2022 SCOTT RIVER JUVENILE SALMONID OUTMIGRANT STUDY

Prepared by

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ABSTRACT

The 2022 Scott River Juvenile Salmonid Outmigrant Study is part of the ongoing work conducted by the California Department of Fish and Wildlife and the Yreka Fisheries Program on the Shasta and Scott Rivers in Siskiyou County, California. The Scott River rotary screw trap project has been in operation since 2000. Two rotary screw traps were operated on the Scott River from January 26 to June 23, 2022 to sample all age classes of emigrating Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*Oncorhynchus kisutch*), and steelhead (*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 2022, we estimated that a total of 493,084 0+, and 327 1+ Chinook Salmon; 10,399 0+ and 68,616 1+ Coho Salmon; and 638,577 0+, 45,445 1+, 4,173 2+, and 14 3+ steelhead 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 (*Oncorhynchus mykiss*) emigrating from the Scott River, Siskiyou County, California between January 26 and June 23, 2022. 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 2022 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 January 26 and June 23, 2022.
- 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 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 RK 34 near United States Geological Survey (USGS) gauging station #11519500. The lower RK 34 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 80 years of data.
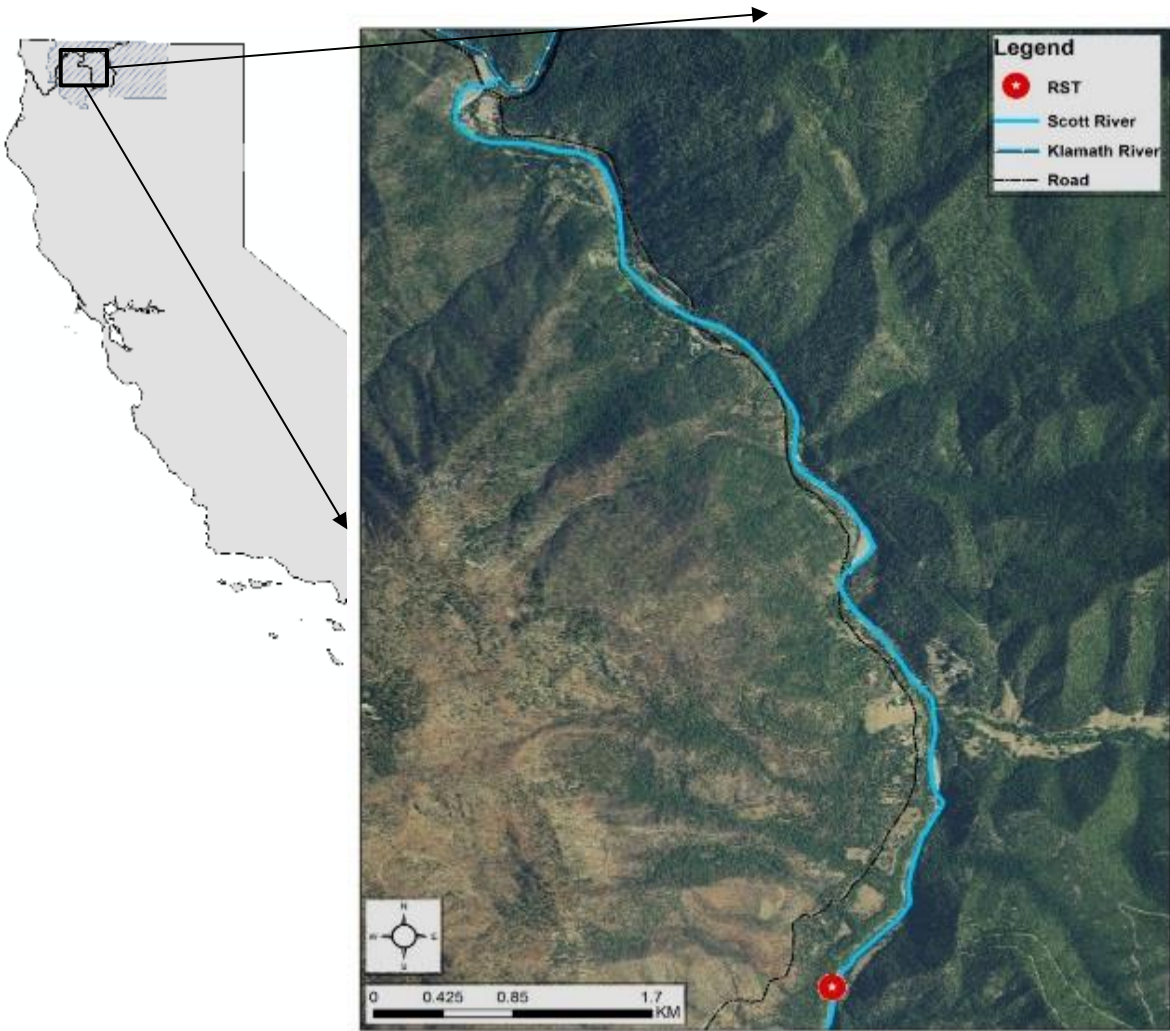
Figure 1. General location for Scott 8' rotary screw trap, approximately 7 RK from the confluence of the Klamath River.

Trap Operation

The Scott River was sampled with both an eight-foot and a five-foot RST manufactured by EG Solutions, Corvallis, Oregon. The eight-foot trap was placed on river left, while the five-foot trap was placed upstream on river right. 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 by a HOBO temperature logger attached to the eight-foot RST. 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 - 15ºC), suboptimal (15 - 20ºC), and detrimental (>20ºC) 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 gage #11519500, Scott River, Fort Jones, California. This gage is located approximately 34 RK upstream of the confluence with the Klamath River and records stream flow and gage height 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 Friday through Thursday to determine the mean weekly trap efficiency for all species and age classes. 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.

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 population-estimate 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 marked and 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). For weeks using correlations and/or seasonal trap efficiencies, intervals created from estimates may not represent 95% confidence. However, intervals for these weeks have been calculated in order to demonstrate the large variance that is associated with low trap efficiencies on the Scott River. 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 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.

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 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 CO_2 water bath. The fish were anesthetized within 45 seconds to one minute. All sedated fish were measured, aged, and attributed a life stage. 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.

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 because 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.

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. These data were then exported to Excel for analysis.

RESULTS

Trap Operation

The Scott River RSTs were operated from Julian Week (JW) 4 (first set on January 26, 2022) through JW 25 (last day of operation was June 23, 2022; Appendix 3). The traps operated for 5,784.83 hours. Volume of water fished was an estimated 484.40 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 estimate because the volume sampling equations assume that half of the cone is submerged.

Table 1. Scott River combined time fished and water volume fished for the traps in 2022.

Scott River, 2022		Water Volume	Time Fished
Julian Week	Calendar Date	Fished (MCF)	(Hours)
4	Jan 22-Jan 28	2.78	72.65
5	Jan 29 - Feb 04	5.74	163.63
6	Feb 05 - Feb 11	12.33	240.72
7	Feb 12 - Feb 18	24.76	334.45
8	Feb 19 - Feb 25	21.93	336.82
9	Feb 26 - Mar 04	21.94	335.63
10	Mar 05 - Mar 11	17.80	335.68
11	Mar 12 - Mar 18	19.85	336.13
12	Mar 19 - Mar 25	28.22	326.40
13	Mar 26 - Apr 01	38.77	274.68
14	Apr 02 - Apr 08	34.07	333.18
15	Apr 09 - Apr 15	29.98	337.68
16	Apr 16 - Apr 22	23.68	336.43
17	Apr 23 - Apr 29	31.61	336.87
18	Apr 30 - May 06	34.22	286.65
19	May 07 - May 13	16.77	145.93
20	May 14 - May 20	18.86	236.75
21	May 21 - May 27	29.08	254.45
22	May 28 - Jun 03	24.64	217.93
23	Jun 04 - Jun 10	15.06	204.92
24	Jun 11 - Jun 17	22.16	192.47
25	Jun 18 - Jun 24	10.18	144.77
Total		**484.40**	**5,784.83**

Water Temperature and Flow Monitoring

Daily average stream temperatures ranged from 3.40°C in January and increased to 22.57°C for portions of June (Figure 2). Minimum stream temperature was 2.40°C (recorded on February 24, 2022), and maximum stream temperature was 22.90°C (recorded on June 27, 2022). 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 >20.3ºC are considered detrimental for juvenile salmonid growth and survival (Stenhouse et al. 2012). Temperatures rose above 20°C for 8 days during the trapping season.

Average monthly stream temperatures during the trapping season ranged from 3.78-16.20°C (Table 2). The maximum weekly average water temperature (MWAT) was 19.85 °C, and the maximum weekly maximum temperature (MWMT) was 21.93 °C, both occurred on during JW 26 (Table 3).

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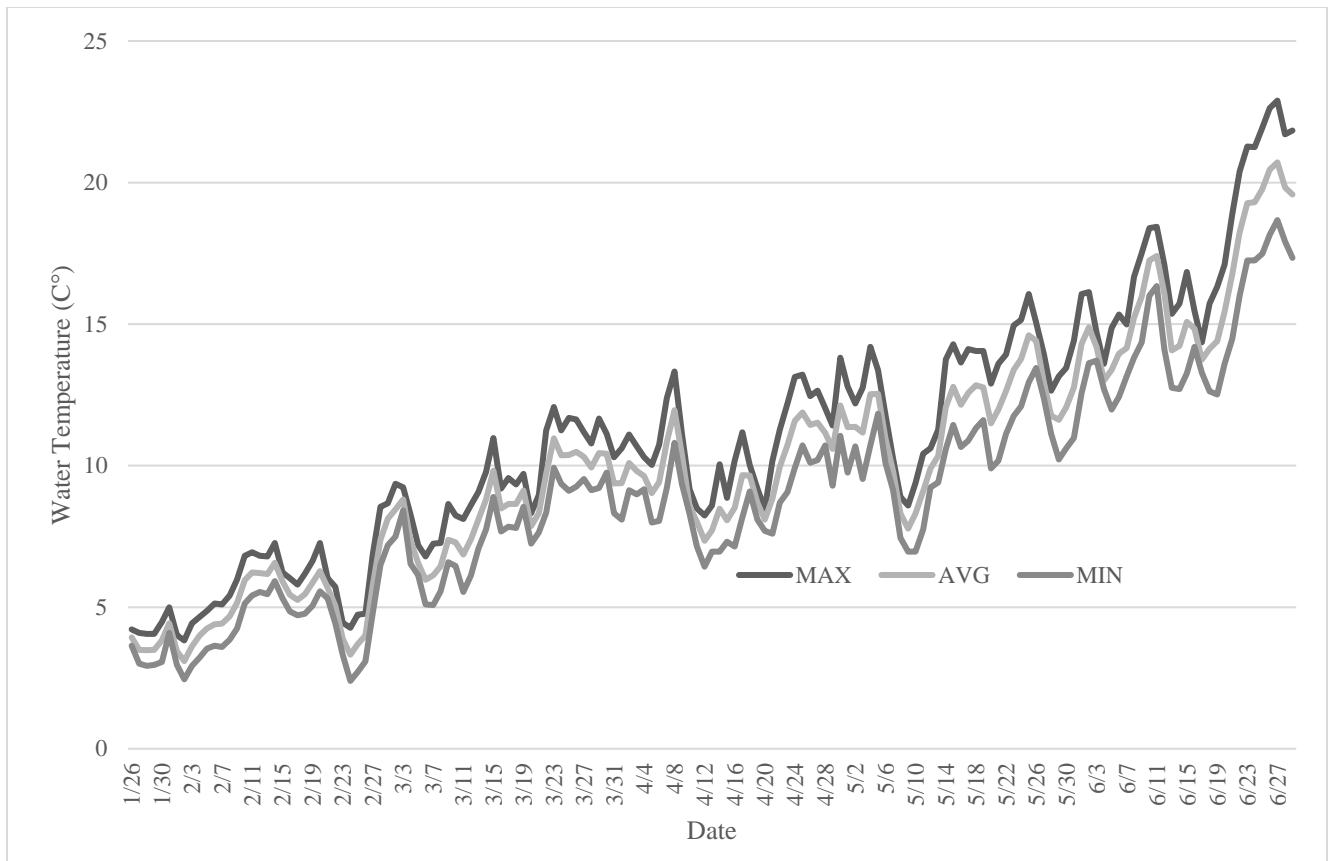
Figure 2. Scott River, 2022. Maximum, minimum and average daily water temperatures.

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

Water Temperature (°C)					
Month	Dates	Days (n)	Max Daily Avg.	Monthly Avg.	Min Daily Avg.
Jan	1/26-1/31	6	4.44	3.78	3.48
Feb	2/1-2/28	28	7.38	5.04	3.10
Mar	3/1-3/31	31	10.97	8.61	5.97
Apr	4/1-4/30	30	12.13	9.77	7.35
May	5/1-5/31	31	14.60	11.68	7.78
Jun	6/1-6/29	29	20.71	16.20	13.01

Table 3. 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	1937	52.1%
Scott RST	MWMT	21.93	26	6/29	Hours at 10-15° C	1350	36.3%
Year	MWAT	19.85	26	6/29	Hours at 15-20° C	343	9.2%
2022	Annual Max	22.90	26	6/27	Hours >20° C	86	2.3%
	Annual Min	2.40	8	2/24	Days with temps >20° C		8
	Total hours logged to date			3716	Avg duration temps >20° C		11

Average monthly streamflows for 2022 from January – June were 275, 234, 325, 279, 482 and 252 cubic feet per second (cfs) (Table 4).

Table 4. Scott River 2001 – 2022 Average Monthly Flow

YEAR	2002 - 2022 Scott River Flow Data During Months Sampled					
	Jan	Feb	Mar	Apr	May	Jun
2002	1077	644	570	1018	707	395
2003	2051	4406	1200	1199	1502	1047
2004	545.7	1082	1185	1050	969	412
2005	554.2	492	549	649	1453	656
2006	3236	2343	1101	1360	2344	1155
2007	696.3	524	1074	634	539	142
2008	381.8	497	749	657	1459	568
2009	234.9	287	613	497	929	309
2010	498.4	437	529	863	1123	1617
2011	1020	529	1168	1452	1204	1580
2012	461.6	293	789	1630	1134	410
2013	341.2	365	552	788	500	129
2014	59.5	488	845	310	131	44
2015	509.8	2235	582	253	157	80
2016	1227	1341	2331	1511	937	307
2017	1518	N/A	N/A	N/A	N/A	N/A
2018	292	321	385	918	475	104
2019	684.1	839	983	1994	1311	664
2020	294.1	273	191	306	423	213
2021	374	349	258	367	339	79
2022	275	234	325	279	482	252
2002 - 2022 Average	778	899	799	887	906	508
2022 Percent of Average	35%	26%	41%	31%	53%	50%

Flows peaked during JW 19 at 980 cfs on May 7th, 2022. The lowest flow while the trap was installed was during JW 25 with a minimum of 160 cfs on June 23, 2022. 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 it 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. It also required the cone to be frequently raised and propped up on blocks to avoid hitting the riverbed while operating in low flow conditions.
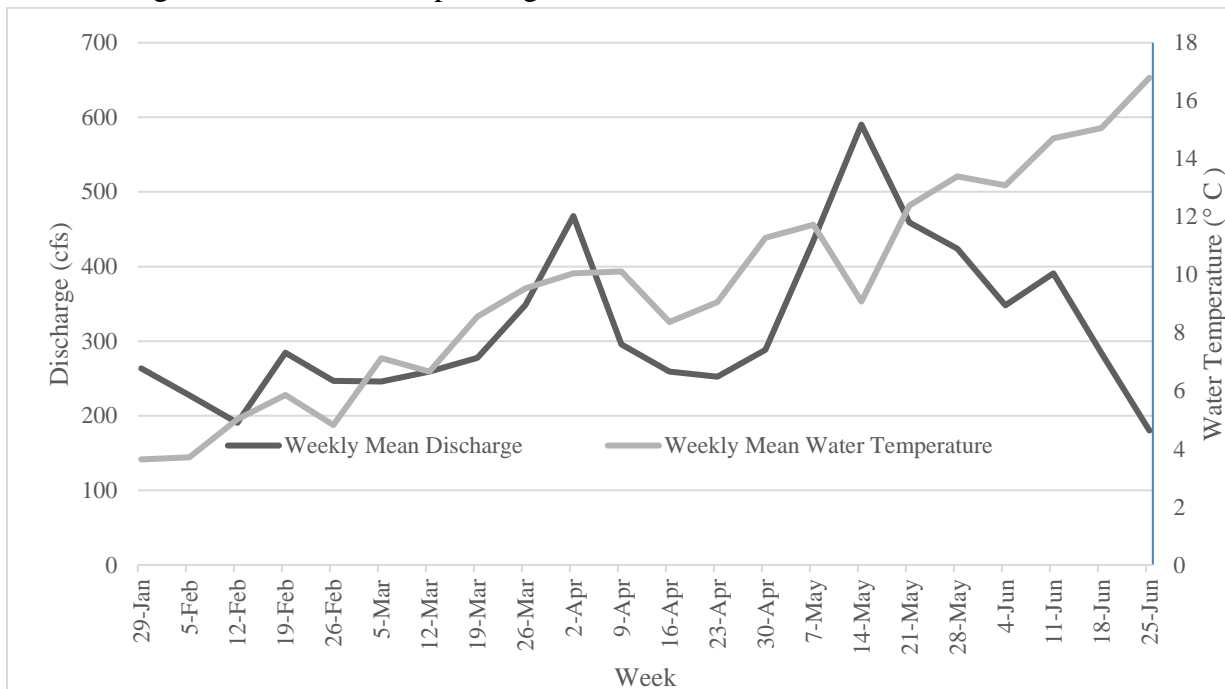
Figure 3. Average weekly flow and average water temperature from JW 4 – 25 on the Scott River. Flow measurements were from USGS gage #11517500. Hourly water temperatures were recorded off the RST.

Trap Efficiency Determinations, Production Estimates, and Bio-sampling

Chinook Salmon: 0+

A total of 30,461 0+ Chinook Salmon were sampled on the Scott River with a seasonal trap efficiency of 8.35%. Weekly trap efficiencies ranged from 2.45%-11.67% (Figure 4). The population estimate for 0+ Chinook Salmon emigrating out of the system in 2022 was 493,084. Peak emigration occurred during JW 22 (May 28 – June 3, 2022) during which, an estimated 60,291 Chinook Salmon (12.23% of the total population) emigrated (Figure 5). An estimated 110,018 (22.31% of the total population) 0+ Chinook Salmon emigrated out of the system by the end of JW 13 (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 2022

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
4	1	0	1	2.78	0	0	8.35%**	4*	2"	7"
5	4	0	4	5.74	0	0	8.35%**	15*	0"	34"
6	2	0	2	12.33	0	0	8.35%**	5*	0"	12"
7	9	0	9	24.75	0	0	8.35%**	51*	0"	112"
8	57	1	58	21.93	0	0	8.35%**	586*	149"	1,023"
9	256	1	257	21.94	90	3	3.33%	5,847	797	10,897
10	176	0	176	17.80	57	3	5.26%	2,552	369	4,735
11	158	3	161	19.85	29	0	8.35%**	1,412*	160"	2,663"
12	1347	12	1359	28.22	779	20	2.57%	50,477	29,510	71,444
13	2859	7	2866	32.78	2122	123	5.80%	49,069	40,543	57,594
14	3615	19	3634	34.98	3001	187	6.23%	58,028	49,814	66,242
15	1975	4	1979	33.44	1687	193	11.44%	17,219	14,837	19,602
16	2749	0	2749	28.94	1434	140	9.76%	27,977	23,497	32,458
17	2046	11	2057	25.14	1678	189	11.26%	18,177	15,640	20,715
18	2838	8	2846	31.48	2244	204	9.09%	36,362	32,161	40,562
19	1471	2	1473	29.49	1151	113	9.82%	26,049	23,368	28,729
20	1659	3	1662	18.86	1286	119	9.25%	17,825	14,693	20,957
21	2803	8	2811	29.08	1603	187	11.67%	23,983	20,665	27,302
22	3568	4	3572	24.64	1113	76	6.83%	60,291	49,107	71,475
23	998	4	1002	15.05	518	25	4.83%	20,001	12,553	27,449
24	1092	10	1102	22.16	331	27	8.16%	22,867	18,258	27,475
25	671	10	681	10.18	204	5	2.45%	54,291	37,233	71,348
Totals	**30,354**	**107**	**30,461**	**491.54**	**19,327**	**1,614**	**8.35%**	**493,084**	**458,702**	**527,474**

[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 fish early released due to condition.

[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.

* Weekly population estimate was calculated using the seasonal trap efficiency.

**Seasonal trap efficiency was used for weekly totals when fish were not recaptured.

" Estimated confidence levels based on seasonal trap efficiency

Figure 4. Total 0+ Chinook Salmon sampled on Scott River from JW 4 – JW 25 was 30,461 with weekly trapping efficiencies ranging from 2.45%-11.67%. Seasonal trapping efficiency was 8.35% and used for JW 4-8 and 11.

Figure 5. Population estimates with 95% confidence interval* for 0+ Chinook Salmon on Scott River. Total population estimate was 493,084.

* Estimated weekly population and CI for JW 4-8 and 11 based on seasonal trap efficiency.

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Chinook Salmon: 1+

A total of 68 1+ Chinook Salmon were sampled on the Scott River (Table 6). Weekly trap efficiencies ranged from 4.26-33.33%. Seasonal trap efficiency was 4.26% and was used for JW 5-7, 9-11, 13, 15 and 21 (Figure 6). The population estimate for 1+ Chinook emigrating out of the watershed in 2022 was 327. Peak emigration was JW 8 (February 19 – February 25, 2022), with an estimated 84 (25.69% of the estimated population) emigrating out of the Scott River during that week (Figure 7). An estimated 312 (95.41% of the total population) emigrated out of the system by the end of JW 13.

Table 6. Catch Table 1+ Chinook Salmon, Scott River 2022

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
4	0	0	0	2.78	0	0	-	-	-	-
5	3	0	3	5.74	2	0	4.26%**	8*	0"	19"
6	8	0	8	12.33	5	0	4.26%**	40*	0"	90"
7	7	0	7	24.75	7	0	4.26%**	43*	0"	99"
8	14	0	14	21.93	11	1	9.09%	84	-9	177
9	8	0	8	21.94	7	0	4.26%**	49*	0"	112"
10	11	0	11	17.80	5	0	4.26%**	54*	0"	122"
11	4	0	4	19.85	1	0	4.26%**	8*	0"	16"
12	0	0	0	28.22	0	0	-	-	-	-
13	6	0	6	32.78	4	0	4.26%**	26*	0"	58"
14	4	0	4	34.98	3	1	33.33%	8	0	16
15	2	0	2	33.44	2	0	4.26%**	6*	0"	13"
16	0	0	0	28.94	0	0	-	-	-	-
17	0	0	0	25.14	0	0	-	-	-	-
18	0	0	0	31.48	0	0	-	-	-	-
19	0	0	0	29.49	0	0	-	-	-	-
20	0	0	0	18.86	0	0	-	-	-	-
21	1	0	1	29.08	0	0	4.26%**	2*	0"	5"
22	0	0	0	24.64	0	0	-	-	-	-
23	0	0	0	15.05	0	0	-	-	-	-
25	0	0	0	22.16	0	0	-	-	-	-
26	0	0	0	10.18	0	0	-	-	-	-
Totals	**68**	**0**	**68**	**491.54**	**47**	**2**	**4.26%**	**327**	**172**	**483**

[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 fish early released due to condition.

[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

* Weekly population estimate was calculated using the seasonal trap efficiency.

**Seasonal trap efficiency was used for weekly totals when fish were not recaptured.

" Estimated confidence levels based on seasonal trap efficiency

Figure 6. Total age 1+ Chinook Salmon sampled on Scott River from JW 4 – JW 25 was 68. Seasonal trap efficiency was 4.26% and was used for JW 5-7, 9-11, 13, 15 and 21.

Figure 7. Population estimate with 95% confidence interval* for age 1+ Chinook Salmon on Scott River. Total population estimate was 327.

* Estimated weekly population and CI for JW 5-7, 9-11, 13, 15 and 21 based on seasonal trap efficiency.

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Bio-Sampling: 0+ and 1+ Chinook Salmon

A total of 1,527 0+ and 61 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 38, 63, and 90 mm, respectively.
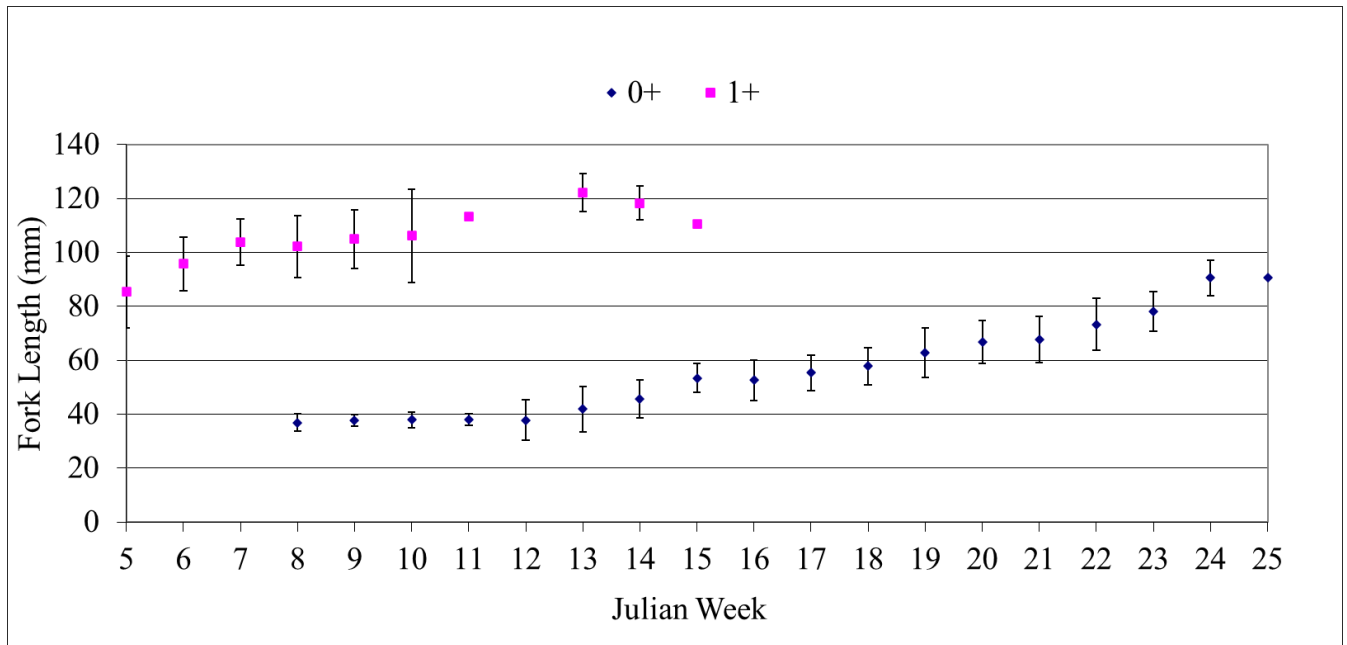
Figure 8. 0+ and 1+ Chinook Salmon weekly mean fork lengths, Scott River, with one standard deviation.

Coho Salmon: 0+

A total of 586 0+ Coho Salmon were sampled on the Scott River (Table 7). Weekly trap efficiencies ranged from 2.50-5.84%. Seasonal trap efficiency was 4.52% and was used for JW 16-22 and 25 (Figure 9). The population estimate for 0+ Coho emigrating out of the watershed in 2022 was 10,399. Peak emigration was JW 23 (June 4 – June 10, 2022), with an estimated 3,333 (32.05% of the estimated population) emigrating out of the Scott River during that week (Figure 10). An estimated 0% emigrated out of the system by the end of JW 13.

Table 7. Catch Table 0+ Coho Salmon, Scott River, 2022

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
4	0	0	0	2.78	0	0	–	–	–	–
5	0	0	0	5.74	0	0	–	–	–	–
6	0	0	0	12.33	0	0	–	–	–	–
7	0	0	0	24.76	0	0	–	–	–	–
8	0	0	0	21.93	0	0	–	–	–	–
9	0	0	0	21.94	0	0	–	–	–	–
10	0	0	0	17.80	0	0	–	–	–	–
11	0	0	0	19.85	0	0	–	–	–	–
12	0	0	0	28.22	0	0	–	–	–	–
13	0	0	0	32.78	0	0	–	–	–	–
14	0	0	0	34.98	0	0	–	–	–	–
15	0	0	0	33.44	0	0	–	–	–	–
16	9	0	9	28.94	0	0	4.52%**	64*	0"	145"
17	2	0	2	25.14	0	0	4.52%**	6*	0"	13"
18	5	0	5	31.48	0	0	4.52%**	29*	0"	61"
19	1	0	1	29.49	0	0	4.52%**	3*	1"	6"
20	42	0	42	18.86	0	0	4.52%**	623*	5"	1,241"
21	77	0	77	29.08	0	0	4.52%**	1,341*	220"	2,461"
22	108	0	108	24.64	10	0	4.52%**	955*	0"	1,915"
23	215	0	215	15.05	154	9	5.84%	3,333	1,384	5,281
24	85	0	85	22.16	40	1	2.50%	3,049	1,104	4,995
25	42	0	42	10.18	17	0	4.52%**	998*	509"	1,486"
Total	**586**	**0**	**586**	**491.55**	**221**	**10**	**4.52%**	**10,399**	**7,176**	**13,622**

[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 fish early released due to condition.

[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

* Weekly population estimate was calculated using the seasonal trap efficiency.

**Seasonal trap efficiency was used for weekly totals when fish were not recaptured.

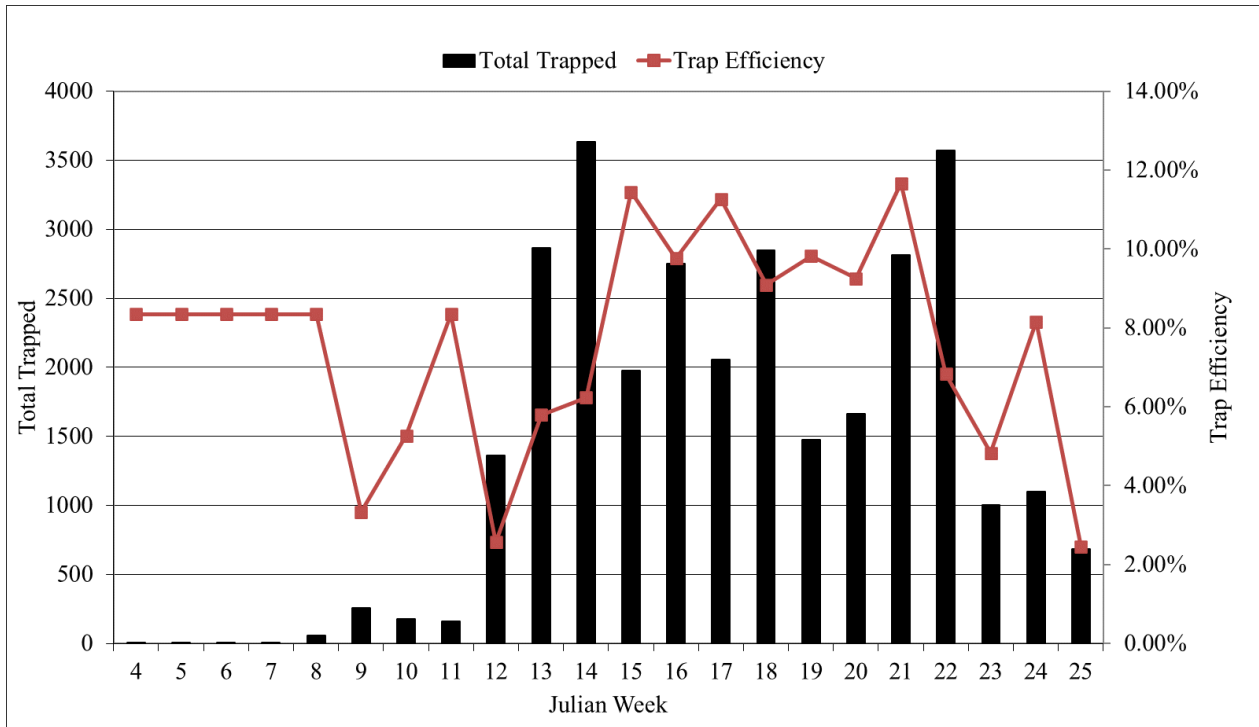" Estimated confidence levels based on seasonal trap efficiency

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Figure 9. Total 0+ Coho Salmon sampled on Scott River from JW 4 – JW 25 was 586. Weekly trap efficiencies ranged from 2.50-5.84%. Seasonal trap efficiency was 4.52% and was used for JW 16-22 and 25.
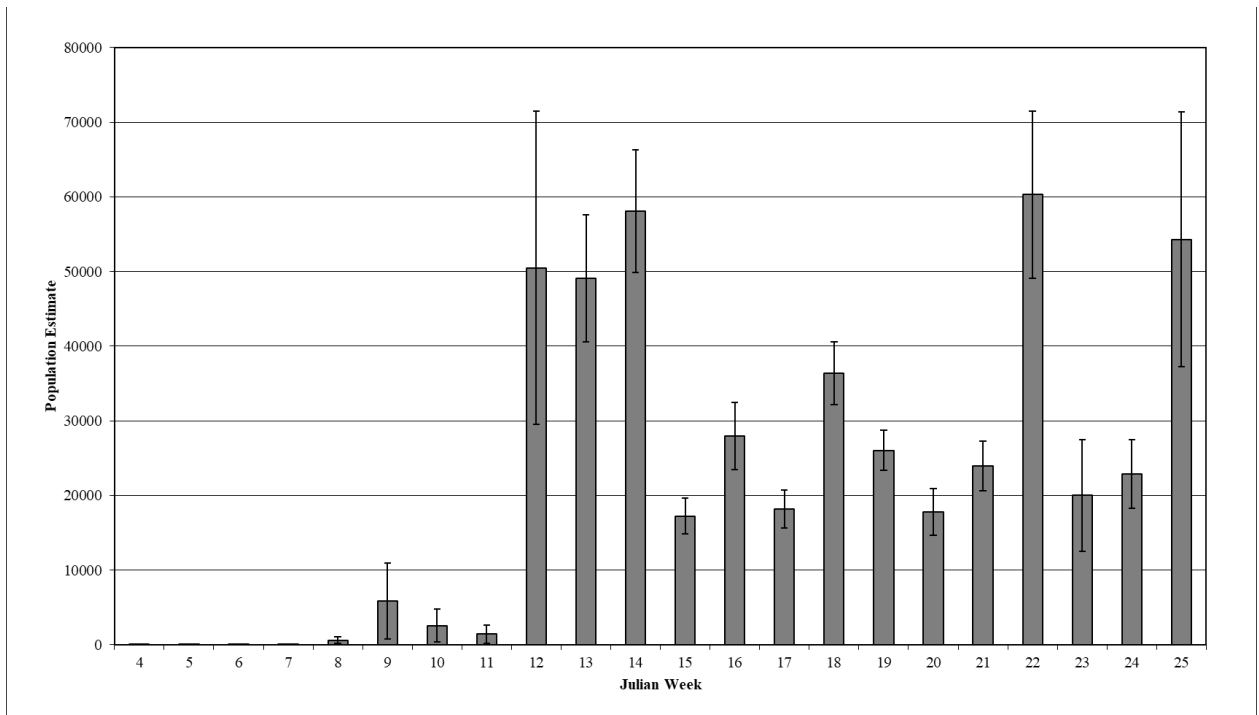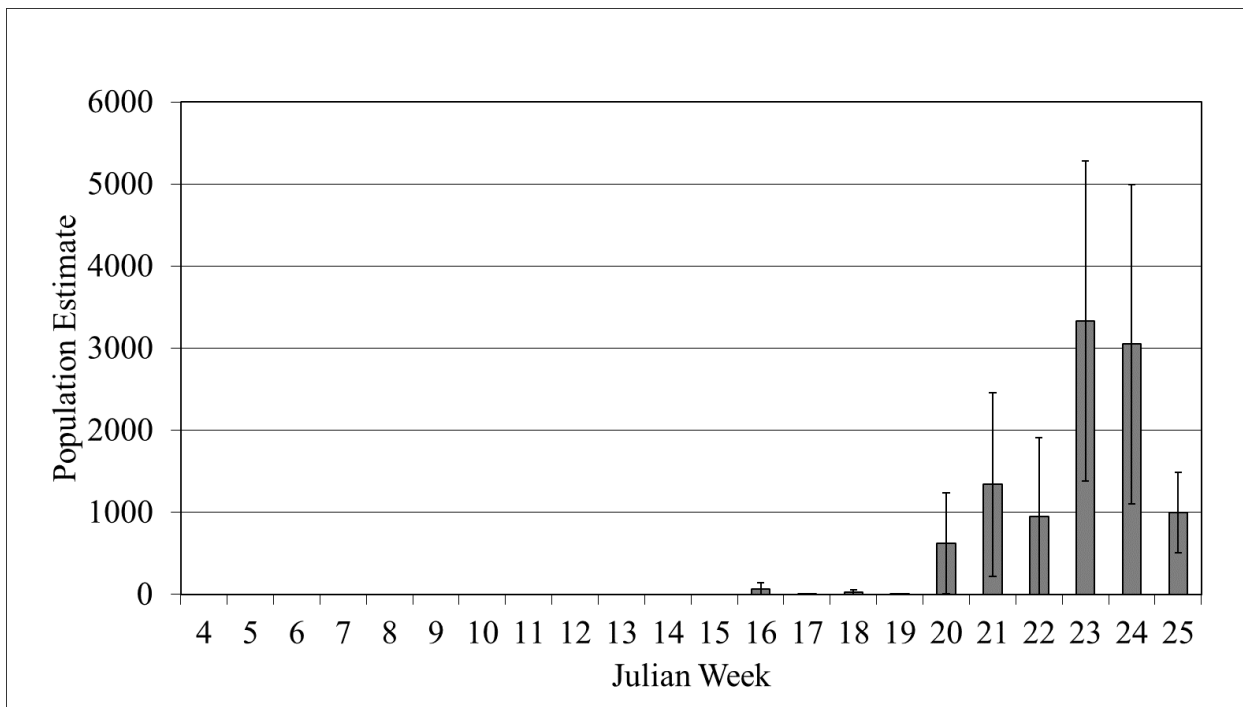

Figure 10. Population estimate with 95% confidence interval* for 0+ Coho Salmon on Scott River. Total population estimate was 10,399.

* Estimated weekly population and CI for JW 16-22 and 25 based on seasonal trap efficiency.

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Coho Salmon: 1+

A total of 1,784 1+ Coho Salmon were sampled on the Scott River with a seasonal trap efficiency of 2.67%, which was used for JW 4, 5, 7, 10-13, 16 and 24-25 (Table 8). Weekly trap efficiencies ranged from 1.39-18.75% (Figure 11). The population estimate for 1+ Coho Salmon emigrating out of the system in 2022 was 68,616. Peak emigration occurred during JW 14 (April 2 – April 8, 2022) with an estimated 9,454 (13.78% of the total population) emigrating out of the Scott River during that week (Figure 12). An estimated 10,107 (14.73% of the total population) emigrated out of the system by the end of JW 13. Three 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 2022

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
4	4	0	4	2.78	3	0	2.67%**	350*	330"	369"
5	10	0	10	5.74	7	0	2.67%**	375*	287"	462"
6	37	0	37	12.33	24	1	4.17%	888	373	1,403
7	29	1	30	24.75	25	0	2.67%**	1,124*	566"	1,682"
8	28	0	28	21.93	16	3	18.75%	149	52	247
9	37	0	37	21.94	36	2	5.56%	666	220	1,112
10	21	0	21	17.80	15	0	2.67%**	787*	487"	1,086"
11	26	0	26	19.85	16	0	2.67%**	974*	591"	1,357"
12	41	0	41	28.22	21	0	2.67%**	1,536*	840"	2,231"
13	87	0	87	32.78	64	0	2.67%**	3,258*	1,146"	5,371"
14	232	0	232	34.98	163	4	2.45%	9,454	3,394	15,514
15	272	1	273	33.44	177	7	3.95%	6,903	2,968	10,838
16	245	0	245	28.94	131	0	2.67%**	9,176*	3,215"	15,137"
17	115	0	115	25.14	92	5	5.43%	2,116	806	3,426
18	101	1	102	31.48	72	2	2.78%	4,284	1,867	6,701
19	69	0	69	29.49	54	3	5.56%	2,174	1,350	2,997
20	113	2	115	18.86	60	1	1.67%	6,900	2,963	10,837
21	107	1	108	29.08	63	1	1.59%	6,804	2,919	10,689
22	104	0	104	24.64	72	1	1.39%	8,736	4,459	13,013
23	54	0	54	15.05	23	1	4.35%	1,242	527	1,957
24	39	0	39	22.16	24	0	2.67%**	1,040*	333"	1,747"
25	7	0	7	10.18	1	0	2.67%**	32*	18"	46"
Totals	**1,778**	**6**	**1,784**	**491.54**	**1,159**	**31**	**2.67%**	**68,616**	**56,643**	**81,288**

[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 fish early released due to condition.

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

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

* Weekly population estimate was calculated using the seasonal trap efficiency.

**Seasonal trap efficiency was used for weekly totals when fish were not recaptured.

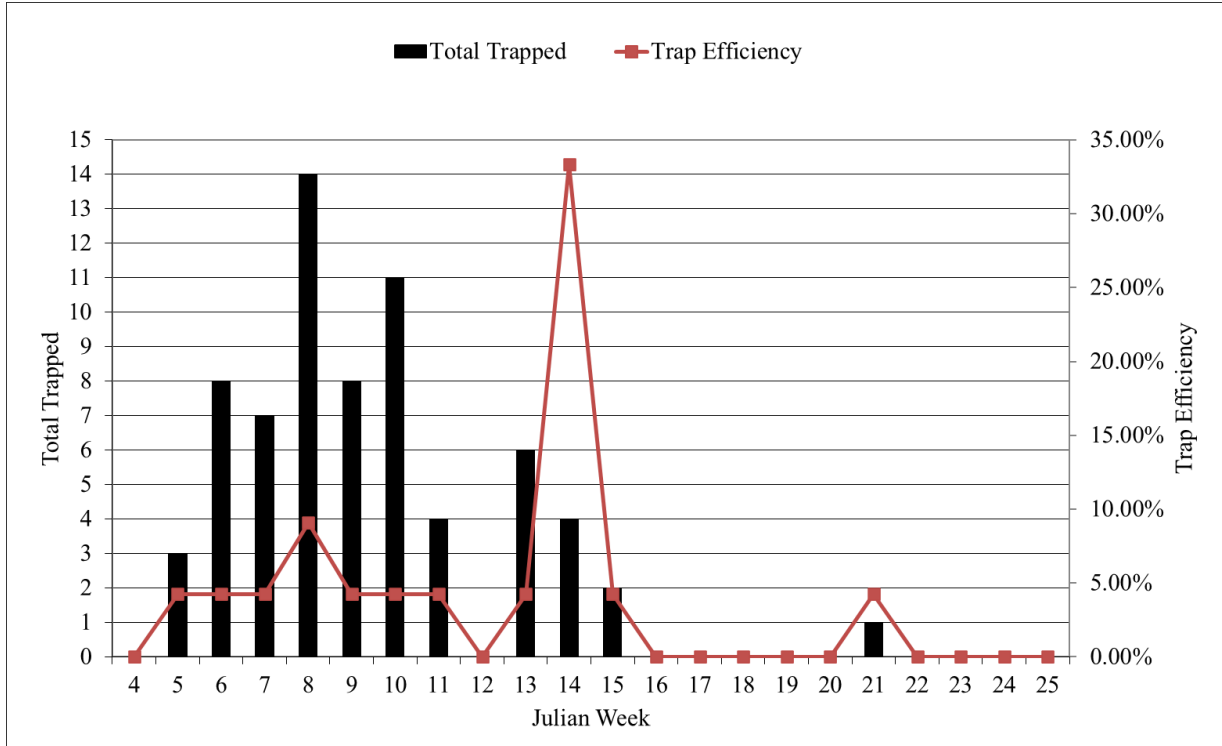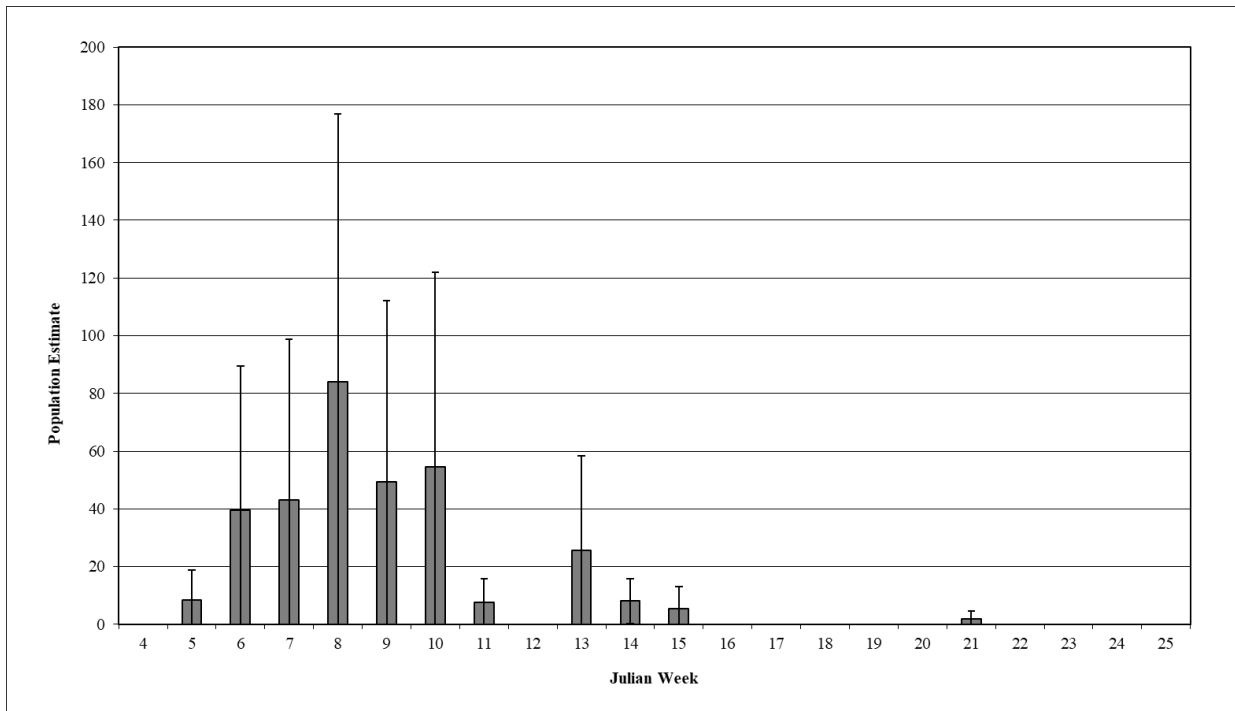" Estimated confidence levels based on seasonal trap efficiency

Figure 11. A total of 1,784 1+ Coho Salmon were sampled on the Scott River with a seasonal trap efficiency of 2.67%, which was used for JW 4, 5, 7, 10-13, 16 and 24-25.
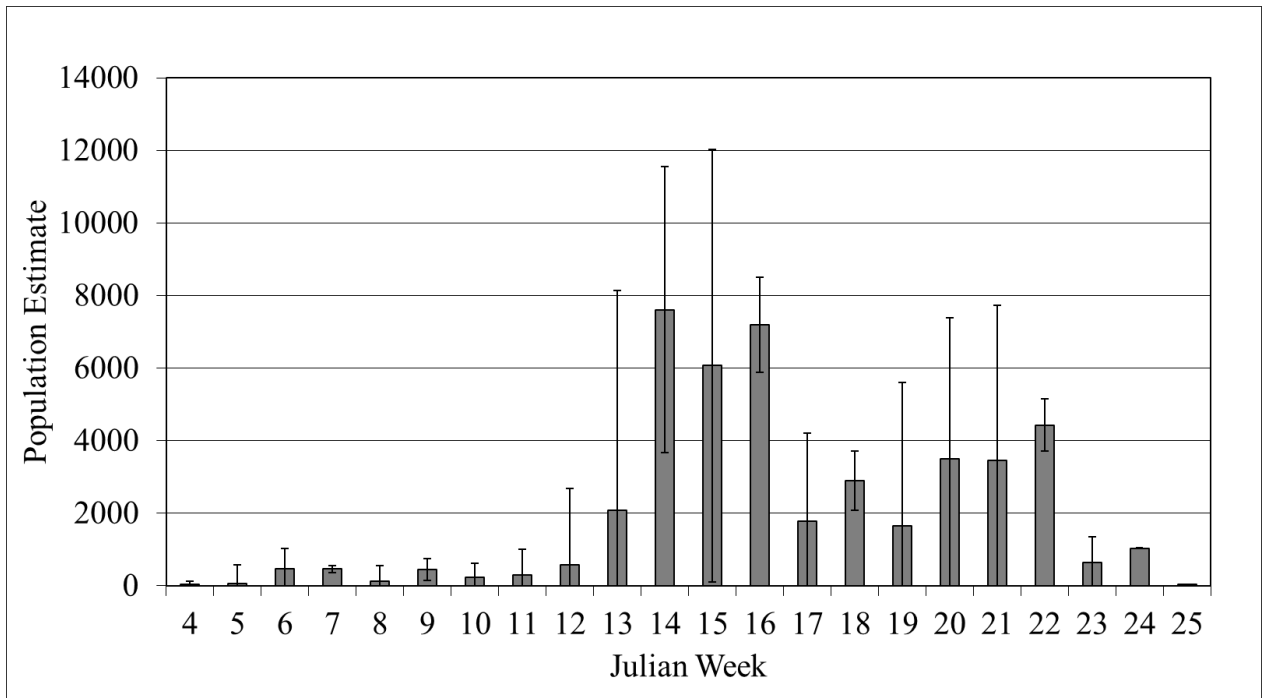
Figure 12. Population estimate with 95% confidence interval* for 1+ Coho Salmon on the Scott River. Total population estimate was 68,616.

* Estimated weekly population and CI for JW 4, 5, 7, 10-13, 16 and 24-25 is based on seasonal trap efficiency.

Bio-Sampling: 0+ and 1+ Coho Salmon

34 0+ and 312 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 94, 115 and 129 mm respectively.
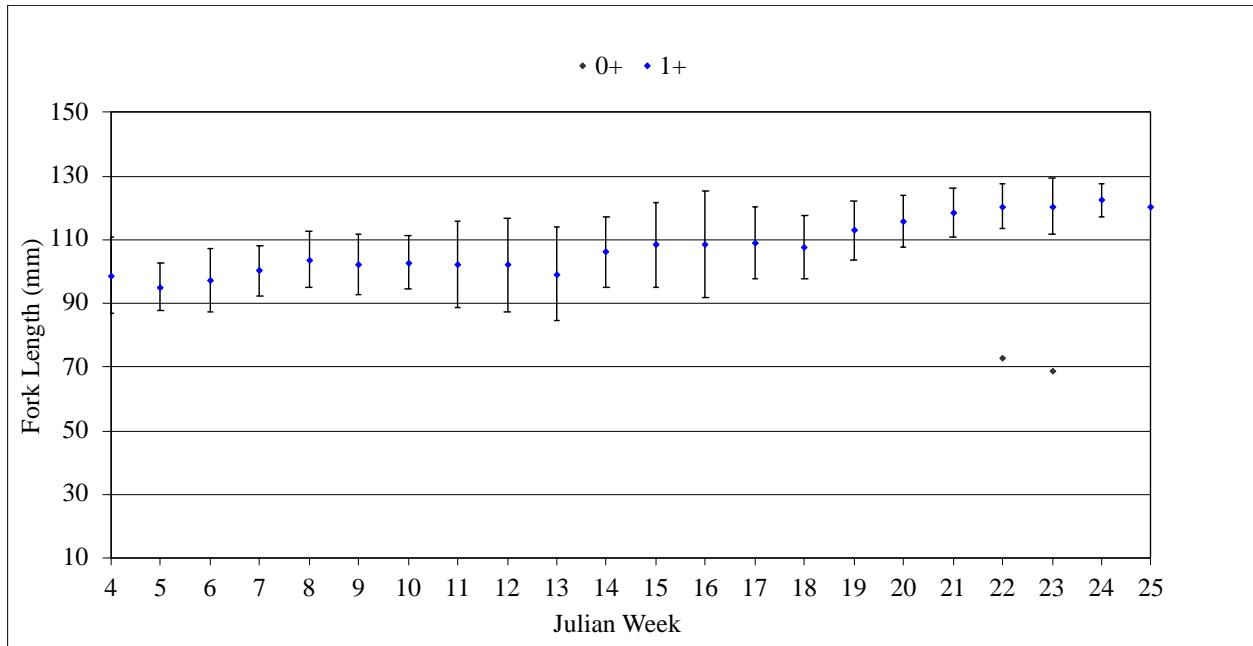

Figure 13. Scott River 0+ and 1+ Coho Salmon weekly mean fork lengths, Scott River.

Steelhead: 0+

A total of 11,671 0+ steelhead were sampled on the Scott River with a seasonal trap efficiency of 4.54%, which was used for JW 14-20 (Table 8). Weekly trap efficiencies ranged from 0.48-8.28% (Figure 14). The population estimate for 0+ steelhead emigrating out of the system in 2022 was 638,577. Peak emigration occurred during JW 25 (June 18 – June 24, 2022) with an estimated 371,846 (58.23% of the total population) emigrating out of the Scott River during that week (Figure 15). An estimated 0% emigrated out of the system by the end of JW 13.

Table 9. Catch Table 0+ steelhead, Scott River 2022

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
4	0	0	0	2.78	0	0	#DIV/0!	0	0	0
5	0	0	0	5.74	0	0	#DIV/0!	0	0	0
6	0	0	0	12.33	0	0	#DIV/0!	0	0	0
7	0	0	0	24.75	0	0	#DIV/0!	0	0	0
8	0	0	0	21.93	0	0	#DIV/0!	0	0	0
9	0	0	0	21.94	0	0	#DIV/0!	0	0	0
10	0	0	0	17.80	0	0	#DIV/0!	0	0	0
11	0	0	0	19.85	0	0	#DIV/0!	0	0	0
12	0	0	0	28.22	0	0	#DIV/0!	0	0	0
13	0	0	0	32.78	0	0	#DIV/0!	0	0	0
14	1	0	0	34.98	0	0	4.54%**	2	0	5
15	1	0	1	33.44	0	0	4.54%**	2	-1	5
16	12	0	12	28.94	0	0	4.54%**	101	-23	225
17	90	1	91	25.14	0	0	4.54%**	1,632	342	2,921
18	232	2	234	31.48	0	0	4.54%**	5,519	2,913	8,126
19	61	0	61	29.49	5	0	4.54%**	522	169	875
20	256	7	263	18.86	47	0	4.54%**	4,028	252	7,805
21	1,886	23	1,909	29.08	616	51	8.28%	22,651	16,736	28,566
22	3,039	24	3,063	24.64	542	26	4.80%	71,867	49,527	94,207
23	3,654	22	3,676	15.05	696	22	3.16%	111,399	67,435	155,363
24	834	2	836	22.16	200	5	2.50%	49,011	28,502	69,519
25	1,515	10	1,525	10.18	208	1	0.48%	371,846	192,257	551,434
Totals	**11,581**	**91**	**11,671**	**491.54**	**2,314**	**105**	**4.54%**	**638,577**	**451,061**	**826,094**

[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 fish early released due to condition.

[4] Trap efficiency was calculated using the equation $y = 0.4906x + 0.03$, where y is steelhead 0+ efficiency and x is Chinook 0 + efficiency.

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

* Weekly population estimate was calculated using the Chinook 0+ seasonal trap efficiency.

″ Estimated confidence levels based on seasonal trap efficiency
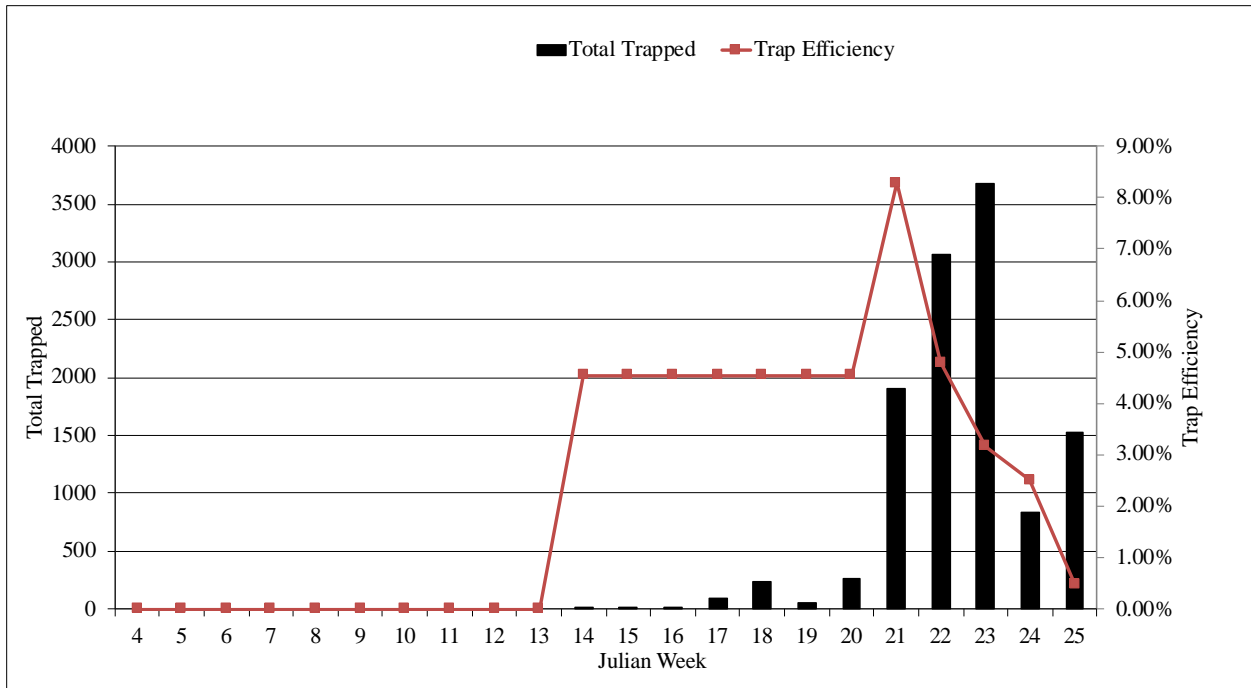
Figure 14. A total of 11,671 0+ steelhead were sampled on the Scott River with a seasonal trap efficiency of 4.54%, which was used for JW 14-20.

Figure 15. Population estimate with 95% confidence interval* for 0+ steelhead on the Scott River. Total population estimate was 638,577.

* Estimated weekly population and CI for JW 14-20 is based on seasonal trap efficiency.

Steelhead: 1+

A total of 1,460 1+ steelhead were sampled on the Scott River with a seasonal trap efficiency of
1.70% (Table 10), which was used for JW 4, 5, 7, 9-12, 17, and 20-25. Weekly trap efficiencies
ranged from 1.05%-5.88% (Figure 16). The population estimate for 1+ steelhead emigrating out
of the Scott River watershed in 2022 was 45,455. Peak emigration was JW 13 (March 26 – April
1, 2022), with an estimated 15,177 (33.39% of the total population) emigrating out of the Scott
River during that period (Figure 17). An estimated 23,946 (52.68% of the total population)
emigrated out of the system by April 1st.

Table 10. Catch Table 1+ Steelhead, Scott River 2022

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
4	8	0	8	2.78	3	0	1.70%**	71*	0"	109"
5	9	0	9	5.74	6	0	1.70%**	57*	0"	132"
6	18	0	18	12.33	17	1	5.88%	162	0	344
7	17	0	17	24.75	15	0	1.70%**	217*	0"	498"
8	32	0	32	21.93	28	1	3.57%	464	0	986
9	48	0	48	21.94	42	0	1.70%**	1,204*	0"	2,633"
10	39	0	39	17.80	26	0	1.70%**	730*	0"	1,638"
11	60	0	60	19.85	31	0	1.70%**	1,257*	0"	2,789"
12	143	0	143	28.22	69	0	1.70%**	4,607*	0"	9,634"
13	288	2	290	32.78	156	2	1.28%	15,177	370	29,983
14	157	0	157	34.98	122	7	5.74%	2,414	851	3,977
15	113	1	114	33.44	95	1	1.05%	5,472	0	11,653
16	49	0	49	28.94	26	1	3.85%	662	0	1,396
17	128	0	128	25.14	103	0	1.70%**	4,839*	0"	9,722"
18	87	3	90	31.48	68	1	1.47%	3,623	122	7,123
19	42	1	43	29.49	36	2	5.56%	928	413	1,443
20	54	0	54	18.86	30	0	1.70%**	1,109*	0"	2,465"
21	43	0	43	29.08	25	0	1.70%**	785*	0"	1,760"
22	51	2	53	24.64	24	0	1.70%**	1,098*	0"	2,268"
23	28	3	31	15.05	8	0	1.70%**	246*	0"	559"
24	13	0	13	22.16	5	0	1.70%**	126*	34"	218"
25	19	2	21	10.18	5	0	1.70%**	271*	125"	417"
Totals	**1,446**	**14**	**1,460**	**491.54**	**940**	**16**	**1.70%**	**45,445**	**27,297**	**63,736**

[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 fish early released due to condition.

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

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

* Weekly population estimate was calculated using the seasonal trap efficiency.

**Seasonal trap efficiency was used for weekly totals when fish were not recaptured.

" Estimated confidence levels based on seasonal trap efficiency

Figure 16. A total of 1,460 1+ steelhead were sampled on the Scott River with a seasonal trap efficiency of 1.70%, which was used for JW 4, 5, 7, 9-12, 17, and 20-25.
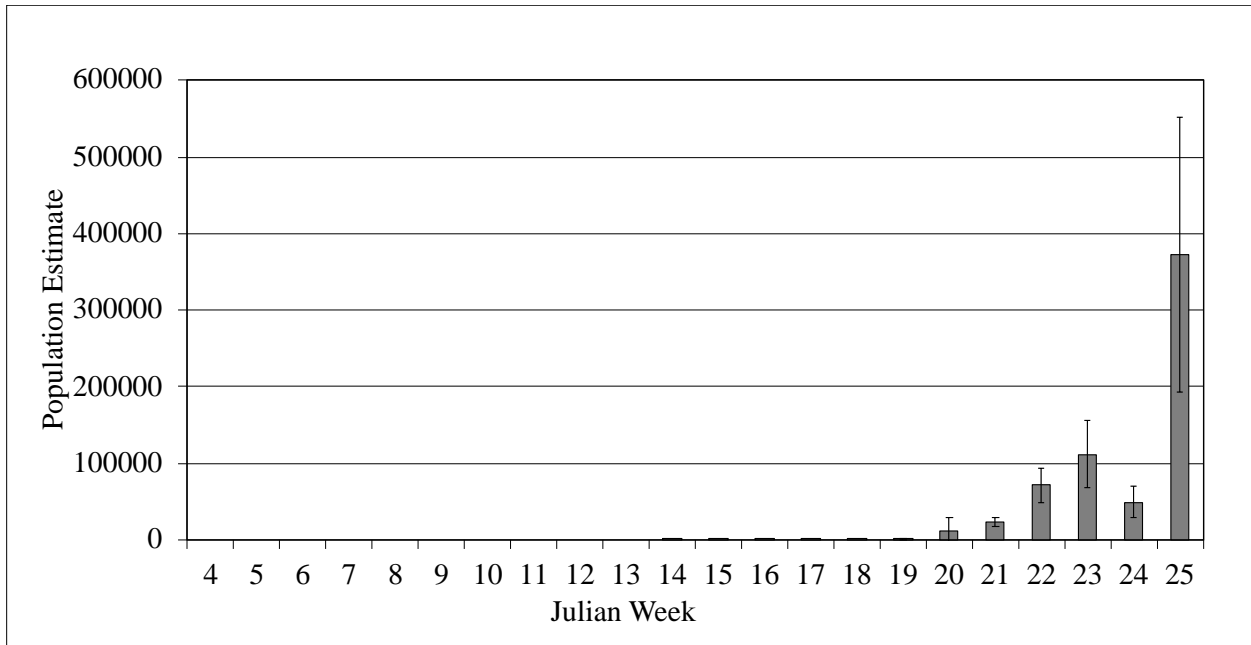

Figure 17. Population estimate with 95% confidence interval* for 1+ steelhead on the Scott River. Total population estimate was 45,455.

* Estimated weekly population and CI for JW 4, 5, 7, 9-12, 17, and 20-25 are based on seasonal trap efficiency.

Steelhead: 2+

A total of 294 2+ steelhead were sampled on the Scott River (Table 11). Seasonal trap efficiency was 1.09% and was used for JW 6-8, 10-17, and 19-25 (Figure 18). Weekly trap efficiency ranged from 1.09-25.00%. The population estimate for 2+ steelhead emigrating out of the Scott River in 2021 was 4,173. Peak emigration was JW 15 (April 9 – 15, 2022), with an estimated 1,273 (30.51% of the total population) emigrating during that week (Figure 19). An estimated 1,466 (35.13% of the population) emigrated out of the system by April 1st.

Table 11. Catch Table 2+ Steelhead, Scott River 2022

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
4	0	0	0	2.78	0	0	-	-	-	-
5	0	0	0	5.74	0	0	-	-	-	-
6	4	0	4	12.33	3	0	1.09%**	15*	0"	36"
7	5	0	5	24.75	5	0	1.09%**	28*	0"	67"
8	3	0	3	21.93	3	0	1.09%**	12*	0"	28"
9	10	1	11	21.94	8	1	12.50%	50	0	103
10	10	0	10	17.80	9	0	1.09%**	91*	0"	214"
11	21	1	22	19.85	15	0	1.09%**	303*	0"	701"
12	36	0	36	28.22	22	0	1.09%**	668*	0"	1,533"
13	25	1	26	32.78	12	0	1.09%**	299*	0"	691"
14	23	0	23	34.98	17	0	1.09%**	349*	0"	808"
15	46	1	47	33.44	37	0	1.09%**	1,273*	0"	2,875"
16	23	0	23	28.94	9	0	1.09%**	209*	0"	483"
17	4	0	4	25.14	4	0	1.09%**	19*	0"	45"
18	4	0	4	31.48	4	1	25.00%	12	1	22
19	3	0	3	29.49	1	0	1.09%**	10*	4"	17"
20	20	0	20	18.86	11	0	1.09%**	214*	0"	497"
21	25	3	28	29.08	14	0	1.09%**	364*	0"	842"
22	16	0	16	24.64	10	0	1.09%**	185*	0"	395"
23	7	1	8	15.05	0	0	1.09%**	66*	0"	156"
24	0	1	1	22.16	0	0	1.09%**	2*	0"	5"
25	1	0	1	10.18	0	0	1.09%**	5*	2"	7"
Totals	**286**	**9**	**294**	**491.54**	**184**	**2**	**1.09%**	**4,173**	**2,100**	**6,245**

[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 fish early released due to condition.

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

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

* Weekly population estimate was calculated using the seasonal trap efficiency.

**Seasonal trap efficiency was used for weekly totals when fish were not recaptured.

" Estimated confidence levels based on seasonal trap efficiency

Figure 18. A total of 294 2+ steelhead were sampled on the Scott River. Seasonal trap efficiency was 1.09% and was used for JW 6-8, 10-17, and 19-25.
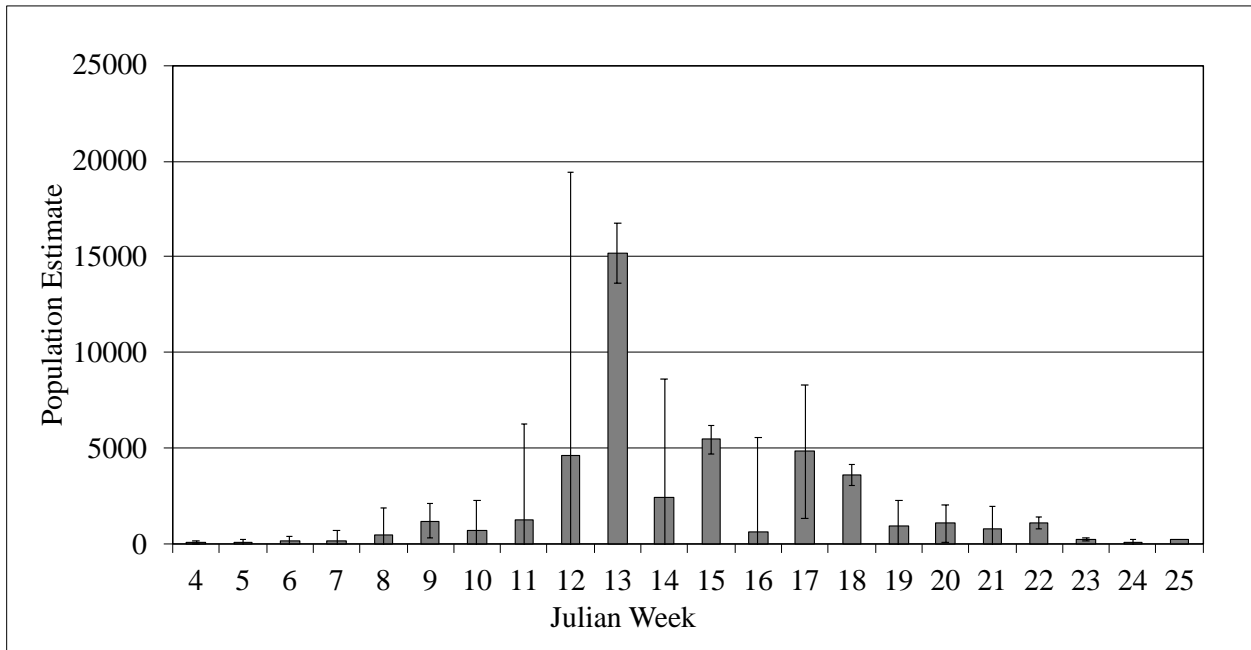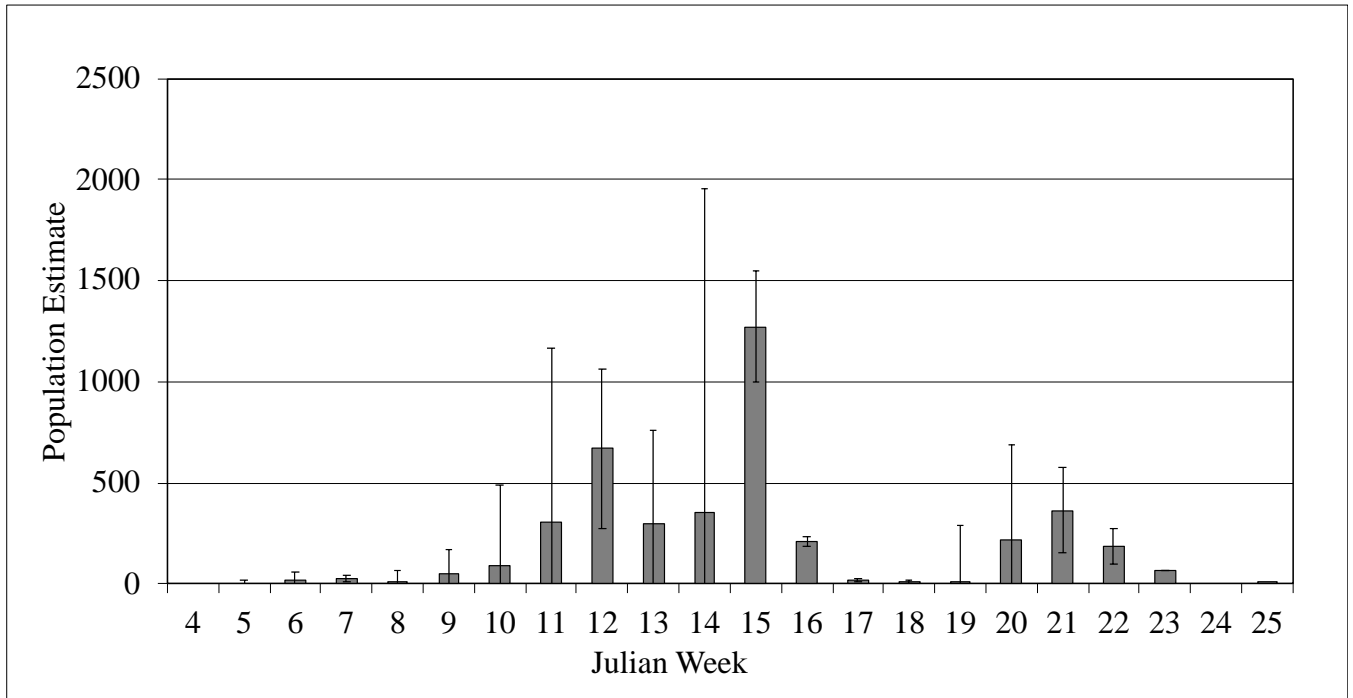

Figure 19. Population estimate with 95% confidence interval* for 2+ steelhead on the Scott River. Total population estimate was 4,173.

* Estimated weekly population and CI for JW 6-8, 10-17, and 19-25 are based on seasonal trap efficiency.

Steelhead: 3+

14 3+ steelhead were trapped during the 2022 season. None of these fish were recaptured so no population estimate is available.

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

A total of 1,173 1+, 254 2+ and six 3+ steelhead 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 were 120, 146, and 204 mm respectively.
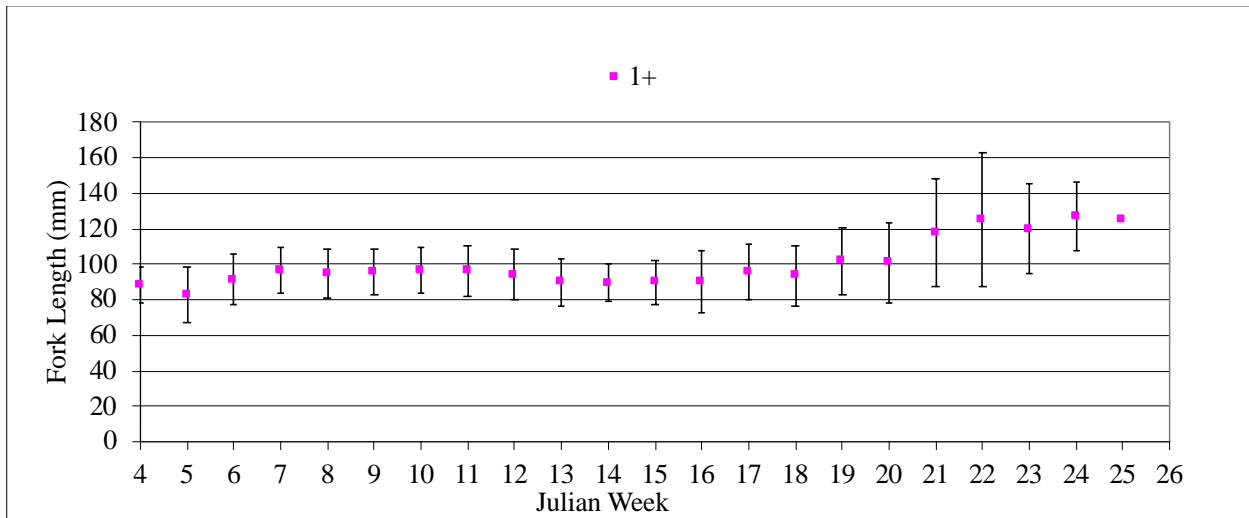
Figure 20. 1+ steelhead, weekly mean fork lengths, Scott River, with one standard deviation.
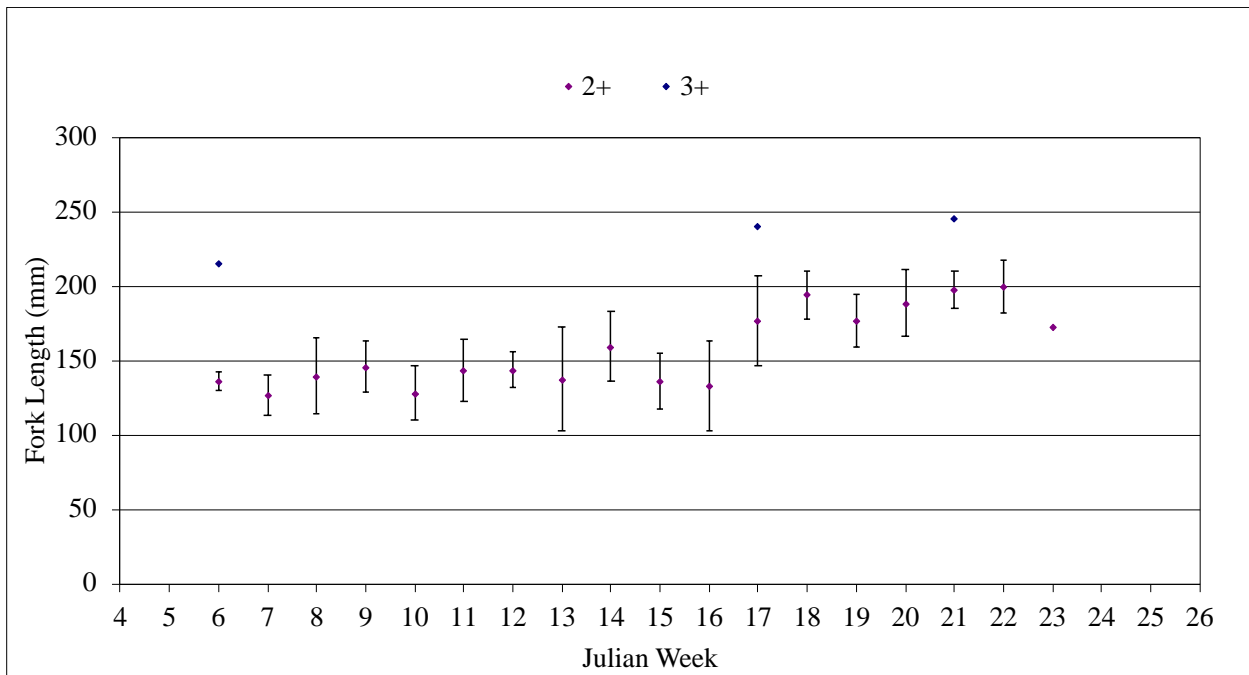
Figure 21. 2+ and 3+ steelhead, weekly mean fork lengths, Scott River, with one standard deviation.

Non-target species

Thirteen non-salmonids were sampled in the Scott River RSTs and equated to 29.51% of the total catch (Table 12).

Table 12. Non-salmonid species collected in the Scott River rotary screw traps, 2022.

Common Name	Scientific Name	Count
Unknown Lamprey	---	10,741
Pacific Lamprey	*Entosphenus tridentatus*	5,544
Klamath Small Scale Sucker	*Catostomus rimiculus*	2,769
Bull Frog & Tadpole	*Rana catesbeiana*	455
Speckled Dace	*Rhinichthys osculus*	325
Brook Stickleback	*Culaea inconstans*	100
Fathead Minnow	*Pimephales promelas*	90
Klamath River Lamprey	*Entosphenus similis*	87
Marbled Sculpin	*Cottus klamathensis*	22
Western Toad	*Anaxyrus boreas*	13
Green Sunfish	*Lepomis cyanellus*	6
Red Swamp Crayfish	*Procambarus clarkii*	5
Signal Crayfish	*Pacifastacus leniusculus*	5

Multi-year Comparison
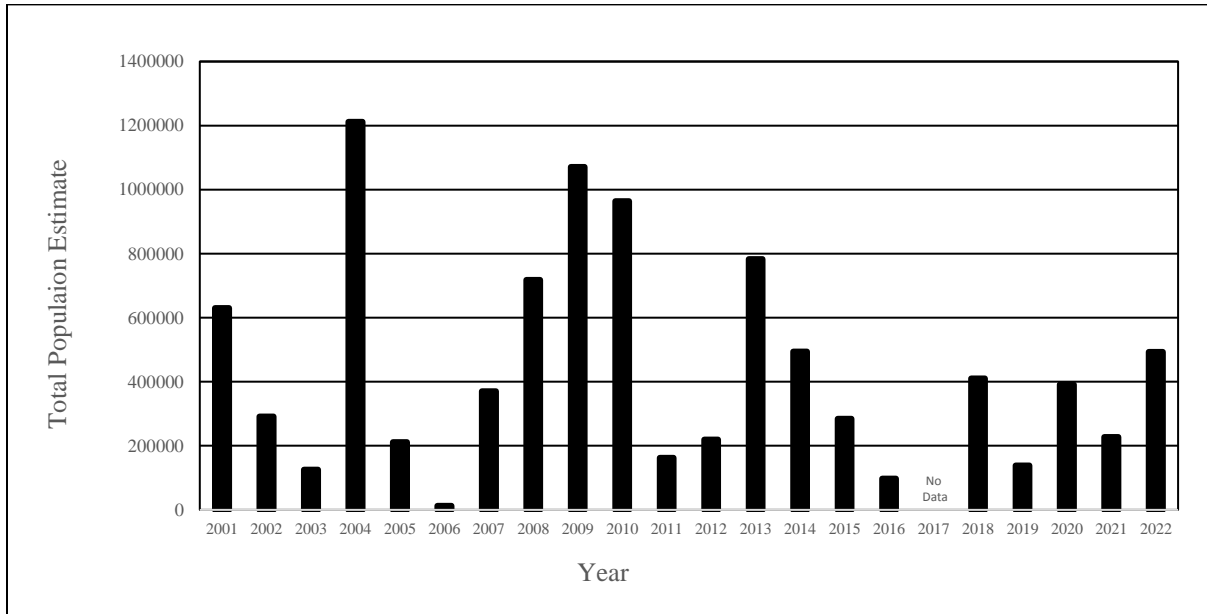
Figure 22. 2001 – 2022 0+ Chinook Salmon population estimates, Scott River. RST was not in operation in 2017.
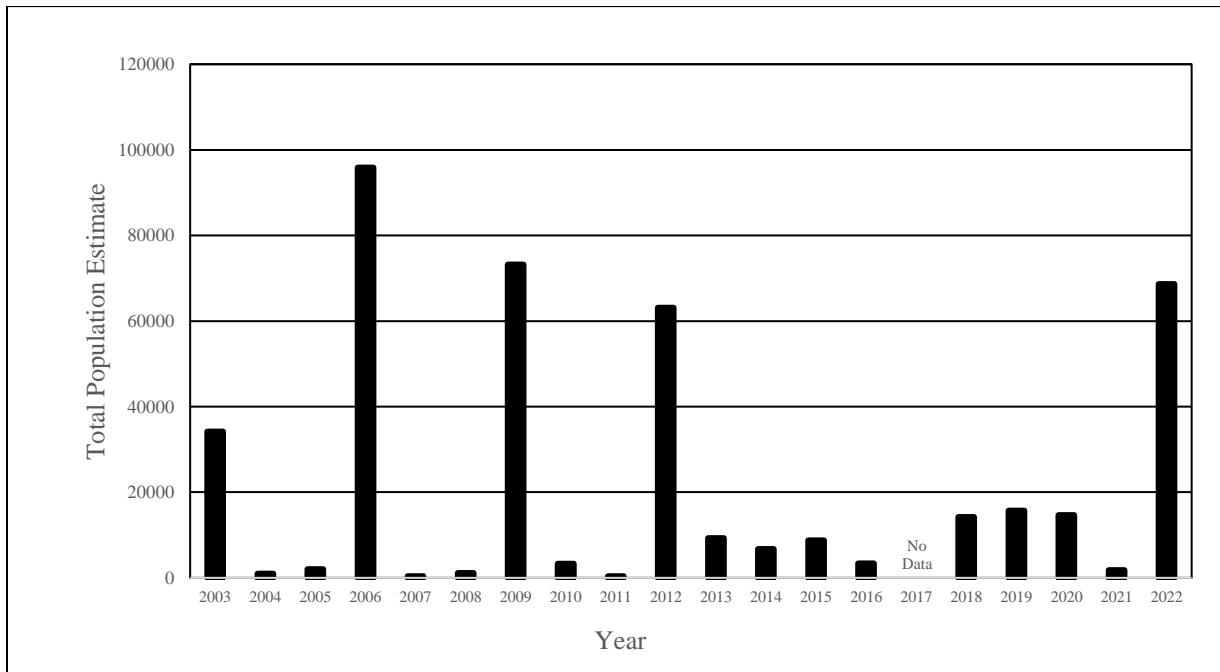
Figure 23. 2003–2022 1+ Coho Salmon population estimates, Scott River. Estimate for 2003 was not corrected for a 7-day estimate; 2007 is based on correlation with steelhead trapping efficiencies; and RST was not operated in 2017.

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 2004-2021 (Giudice and Knechtle 2021).

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	9,283	2014	121	383	504	5.43
2012	2014	6,734	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	**	2018	14	712	726	**
2016	2018	14,218	2019	27	338	365	2.50
2017	2019	15,707	2020	8	1664	1672	10.64
2018	2020	14,628	2021	102	845	947	6.47
2019	2021	1,762	2022	---	---	---	---

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

** For 2009 & 2015: Inherent error in data may be due to underestimating juvenile fish or overestimation or age structure classification of adult Coho Salmon.
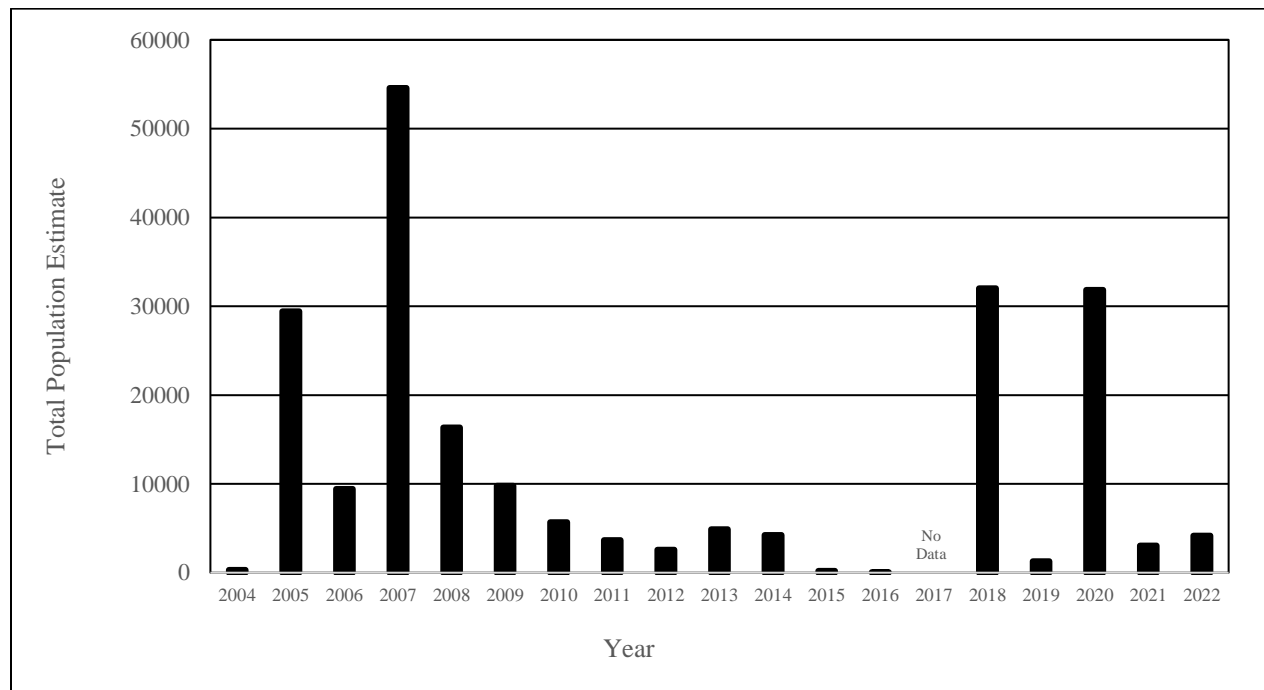
Figure 24. 2004 – 2022 2+ steelhead population estimates, Scott River. The Scott RST was not in operation in 2017.

Discussion

On August 17, 2021 the California State Water Resources Control Board approved emergency curtailment regulations for Shasta and Scott Rivers. This meant that in 2022 curtailments to water diversions would be implemented if Scott River flows fell below the following values (in cubic feet per second):

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
200	200	200	150	150	125	50	30	33	40	60	150

Minimum flow in 2021 was 4.14 cfs on July 17th while minimum flow in 2022 so far was 18.9 cfs on July 17th (USGS 2022). Higher summer flows may have an impact on the timing of outmigration, the percentage of salmonids remaining in the Scott watershed, etc. Continued monitoring of outmigrants in future years will shed light on the impacts of the emergency regulations.

An estimated 68,616 age 1+ coho salmon outmigrated from the Scott River in 2022. This indicates that the 41 smolts were produced per adult coho that returned in the fall of 2020. From 2004 to 2022 the average number smolts produced per adult is 32, meaning that the smolts per adult from the 2020 brood year is 130% of average.

ACKNOWLEDGEMENTS

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APPENDICES

Appendix 1. Life stages of salmonids

Sac Fry	Young salmon from hatching. Yolk sac not yet absorbed.
Fry	Stage between sac fry and parr. Yolk sac is fully absorbed and parr marks are beginning to become visible.
Parr	Parr marks are fully developed. Body is widening.
Silvery Parr	Stage between parr and smolt. Parr marks are fading and being replaced by silver scales.
Smolt	Silver scales and parr marks are not visible.
Adult	A sexually mature fish.

Appendix 2. Scott River age-length cut-offs for Julian weeks 4-25 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

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

* = eight days only during leap years
** = eight day Julian week

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
4	---	---	---	---	---
5	---	---	---	---	---
6	---	---	---	---	---
7	---	---	---	---	---
8	36.90	1.66	10	34	39
9	37.79	3.22	28	30	50
10	37.92	2.12	26	32	44
11	38.10	2.91	21	36	50
12	37.82	2.16	100	33	47
13	41.88	7.48	40	31	62
14	45.61	8.52	163	31	69
15	53.42	7.11	50	38	68
16	52.63	5.41	100	37	66
17	55.38	7.48	53	37	73
18	57.81	6.61	52	45	75
19	62.75	6.93	99	50	81
20	66.86	9.12	44	51	94
21	67.75	8.00	153	44	91
22	73.27	8.60	229	52	93
23	78.18	9.62	119	56	99
24	90.61	7.44	87	73	109
25	90.74	6.65	150	74	105

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
4	---	---	---	---	---
5	85.33	4.16	3	82	90
6	95.75	13.22	8	67	112
7	103.86	10.04	7	89	116
8	102.20	8.58	15	89	116
9	105.00	11.55	8	87	127
10	106.20	10.85	5	94	120
11	113.25	17.25	4	95	136
12	-	-	-	-	-
13	122.17	24.04	6	91	148
14	118.33	7.02	3	111	125
15	110.50	6.36	2	106	115
16	---	---	---	---	---
17	---	---	---	---	---
18	---	---	---	---	---
19	---	---	---	---	---
20	---	---	---	---	---
21	---	---	---	---	---
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
4	---	---	---	---	---
5	---	---	---	---	---
6	---	---	---	---	---
7	---	---	---	---	---
8	---	---	---	---	---
9	---	---	---	---	---
10	---	---	---	---	---
11	---	---	---	---	---
12	---	---	---	---	---
13	---	---	---	---	---
14	---	---	---	---	---
15	---	---	---	---	---
16	---	---	---	---	---
17	---	---	---	---	---
18	---	---	---	---	---
19	---	---	---	---	---
20	---	---	---	---	---
21	---	---	---	---	---
22	73.00	8.25	25	57	89
23	69.00	6.50	9	57	78
24	---	---	---	---	---
25	---	---	---	---	---
26	---	---	---	---	---

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
4	98.75	4.57	4	94	105
5	95.20	11.90	10	75	109
6	97.30	7.46	37	82	111
7	100.23	10.15	30	74	115
8	103.71	8.00	31	82	117
9	102.13	8.87	38	76	114
10	102.76	9.43	21	80	115
11	102.46	8.35	24	80	114
12	102.24	13.57	38	72	125
13	99.31	14.68	84	63	129
14	106.26	14.68	141	64	161
15	108.39	11.03	187	80	140
16	108.45	13.50	141	74	188
17	109.16	16.68	110	75	207
18	107.82	11.36	50	76	133
19	112.90	9.95	69	79	132
20	115.96	9.44	100	94	150
21	118.58	8.09	78	99	135
22	120.44	7.70	96	110	144
23	120.55	7.05	38	108	146
24	122.47	8.72	36	110	141
25	120.57	5.09	7	115	129
26	---	---	---	---	---

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

Julian week	Average	s.d.	n	Min	Max
4	---	---	---	---	---
5	---	---	---	---	---
6	---	---	---	---	---
7	---	---	---	---	---
8	---	---	---	---	---
9	---	---	---	---	---
10	---	---	---	---	---
11	---	---	---	---	---
12	---	---	---	---	---
13	---	---	---	---	---
14	---	---	---	---	---
15	---	---	---	---	---
16	---	---	---	---	---
17	---	---	---	---	---
18	---	---	---	---	---
19	---	---	---	---	---
20	---	---	---	---	---
21	---	---	---	---	---
22	---	---	---	---	---
23	---	---	---	---	---
24	---	---	---	---	---
25	---	---	---	---	---
26	---	---	---	---	---

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

Julian week	Average	s.d.	n	Min	Max
4	88.25	19.41	8	60	115
5	82.44	9.88	9	69	103
6	91.28	15.59	18	65	113
7	96.65	14.38	17	78	118
8	94.55	13.05	33	72	115
9	95.44	13.91	48	65	118
10	96.69	12.90	39	68	130
11	96.31	13.17	58	57	119
12	94.23	13.99	119	56	119
13	89.91	14.45	183	55	119
14	89.74	13.17	124	64	118
15	89.78	10.98	97	70	109
16	90.14	12.03	37	63	107
17	95.91	17.31	122	62	147
18	93.48	15.86	40	73	130
19	101.83	16.65	41	75	143
20	100.84	18.58	49	69	147
21	117.66	22.67	32	81	171
22	125.08	30.00	50	86	177
23	120.00	37.77	22	16	179
24	127.17	24.92	12	98	179
25	124.73	19.17	15	98	169
26	---	---	---	---	---

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

Julian week	Average	s.d.	n	Min	Max
4	---	---	---	---	---
5	---	---	---	---	---
6	136.25	20.37	4	120	166
7	127	6.04	5	121	135
8	139.67	13.61	3	129	155
9	146.00	25.37	12	123	196
10	128.00	17.46	10	100	165
11	143.73	18.19	22	120	184
12	143.88	21.03	25	121	213
13	137.57	12.30	23	120	160
14	159.28	34.79	18	120	220
15	135.85	23.34	46	106	190
16	133.11	18.83	18	112	168
17	177.00	30.32	4	152	217
18	194.00	30.41	3	159	214
19	176.50	16.26	2	165	188
20	188.78	17.76	18	157	219
21	197.39	22.46	23	122	228
22	199.94	12.38	16	182	223
23	172.50	17.68	2	160	185
24	---	---	---	---	---
25	---	---	---	---	---
26	---	---	---	---	---

Appendix 11. Multi-year 0+ Chinook Salmon population estimates by Julian week and season total, 2001 – 2022, 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	2021	2022
4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4
5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	14	----	14	15
6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	168	5255	----	1012	25	----	20	5
7	----	----	----	6395	----	----	530	339	----	1296	31	349	5080	7	1105	4720	----	2713	7	37	110	51
8	----	----	----	----	----	----	1938	175	532	2181	3002	3508	2822	140	4956	7124	----	1562	50	46	212	586
9	----	----	----	14862	----	----	994	3477	----	15778	7816	1986	27672	4292	2164	4778	----	1031	196	68	630	5,847
10	----	----	----	55053	2365	1092	6175	37716	460	20220	13384	2197	22657	226	8446	----	----	72716	176	1992	1387	2,552
11	7240	----	----	97416	11548	63	488	14888	10374	85056	3990	4645	33242	375	26990	9618	----	15141	24093	5989	4008	1,412
12	41535	----	----	104792	14166	103	15659	14433	32479	47132	6539	1119	27951	9038	21555	14427	----	12961	38369	4568	5829	50,477
13	8524	----	----	160406	4592	61	12472	35320	86779	100699	18320	25480	37785	43059	6960	6435	----	3598	22805	12715	6403	49,069
14	18796	49916	----	123290	24907	68	12360	43904	88192	46372	19220	11104	2730	107632	6747	10388	----	11228	0	5859	37932	58,028
15	39187	20945	15164	107805	17070	37	30846	92904	202763	81515	20265	6851	24421	41813	7016	13892	----	24714	0	17381	38567	17,219
16	100278	29008	16113	47900	8598	75	68769	16687	321650	133590	11781	21812	32038	30818	10425	11934	----	17430	6292	18827	40925	27,977
17	79772	24346	3638	30427	5035	----	14320	32757	96571	64864	15371	196	15013	66917	29156	1958	----	7425	74	19314	6220	18,177
18	57000	38295	----	11503	4284	7	16436	41028	60656	20979	9216	12009	32851	29820	24982	5611	----	9742	4195	21625	25622	36,362
19	20869	4494	----	19758	4652	62	6013	71064	----	138698	4989	10499	34685	32561	24798	534	----	12417	47	18751	6766	26,049
20	14330	6057	----	9029	7299	----	14854	18190	44157	64266	5719	3515	28677	29609	24711	267	----	3662	3219	31284	2188	17,825
21	201288	4293	----	5438	3718	19	17261	52194	49291	34618	3020	4589	16297	47712	10641	88	----	2637	971	10166	10613	23,983
22	41331	3781	----	6592	7007	28	4478	61290	12252	22450	1582	2203	50722	27725	17325	0	----	43215	1024	20814	10415	60,291
23	----	36243	----	17533	12248	----	26041	38093	8420	----	515	7550	109656	10969	30423	----	----	125757	2084	189372	27992	20,001
24	----	73829	----	61740	4543	19	60114	38571	13033	26872	25	8947	219875	8679	20375	----	----	38531	1756	12206	1696	22,867
25	----	----	----	268773	2842	22	----	42726	23413	33499	4390	40496	37364	1810	5070	----	----	2630	12455	1684	168	54,291
26	----	----	14050	59270	19341	3061	60877	62195	19500	23310	13533	50247	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	219,303	782,804	493,721	284,329	97,027	NA	410,688	138,947	391,643	227,716	493,084

[1]The Scott RST was not in operation in 2017.

Appendix 12. Multi-year 1+ Coho Salmon population estimates by Julian week and season total, 2003 – 2022, 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	2021	2022
4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	350
5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	616	----	2	375
6	----	----	----	----	----	----	----	----	----	----	----	----	14	139	----	72	448	----	6	888
7	----	0	7	----	2	15	555	28	3	2,069	8	49	1,792	51	----	1	359	44	6	1,124
8	----	95	12	576	0	12	1,818	28	2	2,764	21	1,213	1,832	44	----	19	224	165	4	149
9	489	23	32	651	1	5	6,727	99	4	432	30	1,419	1,617	70	----	22	821	105	4	666
10	272	245	50	323	0	----	15,201	83	4	1,974	54	63	210	----	----	4	186	375	6	787
11	2,367	84	189	1,435	1	52	15,096	115	7	2,946	21	168	211	0	----	1,121	224	322	10	974
12	10,136	5	71	1,199	2	33	7,595	55	3	2,884	67	1,079	120	44	----	454	381	537	39	1,536
13	1,677	28	106	3,400	9	64	7,294	21	2	3,197	22	245	341	709	----	340	719	805	210	3,258
14	3,600	1	343	2,118	21	209	2,866	148	----	4,314	18	84	243	882	----	1,934	----	805	240	9,454
15	4,068	74	313	2,527	48	127	5,805	260	2	5,250	350	417	561	200	----	933	----	1,341	210	6,903
16	1,338	212	173	7,153	30	175	5,121	308	4	8,785	436	394	389	177	----	1,767	499	1,502	132	9,176
17	1,261	37	211	7,125	20	108	2,638	390	44	7	1,895	343	531	310	----	2,215	308	1,609	12	2,116
18	771	11	280	9,515	79	184	1,812	99	20	631	491	665	347	288	----	1,421	1,000	4,471	55	4,284
19	506	75	56	11,591	93	18	----	782	82	9,867	3,208	334	524	67	----	1,524	2,909	2,414	272	2,174
20	3,967	18	175	9,679	37	56	510	378	25	1,307	904	219	23	111	----	1,251	2,122	68	72	6,900
21	800	18	----	8,675	50	----	56	99	118	3,292	1,091	36	16	213	----	973	2,122	30	595	6,804
22	1,613	2	25	19,234	11	42	68	363	31	8,363	567	6	2	67	----	575	1,531	28	306	8,736
23	961	14	----	2,973	4	20	66	----	3	993	76	----	----	----	----	0	616	6	6	1,242
24	312	8	----	4,128	0	20	6	0	----	3,593	25	----	----	----	----	0	411	1	----	1,040
25	11	0	----	2,188	----	2	----	0	----	385	----	----	----	----	----	0	171	----	----	32
26	----	0	----	1,251	0	----	----	0	----	84	----	----	----	----	----	0	41	----	----	----
27	----	0	----	77	0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
28	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
TOTAL	34,149	949	2,042	95,815	410	1,142	73,232	3,257	353	63,135	9283	6734	8,758	3,372	----	14,626	15,707	14,628	1,762	68,616

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

[2] 2007 is based on correlation with steelhead trapping efficiencies. Weekly estimate not available.

[3] The Scott RST was not in operation in 2017.

Appendix 13. Multi-year 2+ steelhead population estimates by Julian week and season total, 2004 – 2022, Scott River.

Julian Week	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015[1]	2016[1]	2017[2]	2018	2019	2020	2021	2022
4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0	----	----	----
6	----	----	----	----	----	----	----	----	----	----	----	----	2	----	42	23	----	----	15
7	4	96	----	361	95	36	1	59	81	11	21	11	0	----	128	14	385	----	28
8	5	92	193	121	20	116	4	83	123	11	294	13	0	----	105	11	220	----	12
9	4	868	75	----	560	851	172	231	58	12	1,096	13	4	----	11	175	769	6	50
10	26	1,482	116	2,352	1,107	859	229	832	15	114	250	9	----	----	408	218	616	21	91
11	14	2,086	7	2,664	2,786	71	1,331	546	41	39	57	9	0	----	3,220	212	769	120	303
12	9	1,300	295	14,749	546	438	2,107	199	50	186	282	5	2	----	5,460	246	513	432	668
13	6	1,853	595	5,770	1,415	1,190	480	512	47	63	370	4	8	----	1,531	25	1,847	467	299
14	12	3,500	359	2,871	4,611	429	113	33	231	18	109	1	21	----	14,380	----	3,385	1,219	349
15	7	2,616	317	5,019	4,236	2,827	452	496	217	687	313	26	11	----	4,106	----	5,538	280	1,273
16	27	5,819	7	1,813	719	2,938	660	158	1,602	1,136	212	33	6	----	1,292	268	9,538	406	209
17	14	2,546	105	501	89	37	4	16	42	247	33	8	5	----	106	0	2,001	12	19
18	8	741	42	299	64	5	0	16	6	36	274	6	1	----	35	7	1,027	----	12
19	13	664	126	630	11	----	18	83	1	327	411	14	0	----	67	14	210	20	10
20	30	231	1,218	12,950	----	----	4	67	0	265	519	30	4	----	754	14	2,501	15	214
21	27	60	4,106	3,354	14	----	6	59	29	870	0	6	1	----	231	14	1,538	30	364
22	25	282	691	912	26	----	85	119	18	457	1	1	2	----	116	41	769	6	185
23	25	1,579	245	100	7	----	----	80	7	410	1	0	----	----	25	5	220	2	66
24	31	1,664	298	71	26	----	3	----	13	5	----	0	----	----	0	5	----	----	2
25	12	204	18	----	5	----	16	----	6	0	----	0	----	----	1	5	----	----	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	3,036	4,173

[1]Reported numbers are total trapped and not population estimate.
[2]The Scott RST was not in operation in 2017.