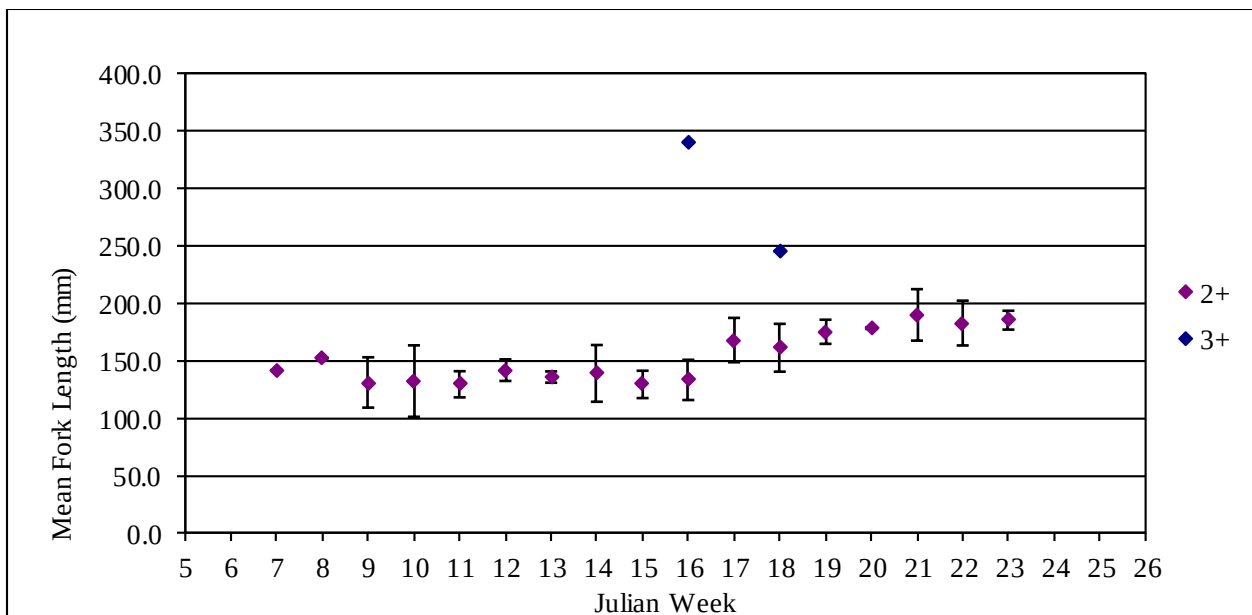


Figure 21. 2+ and 3+ steelhead trout, weekly mean fork lengths, Scott River, with one standard deviation.

Non-target species

Thirteen non-salmonids were sampled in the Scott River RSTs and equated to 38.2% of the total catch (Table 12).

Table 12. Non-salmonid species collected in the Scott River rotary screw traps, 2020.

Common Name	Scientific Name	Count
Unknown Lamprey	---	3,326
Klamath Small Scale Sucker	<i>Catostomus rimiculus</i>	3,081
Speckled Dace	<i>Rhinichthys osculus</i>	605
Pacific Lamprey	<i>Entosphenus tridentatus</i>	214
Marbled Sculpin	<i>Cottus klamathensis</i>	64
Klamath River Lamprey	<i>Entosphenus similis</i>	23
Fathead Minnow	<i>Pimephales promelas</i>	16
Western Toad	<i>Anaxyrus boreas</i>	10
Unknown Frog/Toad	---	7
Brook Stickleback	<i>Culaea inconstans</i>	5
Bull Frog	<i>Rana catesbeiana</i>	5
Crayfish	<i>Astacoidea</i>	5
Miller Lamprey	<i>Entosphenus cf. minimus</i>	3
Grand Total		7,364

Multi-year Comparison

Estimates of the number of 0+ Chinook Salmon produced from the Scott River in 2019 were compared with the data from the previous 18 years of sampling. The total population estimate of 391,643 for 2020 is 88% of the average seasonal population estimate (Figure 22; Appendix 11). Estimates of 1+ Coho Salmon were compared with data from the previous 16 years of sampling. The population estimate of 14,628 for 2020 was the sixth highest estimate (Figure 23). It was estimated that 365 adults returned in the 2019/2020 season (Table 13; Appendix 12). Estimates of the number of 2+ steelhead trout produced from the Scott River for 2020 were compared with the data from the previous 19 years of sampling. The estimate of 31,845 age 2+ steelhead trout is the third highest in the 15 years of trap operation (Table 23; Appendix 13).

Analysis limitation: In the case of 0+ Chinook, 0+ steelhead and 2+ steelhead, weekly/seasonal trap efficiencies less than 1% were used to produce a population estimate. These values have the potential to inflate population estimate numbers. Any interpretation of these estimates should be verified with the authors. Any questions or comments about the use of this trap efficiency should also be directed to the authors.

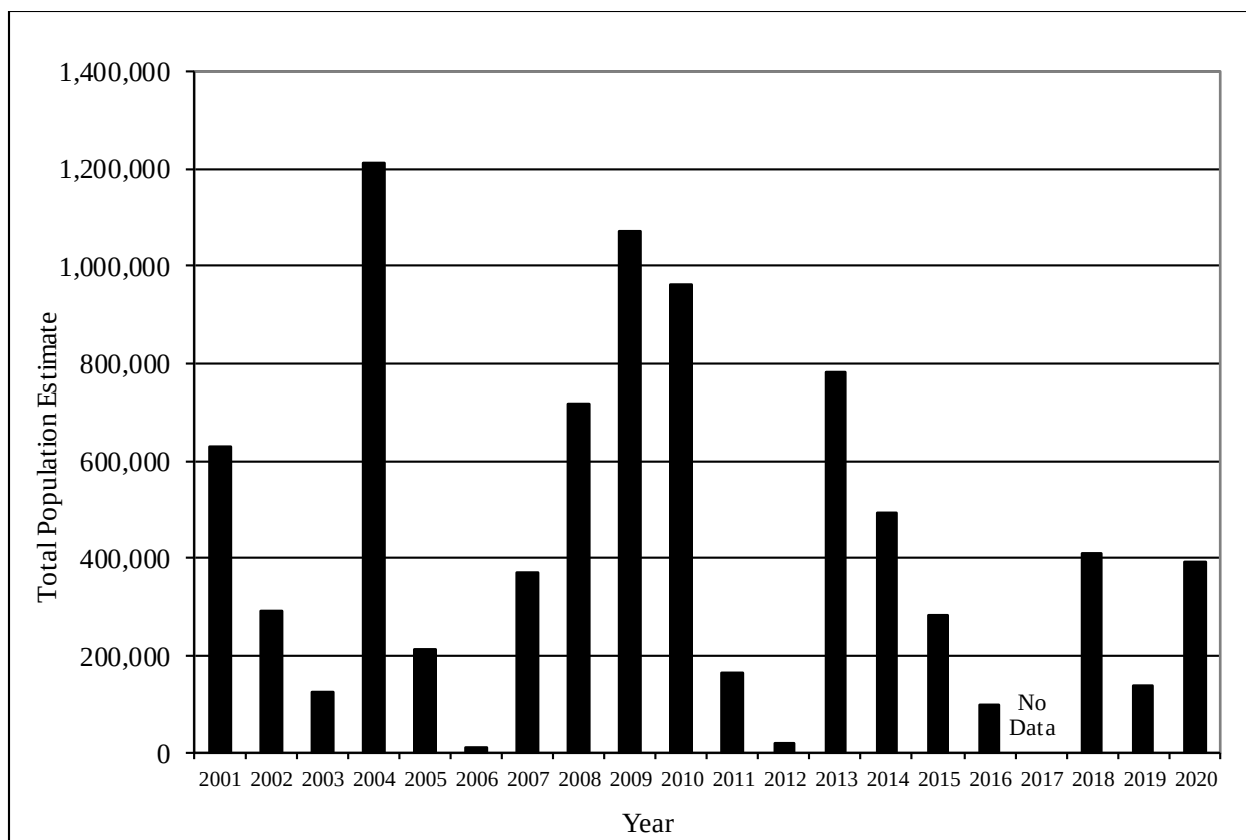


Figure 22. 2001 – 2020 0+ Chinook Salmon population estimates, Scott River. RST was not in operation in 2017.

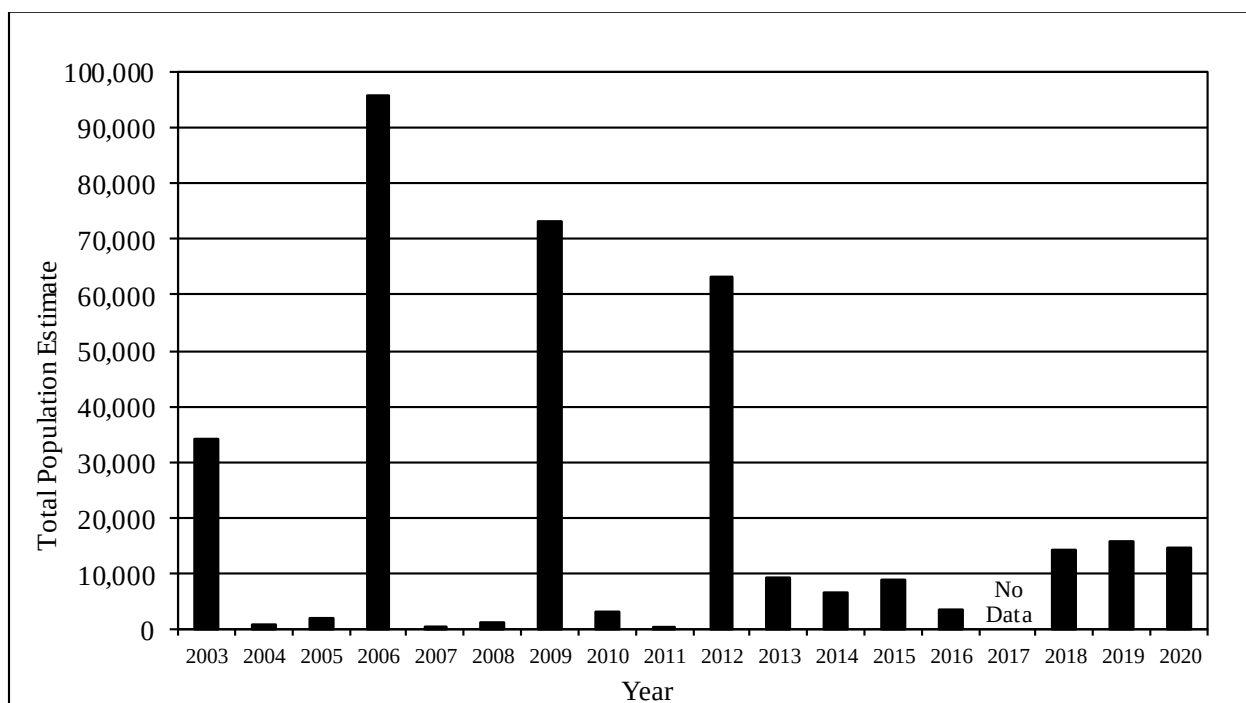


Figure 23. 2003–2020 1+ Coho Salmon population estimates, Scott River. Estimate for 2003 was not corrected for a 7-day estimate, 2007 is based on correlation with steelhead trout trapping efficiencies, and RST was not operated in 2017.

Table 13. Coho Salmon smolt outmigration abundance estimates, age 2 and 3 Coho Salmon abundance estimates, and proportion of outmigrants smolts that returned by brood year for the Scott River, years 2004-2019 (Giudice and Knechtle 2019).

Brood Year	Smolt Year	Smolt Point Estimate ¹	Age 3 Return Year	Age 2 Return	Age 3 Return	Age 2 and 3 Return	Percent smolt Survival
2004	2006	95,815	2007	0	1622	1622	1.69
2005	2007	3,931	2008	0	58	58	1.48
2006	2008	1,142	2009	5	75	80	7.01
2007	2009	73,232	2010	6	913	919	1.25
2008	2010	3,257	2011	14	344	358	10.99
2009	2011	353	2012	11	186	197	*
2010	2012	63,135	2013	13	2631	2644	4.19
2011	2013	9283	2014	121	383	504	5.43
2012	2014	6734	2015	102	188	290	4.31
2013	2015	8,758	2016	24	226	250	2.85
2014	2016	3,372	2017	0	364	364	10.79
2015	2017	N/A	2018	14	712	726	N/A
2016	2018	14,218	2019	27	338	365	2.50
2017	2019	15,707	2020	---	---	---	---
2018	2020	14,628	2021	---	---	---	---

¹Efficiency trials were not conducted in low production years. Estimates were produced from correlation with steelhead trout efficiencies.

*2009: Inherent error in this year's data may be due to underestimating juvenile fish or overestimation or age structure classification of adult Coho Salmon.

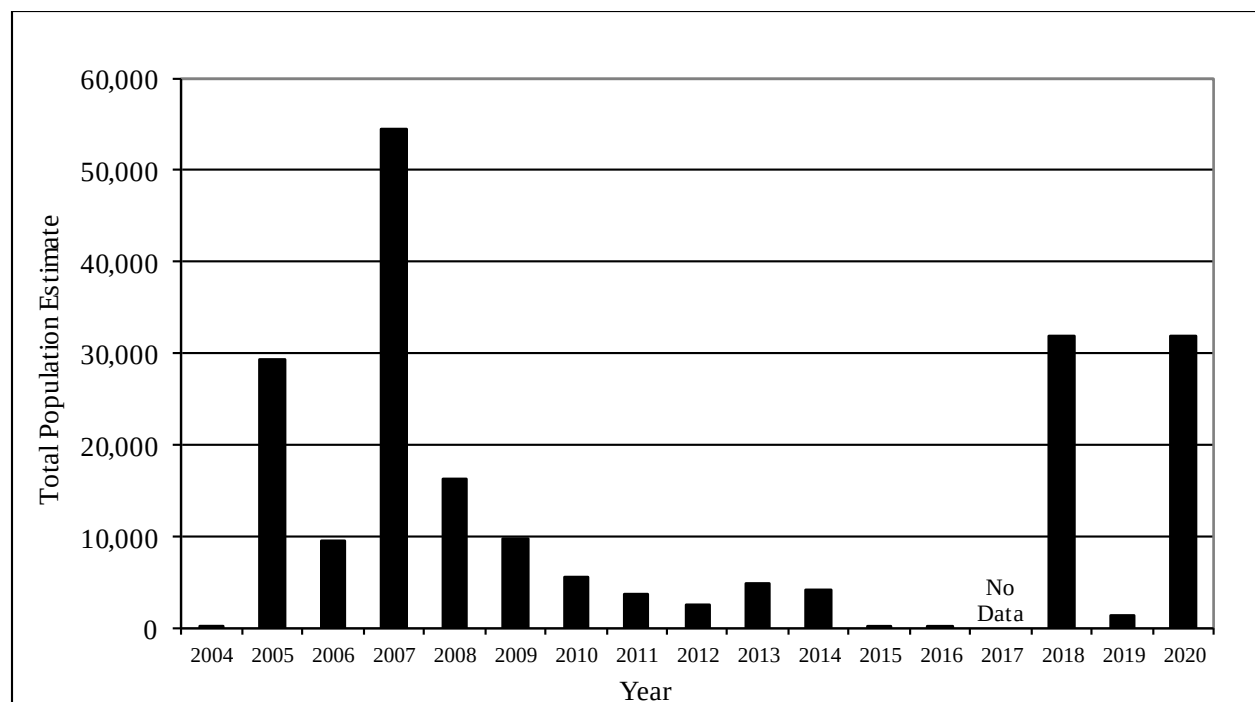


Figure 24. 2004 – 2020 2+ Steelhead population estimates, Scott River. The Scott RST was not in operation in 2017.

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Appendix 1. Life stages of salmonids

Sac Fry	Young salmon from hatching. Yolk sac not yet absorbed.
Fry	Stage between sac fry and parr. Parr marks are not yet visible but sac is fully absorbed; For this study any fish that is under 55mm length is considered a fry
Parr	Parr marks visible on fish
Smolt	Sliver scales and no parr marks visible
Rosy Post Smolt	A colorful fish larger than the usual smolt size; possibly resident
Adult	A sexually mature fish

Appendix 2. Scott River age-length cut-offs for Julian weeks 6-26 based on 2000 - 2006 scale ageing data.

Chinook	Julian Week	Age 0+	Age 1+	Age 2+	Age 3+
	1-8	≤ 49	≥ 50		
	9-12	≤ 79	≥ 80		
	13-14	≤ 79	≥ 80		
	15-16	≤ 89	≥ 90		
	17-20	≤ 119	≥ 120		
	21-28	≤ 159	≥ 160		
Coho	Julian Week	Age 0+	Age 1+	Age 2+	Age 3+
	1-8	≤ 39	40 - 149	≥ 150	
	9-12	≤ 49	50 - 189	≥ 190	
	13-14	≤ 59	60 - 219	≥ 220	
	15-16	≤ 99	100 - 159	≥ 160	
	17-20	≤ 99	100 - 169	≥ 170	
	21-28	≤ 119	120 - 149	≥ 150	
Steelhead	Julian Week	Age 0+	Age 1+	Age 2+	Age 3+
	1-8	≤ 39	40 - 139	140 - 229	≥ 230
	9-12	≤ 39	40 - 139	140 - 209	≥ 210
	13-14	≤ 89	90 - 139	140 - 229	≥ 230
	15-16	≤ 79	80 - 139	140 - 219	≥ 220
	17-20	≤ 79	80 - 159	160 - 229	≥ 230
	21-28	≤ 109	110 - 179	180 - 269	≥ 270

Appendix 3. List of Julian Weeks and Calendar Equivalents

<u>Julian Week #</u>	<u>Inclusive Dates</u>
<u>1</u>	<u>1/1 - 1/7</u>
<u>2</u>	<u>1/8 - 1/14</u>
<u>3</u>	<u>1/15 - 1/21</u>
<u>4</u>	<u>1/22 - 1/28</u>
<u>5</u>	<u>1/29 - 2/4</u>
<u>6</u>	<u>2/5 - 2/11</u>
<u>7</u>	<u>2/12 - 2/18</u>
<u>8</u>	<u>2/19 - 2/25</u>
<u>9</u>	<u>2/26 - 3/4*</u>
<u>10</u>	<u>3/5 - 3/11</u>
<u>11</u>	<u>3/12 - 3/18</u>
<u>12</u>	<u>3/19 - 3/25</u>
<u>13</u>	<u>3/26 - 4/1</u>
<u>14</u>	<u>4/2 - 4/8</u>
<u>15</u>	<u>4/9 - 4/15</u>
<u>16</u>	<u>4/16 - 4/22</u>
<u>17</u>	<u>4/23 - 4/29</u>
<u>18</u>	<u>4/30 - 5/6</u>
<u>19</u>	<u>5/7 - 5/13</u>
<u>20</u>	<u>5/14 - 5/20</u>
<u>21</u>	<u>5/21 - 5/27</u>
<u>22</u>	<u>5/28 - 6/3</u>
<u>23</u>	<u>6/4 - 6/10</u>
<u>24</u>	<u>6/11 - 6/17</u>
<u>25</u>	<u>6/18 - 6/24</u>
<u>26</u>	<u>6/25 - 7/1</u>

* = eight days only during leap years

** = eight day Julian week

<u>Julian Week #</u>	<u>Inclusive Dates</u>
<u>27</u>	<u>7/2 - 7/8</u>
<u>28</u>	<u>7/9 - 7/15</u>
<u>29</u>	<u>7/16 - 7/22</u>
<u>30</u>	<u>7/23 - 7/29</u>
<u>31</u>	<u>7/30 - 8/5</u>
<u>32</u>	<u>8/6 - 8/12</u>
<u>33</u>	<u>8/13 - 8/19</u>
<u>34</u>	<u>8/20 - 8/26</u>
<u>35</u>	<u>8/27 - 9/2</u>
<u>36</u>	<u>9/3 - 9/9</u>
<u>37</u>	<u>9/10 - 9/16</u>
<u>38</u>	<u>9/17 - 9/23</u>
<u>39</u>	<u>9/24 - 9/30</u>
<u>40</u>	<u>10/1 - 10/7</u>
<u>41</u>	<u>10/8 - 10/14</u>
<u>42</u>	<u>10/15 - 10/21</u>
<u>43</u>	<u>10/22 - 10/28</u>
<u>44</u>	<u>10/29 - 11/4</u>
<u>45</u>	<u>11/5 - 11/11</u>
<u>46</u>	<u>11/12 - 11/18</u>
<u>47</u>	<u>11/19 - 11/25</u>
<u>48</u>	<u>11/26 - 12/02</u>
<u>49</u>	<u>12/03 - 12/09</u>
<u>50</u>	<u>12/10 - 12/16</u>
<u>51</u>	<u>12/17 - 12/23</u>
<u>52</u>	<u>12/24 - 12/31**</u>

Appendix 4. 0+ Chinook Salmon weekly mean fork lengths, one standard deviation, sample size, minimum and maximum lengths, Scott River.

Julian week	Average	s.d.	n	Min	Max
6	---	---	---	---	---
7	32.7	2.3	3	30.0	34.0
8	35.5	0.9	40	34	38
9	35.8	1.3	53	32	38
10	36.7	1.3	49	34	40
11	37.1	3.1	72	32	49
12	37.2	3.4	83	30	48
13	37.3	3.8	50	31	52
14	38.1	5.3	49	33	61
15	45.5	11.1	90	33	69
16	53.3	9.3	201	32	76
17	51.0	8.2	150	36	74
18	59.8	10.2	100	34	85
19	62.0	9.4	100	43	89
20	66.4	10.5	119	45	96
21	68.1	16.2	94	41	101
22	80.8	12.5	94	52	102
23	85.8	10.2	66	59	105
24	81.6	10.1	48	57	100
25	90.0	3.8	7	84	94

Appendix 5. 1+ Chinook Salmon weekly mean fork lengths, one standard deviation, sample size, minimum and maximum lengths, Scott River.

Julian week	Average	s.d.	n	Min	Max
6	103.6	8.9	13	86	115
7	103.0	14.7	3	94	120
8	104.5	10.6	2	97	112
9	98.0	---	1	98	98
10	---	---	---	---	---
11	110.0	---	1	110	110
12	---	---	---	---	---
13	115.0	0.0	1	115	115
14	111.0	0.0	2	111	111
15	108.0	2.8	2	106	110
16	---	---	---	---	---
17	148.0	0.0	1	148	148
18	---	---	---	---	---
19	---	---	---	---	---
20	---	---	---	---	---
21	135.0	---	1	135	135
22	---	---	---	---	---
23	---	---	---	---	---
24	---	---	---	---	---
25	---	---	---	---	---

Appendix 6. 0+ Coho Salmon weekly mean fork lengths, one standard deviation, sample size, minimum and maximum lengths, Scott River.

Julian week	Average	s.d.	n	Min	Max
6	---	---	---	---	---
7	---	---	---	---	---
8	---	---	---	---	---
9	---	---	---	---	---
10	---	---	---	---	---
11	---	---	---	---	---
12	---	---	---	---	---
13	---	---	---	---	---
14	---	---	---	---	---
15	37.0	-	1	37	37
16	33.5	3.5	2	31	36
17	---	---	---	---	---
18	---	---	---	---	---
19	38.0	---	1	38	38
20	---	---	---	---	---
21	64.5	16.6	18	51	109
22	89.3	23.8	3	62	105
23	---	---	---	---	---
24	---	---	---	---	---
25	---	---	---	---	---

Appendix 7. 1+ Coho Salmon weekly mean fork lengths, one standard deviation, sample size, minimum and maximum lengths, Scott River.

Julian week	Average	s.d.	n	Min	Max
6	---	---	---	---	---
7	95.9	10.4	21	77	112
8	98.4	10.2	39	83	125
9	99.6	6.3	17	91	111
10	99.4	12.9	7	74	112
11	105.2	3.2	6	101	109
12	98.8	4.4	6	95	106
13	102.0	9.6	15	87	116
14	107.0	9.9	15	89	121
15	107.0	7.8	24	96	126
16	106.9	10.7	28	90	135
17	111.5	11.4	28	85	135
18	115.5	11.8	37	92	150
19	120.5	14.2	22	100	159
20	119.7	8.3	20	107	141
21	118.4	5.3	22	111	131
22	124.5	6.4	14	112	133
23	131	0	2	131	131
24	---	---	---	---	---
25	---	---	---	---	---

Appendix 8. 0+ steelhead trout weekly mean fork lengths, one standard deviation, sample size, minimum and maximum lengths, Scott River

Julian week	Average	s.d.	n	Min	Max
6	---	---	---	---	---
7	---	---	---	---	---
8	---	---	---	---	---
9	---	---	---	---	---
10	---	---	---	---	---
11	---	---	---	---	---
12	---	---	---	---	---
13	---	---	---	---	---
14	---	---	---	---	---
15	---	---	---	---	---
16	50.0	---	1	50	50
17	28.0	2.4	10	26	34
18	---	---	---	---	---
19	---	---	---	---	---
20	---	---	---	---	---
21	36.2	10.9	40	22	61
22	52.9	10.0	26	26	77
23	49.9	6.2	27	38	62
24	52.0	6.0	45	38	67
25	54.2	7.3	6	44	61

Appendix 9. 1+ steelhead trout weekly mean fork lengths, one standard deviation, sample size, minimum and maximum lengths, Scott River

Julian week	Average	s.d.	n	Min	Max
6	75.3	6.7	8	66	87
7	82.5	16.6	36	62	140
8	83.3	14.3	49	62	119
9	84.4	16.6	30	62	119
10	87.6	9.9	10	72	111
11	90.0	12.3	23	69	117
12	90.4	9.8	43	73	109
13	91.6	12.4	109	60	119
14	93.1	11.5	64	67	119
15	89.2	11.9	80	65	114
16	87.2	11.5	116	61	109
17	98.7	21.7	101	61	146
18	97.0	22.0	22	70	148
19	110.4	25.1	40	66	149
20	105.6	23.2	16	65	142
21	130.7	28.0	66	80	179
22	123.5	22.6	38	82	164
23	123.7	18.3	27	89	160
24	139.6	12.3	7	120	160
25	142.2	30.0	5	101	172

Appendix 10. 2+ steelhead trout weekly mean fork lengths, one standard deviation, sample size, minimum and maximum lengths, Scott River

Julian week	Average	s.d.	n	Min	Max
6	---	---	---	---	---
7	141.5	21.9	2	126	157
8	152.0	31.1	2	130	174
9	130.8	11.4	6	121	151
10	132.0	9.4	4	121	144
11	129.2	4.9	5	123	135
12	141.5	24.7	2	124	159
13	135.5	11.9	11	121	163
14	138.7	17.5	21	120	183
15	129.1	19.3	35	111	175
16	133.0	20.8	58	110	197
17	167.7	10.5	12	150	186
18	161.0	0.7	2	160	161
19	174.9	22.4	20	150	222
20	178.1	19.5	11	152	205
21	189.6	8.2	13	180	210
22	182.5	1.9	4	181	185
23	185.0	1.4	2	184	186
24	---	---	---	---	---
25	---	---	---	---	---

Appendix 11. Multi-year 0+ Chinook Salmon population estimates by Julian week and season total, 2001 – 2020, Scott River.

Julian Week	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 ¹	2018	2019	2020
5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	14	----
6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	168	5255	----	1012	25	----
7	----	----	----	6395	----	----	530	339	----	1296	31	43	5080	7	1105	4720	----	2713	7	37
8	----	----	----	----	----	----	1938	175	532	2181	3002	113	2822	140	4956	7124	----	1562	50	46
9	----	----	----	14862	----	----	994	3477	----	15778	7816	177	27672	4292	2164	4778	----	1031	196	68
10	----	----	----	55053	2365	1092	6175	37716	460	20220	13384	109	22657	226	8446	----	----	72716	176	1992
11	7240	----	----	97416	11548	63	488	14888	10374	85056	3990	221	33242	375	26990	9618	----	15141	24093	5989
12	41535	----	----	104792	14166	103	15659	14433	32479	47132	6539	111	27951	9038	21555	14427	----	12961	38369	4568
13	8524	----	----	160406	4592	61	12472	35320	86779	100699	18320	319	37785	43059	6960	6435	----	3598	22805	12715
14	18796	49916	----	123290	24907	68	12360	43904	88192	46372	19220	236	2730	107632	6747	10388	----	11228	0	5859
15	39187	20945	15164	107805	17070	37	30846	92904	202763	81515	20265	315	24421	41813	7016	13892	----	24714	0	17381
16	100278	29008	16113	47900	8598	75	68769	16687	321650	133590	11781	734	32038	30818	10425	11934	----	17430	6292	18827
17	79772	24346	3638	30427	5035	----	14320	32757	96571	64864	15371	196	15013	66917	29156	1958	----	7425	74	19314
18	57000	38295	----	11503	4284	7	16436	41028	60656	20979	9216	691	32851	29820	24982	5611	----	9742	4195	21625
19	20869	4494	----	19758	4652	62	6013	71064	----	138698	4989	330	34685	32561	24798	534	----	12417	47	18751
20	14330	6057	----	9029	7299	----	14854	18190	44157	64266	5719	189	28677	29609	24711	267	----	3662	3219	31284
21	201288	4293	----	5438	3718	19	17261	52194	49291	34618	3020	161	16297	47712	10641	88	----	2637	971	10166
22	41331	3781	----	6592	7007	28	4478	61290	12252	22450	1582	128	50722	27725	17325	0	----	43215	1024	20814
23	----	36243	----	17533	12248	----	26041	38093	8420	----	515	412	109656	10969	30423	----	----	125757	2084	189372
24	----	73829	----	61740	4543	19	60114	38571	13033	26872	25	1129	219875	8679	20375	----	----	38531	1756	12206
25	----	----	----	268773	2842	22	----	42726	23413	33499	4390	5378	37364	1810	5070	----	----	2630	12455	1684
26	----	----	14050	59270	19341	3061	60877	62195	19500	23310	13533	6789	21268	520	316	----	----	566	21094	----
27	----	----	34802	3625	49943	5788	----	----	----	----	----	----	----	----	----	----	----	----	----	----
28	----	----	42142	----	7691	2204	----	----	----	----	----	----	----	----	----	----	----	----	----	----
TOTAL	630,151	291,207	125,909	1,211,604	211,847	12,707	370,622	717,948	1,070,520	963,392	162,706	17,781	782,804	493,721	284,329	97,027	NA	410,688	138,947	391,643

¹The Scott RST was not in operation in 2017.

Appendix 12. Multi-year 1+ Coho Salmon population estimates by Julian week and season total, 2003 – 2020, Scott River.

Julian Week	2003 ¹	2004	2005	2006	2007 ²	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 ³	2018	2019	2020
5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	616	----
6	----	----	----	----	----	----	----	----	----	----	----	----	14	139	----	72	448	----
7	----	0	7	----	2	15	555	28	3	2,069	8	49	1,792	51	----	1	359	44
8	----	95	12	576	0	12	1,818	28	2	2,764	21	1,213	1,832	44	----	19	224	165
9	489	23	32	651	1	5	6,727	99	4	432	30	1,419	1,617	70	----	22	821	105
10	272	245	50	323	0	----	15,201	83	4	1,974	54	63	210	----	----	4	186	375
11	2,367	84	189	1,435	1	52	15,096	115	7	2,946	21	168	211	0	----	1,121	224	322
12	10,136	5	71	1,199	2	33	7,595	55	3	2,884	67	1,079	120	44	----	454	381	537
13	1,677	28	106	3,400	9	64	7,294	21	2	3,197	22	245	341	709	----	340	719	805
14	3,600	1	343	2,118	21	209	2,866	148	----	4,314	18	84	243	882	----	1,934	----	805
15	4,068	74	313	2,527	48	127	5,805	260	2	5,250	350	417	561	200	----	933	----	1,341
16	1,338	212	173	7,153	30	175	5,121	308	4	8,785	436	394	389	177	----	1,767	499	1,502
17	1,261	37	211	7,125	20	108	2,638	390	44	7	1,895	343	531	310	----	2,215	308	1,609
18	771	11	280	9,515	79	184	1,812	99	20	631	491	665	347	288	----	1,421	1,000	4,471
19	506	75	56	11,591	93	18	----	782	82	9,867	3,208	334	524	67	----	1,524	2,909	2,414
20	3,967	18	175	9,679	37	56	510	378	25	1,307	904	219	23	111	----	1,251	2,122	68
21	800	18	----	8,675	50	----	56	99	118	3,292	1,091	36	16	213	----	973	2,122	30
22	1,613	2	25	19,234	11	42	68	363	31	8,363	567	6	2	67	----	575	1,531	28
23	961	14	----	2,973	4	20	66	----	3	993	76	----	----	----	----	0	616	6
24	312	8	----	4,128	0	20	6	0	----	3,593	25	----	----	----	----	0	411	1
25	11	0	----	2,188	----	2	----	0	----	385	----	----	----	----	----	0	171	----
26	----	0	----	1,251	0	----	----	0	----	84	----	----	----	----	----	0	41	----
27	----	0	----	77	0	----	----	----	----	----	----	----	----	----	----	----	----	----
28	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
TO TAL	34,149	949	2,042	95,815	410	1,142	73,232	3,257	353	63,135	9283	6734	8,758	3,372	0	14,628	15,707	14,628

¹ There was no data on number of days of trap operation. As a result, a 7-day estimate was not produced.

²2007 is based on correlation with steelhead trout trapping efficiencies. Weekly estimate not available.

³The Scott RST was not in operation in 2017.

Appendix 13. Multi-year 2+ steelhead trout population estimates by Julian week and season total, 2004 – 2020, Scott River.

Julian Week	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015 ¹	2016 ¹	2017 ²	2018	2019	2020
5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0	----
6	----	----	----	----	----	----	----	----	----	----	----	----	2	----	42	23	----
7	4	96	----	361	95	36	1	59	81	11	21	11	0	----	128	14	385
8	5	92	193	121	20	116	4	83	123	11	294	13	0	----	105	11	220
9	4	868	75	----	560	851	172	231	58	12	1,096	13	4	----	11	175	769
10	26	1,482	116	2,352	1,107	859	229	832	15	114	250	9	----	----	408	218	616
11	14	2,086	7	2,664	2,786	71	1,331	546	41	39	57	9	0	----	3,220	212	769
12	9	1,300	295	14,749	546	438	2,107	199	50	186	282	5	2	----	5,460	246	513
13	6	1,853	595	5,770	1,415	1,190	480	512	47	63	370	4	8	----	1,531	25	1,847
14	12	3,500	359	2,871	4,611	429	113	33	231	18	109	1	21	----	14,380	----	3,385
15	7	2,616	317	5,019	4,236	2,827	452	496	217	687	313	26	11	----	4,106	----	5,538
16	27	5,819	7	1,813	719	2,938	660	158	1,602	1,136	212	33	6	----	1,292	268	9,538
17	14	2,546	105	501	89	37	4	16	42	247	33	8	5	----	106	0	2,001
18	8	741	42	299	64	5	0	16	6	36	274	6	1	----	35	7	1,027
19	13	664	126	630	11	----	18	83	1	327	411	14	0	----	67	14	210
20	30	231	1,218	12,950	----	----	4	67	0	265	519	30	4	----	754	14	2,501
21	27	60	4,106	3,354	14	----	6	59	29	870	0	6	1	----	231	14	1,538
22	25	282	691	912	26	----	85	119	18	457	1	1	2	----	116	41	769
23	25	1,579	245	100	7	----	----	80	7	410	1	0	----	----	25	5	220
24	31	1,664	298	71	26	----	3	----	13	5	----	0	----	----	0	5	----
25	12	204	18	----	5	----	16	----	6	0	----	0	----	----	1	5	----
26	7	48	131	41	0	----	7	65	1	0	----	0	----	----	0	0	----
27	5	1,700	506	----	----	----	----	----	----	----	----	----	----	----	----	----	----
28	----	5,859	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
TOTAL	308	29,428	9,448	54,578	16,336	9,796	5,690	3,653	2,587	4,892	4,242	189	66	NA	32,015	1,296	31,845

¹Reported numbers are total trapped and not population estimate.

²The Scott RST was not in operation in 2017.