

State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

ANNUAL REPORT
SHASTA AND SCOTT RIVER
JUVENILE SALMONID OUTMIGRANT STUDY, 2007

Prepared by

William R. Chesney, Whitney B. Crombie and
Heather D. Langendorf

Anadromous Fisheries Resource Assessment and Monitoring Program
December 2008

Funded By the California Department of Fish and Game Fisheries Restoration Grants
Program
Grant Administered by the Shasta Valley Resource Conservation District

Table of Contents

List of Charts	iii
List of Tables	v
List of Appendices	v
Abstract	1
Background	1

Shasta River Rotary Screw Trap Summary

Methods	1
Age Determination	2
Trap Efficiency Determinations and Production Estimates	2
Water Temperature and Flow Monitoring	3
Results	3
Chinook	3
Coho	3
Steelhead	3
Discussion	13
Coho	13
Chinook	15

Scott River Rotary Screw Trap Summary

Methods	18
Trap Efficiency Determinations and Production Estimates	18
Water Temperature and Flow Monitoring	18
Results	18
Chinook	19
Coho	19
Steelhead	19
Discussion	29
Coho Estimates	29
Acknowledgements	31
Literature Cited	32

List of Charts

Chart 1. Shasta River 0+ Chinook estimates, 2007.....	4
Chart 2. Shasta River 0+ Chinook estimates, as percentage of total estimate, 2007	5
Chart 3. Shasta River 0+ and 1+ Chinook weekly mean fork lengths, 2007	5
Chart 4. Shasta River 0+ coho estimates, 2007.....	6
Chart 5. Shasta River 0+ coho estimates, as percentage of total estimate, 2007	6
Chart 6. Shasta River 1+ coho estimates, 2007	7
Chart 7. Shasta River 1+ coho estimates, as percentage of total estimate, 2007	7
Chart 8. Shasta River 0+ steelhead estimates, 2007.....	8
Chart 9. Shasta River 0+ steelhead estimates, as percentage of total estimate, 2007	8
Chart 10. Shasta River 1+ steelhead estimates, 2007.....	9
Chart 11. Shasta River 1+ steelhead estimates, as percentage of total estimate, 2007	9
Chart 12. Shasta River 0+ and 1+ steelhead weekly mean fork lengths, 2007	10
Chart 13. Shasta River 2+ steelhead estimates, 2007.....	10
Chart 14. Shasta River 2+ steelhead estimates, as percentage of total estimate, 2007 ...	11
Chart 15. Shasta River 3+ steelhead estimates, 2007.....	11
Chart 16. Shasta River 3+ steelhead estimates, as percentage of total estimate, 2007.....	12
Chart 17. Shasta River 2+ and 3+ steelhead weekly mean fork lengths, 2007.....	12
Chart 18. Correlation between trap efficiencies of 1+ coho and 2+ steelhead smolts ...	13
Chart 19. Correlation between trap efficiencies of 0+ coho and 0+ steelhead	14
Chart 20. Shasta River 2007 flow by Julian week.....	16
Chart 21. Shasta River 2007 water temperatures by Julian week	16

Chart 22. Shasta River 2007 average, maximum and minimum water temperatures.....	17
Chart 23. Shasta River water temperature 4/30/07	17
Chart 24. Scott River 0+ Chinook estimates, 2007.....	20
Chart 25. Scott River 0+ Chinook estimates, as percentage of total estimate, 2007.....	21
Chart 26. Scott River 0+ and 1+ Chinook weekly mean fork lengths, 2007.....	21
Chart 27. Scott River 0+ coho estimates, 2007.....	22
Chart 28. Scott River 0+ coho estimates, as percentage of total estimate, 2007	22
Chart 29. Scott River 1+ coho weekly catch, as percentage of total catch, 2007	23
Chart 30. Scott River 0+ steelhead estimates, 2007.....	23
Chart 31. Scott River 0+ steelhead estimates, as percentage of total estimate, 2007	24
Chart 32. Scott River 1+ steelhead estimates, 2007.....	24
Chart 33. Scott River 1+ steelhead estimates, as percentage of total estimate, 2007	25
Chart 34. Scott River 0+ and 1+ steelhead weekly mean fork lengths, 2007.....	25
Chart 35. Scott River 2+ steelhead estimates, 2007	26
Chart 36. Scott River 2+ steelhead estimates, as percentage of total estimate, 2007.....	26
Chart 37. Scott River 2+ and 3+ steelhead weekly mean fork lengths, 2007.....	27
Chart 38. Scott River 2007 flow by Julian week.....	27
Chart 39. Scott River 2007 water temperatures by Julian week.....	28
Chart 40. Scott River 2007 average, maximum and minimum water temperatures	28
Chart 41. Correlation between trap efficiencies of 0+ coho and 0+ steelhead smolts	30

List of Tables

Table 1. Relationship between the number of returning adults and the number of 1+ coho smolts produced14

Table 2. Number of 1+ coho produced and observed and projected adult returns.....15

Table 3. Weekly juvenile Chinook estimates, Shasta River Chinook estimates, 2001-200715

Table 4. Scott River 1+ coho mark and recapture data, 2004-200729

List of Appendices

Appendix 1. Catch table with weekly data for Chinook 0+, Shasta River 2007.....33

Appendix 2. Catch table with weekly data for coho 0+, Shasta River 200734

Appendix 3. Catch table with weekly data for coho 1+, Shasta River 200735

Appendix 4. Catch table with weekly data for steelhead 0+, Shasta River 200736

Appendix 5. Catch table with weekly data for steelhead 1+, Shasta River 200737

Appendix 6. Catch table with weekly data for steelhead 2+, Shasta River 200738

Appendix 7. Catch table with weekly data for steelhead 3+, Shasta River 200739

Appendix 8. Catch table with weekly data for Chinook 0+, Scott River 2007.....40

Appendix 9. Catch table with weekly data for coho 0+, Scott River 200741

Appendix 10. Catch table with weekly data for coho 1+, Scott River 2007.....42

Appendix 11. Catch table with weekly data for steelhead 0+, Scott River 2007.....43

Appendix 12. Catch table with weekly data for steelhead 1+, Scott River 2007.....44

Appendix 13. Catch table with weekly data for steelhead 2+, Scott River 2007.....45

Appendix 14. Weekly fork length data for Chinook 0+, Shasta River 2007.....	46
Appendix 15. Weekly fork length data for Chinook 1+, Shasta River 2007.....	46
Appendix 16. Weekly fork length data for steelhead 0+, Shasta River 2007.....	47
Appendix 17. Weekly fork length data for steelhead 1+, Shasta River 2007.....	47
Appendix 18. Weekly fork length data for steelhead 2+, Shasta River 2007.....	48
Appendix 19. Weekly fork length data for steelhead 3+, Shasta River 2007.....	48
Appendix 20. Weekly fork length data for Chinook 0+, Scott River 2007.....	49
Appendix 21. Weekly fork length data for Chinook 1+, Scott River 2007.....	49
Appendix 22. Weekly fork length data for steelhead 0+, Scott River 2007.....	50
Appendix 23. Weekly fork length data for steelhead 1+, Scott River 2007.....	50
Appendix 24. Weekly fork length data for steelhead 2+, Scott River 2007.....	51
Appendix 25. Weekly fork length data for steelhead 3+, Scott River 2007.....	51
Appendix 26. Age Length cut-offs for Shasta River juvenile salmonids.....	52
Appendix 27. Age Length cut-offs for Scott River juvenile salmonids.....	53
Appendix 28. Additional fish species collected in the Shasta and Scott River rotary traps, 2007.....	54
Appendix 29. List of Julian weeks and calendar equivalents.....	55

Abstract

2007 was the eighth consecutive year of rotary trapping on the Shasta and Scott rivers. The goals of the project were to determine emigration abundance and timing of all age classes of juvenile salmonids leaving the Shasta and Scott rivers between early February and early July 2007 and to investigate the relationships between instream conditions and emigration patterns of juvenile salmonids.

We determined trap efficiencies for all age classes of Chinook (*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss*) in the catch and calculated weekly production estimates for each age class. We estimated the weekly mean fork length at age of salmonids in the catch from a measured sub-sample. Due to low numbers of 0+ and 1+ coho expected in 2007, we used the correlation between steelhead trap efficiencies and coho efficiencies observed in previous years to produce estimates of trap efficiency in 2007.

Background

2007 was the eighth consecutive year of rotary trapping on the Shasta and Scott rivers. The goals of the project were:

- To determine emigration abundance and timing of all age classes of juvenile salmonids exiting the Shasta and Scott rivers between early February and early July 2007.
- To investigate the relationships between instream conditions and emigration patterns of juvenile salmonids.

The specific objectives were:

- To estimate the weekly mean fork length at age of salmonids in the catch from a measured sub-sample.
- To estimate weekly rotary trap efficiencies for all age classes of Chinook and steelhead in the catch and produce weekly production estimates for each age class.
- To monitor stream flow and temperature at the traps.

Shasta River Rotary Screw Trap Summary

Methods

We sampled the Shasta River with a modified five foot rotary screw trap manufactured by EG Solutions, Corvallis, Oregon. The trap was operated six days per week: Sunday afternoon through Saturday morning, directly downstream of the Shasta River Fish Counting Facility at 041° 49' 46.38" N, 122° 35' 35.38" W. The catch in the trap was processed daily at approximately 0800 hrs. We also checked the operation of the trap and removed debris from the live car at approximately 1700 hrs daily. We measured the velocity of the water entering the cone at the beginning and end of each set with a flow meter manufactured by General Oceanics, model 2030R and calculated the total volume sampled for each set. All vertebrates collected in the trap were identified and counted. Salmonids collected in the trap were classified by

species, age and life stage. Scale samples and fork length data were collected from a random sample of Chinook and steelhead in the catch.

Age Determination

We used the same age-length cutoffs for salmonids that were used in 2006. These cutoffs were determined from fork length frequency distributions and by estimating the age 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. We recognize that the intervals are not absolute and that as a result of variable growth, some individuals may be larger or smaller than the cutoff fork length. The fork length cutoffs and the number of scales examined to determine the cutoffs are shown in Appendices 26 and 27.

Trap Efficiency Determinations and Production Estimates

When sufficient fish were in the catch, we conducted multiple trap efficiency trials to determine the mean weekly trap efficiency for 0+ Chinook (*Oncorhynchus tshawytscha*), and 0+, 1+, 2+, and 3+ steelhead (*Oncorhynchus mykiss*). For each trial, a known number of marked fish from each age class were taken three quarters of a mile upstream from the trap and released. 0+ Chinook and steelhead were dyed by placing them in a solution of 0.6 grams of Bismarck brown mixed with 19 liters of water for 45 minutes. The older age fish were marked with a caudal fin margin clip. Three different caudal fin margin clips were used in a weekly rotation allowing us to determine if marked fish were being recaptured outside of the week in which they were marked. Fish marked in the morning processing were held in live cars until the afternoon in order to assess their condition prior to release. For each species and age class, the number of fish recaptured during the week divided by the total number marked equals the estimated trap efficiency for the week. An estimate of the total number of outmigrants per week was determined using a stratified mark and recapture technique (Carlson 1998). We used zero for the lower confidence limit if the calculated lower confidence limit for the estimate was negative. In weeks when marked fish were released but none were recaptured, we used the average trap efficiency for the season or the seasonal trap efficiency to expand the number of fish trapped to develop an estimate of the total migrants for the week (ODFW Salmonid Lifecycle Monitoring Project).

Prior to 2007, we marked and released 1+ and 0+ coho upstream of the rotary trap to produce weekly estimates of trap efficiency. Due to the low number of 1+ coho projected for 2007 (1,706), and the low number of 0+ produced by the 47 adults returning to the Shasta River in 2006, we chose to minimize our handling of the fish. We used the correlation between the trap efficiency for 2+ steelhead smolts and 1+ coho smolts observed in 2004 and 2005 to estimate the number of coho smolts produced in 2007. We used the correlation between 0+ coho and 0+ steelhead observed in 2005 and 2006 to produce weekly estimates for 0+ coho in 2007.

Water temperature and flow monitoring

Hourly water temperatures were recorded with an Onset Optic StowAway® temperature logger attached to the downstream end of the trap. Stream flow measurements presented in this report are preliminary data from the United States Geological Survey (USGS) stream gauge number 11517500, Shasta River, Yreka (SRY). This gauge is located approximately .75 miles upstream of the confluence with the Klamath River.

Results

The Shasta River rotary trap began sampling six days per week on February 12, 2007. Trapping ended after 18 weeks on June 23, 2007. The trap fished 113 sets for a total of 2,558.3 hours. We estimate that 385,436,934.5 cubic feet of water was sampled. The number of Chinook and steelhead trapped, marked and recaptured by week, and weekly population estimates with a 95% Confidence Interval (CI) are shown in Appendices 1 and 4-7. The number of 0+ and 1+ coho trapped per week and the weekly estimates are shown in Appendices 2 and 3. Weekly mean fork lengths, sample size, minimum and maximum size and standard deviations for Chinook and steelhead are shown in Appendices 14-19. No length data were collected from coho.

Chinook 0

We estimate a total of 579,735 0+ Chinook (95% CI, 556,443 – 603,026) left the Shasta River during the period sampled. The greatest number of Chinook emigrated during week 11 (93,418, 95% CI, 79,172 – 107,663). This is equal to 16.1% of the total estimate (Charts 1 and 2). The mean fork length for 0+ Chinook during week 11 was 42 mm (Appendix 14).

Coho 0+

An estimated 2,837 0+ coho emigrated from the Shasta River during weeks 12 through 15 and 17 through 25. The greatest number left during week 22 (1,282) (Chart 4). This is equal to 45.2% of the total estimate (Chart 5).

Coho 1+

An estimated 1,178 1+ coho emigrated from the Shasta River from weeks 10 and 12 through 24 (Chart 6). The greatest number left during week 14 (326), (Chart 6). This is equal to 27.7% of the total estimate (Chart 7).

Coho 2+

One 2+ coho emigrated from the Shasta River during week 14.

Steelhead 0+

An estimated 8,990 0+ steelhead (95% CI, 8,005 – 9,976) emigrated from the Shasta River during weeks 17, 19 and 21 through 25. The greatest number left during week 25 (2,793, 95% CI, 2,305 – 3,281) (Chart 8). This is equal to 31.1% of the total estimate for the period sampled (Chart 9). The mean fork length for 0+ steelhead during week 25 was 75 mm (Appendix 16).

Steelhead 1+

An estimated 6,382 1+ steelhead (95% CI, 5,470 – 7,295) emigrated from the Shasta River in weeks 7 - 25. The greatest number left during week 22 (1,121, 95% CI, 662 – 1,580) (Chart 10). This is equal to 17.6% of the total estimate for the period sampled (Chart 11). The mean fork length by week is shown in Appendix 17.

Steelhead 2+

An estimated 56,483 2+ steelhead (95% CI, 48,304 – 64,663) emigrated from the Shasta River during weeks 7 – 25 (Chart 13). The mean fork length by week is shown in Appendix 18.

Steelhead 3+

We estimated 1,618 3+ (95% CI, 937 – 2,300) emigrated from the Shasta River during weeks 11 – 20 (Chart 15). The greatest number left during week 15 (487, 95% CI, 16 – 959). The mean fork lengths for 3+ steelhead are shown by week in Appendix 19.

Chart 1

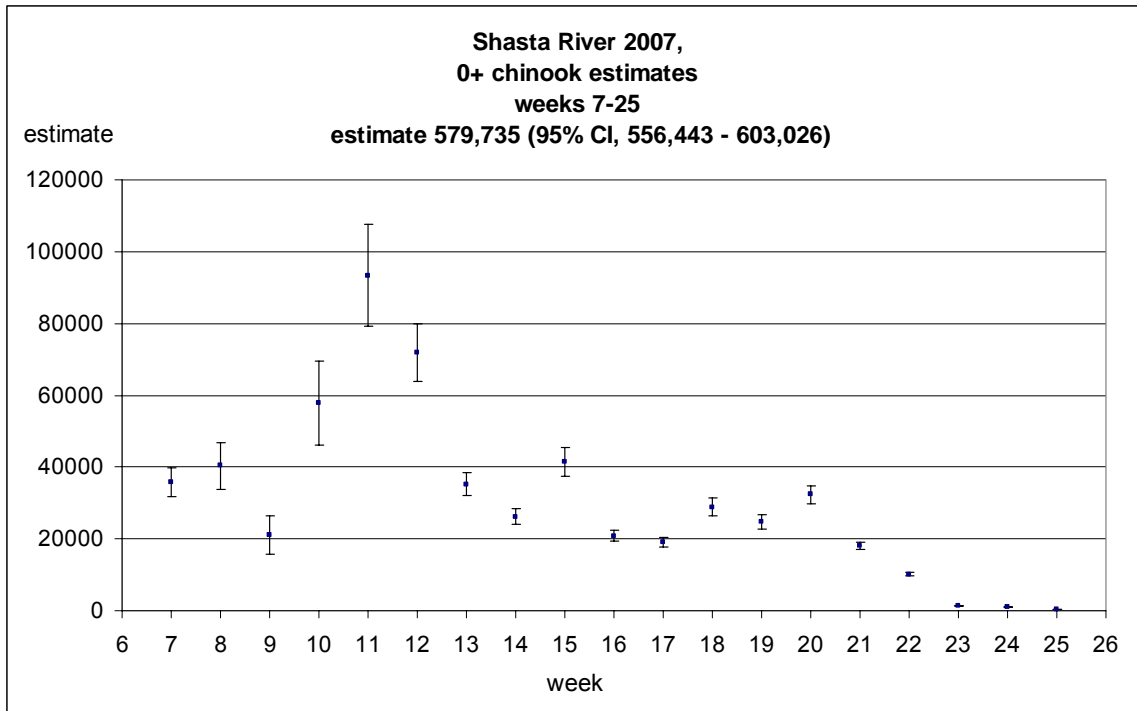


Chart 2

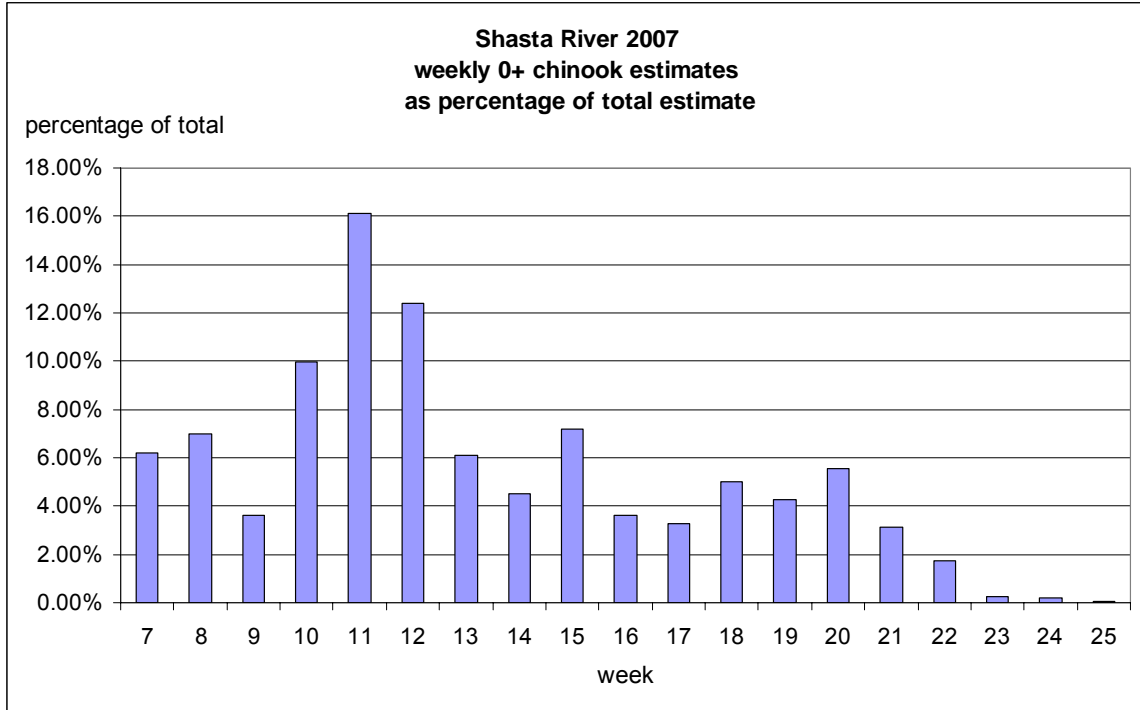


Chart 3

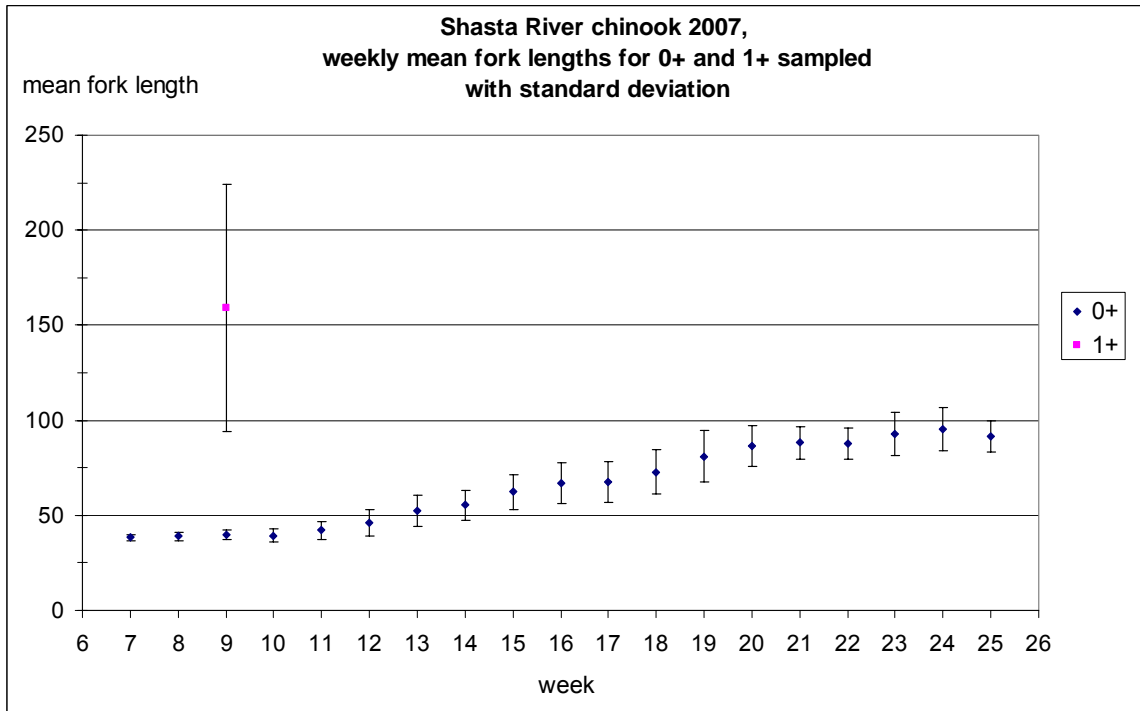


Chart 4

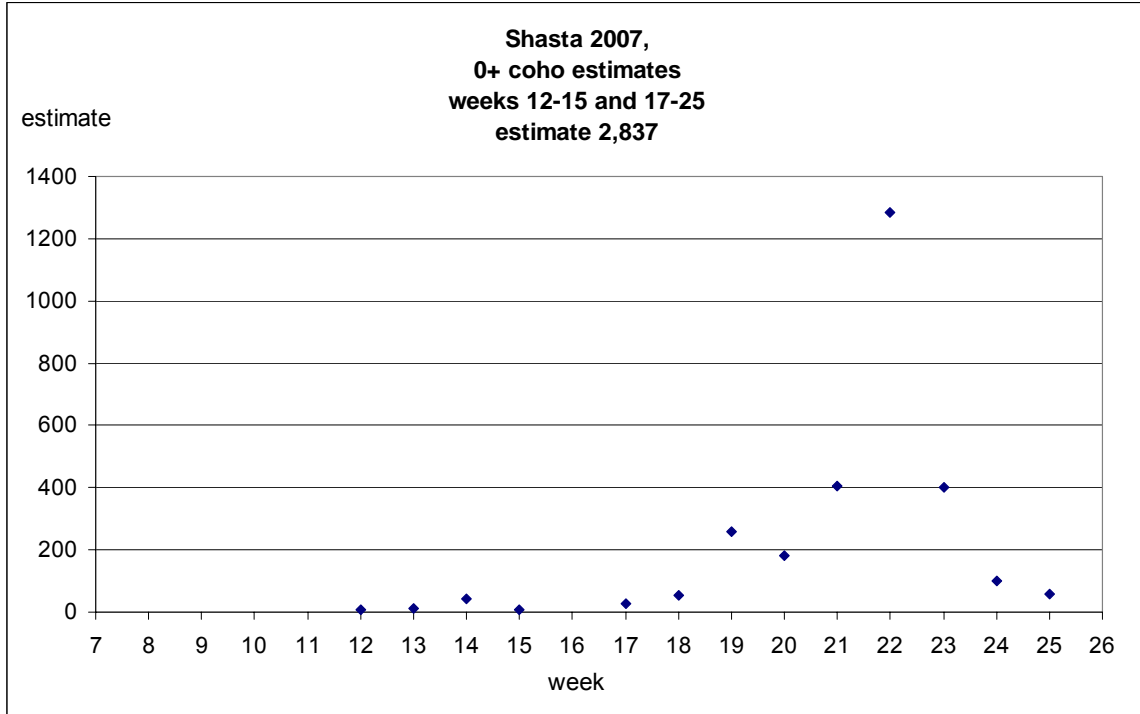


Chart 5

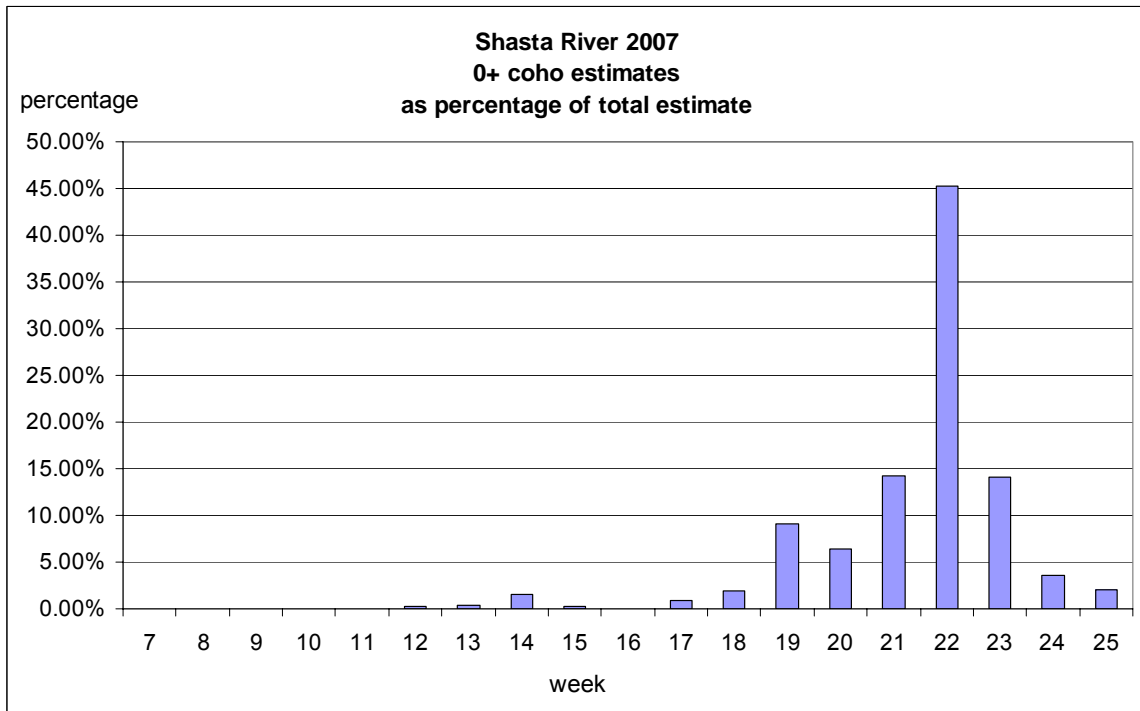


Chart 6

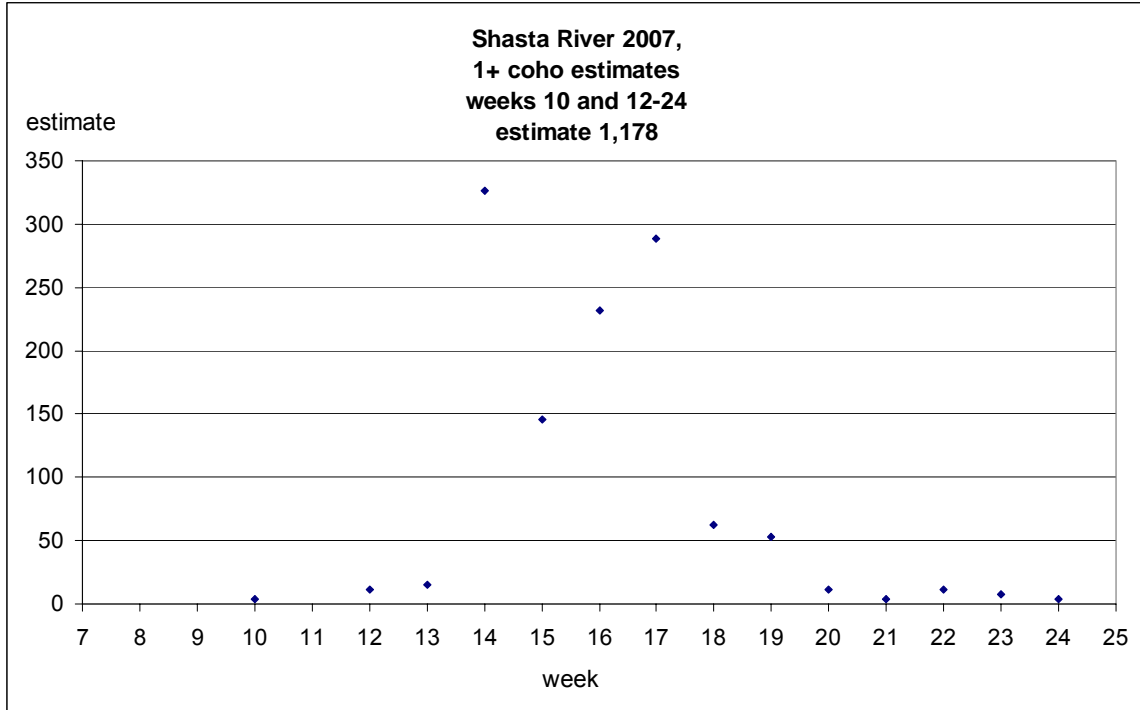


Chart 7

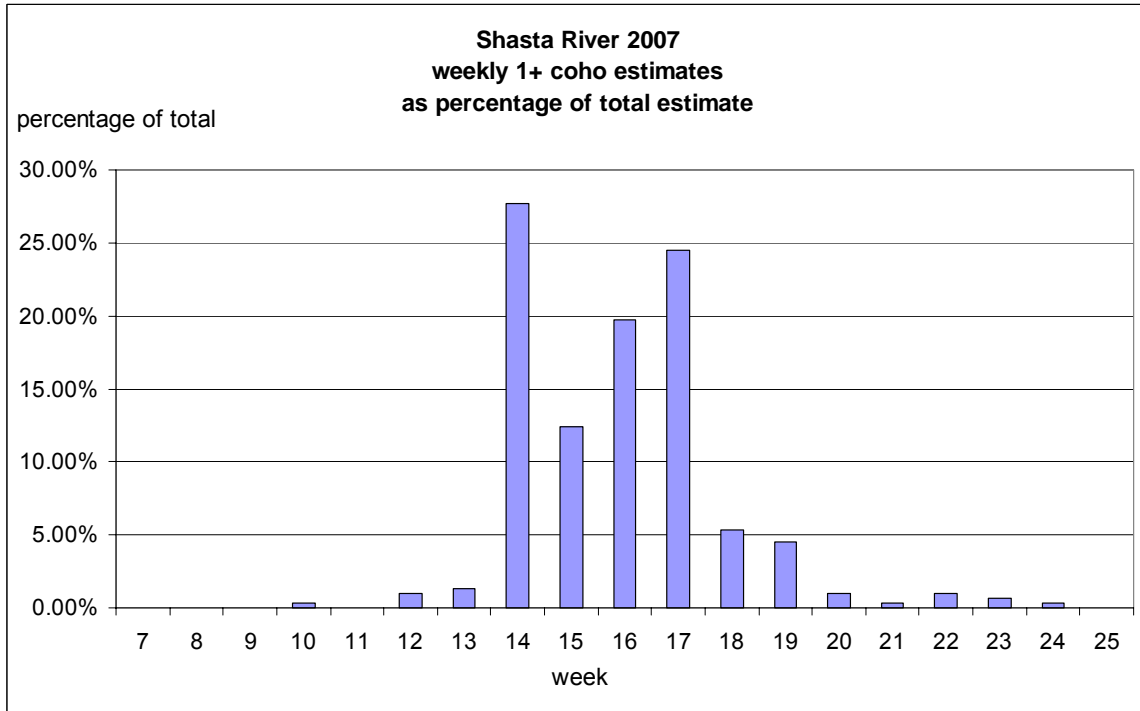


Chart 8

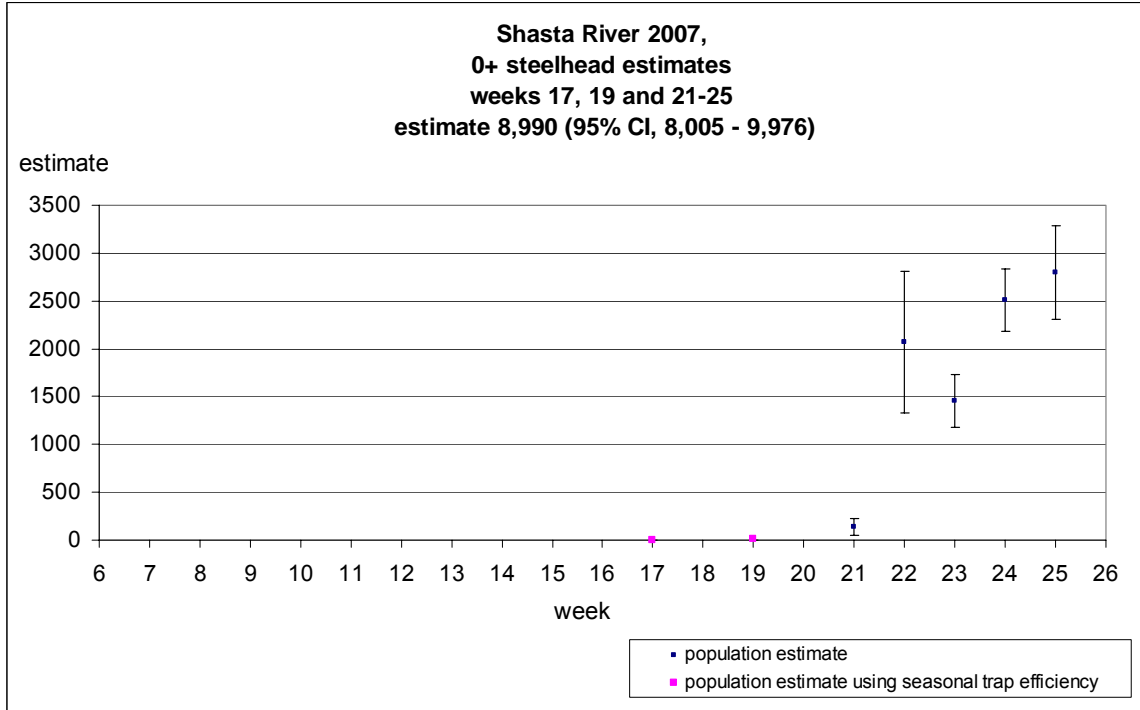


Chart 9

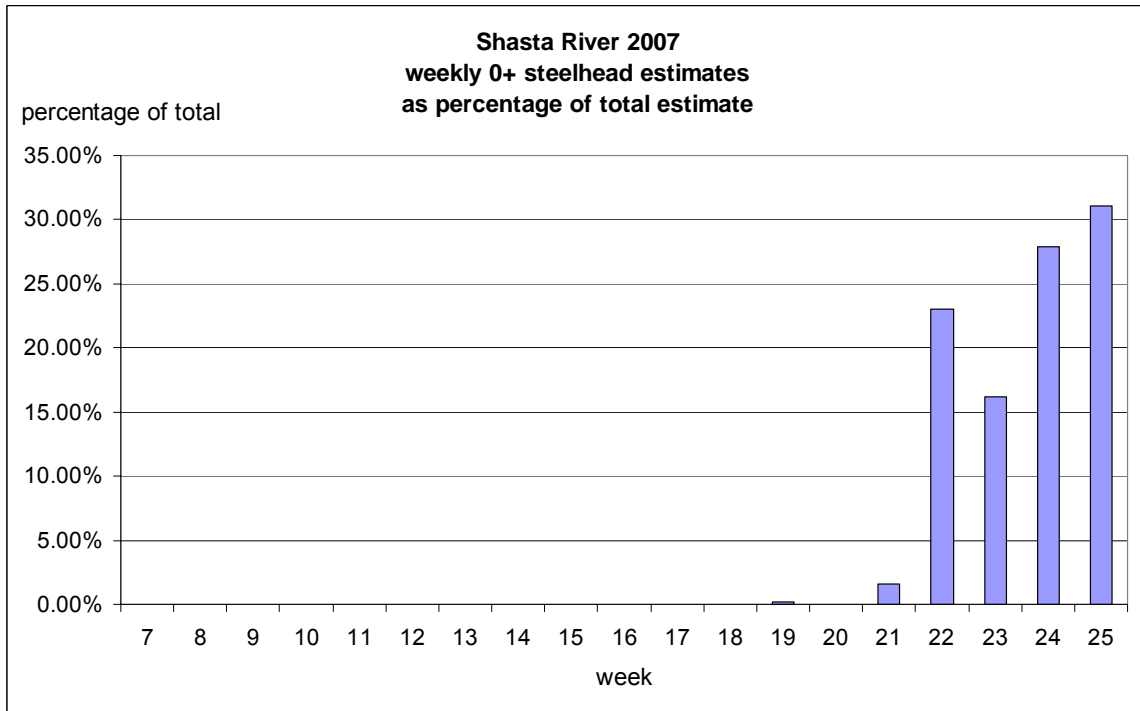


Chart 10

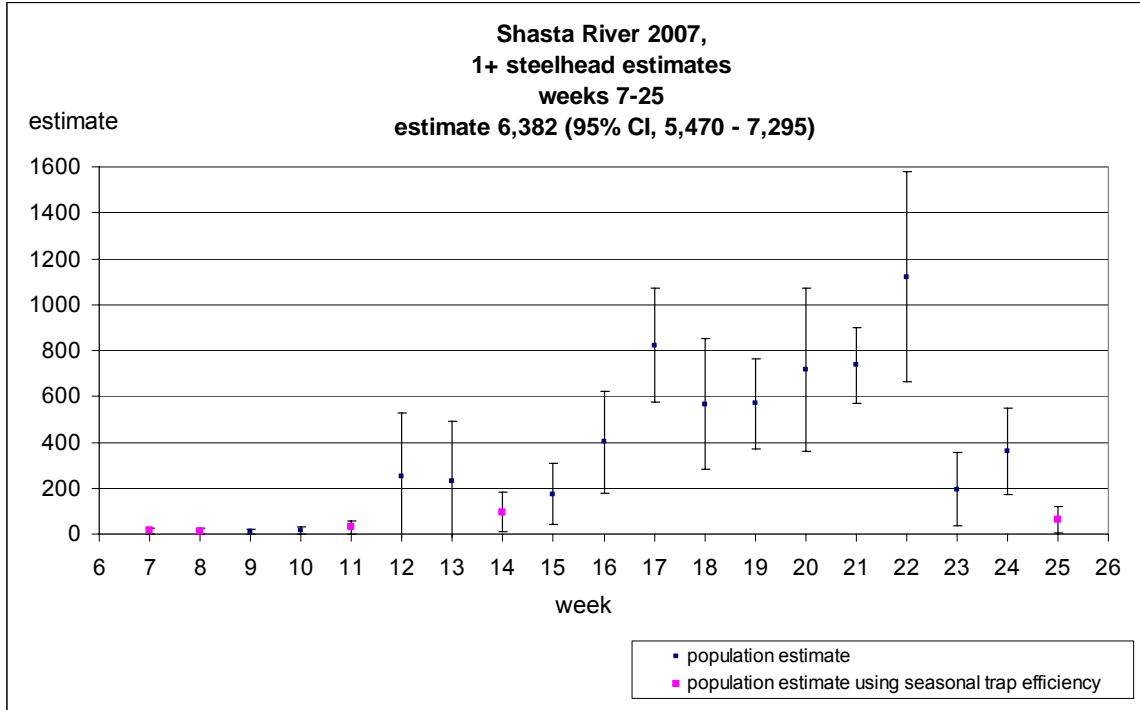


Chart 11

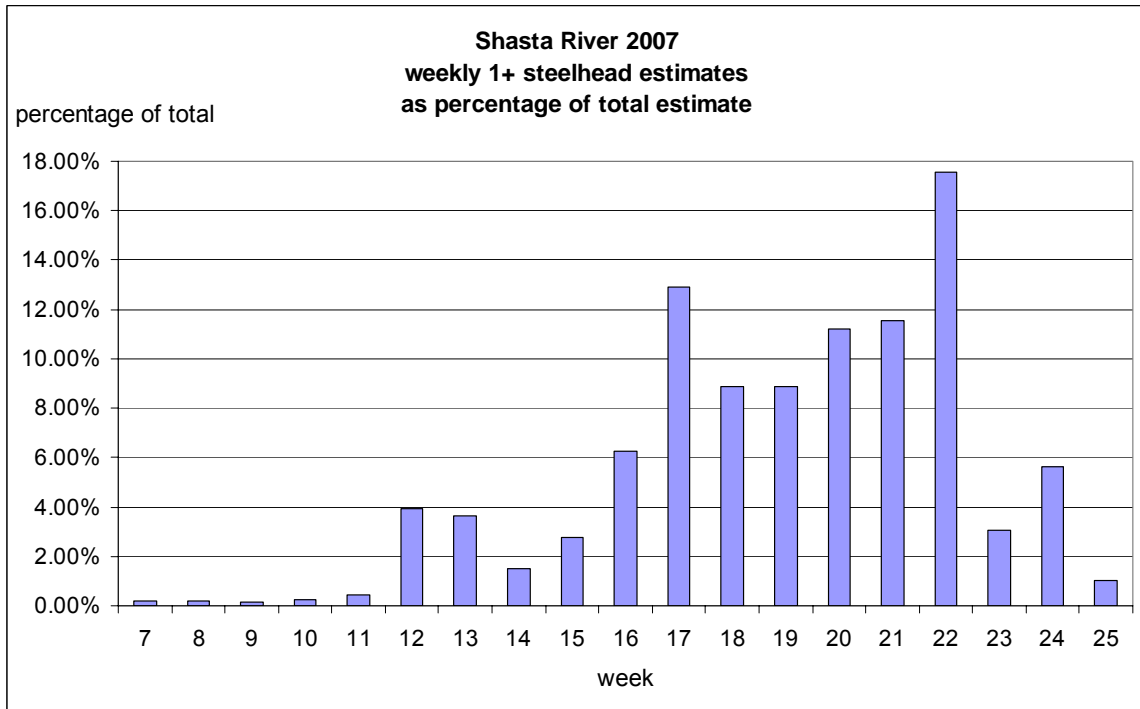


Chart 12

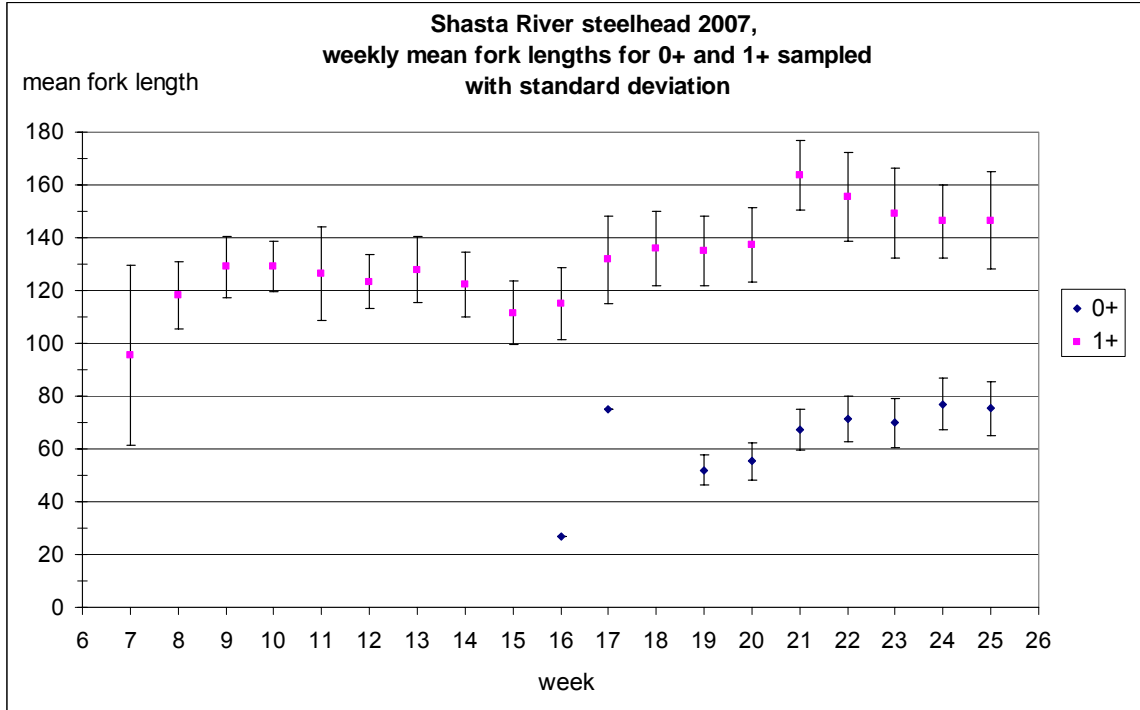


Chart 13

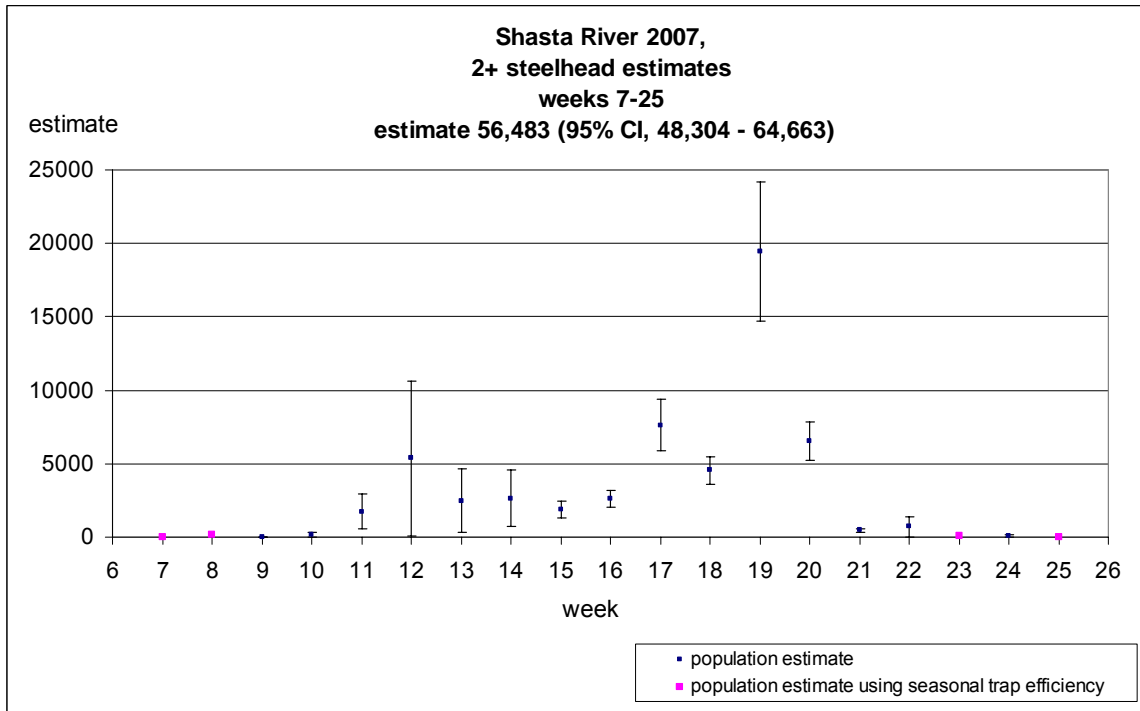


Chart 14

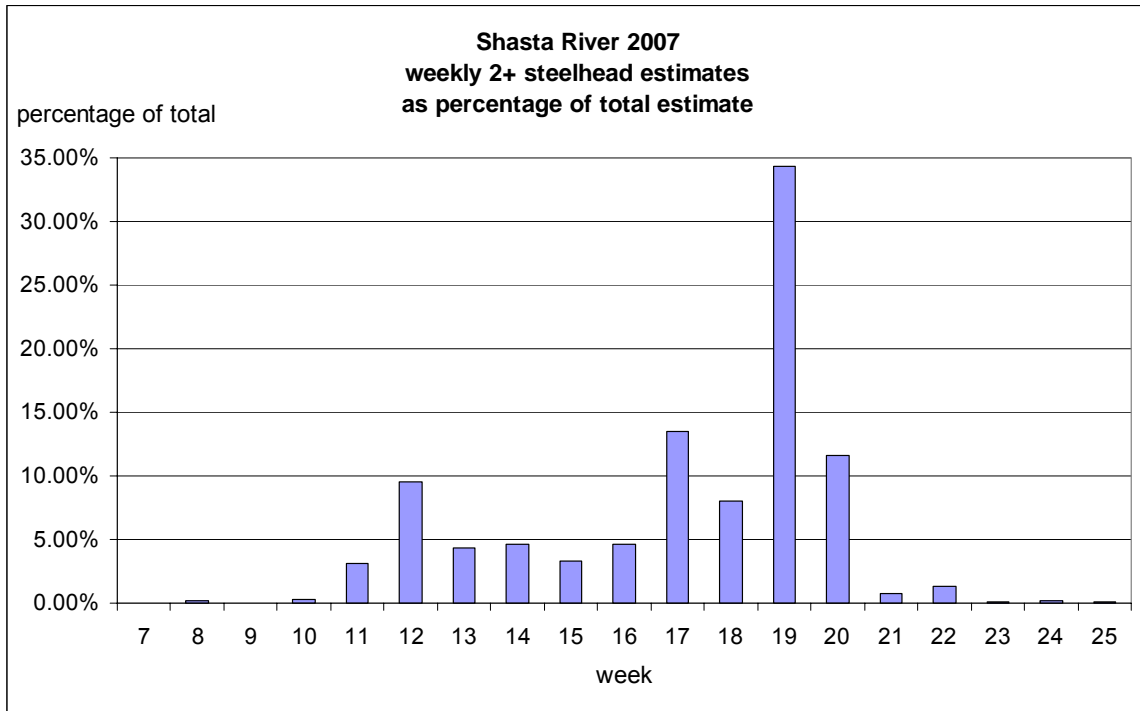


Chart 15

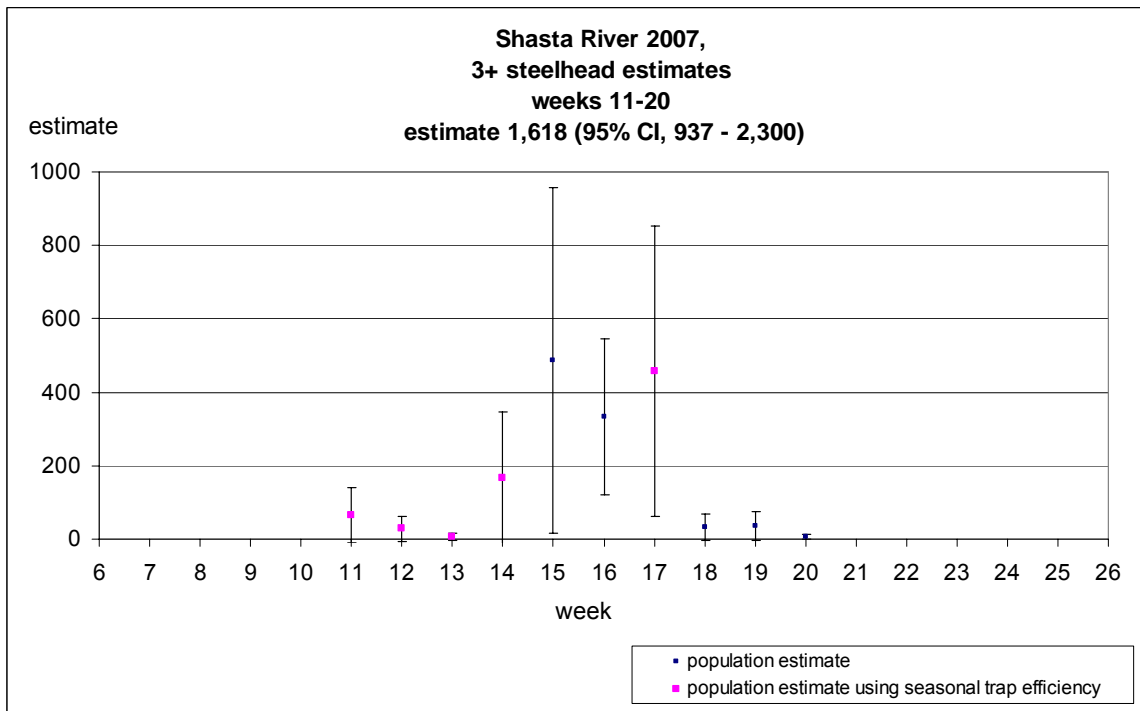


Chart 16

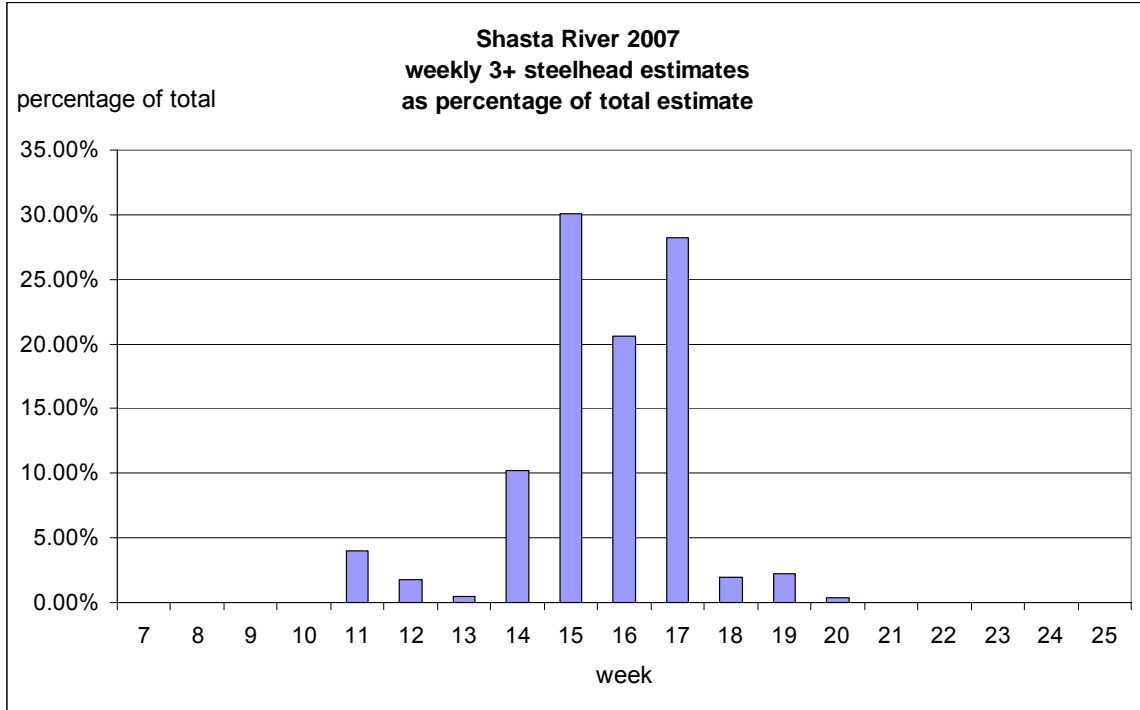
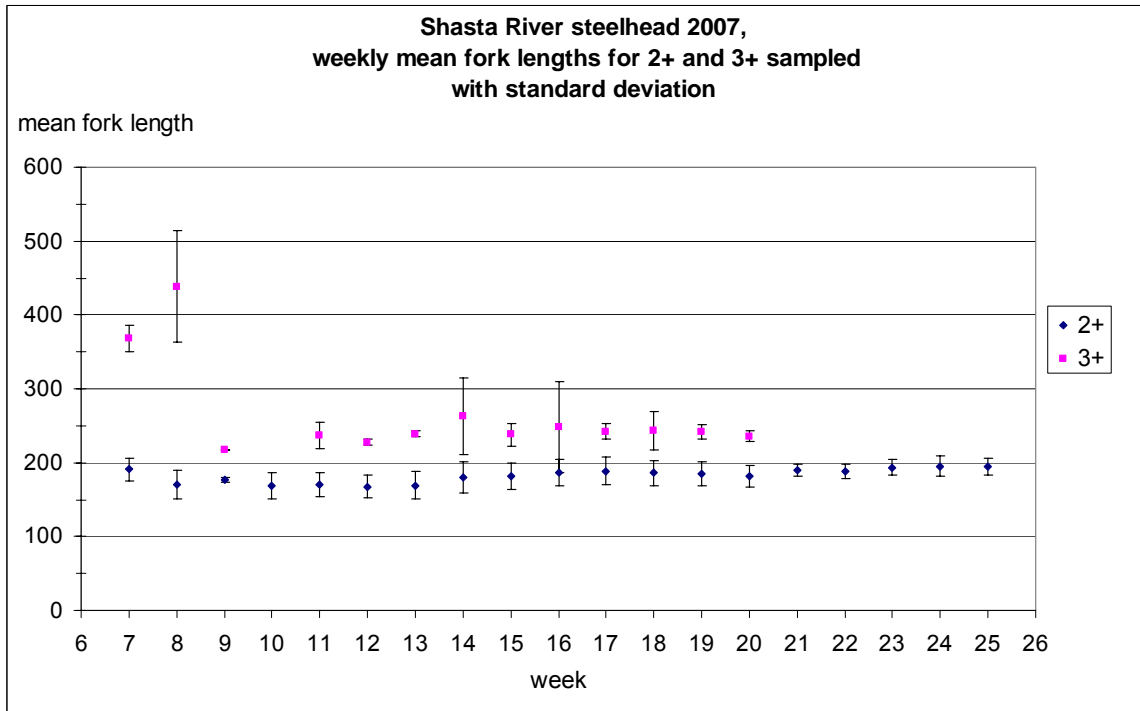


Chart 17



Discussion

Coho

Due to low numbers of 0+ and 1+ coho expected in 2007, we used the correlation between steelhead trap efficiencies and coho efficiencies observed in previous years to produce estimates of trap efficiency in 2007. The correlation between 2+ steelhead and 1+ coho observed in 2004 and 2005 for weeks 14–19 is expressed by the equation $y = 1.1388x + 0.107$ (Chart 18). We used the weekly efficiencies for 2+ steelhead from 2007 for X and solved for Y to get weekly estimates for 1+ coho. The correlation between 0+ steelhead and 0+ coho in 2005 and 2006 is expressed by the equation $y = 0.7625x + 0.0095$ (Chart 19). The weekly efficiencies for 0+ steelhead from 2007 were equal to X and we solved for Y to estimate the trap efficiency for 0+ coho.

We believe that the trap efficiencies between coho and steelhead smolts are well correlated because both species are at the same life stage and are responding similarly to environmental conditions.

Chart 18

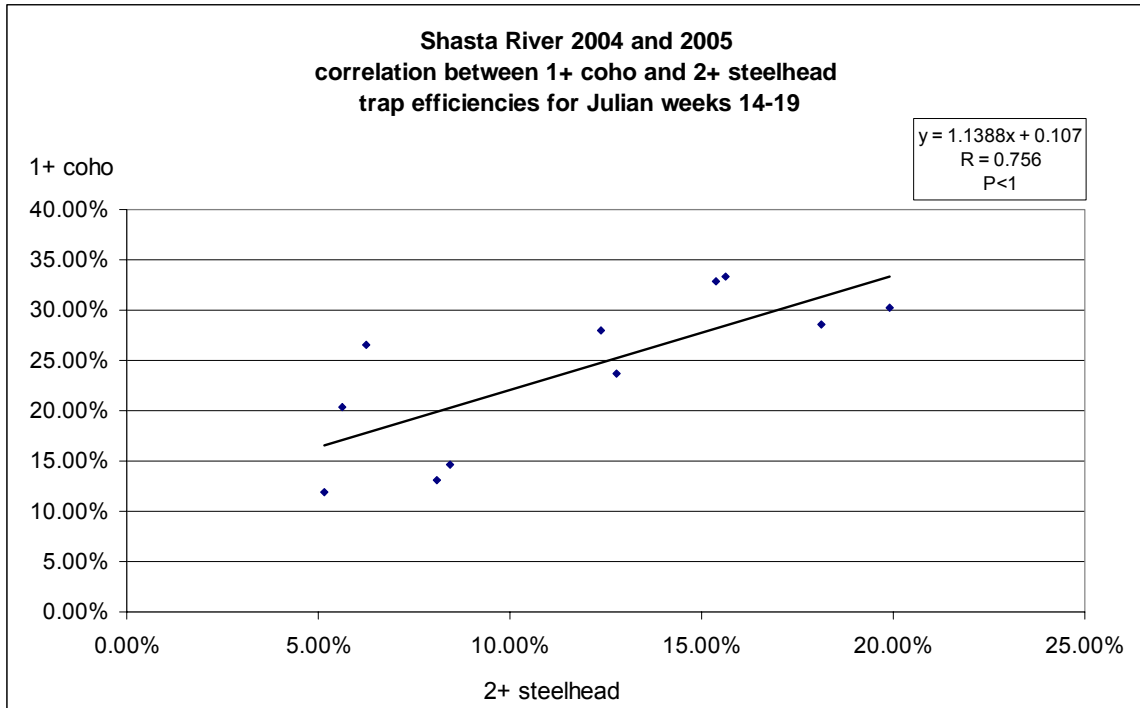
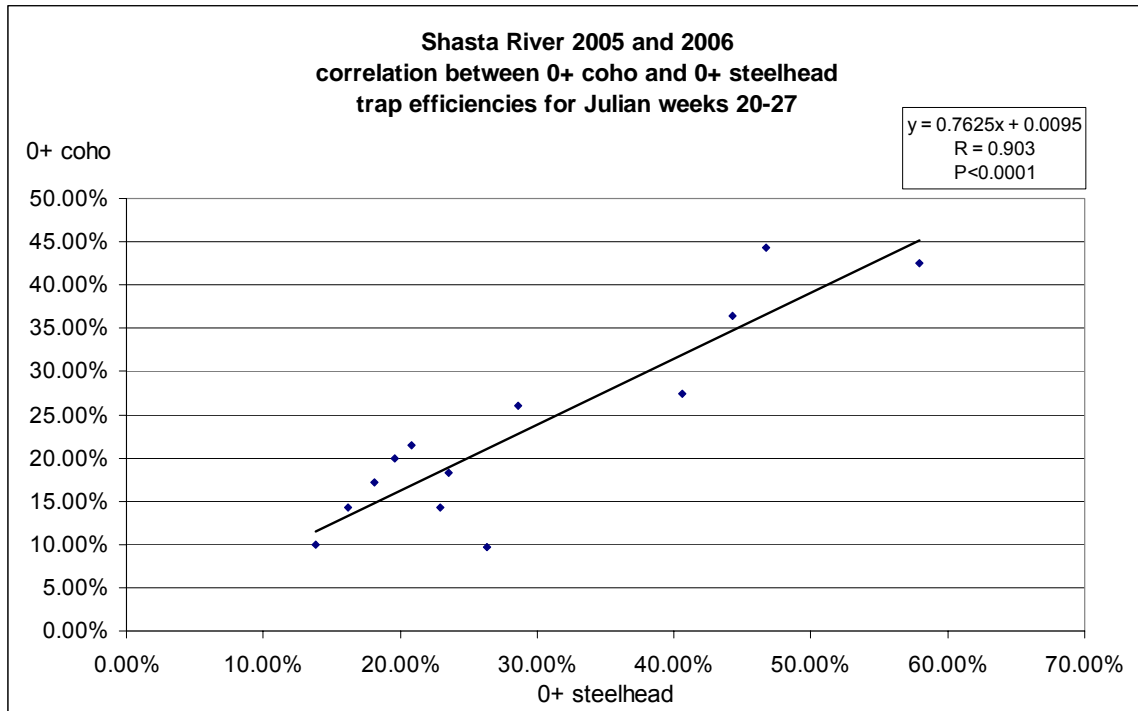


Chart 19



Coho smolt production and return rate

The estimate of the number of smolts produced in 2007 per returning adult in 2005 is shown in Table 1. The average number of smolts per adult produced has dropped to 23.2 smolts. The projected adult returns for 2008, 2009, and 2010 are shown in Table 2 using the average rate of return of 2.96%.

Table 1

Coho smolts produced per returning adult

Relationship between the number of returning adults and the number of 1+ coho smolts produced.

Brood year	adults	1+ produced in	Year	smolts per adult
2001	291	11,052	2003	38.0
2002	86	1,799	2004	21.0
2003	187	2,054	2005	11.0
2004	373	10,833	2006	29.0
2005	69	1,178	2007	17.0
2006	47	1090 *	2008	23.2
2007	255	5,916*	2009	23.2

*Projected production based on average of 23.2 smolts per adult

Table 2**Coho smolt to adult survival**

Number of 1+ coho produced and observed and projected adult returns.

Brood year	adults	emigration year	1+ produced	% return	adults returning in	Brood Year
2001	291	2003	11,052	3.37%	373	2004
2002	86	2004	1,799	3.84%	69	2005
2003	187	2005	2,054	2.29%	47	2006
2004	373	2006	10,833	2.35%	255	2007
2005	69	2007	1,178	2.96%	35**	2008
2006	47	2008	1,090*	2.96%	32**	2009
2007	255	2009	5916*	2.96%	175**	2010

*Projected smolt estimates using the mean smolt per adult value (2.96), 2001 through 2007.

** Projected adult returns based on an average smolt to adult survival rate of 2.96 % 2004 through 2007

Chinook

The estimate for the total number of Chinook produced in 2007 (579,735) was equal to 29.65% of the average estimate for 2001-2006 (Table 3) Although this is well below the average production for the period of record (1,955,240), it is seven times the estimate of the number of Chinook produced in 2006 (83,389).

Table 3**Weekly Juvenile Chinook estimates, Shasta River 2001-2007**

	2001	2002	2003	2004	2005	2006	average 2001-2006	2007	% of weekly average from 2001-2006 estimated in 2007
6	3137								
7	10546		13429	125190	14470	1358	32999	35803	108.50%
8	17861		97358	401988	13942	2545	106739	40407	37.86%
9	1305719	321719	144206	395915	26738	1427	365954	20975	5.73%
10	260137	622634	143548	851550	50927	154	321492	57729	17.96%
11	1032865	521745	86911	249353	33513	2654	321173	93418	29.09%
12	1199398	410963	100881	107549	15256	1531	305930	71841	23.48%
13	197368	363540	171099	46026	14719	475	132205	35228	26.65%
14	40306	738380	55585	26906	36996	939	149852	26158	17.46%
15	22557	148765	35821	64925	23114	1087	49378	41542	84.13%
16	12042	148890	17697	51207	11409	3499	40790	20847	51.11%
17	40223	23015	17879	25286	6693	1886	19164	18986	99.07%
18	31575	24995	8626	48625	6265	4243	20722	28892	139.43%
19	163	74983	6520	23136	3134	9777	19619	24774	126.28%
20	19655	62352	26573	9206	9729	32600	26686	32279	120.96%
21	7486	22535	65501	25328	18746	1564	23527	17974	76.40%
22	1501	7407	22235	18534	4443	5320	9907	10172	102.68%
23	264	15971	5616	9205	1921	6170	6525	1365	20.92%
24	256	1251	539	3401	1869	2261	1596	1011	63.33%
25	322	208	504	1609	968	2300	985	334	33.95%
26	345	33	173	1138	847	1586			
27	41	4	116			10			
28			38			3			
29			48						
total	4203764	3509388	1020905	2486076	295699	83389	1955240	579735	29.65%

Chart 20

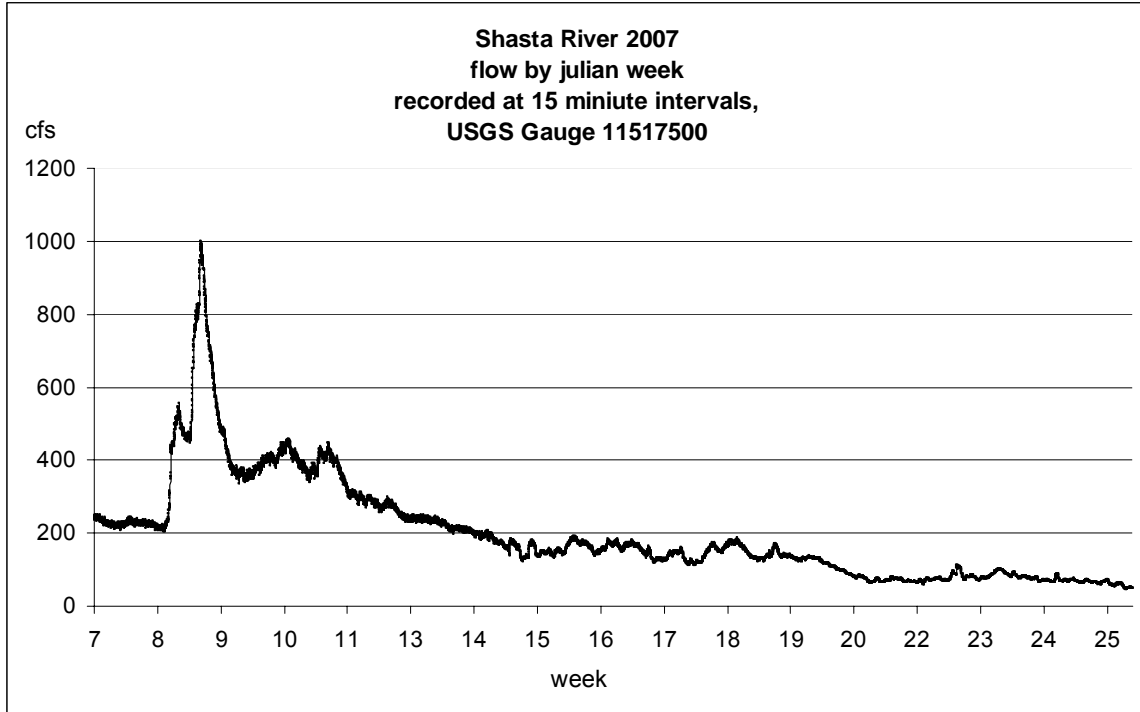


Chart 21

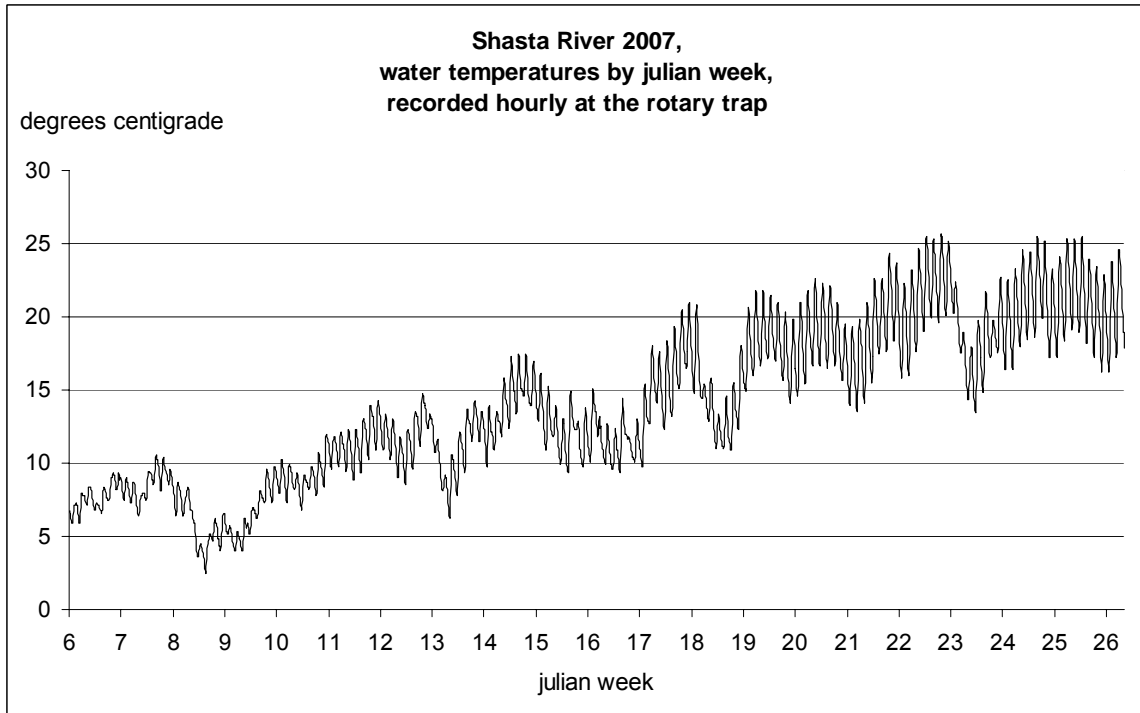
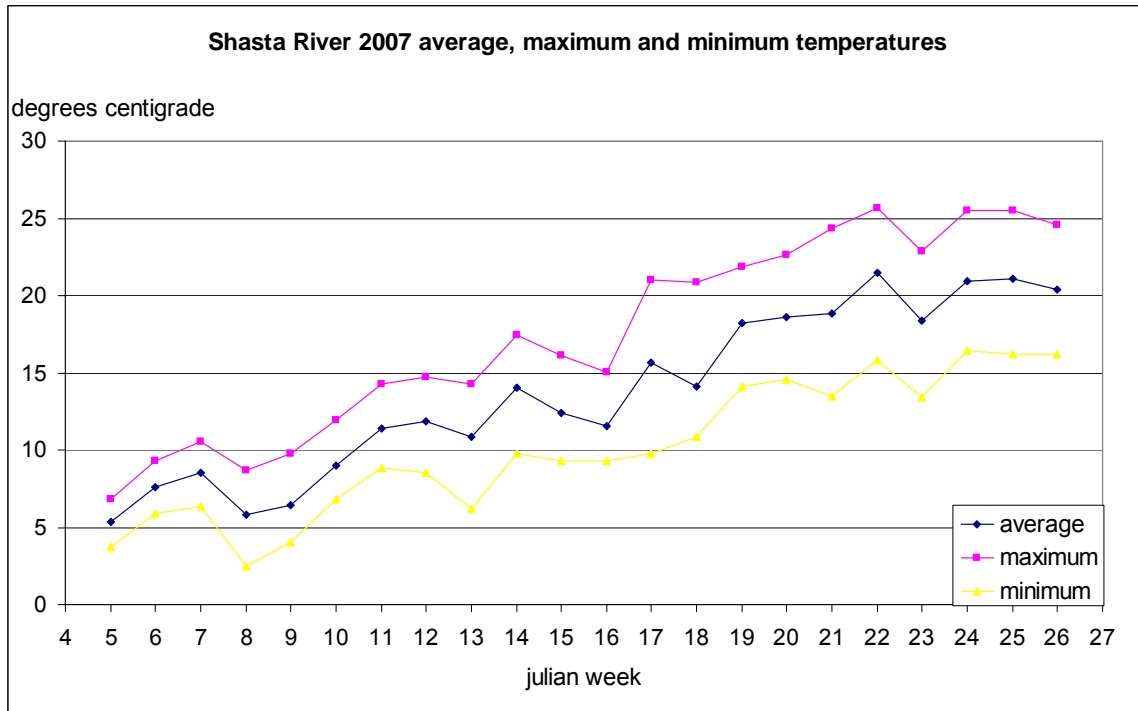
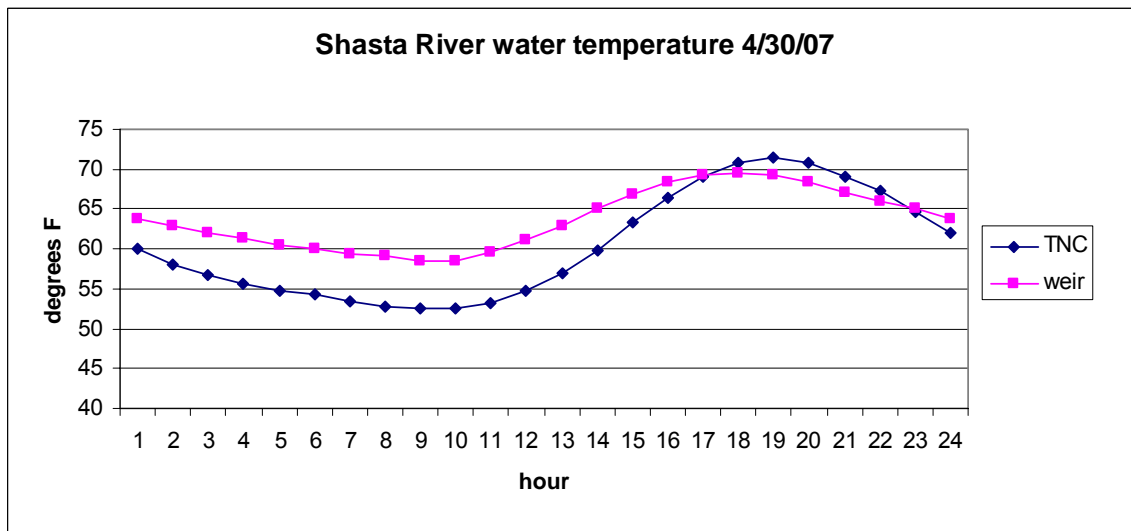


Chart 22



Since March of 2006, the Department of Fish and Game has monitored the emigration patterns of juvenile salmonids from the upper Shasta River by means of a rotary trap located at the Nelson Ranch (river mile 31.9). Because summer flow in the Shasta River below Dwinnell dam (RM 40.46) is comprised mostly of inflow from known cold water springs, we expected to see river temperatures with the cool and stable characteristic of the springs. On 4/30/07, water temperatures recorded at the Nelson Ranch showed a surprising diurnal range between 52.5 degrees Fahrenheit at 0900 to 71.4 by 1800. By comparison, the temperature of the river 30 miles downstream at the mouth was more stable with a low of 58.5 and a high temperature of 69.5 (Chart 23).

Chart 23



Thermal imagery surveys conducted in July of 2003 recorded significant warm water inflow from Big Springs Creek, Parks Creek and the Shasta River upstream of Parks Creek (Watershed Sciences, 2004). Further investigation is needed to understand the factors responsible for the temperatures observed at the Nelson Ranch. On the ground studies and a review of historic data may help us understand factors affecting water temperatures of the upper Shasta River.

Scott River Rotary Screw Trap Summary

Methods

We sampled the Scott River with a five foot and an eight foot rotary screw trap manufactured by EG Solutions, Corvallis, Oregon. The traps were operated six days per week, Sunday afternoon through Saturday morning, at approximately 4.75 miles upstream of the confluence with the Klamath River at 041° 43' 34.87" N, 123° 00' 30.11" W. The catch in the trap was processed daily at approximately 0800 hrs. We measured the velocity of the water entering each cone at the beginning and end of each set with a flow meter manufactured by General Oceanics model 2030R and calculated the total volume sampled for each set. All vertebrates collected in the trap were identified and counted. Salmonids collected in the trap were classified by species, age and life stage. Scale samples and fork length data were collected from a random sample of Chinook and steelhead in the catch.

Trap Efficiency Determinations and Production Estimates

Trap efficiencies were calculated weekly using the same methods described in the Shasta River section of this report on page 2. Prior to 2007, we marked and released 1+ and 0+ coho upstream of the rotary traps to produce weekly estimates of trap efficiency. Due to the low number of 1+ and 0+ coho expected in 2007, we chose to minimize our handling of coho and produce estimates based on the relationship between the trap efficiencies for steelhead and coho observed in previous years.

Water temperature and flow monitoring

Hourly water temperatures were recorded with an Onset Optic StowAway temperature logger attached to the downstream end of the trap. Stream flow measurements presented in this report are made using preliminary data from the United States Geological Survey (USGS) recorded at stream gauge number 11519500. This gauge is located approximately 19.5 miles upstream of the trap. Several large, tributaries without stream gauges and numerous small streams enter the Scott River between the gauge and the trap and are not included in the flow measurements.

Results

The eight-foot Scott River rotary trap began sampling six days per week on February 12, 2007. Trapping ended after 20 weeks on July 2, 2007. The trap fished 119 sets for a total of 2,751.2 hours. We estimate that 336.9 million cubic feet of water was sampled. The number of fish trapped, marked and recaptured by week, and weekly estimates with 95% CI for all age classes of Chinook and steelhead with population

estimates are shown in Appendices 8 and 11-13. Weekly mean fork length, sample size, minimum and maximum size and standard deviation for steelhead and Chinook are shown in Appendices 20-25. Weekly estimates for 0+ coho and a seasonal estimate for 1+ coho are shown in Appendices 9 and 10.

The five-foot Scott River rotary trap began sampling six days per week on February 12, 2007. After 17 weeks, trapping ended on June 16, 2007. The trap fished 96 sets for a total of 2,176.8 hours. We estimate that 270.3 million cubic feet of water was sampled during the season.

Chinook 0+

An estimated 435,279 0+ Chinook (95% CI, 401,400 – 469,158) left the Scott River during the period sampled. The greatest number of Chinook emigrated during week 25 (117,746, 95% CI, 91,421 – 144,072) (Chart 24). This is equal to 27.1% of the total estimate (Chart 25). The mean fork length for 0+ Chinook during week 25 was 85 mm (Appendix 20).

Coho 0+

An estimated 6,647 0+ coho emigrated from the Scott River during weeks 14 through 27. The greatest number left during week 16 (3,080) (Chart 27). This is equal to 46.3% of the total estimate (Chart 28).

Coho 1+

An estimated 3,931 1+ coho emigrated from the Scott River during weeks 7-25. In week 19, 80 1+ coho were captured, which is equal to 22.7% of the total 1+ coho captured (Chart 29).

Coho 2+

We trapped four 2+ coho emigrating from the Scott River, 3 in week 15 and 1 in week 19.

Steelhead 0+

An estimated 22,777 0+ steelhead (95% CI, 19,195 – 26,359) emigrated from the Scott River during weeks 20 - 26. The greatest number left during week 25 (8,504, 95% CI, 6,788 – 10,220) (Chart 30). This is equal to 37.3% of the total estimate for the period sampled (Chart 31). The mean fork length for 0+ steelhead during week 25 was 61 mm (Appendix 22).

Steelhead 1+

An estimated 140,775 1+ steelhead (95% CI, 111,290 – 170,261) left the Scott River between weeks 7 through 26. The greatest number left during week 26 (22,488, 95% CI, 0 – 47,887) (Chart 32). This is equal to 15.9% of the total estimate for the period sampled (Chart 33). The mean fork length for 1+ steelhead during week 26 was 121 mm (Appendix 23).

Steelhead 2+

An estimated 46,810 2+ steelhead (95% CI, 27,901 – 65,719) left the Scott River in weeks 7, 8, and 10 – 26. The greatest number left during week 12 (12,642, 95% CI, 0 – 26,932). This is equal to 27.0% of the total estimate for the period sampled (Chart 36). The mean fork lengths by week are shown in Appendix 24.

Steelhead 3+

A total of 77 3+ steelhead were trapped in the Scott River in weeks 8, 9, 12 and 15 – 21. The mean fork lengths are shown in Appendix 25.

Chart 24

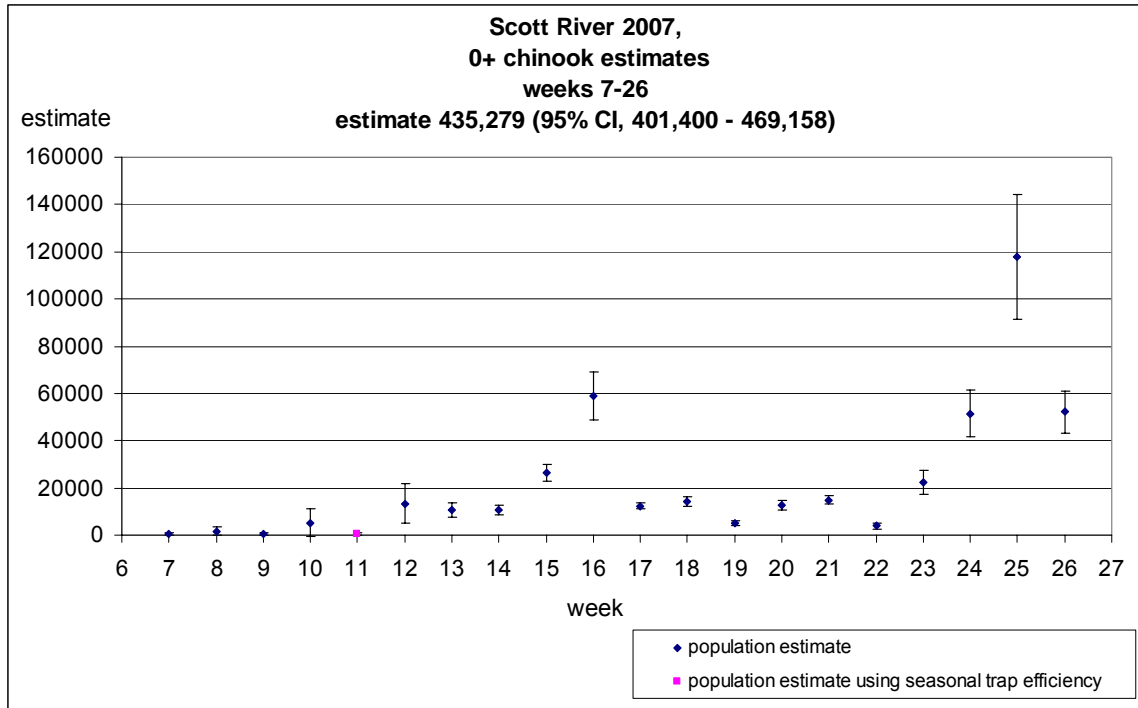


Chart 25

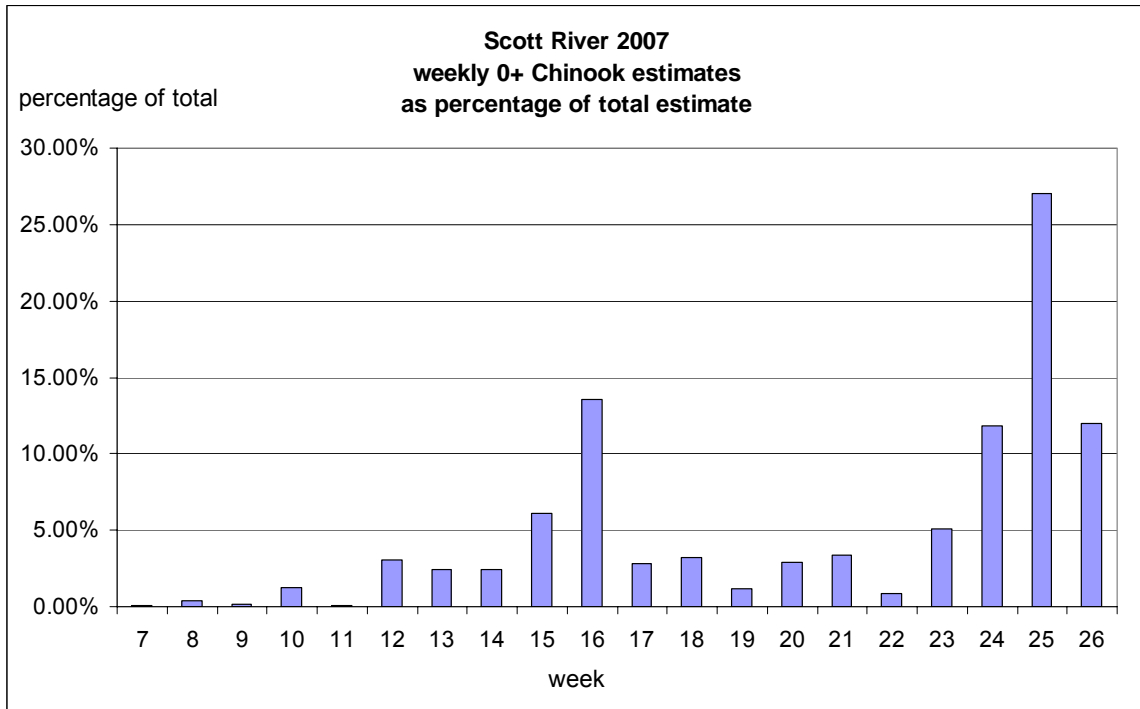


Chart 26

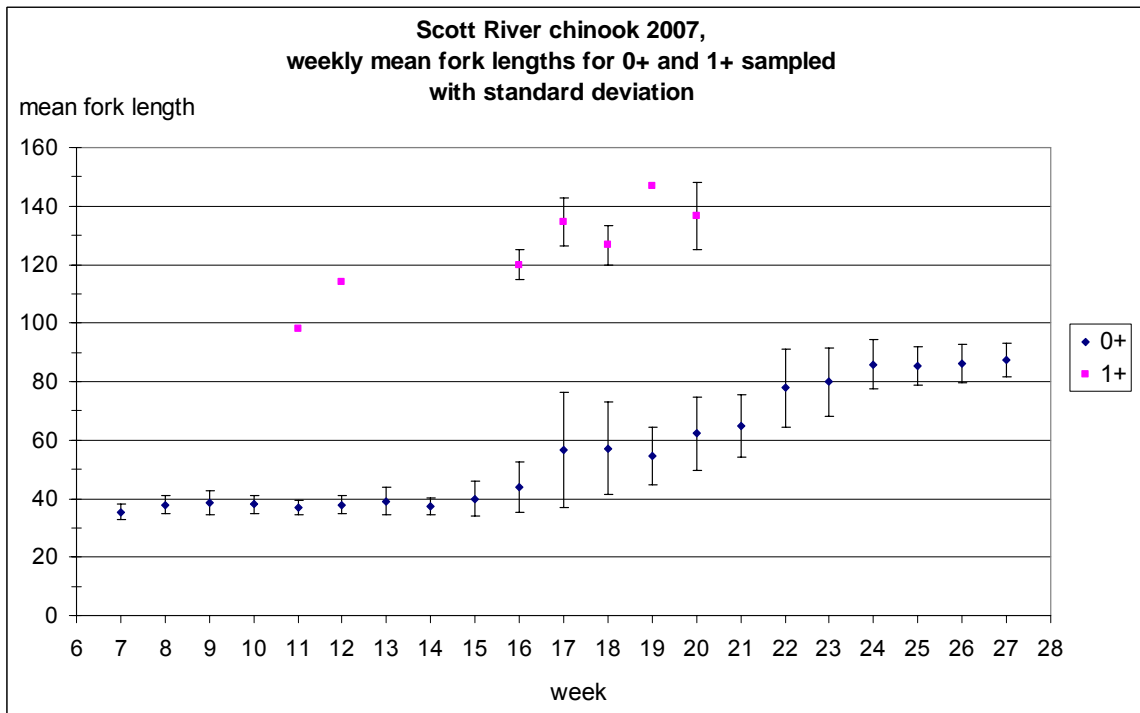


Chart 27

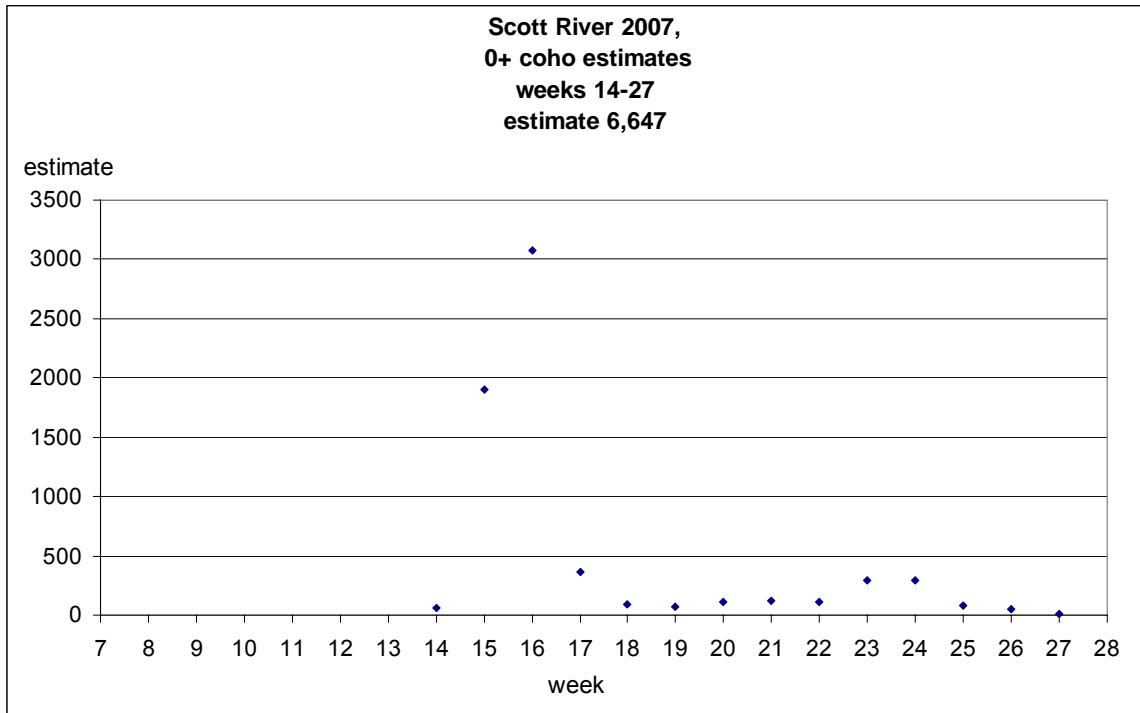


Chart 28

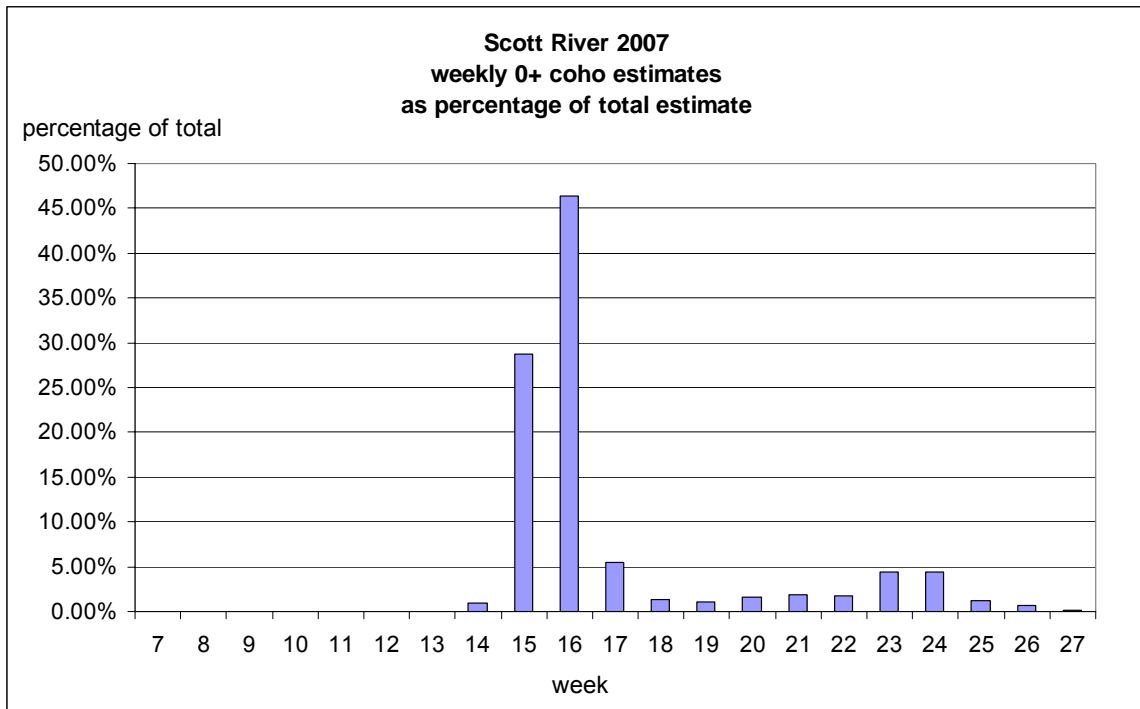


Chart 29

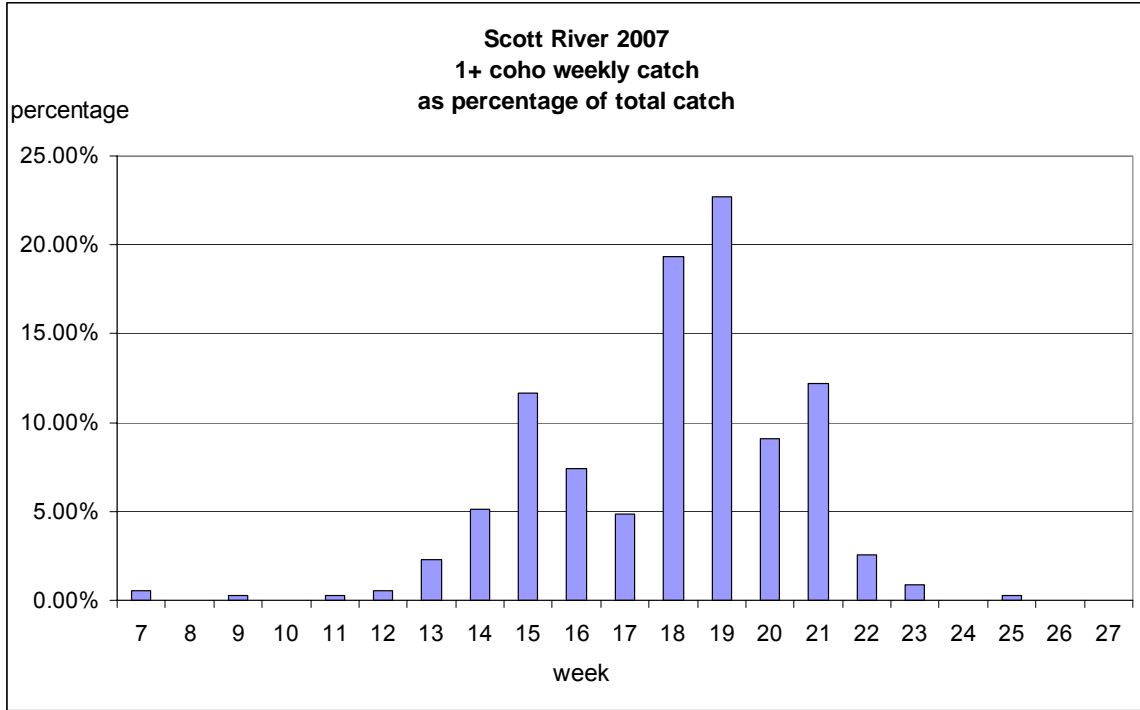


Chart 30

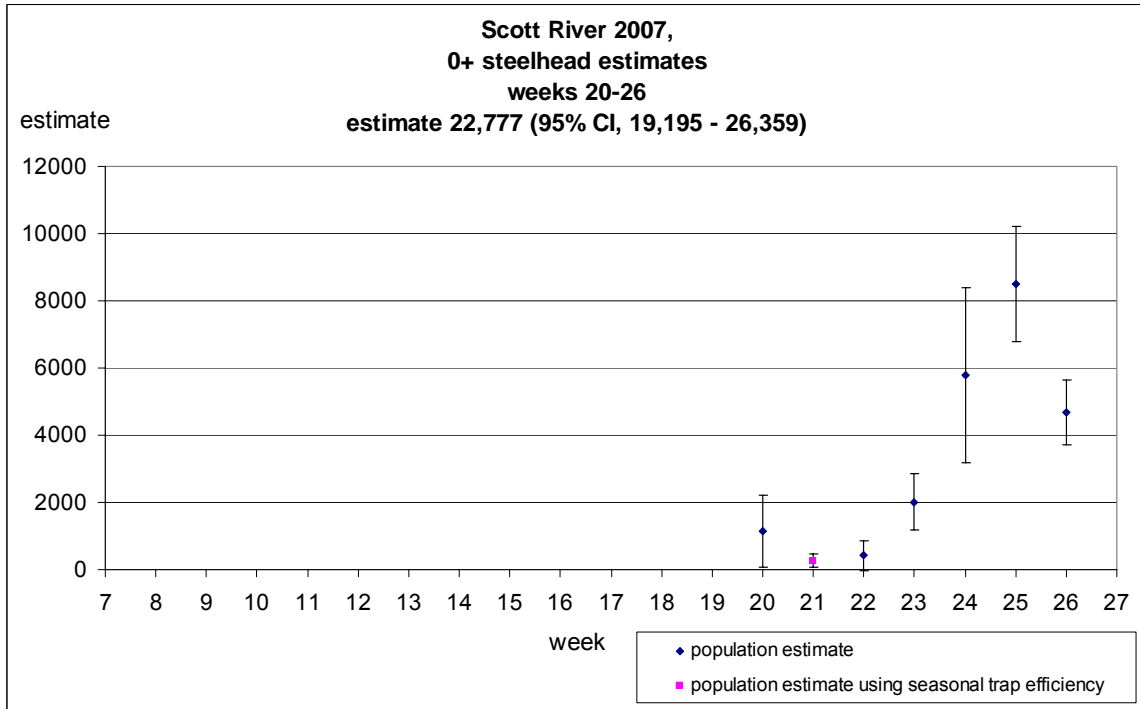


Chart 31

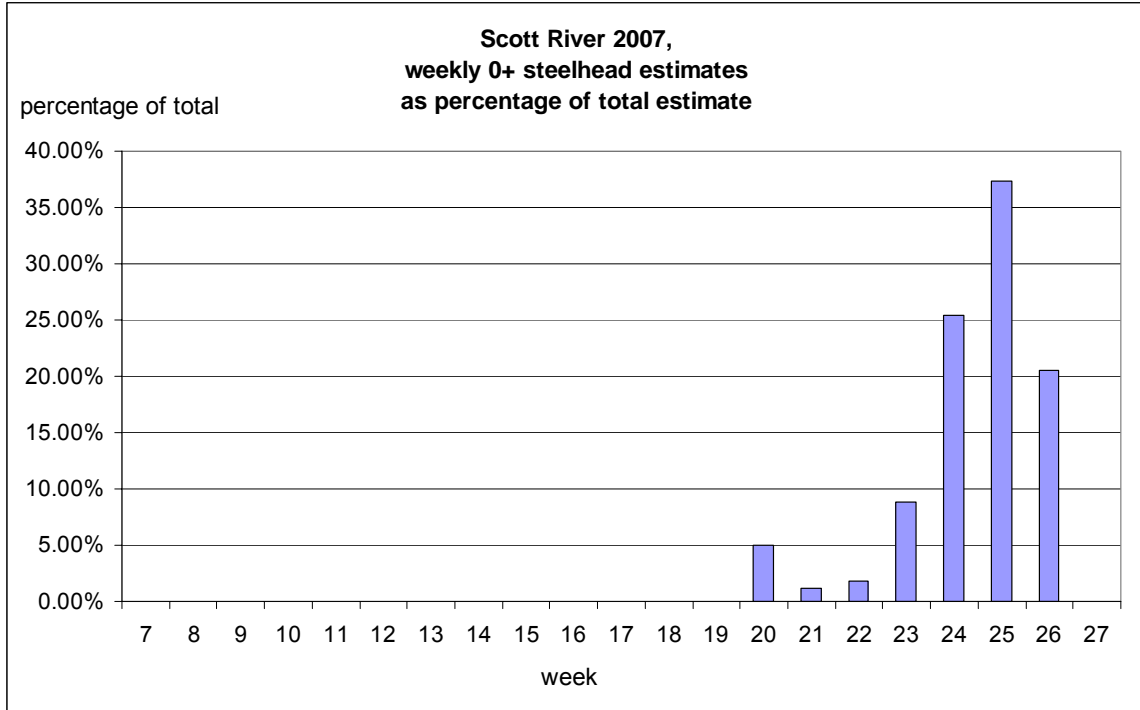


Chart 32

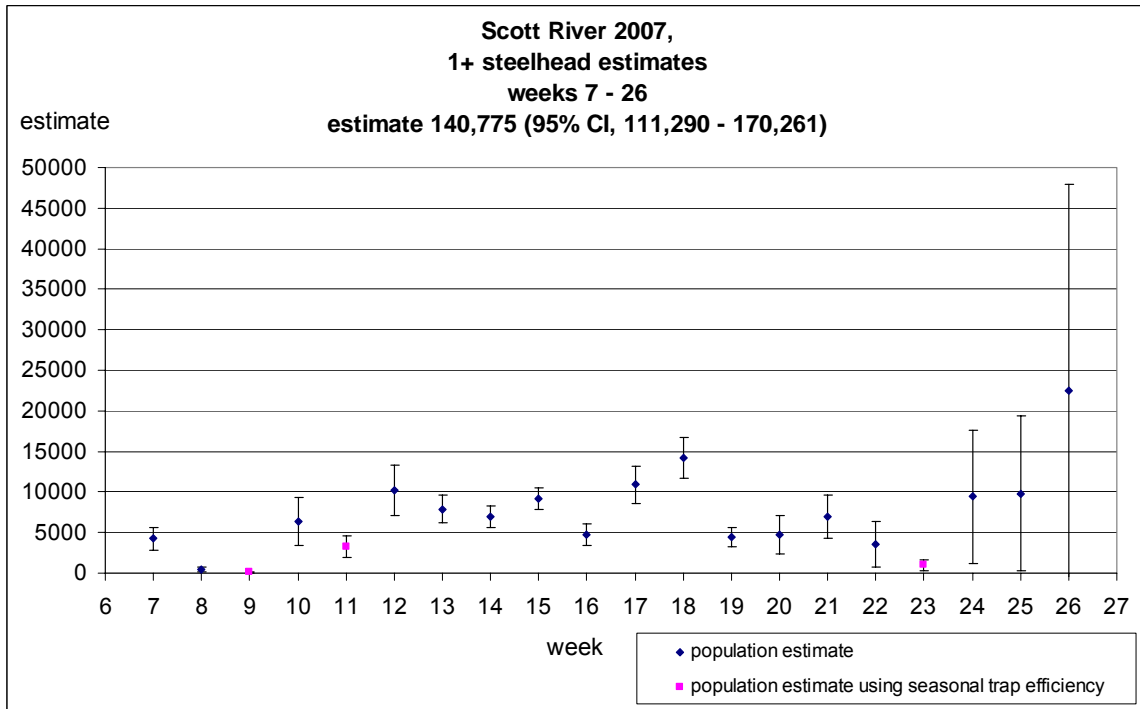


Chart 33

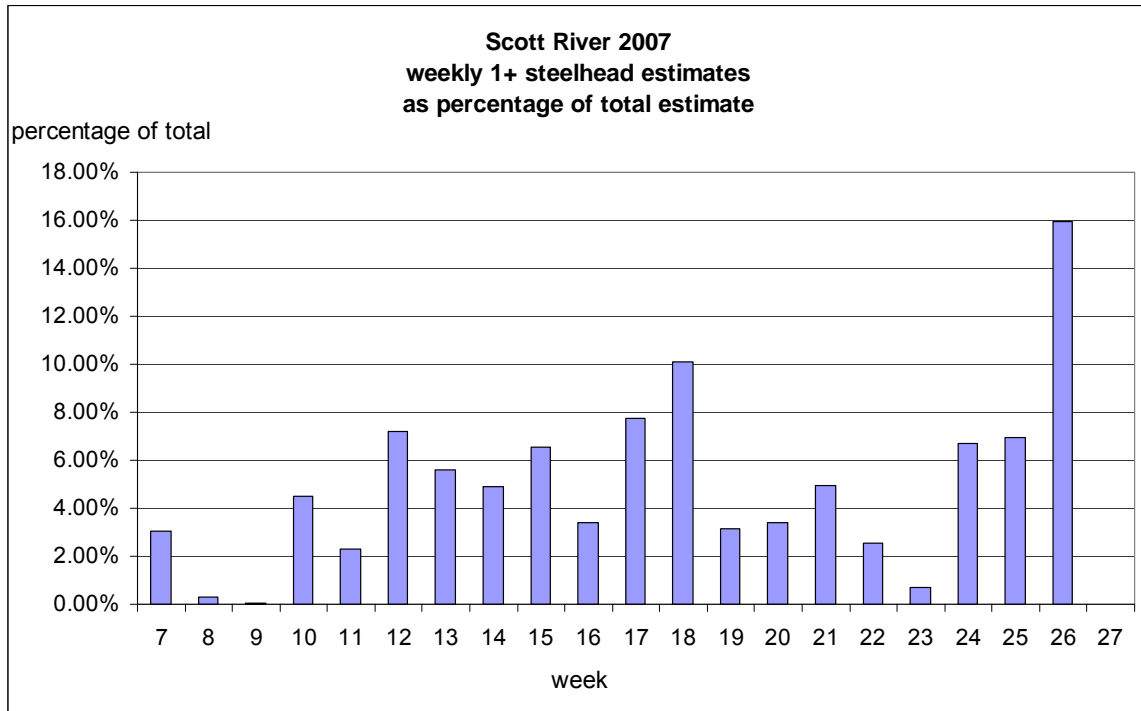


Chart 34

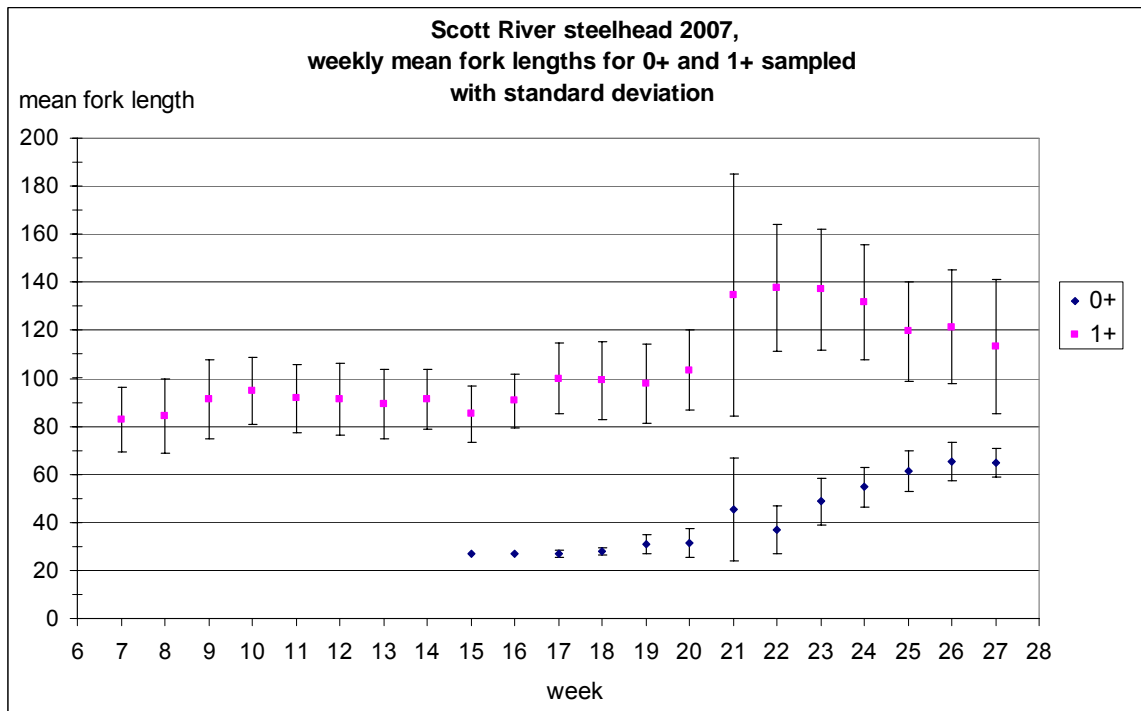


Chart 35

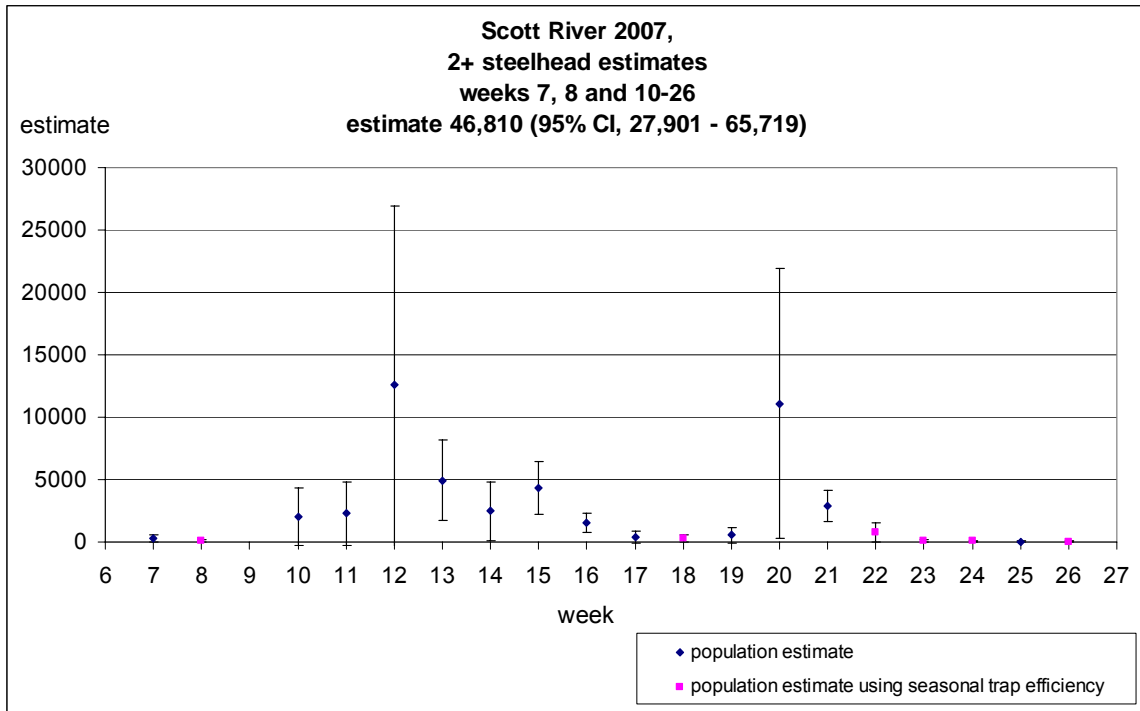


Chart 36

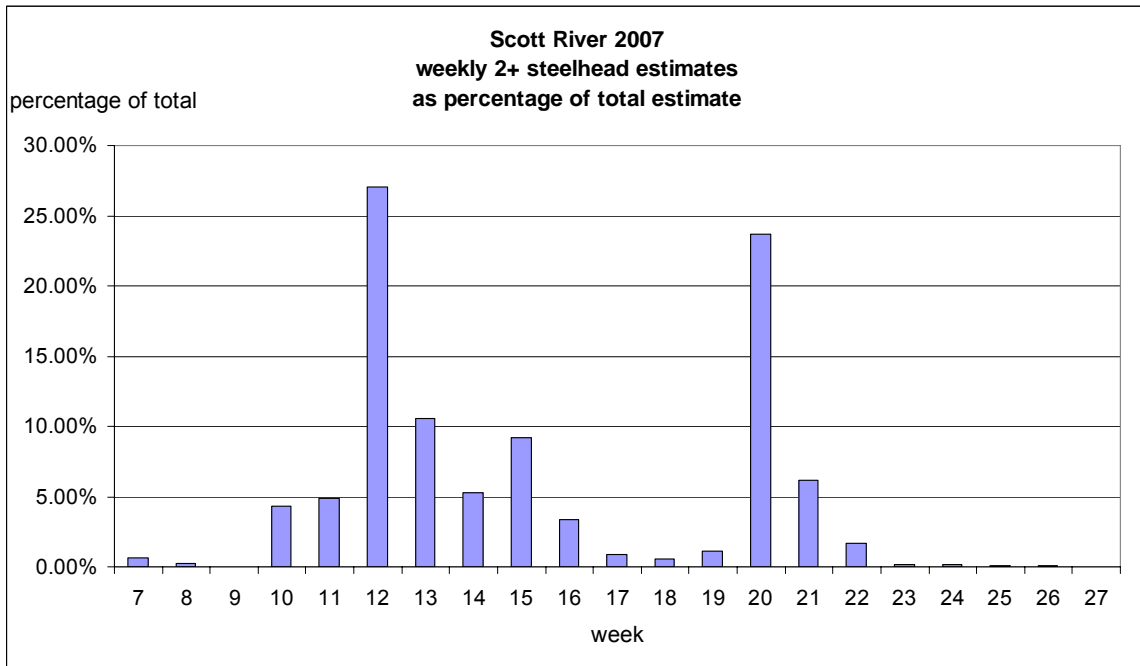


Chart 37

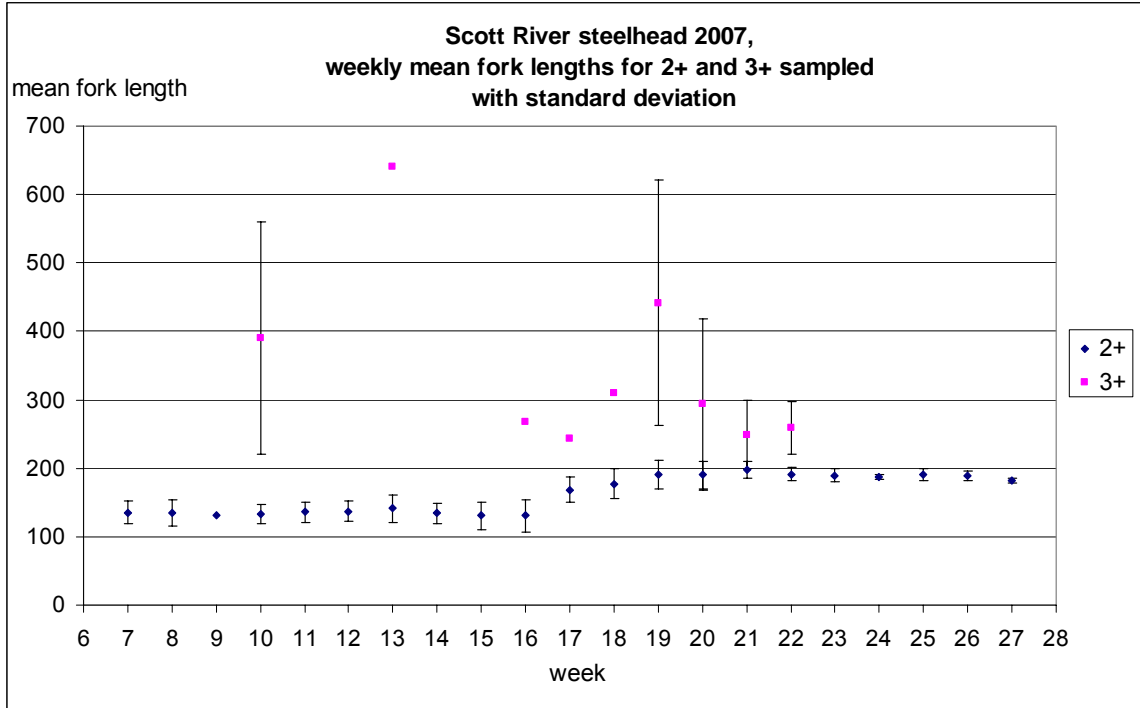


Chart 38

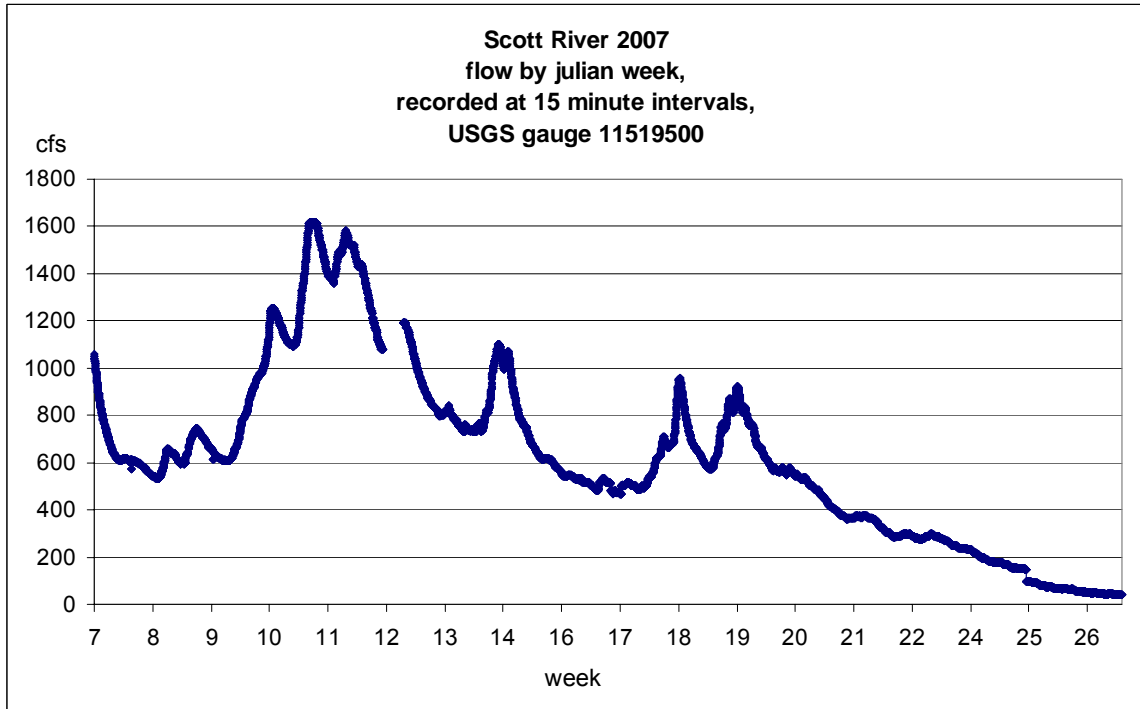


Chart 39

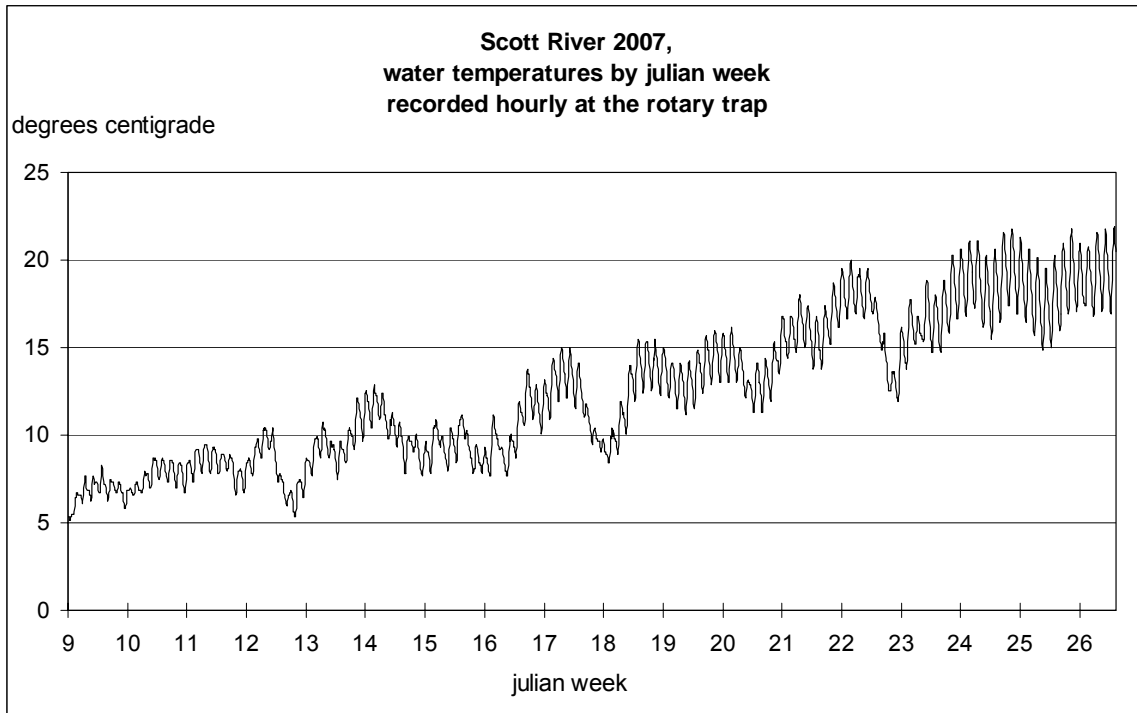
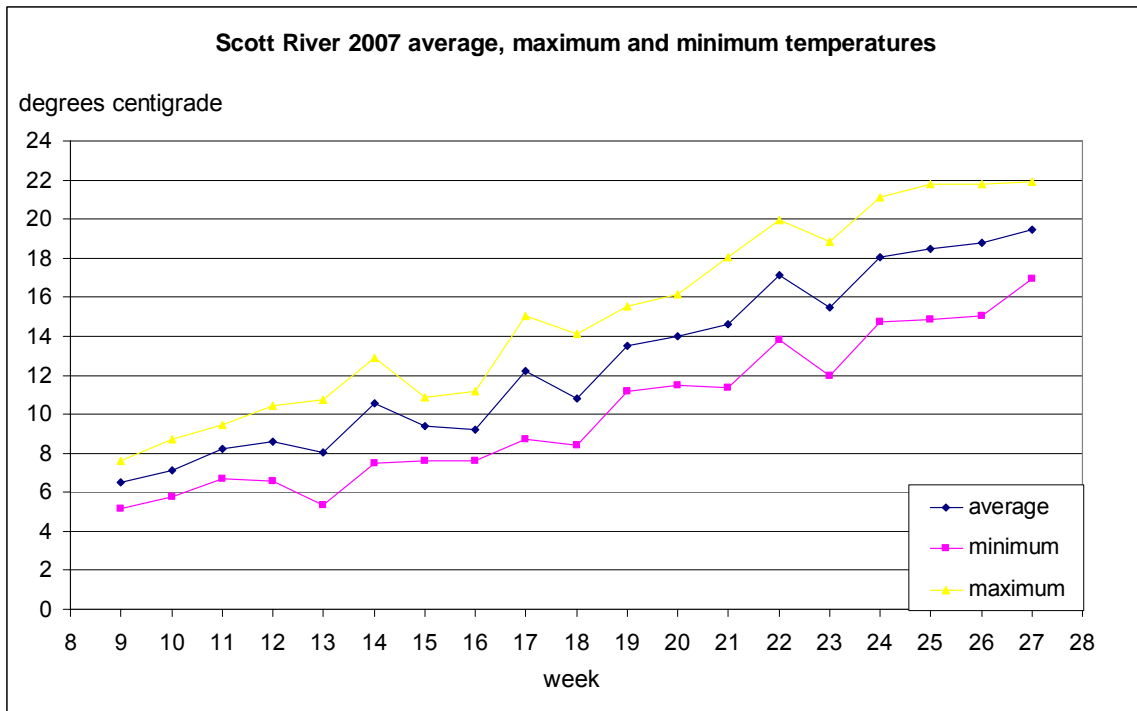


Chart 40



Discussion

1+ Coho estimates

Our ability to estimate the trap efficiency is limited in years of low abundance; this is especially true in high flow years and on larger streams such as the Scott River. In 2004 the total number of 1+ coho captured was 91. Although we marked and released 76 coho we were unable to recapture any (Table 4).

Table 4. Scott River 1+ coho mark and recapture data, 2004-2007.

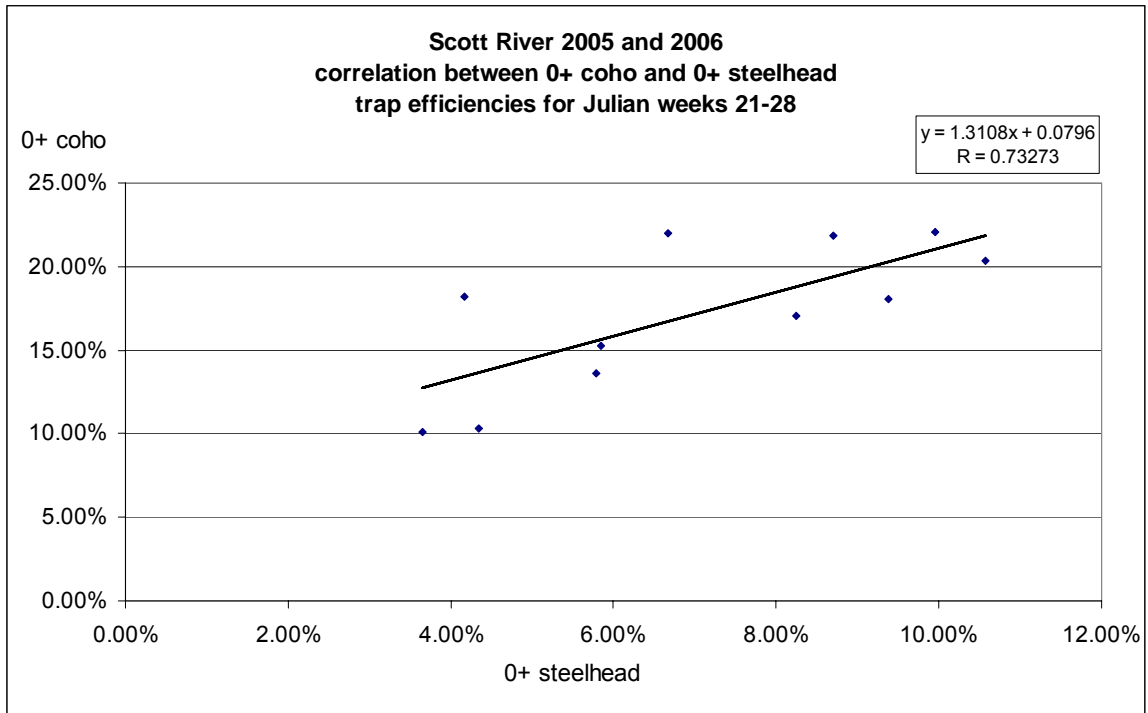
Scott River 1+ coho				
	catch total	marked/released	recaptures	population estimate
2004	91	76	0	no estimate
2005	248	199	15	1,660
2006	3,828	2,980	185	75,097
2007	352	0	0	3,931

In 2007, the emigrating 1+ coho smolts were again the progeny of what we believe is the weakest cohort of Scott River coho. Instead of the standard procedure of applying a caudal fin margin clip to a known number of the trapped coho and releasing them upstream of the trap to estimate efficiency, we identified, counted and released coho captured in the trap. We used the observed relationship between the trap efficiency for 1+ coho and 2+ steelhead observed in 2005 and 2006 to estimate the trap efficiency for coho in 2007 and expanded the number trapped in 2007 by the seasonal trap efficiency. The average seasonal trap efficiency observed in 2005 and 2006 for 1+ coho and 2+ steelhead was 6.87% and 3.47% respectively. We multiplied the observed trap efficiency for 2+ steelhead in 2007, (4.53%) by the ratio of 1+ coho efficiency to 2+ steelhead efficiency from 2005 and 2006, (1.98) to estimate a seasonal trap efficiency of 8.96% for 1+ coho. Expanding the total number of 1+ coho trapped, (352) by the estimated seasonal trap efficiency (8.96%), we estimate that 3,931, 1+ coho emigrated from the Scott River during Julian weeks 7 through 27 (2/12/07 through 7/08/07).

0+ Coho estimates

As with the Shasta River estimates, we used the correlation between the trap efficiency for 0+ coho and 0+ steelhead observed in 2005 and 2006 to estimate the trap efficiency for 0+ coho in 2007. The correlation between 0+ steelhead and 0+ coho in 2005 and 2006 is expressed by the equation $y = 1.3108x + 0.0796$ (Chart 41). The weekly efficiencies for 0+ steelhead from 2007 were equal to X and we solved for Y to estimate the trap efficiency for 0+ coho (Appendix 9).

Chart 41



Acknowledgements

The Anadromous Fisheries Resource Assessment and Monitoring Program (AFRAMP) would like to acknowledge the people who contributed their efforts to a successful field season in 2007:

Christopher Adams
Andrea Collins
Erica Eisch
Noah Ellis
Jack Herr

Jim Kilgore
Byron Littleton
Karen Schmidt
Nina Selvage
Steven Stenhouse
Brannon Walsh

Thanks to the following agencies and organizations for their support:

Shasta River Resource Conservation District

AmeriCorp Watershed Steward Program

California Department of Fish and Game,
Fisheries Restoration Grants Program

Additional Thanks to:

Bob Noyes of Gravity Works, for his excellent river safety training program

Literature Cited

- Carlson, S. R., L. G. Coggins Jr. and C. O. Swanton. 1998. A simple stratified design for mark-recapture estimation of salmon smolt abundance. *Alaska Fishery Research Bulletin* 5(2):88-102.
- Casselman, J.M. 1983. Age and growth assessment of fish from their calcified structures – Techniques and tools. In proceedings of the international workshop on age determination of oceanic pelagic fishes: Tunas, billfishes, sharks, ed. E. Prince and L. Pulos, pp. 1-17. NOAA Technical Report/National Marine Fisheries Service 8.
- Chilton, D.E., and Beamish, R.J. 1982. Age determination methods for fishes studied by the groundfish program at the Pacific Biological Station. 102 pp. *Can. Spec. Publ. Fish. Aquat. Sci.* no. 60.
- North Coast Regional Water Quality Control Board. 2006. Action plan for the Shasta River watershed temperature and dissolved oxygen total maximum daily loads. [online] Available at <http://www.swrcb.ca.gov/rwqcb1/programs/tmdl/Shasta/060707/FinalShastaTMDLActionPlan.pdf>
- Oregon Department of Fish and Wildlife. Sampling protocols for downstream migrant fish traps. Salmonid Life-Cycle Monitoring Project. [online] Available at <http://oregonstate.edu/Dept/ODFW/life-cycle/TRPMETH3.HTM#trap%20efficiency>
- Reader, J. M. and W. R. Chesney. 2006. (Unpublished data).
- Snyder, J. O. 1931. Salmon of the Klamath River California. Division of Fish and Game of California. *Fish Bulletin* No. 34.
- Siskiyou Resource Conservation District. 2007. Report to CDFG, RCD ref # 34-2c.
- Van Oosten, J. 1957. The skin and scales. In *The physiology of fishes*, vol. 1, Metabolism, ed. M.E. Brown, pp. 207-244. New York: Academic Press.
- Watershed Sciences. 2004. Aerial surveys using thermal infrared and color videography, Scott River and Shasta River Sub-Basins. Report to: North Coast Regional Water Quality Control Board.

Appendix 1. Catch Table Chinook 0+, Shasta River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	7343	18	7361	21.10	7361	1249	256	20.50%	35803	31841	39764
8	5897	346	6243	20.51	6243	821	126	15.35%	40407	33906	46909
9	1481	21	1502	20.33	1502	795	56	7.04%	20975	15676	26274
10	4126	163	4289	20.52	4289	1170	86	7.35%	57729	46007	69451
11	9193	180	9373	21.13	9373	1494	149	9.97%	93418	79172	107663
12	11684	260	11944	23.79	11944	1623	269	16.57%	71841	63943	79739
13	7006	47	7053	19.34	7053	1882	376	19.98%	35228	31968	38487
14	6601	46	6647	16.57	6647	1640	416	25.37%	26158	23925	28390
15	11561	106	11667	17.10	11667	1085	304	28.02%	41542	37544	45541
16	7467	47	7514	23.23	7514	1450	522	36.00%	20847	19370	22323
17	7083	28	7111	21.01	7111	1334	499	37.41%	18986	17626	20347
18	11026	57	11083	19.50	11083	914	350	38.29%	28892	26485	31298
19	10072	18	10090	21.10	10090	905	368	40.66%	24774	22795	26752
20	14425	11	14436	17.73	14436	719	321	44.65%	32279	29633	34926
21	11843	9	11852	21.35	11851	680	448	65.88%	17974	16987	18962
22	6292	15	6307	21.73	6307	678	420	61.95%	10172	9554	10790
23	805	5	810	22.03	810	390	231	59.23%	1365	1238	1492
24	578	3	581	19.32	581	293	168	57.34%	1011	898	1123
25	151	1	152	18.06	152	131	59	45.04%	334	261	408
Totals	134634	1381	136015	385.44	136014	19253	5424		579735	556443	603026

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 14 and 15, five out of six flow measurements were reported due to flow meter failure.)

³ 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.

⁴ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁵ % trap efficiency equals # recaptured fish/# marked released.

Appendix 2. Catch Table coho 0+, Shasta River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	0	0	0	21.10	0	-----	-----	-----	-----	-----	-----
8	0	0	0	20.51	0	-----	-----	-----	-----	-----	-----
9	0	0	0	20.33	0	-----	-----	-----	-----	-----	-----
10	0	0	0	20.52	0	-----	-----	-----	-----	-----	-----
11	0	0	0	21.13	0	-----	-----	-----	-----	-----	-----
12	0	2	2	23.79	2	-----	-----	23.75%	8*	-----	-----
13	3	0	3	19.34	3	-----	-----	23.75%	13*	-----	-----
14	9	1	10	16.57	10	-----	-----	23.75%	42*	-----	-----
15	2	0	2	17.10	2	-----	-----	23.75%	8*	-----	-----
16	0	0	0	23.23	0	-----	-----	-----	-----	-----	-----
17	6	0	6	21.01	6	-----	-----	23.75%	25*	-----	-----
18	13	0	13	19.50	13	-----	-----	23.75%	55*	-----	-----
19	60	1	61	21.10	61	-----	-----	23.75%	257*	-----	-----
20	43	0	43	17.73	43	-----	-----	23.75%	181*	-----	-----
21	84	0	84	21.35	84	-----	-----	20.72%	405	-----	-----
22	213	0	213	21.73	213	-----	-----	16.61%	1282	-----	-----
23	102	0	102	22.03	102	-----	-----	25.50%	400	-----	-----
24	34	0	34	19.32	34	-----	-----	33.32%	102	-----	-----
25	13	0	13	18.06	13	-----	-----	22.58%	58	-----	-----
Totals	582	4	586	385.44	586	-----	-----		2837	-----	-----

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 14 and 15, only five out of six flow measurements were reported due to flow meter failure.)

³ 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.

⁴ No mark-recapture trials performed. We minimized handling of coho due to projected low numbers of 0+ coho production in 2007.

⁵ Estimated percent trap efficiency. Derived from linear correlation of Shasta River weekly trap efficiencies for 0+ coho and 0+ steelhead in 2005 and 2006 (Chart 19). Using the equation for the line $y = 0.7625x + 0.0095$ and weekly trap efficiencies for 0+ steelhead in 2007, we calculated y.

* Estimates based on a seasonal trap efficiency of 23.75%.

Appendix 3. Catch Table coho 1+, Shasta River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	0	0	0	21.10	0	-----	-----	-----	-----	-----	-----
8	0	0	0	20.51	0	-----	-----	-----	-----	-----	-----
9	0	0	0	20.33	0	-----	-----	-----	-----	-----	-----
10	1	0	1	20.52	1	-----	-----	26.03%	4*	-----	-----
11	0	0	0	21.13	0	-----	-----	-----	-----	-----	-----
12	3	0	3	23.79	3	-----	-----	26.03%	12*	-----	-----
13	4	0	4	19.34	4	-----	-----	26.03%	15*	-----	-----
14	56	0	56	16.57	56	-----	-----	17.17%	326	-----	-----
15	42	0	42	17.10	42	-----	-----	28.75%	146	-----	-----
16	76	0	76	23.23	76	-----	-----	32.78%	232	-----	-----
17	69	2	71	21.01	71	-----	-----	24.59%	289	-----	-----
18	19	0	19	19.50	19	-----	-----	30.34%	63	-----	-----
19	12	0	12	21.10	12	-----	-----	22.52%	53	-----	-----
20	3	0	3	17.73	3	-----	-----	26.03%	12*	-----	-----
21	1	0	1	21.35	1	-----	-----	26.03%	4*	-----	-----
22	3	0	3	21.73	3	-----	-----	26.03%	12*	-----	-----
23	2	0	2	22.03	2	-----	-----	26.03%	8*	-----	-----
24	1	0	1	19.32	1	-----	-----	26.03%	4*	-----	-----
25	0	0	0	18.06	0	-----	-----	-----	-----	-----	-----
Totals	292	2	294	385.44	294	-----	-----		1178	-----	-----

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 14 and 15, five out of six flow measurements were reported due to flow meter failure.)

³ 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.

⁴ No mark-recapture trials performed. We minimized handling of coho due to projected low numbers of 1+ coho in 2007.

⁵ Estimated percent trap efficiency. Derived from linear correlation of Shasta River weekly trap efficiencies for 1+ coho and 2+ steelhead in 2004 and 2005 (Chart 18). Using the equation for the line $y = 1.1388x + 0.107$ and weekly trap efficiencies for 2+ steelhead in 2007, we calculated y .

* Estimates based on seasonal trap efficiency of 26.03%.

Appendix 4. Catch Table steelhead 0+, Shasta River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	0	0	0	21.10	0	0	0	-----	-----	-----	-----
8	0	0	0	20.51	0	0	0	-----	-----	-----	-----
9	0	0	0	20.33	0	0	0	-----	-----	-----	-----
10	0	0	0	20.52	0	0	0	-----	-----	-----	-----
11	0	0	0	21.13	0	0	0	-----	-----	-----	-----
12	0	0	0	23.79	0	0	0	-----	-----	-----	-----
13	0	0	0	19.34	0	0	0	-----	-----	-----	-----
14	0	0	0	16.57	0	0	0	-----	-----	-----	-----
15	0	0	0	17.10	0	0	0	-----	-----	-----	-----
16	1	0	1	23.23	1	0	0	-----	-----	-----	-----
17	2	0	2	21.01	2	2	1	32.79%	4*	0	8
18	0	0	0	19.50	0	0	0	-----	-----	-----	-----
19	10	0	10	21.10	10	2	1	32.79%	18*	2	34
20	39	0	39	17.73	39	0	0	-----	-----	-----	-----
21	40	0	40	21.35	40	27	7	25.93%	140	55	225
22	437	2	439	21.73	439	112	23	20.54%	2067	1328	2805
23	471	2	473	22.03	473	264	85	32.20%	1458	1184	1731
24	1065	5	1070	19.32	1070	351	149	42.45%	2511	2187	2835
25	795	3	798	18.06	798	349	99	28.37%	2793	2305	3281
Totals	2860	12	2872	385.44	2872	1107	365		8990	8005	9976

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 14 and 15, five out of six flow measurements were reported due to flow meter failure.)

³ 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.

⁴ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁵ % trap efficiency equals # recaptured fish/# marked released.

* Estimates based on seasonal trap efficiency of 32.79%.

Appendix 5. Catch Table steelhead 1+, Shasta River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	5	0	5	21.10	5	4	1	21.47%	13*	0	28
8	6	0	6	20.51	6	2	0	21.47%	13*	0	25
9	4	0	4	20.33	4	4	1	25.00%	10	0	21
10	5	0	5	20.52	5	5	1	20.00%	15	0	31
11	8	1	9	21.13	9	7	2	21.47%	29*	1	57
12	25	0	25	23.79	25	19	1	5.26%	250	0	529
13	21	0	21	19.34	21	21	1	4.76%	231	0	492
14	29	0	29	16.57	29	8	2	21.47%	96*	11	181
15	38	0	38	17.10	35	24	4	16.67%	175	41	309
16	72	0	72	23.23	70	62	10	16.13%	401	179	623
17	203	2	205	21.01	203	149	36	24.16%	823	576	1070
18	108	1	109	19.50	101	72	12	16.67%	567	281	853
19	158	0	158	21.10	157	93	25	26.88%	568	371	764
20	131	1	132	17.73	131	70	12	17.14%	715	360	1071
21	249	0	249	21.35	248	183	61	33.33%	736	571	901
22	186	4	190	21.73	190	117	19	16.24%	1121	662	1580
23	39	0	39	22.03	39	19	3	15.79%	195	34	356
24	85	3	88	19.32	86	45	10	22.22%	360	171	548
25	17	2	19	18.06	19	9	2	21.47%	65*	7	123
Totals	1389	14	1403	385.44	1383	913	203		6382	5470	7295

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 14 and 15, five out of six flow measurements were reported due to flow meter failure.)

³ 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.

⁴ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁵ % trap efficiency equals # recaptured fish/# marked released.

* Estimates based on seasonal trap efficiency of 21.47%.

Appendix 6. Catch Table steelhead 2+, Shasta River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	5	0	5	21.10	5	1	0	13.78%	9*	0	17
8	23	1	24	20.51	24	15	2	13.78%	125*	9	241
9	4	0	4	20.33	4	4	1	25.00%	10	0	21
10	19	0	19	20.52	19	14	1	7.14%	143	0	300
11	127	2	129	21.13	129	93	6	6.45%	1732	547	2918
12	139	0	139	23.79	138	116	2	1.72%	5382	119	10645
13	107	0	107	19.34	103	95	3	3.16%	2472	310	4634
14	179	0	179	16.57	177	88	5	5.68%	2626	716	4535
15	321	1	322	17.10	306	246	39	15.85%	1890	1327	2453
16	531	1	532	23.23	512	423	82	19.39%	2616	2075	3156
17	949	2	951	21.01	944	541	66	12.20%	7637	5878	9395
18	796	3	799	19.50	791	487	84	17.25%	4541	3623	5459
19	2049	7	2056	21.10	2048	549	57	10.38%	19421	14668	24174
20	1054	4	1058	17.73	1054	508	81	15.94%	6543	5204	7881
21	128	2	130	21.35	129	107	30	28.04%	449	303	596
22	56	1	57	21.73	57	37	2	5.41%	722	25	1419
23	15	1	16	22.03	16	5	1	13.78%	57*	0	117
24	19	0	19	19.32	19	12	2	16.67%	82	6	158
25	7	1	8	18.06	8	5	1	13.78%	28*	0	60
Totals	6528	26	6554	385.44	6483	3346	465		56483	48304	64663

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 14 and 15, five out of six flow measurements were reported due to flow meter failure.)

³ 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.

⁴ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁵ % trap efficiency equals # recaptured fish/# marked released.

* Estimates based on seasonal trap efficiency of 13.78%.

Appendix 7. Catch Table steelhead 3+, Shasta River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	1	1	2	21.10	2	0	0	-----	-----	-----	-----
8	4	0	4	20.51	4	0	0	-----	-----	-----	-----
9	1	0	1	20.33	1	0	0	-----	-----	-----	-----
10	0	0	0	20.52	0	0	0	-----	-----	-----	-----
11	11	0	11	21.13	11	9	1	7.93%	64*	0	139
12	6	0	6	23.79	6	6	0	7.93%	28*	0	64
13	3	0	3	19.34	3	2	0	7.93%	8*	0	17
14	24	0	24	16.57	24	13	1	7.93%	165*	0	345
15	45	0	45	17.10	43	33	2	6.06%	487	16	959
16	59	0	59	23.23	58	45	7	15.56%	334	122	545
17	47	0	47	21.01	47	38	3	7.93%	457*	62	852
18	8	0	8	19.50	8	7	1	14.29%	32	0	67
19	9	0	9	21.10	9	7	1	14.29%	36	0	75
20	4	0	4	17.73	4	4	2	50.00%	7	1	12
21	0	0	0	21.35	0	0	0	-----	-----	-----	-----
22	0	0	0	21.73	0	0	0	-----	-----	-----	-----
23	0	0	0	22.03	0	0	0	-----	-----	-----	-----
24	0	0	0	19.32	0	0	0	-----	-----	-----	-----
25	0	0	0	18.06	0	0	0	-----	-----	-----	-----
Totals	222	1	223	385.44	220	164	18		1618	937	2300

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 14 and 15, five out of six flow measurements were reported due to flow meter failure.)

³ 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.

⁴ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁵ % trap efficiency equals # recaptured fish/# marked released.

* Estimates based on seasonal trap efficiency of 7.93%.

Appendix 8. Catch Table Chinook 0+, Scott River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	52	3	55	39.92	55	32	3	9.38%	454	68	840
8	77	4	81	39.64	81	40	1	2.50%	1661	0	3516
9	105	3	108	32.81	108	45	6	13.33%	710	242	1177
10	110	48	158	29.59	158	66	1	1.52%	5293	0	11230
11	30	73	103	9.13	103	6	1	12.10%	418*	0	852
12	357	241	598	33.27	598	201	8	3.98%	13422	5229	21614
13	847	80	927	40.64	927	541	46	8.50%	10690	7728	13653
14	1233	70	1303	40.16	1303	747	91	12.18%	10594	8508	12680
15	3183	312	3495	40.60	3495	1633	215	13.17%	26439	23062	29816
16	4874	130	5004	40.25	5004	1389	117	8.42%	58945	48695	69196
17	2176	37	2213	37.59	2213	1674	301	17.98%	12274	10940	13608
18	1957	120	2077	38.04	2077	1186	174	14.67%	14088	12087	16089
19	713	58	771	39.67	771	507	75	14.79%	5154	4041	6266
20	1952	21	1973	40.18	1973	896	138	15.40%	12732	10726	14738
21	2755	12	2767	41.15	2767	1293	241	18.64%	14795	13046	16545
22	469	13	482	25.40	481	374	46	12.30%	3838	2774	4902
23	1938	19	1957	22.24	1956	775	67	8.65%	22321	17204	27439
24	4147	41	4188	17.02	4187	1205	97	8.05%	51526	41684	61368
25	8330	30	8360	-----	8360	999	70	7.01%	117746	91421	144072
26	4465	16	4481	-----	4481	1408	120	8.52%	52180	43208	61151
27**	397	3	400	-----	400	0	0	-----	-----	-----	-----
Totals	40167	1334	41501	607.28	41498	15017	1818		435279	401400	469158

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 8 and 13, volume measurement was estimated for 1 out of the 6 sample days. For week 11, the Scott 5' trap was not in operation due to high flows. In addition, for weeks 25 and 26, flow meter data was unusable due to low flows.)

³ 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.

⁴ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁵ % trap efficiency equals # recaptured fish/# marked released.

* Estimates based on seasonal trap efficiency of 12.10%.

**Week 27 - trap was only in operation one day.

Appendix 9. Catch Table coho 0+, Scott River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	0	0	0	39.92	0	0	0	-----	-----	-----	-----
8	0	0	0	39.64	0	0	0	-----	-----	-----	-----
9	0	0	0	32.81	0	0	0	-----	-----	-----	-----
10	0	0	0	29.59	0	0	0	-----	-----	-----	-----
11	0	0	0	9.13	0	0	0	-----	-----	-----	-----
12	0	0	0	33.27	0	0	0	-----	-----	-----	-----
13	0	0	0	40.64	0	0	0	-----	-----	-----	-----
14	15	1	16	40.16	16	0	0	23.60%	64*	-----	-----
15	450	40	490	40.60	490	0	0	23.60%	1906*	-----	-----
16	727	19	746	40.25	746	0	0	23.60%	3080*	-----	-----
17	87	2	89	37.59	89	0	0	23.60%	369*	-----	-----
18	21	1	22	38.04	22	0	0	23.60%	89*	-----	-----
19	16	0	16	39.67	16	0	0	23.60%	68*	-----	-----
20	17	0	17	40.18	17	0	0	15.67%	108	-----	-----
21	29	1	30	41.15	30	0	0	23.60%	123	-----	-----
22	19	0	19	25.40	19	0	0	16.70%	114	-----	-----
23	69	0	69	22.24	69	0	0	23.82%	290	-----	-----
24	52	0	52	17.02	52	0	0	17.49%	297	-----	-----
25	29	0	29	-----	29	0	0	34.88%	83	-----	-----
26	16	0	16	-----	16	0	0	33.05%	48	-----	-----
27**	2	0	2	-----	2	0	0	23.60%	8*	-----	-----
Totals	1549	64	1613	607.28	1613	0	0	-----	6647	-----	-----

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 8 and 13, volume measurement was estimated for 1 out of the 6 sample days. For week 11, the Scott 5' trap was not in operation due to high flows. In addition, for weeks 25 and 26, flow meter data was unusable due to low flows.)

³ 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.

⁴ No mark-recapture trials performed. We minimized handling of coho due to projected low numbers of 0+ coho production in 2007.

⁵ Estimated percent trap efficiency. Derived from linear correlation of Scott River weekly trap efficiencies for 0+ coho and 0+ steelhead in 2005 and 2006 (Chart 41). Using the equation for the line $y=1.3108x + .0796$ and weekly trap efficiencies for 0+ steelhead in 2007, we calculated y.

* Estimates based on seasonal trap efficiency of 23.60%.

**Week 27 - trap was only in operation one day.

Appendix 10. Catch Table coho 1+, Scott River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	Estimated % trap efficiency ⁵	Population estimate	Lower CI	Upper CI
7	2	0	2	39.92	2	-----	-----	-----	-----	-----	-----
8	0	0	0	39.64	0	-----	-----	-----	-----	-----	-----
9	1	0	1	32.81	1	-----	-----	-----	-----	-----	-----
10	0	0	0	29.59	0	-----	-----	-----	-----	-----	-----
11	1	0	1	9.13	1	-----	-----	-----	-----	-----	-----
12	2	0	2	33.27	2	-----	-----	-----	-----	-----	-----
13	8	0	8	40.64	8	-----	-----	-----	-----	-----	-----
14	18	0	18	40.16	18	-----	-----	-----	-----	-----	-----
15	41	0	41	40.60	41	-----	-----	-----	-----	-----	-----
16	25	1	26	40.25	26	-----	-----	-----	-----	-----	-----
17	17	0	17	37.59	17	-----	-----	-----	-----	-----	-----
18	68	0	68	38.04	68	-----	-----	-----	-----	-----	-----
19	80	0	80	39.67	80	-----	-----	-----	-----	-----	-----
20	30	2	32	40.18	32	-----	-----	-----	-----	-----	-----
21	43	0	43	41.15	43	-----	-----	-----	-----	-----	-----
22	9	0	9	25.40	9	-----	-----	-----	-----	-----	-----
23	3	0	3	22.24	3	-----	-----	-----	-----	-----	-----
24	0	0	0	17.02	0	-----	-----	-----	-----	-----	-----
25	1	0	1	-----	1	-----	-----	-----	-----	-----	-----
26	0	0	0	-----	0	-----	-----	-----	-----	-----	-----
27	0	0	0	-----	0	-----	-----	-----	-----	-----	-----
Totals	349	3	352	607.28	352	-----	-----	8.96%	3931	-----	-----

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 8 and 13, volume measurement was estimated for 1 out of the 6 sample days. For week 11, the Scott 5' trap was not in operation due to high flows. In addition, for weeks 25 and 26, flow meter data was unusable due to low flows.)

³ 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.

⁴ No mark-recapture trials performed. We minimized handling of coho due to projected low numbers of 1+ coho production in 2007.

⁵ Estimated % trap efficiency equals steelhead 2+ trap efficiency for 2007, multiplied by the ratio of coho 1+ and steelhead 2+ efficiencies for 2005 and 2006.

*Week 27 - trap was only in operation one day.

Appendix 11. Catch Table steelhead 0+, Scott River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	0	0	0	39.92	0	0	0	-----	-----	-----	-----
8	0	0	0	39.64	0	0	0	-----	-----	-----	-----
9	0	0	0	32.81	0	0	0	-----	-----	-----	-----
10	0	0	0	29.59	0	0	0	-----	-----	-----	-----
11	0	0	0	9.13	0	0	0	-----	-----	-----	-----
12	0	0	0	33.27	0	0	0	-----	-----	-----	-----
13	0	0	0	40.64	0	0	0	-----	-----	-----	-----
14	0	0	0	40.16	0	0	0	-----	-----	-----	-----
15	1	1	2	40.60	2	0	0	-----	-----	-----	-----
16	10	1	11	40.25	11	0	0	-----	-----	-----	-----
17	2	0	2	37.59	2	0	0	-----	-----	-----	-----
18	40	9	49	38.04	49	0	0	-----	-----	-----	-----
19	171	33	204	39.67	204	0	0	-----	-----	-----	-----
20	90	7	97	40.18	97	34	2	5.88%	1132	55	2208
21	49	0	49	41.15	49	23	4	15.63%	256*	56	456
22	51	1	52	25.40	52	15	1	6.67%	416	0	865
23	253	1	254	22.24	254	157	19	12.10%	2007	1174	2840
24	440	5	445	17.02	445	220	16	7.27%	5785	3169	8401
25	1757	8	1765	-----	1765	370	76	20.54%	8504	6788	10220
26	902	3	905	-----	905	397	76	19.14%	4678	3707	5649
27**	51	0	51	-----	51	0	0	-----	-----	-----	-----
Totals	3817	69	3886	607.28	3886	1216	194		22777	19195	26359

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 8 and 13, volume measurement was estimated for 1 out of the 6 sample days. For week 11, the Scott 5' trap was not in operation due to high flows. In addition, for weeks 25 and 26, flow meter data was unusable due to low flows.)

³ 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.

⁴ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁵ % trap efficiency equals # recaptured fish/# marked released.

* Estimates based on seasonal trap efficiency of 15.63%.

**Week 27 - trap was only in operation one day.

Appendix 12. Catch Table steelhead 1+, Scott River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	399	1	400	39.92	400	361	33	9.14%	4259	2860	5658
8	57	0	57	39.64	57	44	5	11.36%	428	118	737
9	16	0	16	32.81	16	8	1	9.55%	82*	0	173
10	345	3	348	29.59	347	292	15	5.14%	6354	3350	9358
11	320	3	323	9.13	323	228	22	9.55%	3249*	1966	4531
12	716	1	717	33.27	717	552	38	6.88%	10167	7048	13286
13	834	5	839	40.64	838	733	77	10.50%	7886	6167	9605
14	1015	4	1019	40.16	1018	656	96	14.63%	6895	5576	8214
15	1307	6	1313	40.60	1312	1170	166	14.19%	9200	7832	10567
16	515	3	518	40.25	515	416	44	10.58%	4772	3414	6131
17	1049	4	1053	37.59	1049	884	84	9.50%	10922	8640	13204
18	1525	5	1530	38.04	1528	1067	114	10.68%	14190	11661	16720
19	521	6	527	39.67	527	418	49	11.72%	4416	3226	5606
20	337	1	338	40.18	338	196	13	6.63%	4756	2389	7124
21	468	4	472	41.15	472	367	24	6.54%	6948	4302	9594
22	150	7	157	25.40	157	113	4	3.54%	3580	735	6425
23	101	7	108	22.24	108	57	5	9.55%	972*	294	1650
24	221	8	229	17.02	227	165	3	1.82%	9421	1192	17649
25	199	5	204	-----	204	143	2	1.40%	9792	227	19357
26	248	9	257	-----	257	174	1	0.57%	22488	0	47887
27**	23	2	25	-----	25	0	0	-----	-----	-----	-----
Totals	10366	84	10450	607.28	10435	8044	796		140775	111290	170261

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 8 and 13, volume measurement was estimated for 1 out of the 6 sample days. For week 11, the Scott 5' trap was not in operation due to high flows. In addition, for weeks 25 and 26, flow meter data was unusable due to low flows.)

³ 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.

⁴ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁵ % trap efficiency equals # recaptured fish/# marked released.

* Estimates based on seasonal trap efficiency of 9.55%.

**Week 27 - trap was only in operation one day.

Appendix 13. Catch Table steelhead 2+, Scott River 2007.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekly population estimate	Lower CI	Upper CI
7	32	0	32	39.92	32	28	2	7.14%	309	9	610
8	11	2	13	39.64	13	11	0	4.53%	104*	0	232
9	2	0	2	32.81	2	0	0	-----	-----	-----	-----
10	71	1	72	29.59	72	55	1	1.82%	2016	0	4287
11	83	0	83	9.13	83	54	1	1.85%	2283	0	4848
12	171	1	172	33.27	172	146	1	0.68%	12642	0	26932
13	204	1	205	40.64	205	192	7	3.65%	4946	1721	8170
14	104	0	104	40.16	104	70	2	2.86%	2461	67	4856
15	269	1	270	40.60	270	238	14	5.88%	4302	2205	6399
16	173	1	174	40.25	174	133	14	10.53%	1554	806	2302
17	32	1	33	37.59	33	25	1	4.00%	429	0	909
18	26	0	26	38.04	26	16	1	4.53%	256*	0	554
19	41	0	41	39.67	40	26	1	3.85%	540	0	1143
20	222	4	226	40.18	225	147	2	1.36%	11100	261	21939
21	250	0	250	41.15	250	206	17	8.25%	2875	1596	4154
22	52	0	52	25.40	52	44	2	4.53%	782*	20	1545
23	13	0	13	22.24	13	8	0	4.53%	86*	0	192
24	11	0	11	17.02	11	6	0	4.53%	61*	0	136
25	8	0	8	-----	8	6	1	16.67%	28	0	58
26	10	0	10	-----	10	3	0	4.53%	35*	0	77
27**	2	0	2	-----	2	0	0	-----	-----	-----	-----
Totals	1787	12	1799	607.28	1797	1414	68		46810	27901	65719

¹ Does not include recaptured fish.

² Million cubic feet. (Note: For weeks 8 and 13, volume measurement was estimated for 1 out of the 6 sample days. For week 11, the Scott 5' trap was not in operation due to high flows. In addition, for weeks 25 and 26, flow meter data was unusable due to low flows.)

³ 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.

⁴ Adjusted marked & released includes fish marked during the week minus marked fish caught after the end of the week.

⁵ % trap efficiency equals # recaptured fish/# marked released.

* Estimates based on seasonal trap efficiency of 4.53%.

**Week 27 - trap was only in operation one day.

Appendix 14. Shasta River 2007 average fork length by Julian week for Chinook 0+.

Julian week	average	s.d.	n	min	max
7	38	1.58	306	32	42
8	39	2.04	281	34	45
9	40	2.69	252	32	49
10	39	3.41	291	32	51
11	42	4.49	300	31	56
12	46	6.97	300	28	74
13	52	8.20	303	24	77
14	55	7.79	300	36	78
15	62	8.92	299	43	93
16	67	10.57	294	42	97
17	68	10.59	306	45	95
18	73	11.62	300	44	105
19	81	13.32	300	50	110
20	86	10.64	301	33	113
21	88	8.56	302	56	110
22	88	8.31	300	65	120
23	93	11.56	179	57	121
24	95	11.25	223	59	127
25	91	8.14	6	82	100

Appendix 15. Shasta River 2007 average fork length by Julian week for Chinook 1+.

Julian week	average	s.d.	n	min	max
7	----	----	----	----	----
8	----	----	----	----	----
9	159	65.05	2	113	205
10	----	----	----	----	----
11	----	----	----	----	----
12	----	----	----	----	----
13	----	----	----	----	----
14	----	----	----	----	----
15	----	----	----	----	----
16	----	----	----	----	----
17	----	----	----	----	----
18	----	----	----	----	----
19	----	----	----	----	----
20	----	----	----	----	----
21	----	----	----	----	----
22	----	----	----	----	----
23	----	----	----	----	----
24	----	----	----	----	----
25	----	----	----	----	----

Appendix 16. Shasta River 2007 average fork length by Julian week for steelhead 0+.

Julian week	average	s.d.	n	min	max
7	----	----	----	----	----
8	----	----	----	----	----
9	----	----	----	----	----
10	----	----	----	----	----
11	----	----	----	----	----
12	----	----	----	----	----
13	----	----	----	----	----
14	----	----	----	----	----
15	----	----	----	----	----
16	27	----	1	27	27
17	75	----	1	75	75
18	----	----	----	----	----
19	52	5.66	2	48	56
20	55	6.92	14	45	68
21	67	7.78	11	51	81
22	71	8.72	65	56	109
23	70	9.24	113	48	89
24	77	9.80	247	52	109
25	75	10.17	230	49	106

Appendix 17. Shasta River 2007 average fork length by Julian week for steelhead 1+.

Julian week	average	s.d.	n	min	max
7	96	34.15	5	58	135
8	118	12.71	6	105	136
9	129	11.58	4	115	139
10	129	9.59	5	112	134
11	126	17.55	8	86	139
12	123	10.34	24	102	139
13	128	12.64	17	89	139
14	122	12.24	14	96	136
15	112	12.14	21	95	135
16	115	13.46	25	94	136
17	132	16.56	106	97	159
18	136	13.90	76	100	158
19	135	13.20	98	91	158
20	137	13.98	62	106	159
21	164	13.26	151	123	179
22	155	16.71	129	112	179
23	149	17.08	39	117	179
24	146	13.95	72	110	178
25	147	18.56	19	110	179

Appendix 18. Shasta River 2007 average fork length by Julian week for steelhead 2+.

Julian week	average	s.d.	n	min	max
7	191	15.22	5	179	212
8	170	19.21	22	144	210
9	177	3.30	4	173	181
10	168	17.55	18	142	200
11	170	15.56	101	141	209
12	168	15.90	110	140	209
13	169	18.61	74	140	211
14	180	21.09	93	140	228
15	181	17.96	128	140	219
16	186	17.85	102	142	218
17	188	18.48	139	143	229
18	186	16.89	140	160	226
19	185	15.67	146	160	229
20	182	14.74	139	160	221
21	190	8.76	122	175	211
22	188	9.27	52	180	228
23	193	10.55	16	180	212
24	195	14.00	19	181	225
25	195	11.49	8	180	210

Appendix 19. Shasta River 2007 average fork length by Julian week for steelhead 3+.

Julian week	average	s.d.	n	min	max
7	368	17.68	2	355	380
8	439	75.34	4	334	510
9	217	-----	1	217	217
10	-----	-----	-----	-----	-----
11	237	17.29	11	212	275
12	228	3.40	4	225	232
13	239	4.58	3	234	243
14	263	52.33	15	230	430
15	238	15.12	44	219	280
16	248	62.08	58	220	600
17	242	9.90	47	230	280
18	244	26.14	8	230	305
19	242	9.51	8	230	258
20	236	7.05	4	231	246
21	-----	-----	-----	-----	-----
22	-----	-----	-----	-----	-----
23	-----	-----	-----	-----	-----
24	-----	-----	-----	-----	-----
25	-----	-----	-----	-----	-----

Appendix 20. Scott River 2007 average fork length by Julian week for Chinook 0+.

Julian week	average	s.d.	n	min	max
7	35	2.64	12	32	39
8	38	2.97	27	31	43
9	39	4.21	65	10	42
10	38	3.06	72	32	49
11	37	2.47	73	31	42
12	38	2.94	296	30	54
13	39	4.83	217	31	62
14	37	2.83	223	30	52
15	40	5.85	482	30	69
16	44	8.71	586	31	76
17	57	19.65	200	29	119
18	57	15.89	234	29	119
19	55	9.88	142	36	85
20	62	12.53	195	35	119
21	65	10.65	402	42	108
22	78	13.37	73	49	109
23	80	11.59	253	35	108
24	86	8.36	548	51	107
25	85	6.67	350	59	108
26	86	6.56	254	65	105
27	87	5.73	50	63	96

Appendix 21. Scott River 2007 average fork length by Julian week for Chinook 1+.

Julian week	average	s.d.	n	min	max
7	-----	-----	-----	-----	-----
8	-----	-----	-----	-----	-----
9	-----	-----	-----	-----	-----
10	-----	-----	-----	-----	-----
11	98	-----	1	98	98
12	114	-----	1	114	114
13	-----	-----	-----	-----	-----
14	-----	-----	-----	-----	-----
15	-----	-----	-----	-----	-----
16	120	5.00	3	115	125
17	135	8.21	8	128	153
18	127	6.87	11	120	143
19	147	-----	1	147	147
20	137	11.59	3	129	150
21	-----	-----	-----	-----	-----
22	-----	-----	-----	-----	-----
23	-----	-----	-----	-----	-----
24	-----	-----	-----	-----	-----
25	-----	-----	-----	-----	-----
26	-----	-----	-----	-----	-----
27	-----	-----	-----	-----	-----

Appendix 22. Scott River 2007 average fork length by Julian week for steelhead 0+.

Julian week	average	s.d.	n	min	max
7	-----	-----	-----	-----	-----
8	-----	-----	-----	-----	-----
9	-----	-----	-----	-----	-----
10	-----	-----	-----	-----	-----
11	-----	-----	-----	-----	-----
12	-----	-----	-----	-----	-----
13	-----	-----	-----	-----	-----
14	-----	-----	-----	-----	-----
15	27	-----	1	27	27
16	27	-----	1	27	27
17	27	1.41	2	26	28
18	28	1.44	16	25	30
19	31	3.97	43	27	47
20	31	5.99	18	25	47
21	45	21.45	7	26	75
22	37	9.85	3	26	45
23	49	9.82	50	25	78
24	55	8.21	122	26	78
25	61	8.32	174	44	84
26	65	8.02	104	44	79
27	65	5.89	25	54	78

Appendix 23. Scott River 2007 average fork length by Julian week for steelhead 1+.

Julian week	average	s.d.	n	min	max
7	83	13.45	207	55	119
8	84	15.49	55	56	117
9	91	16.43	15	62	119
10	95	13.78	170	60	119
11	92	14.33	101	63	121
12	91	15.01	259	55	119
13	89	14.50	243	9	119
14	91	12.64	261	59	118
15	85	11.72	247	62	117
16	91	11.23	274	57	109
17	100	14.63	261	69	146
18	99	16.19	268	69	149
19	98	16.40	263	65	197
20	103	16.81	181	72	148
21	135	50.28	280	74	790
22	138	26.48	133	82	179
23	137	25.22	102	86	179
24	132	23.78	196	84	179
25	120	20.72	159	80	177
26	121	23.66	131	80	173
27	113	27.92	23	80	164

Appendix 24. Scott River 2007 average fork length by Julian week for steelhead 2+.

Julian week	average	s.d.	n	min	max
7	135	16.17	32	120	176
8	135	18.52	13	120	173
9	132	-----	1	132	132
10	133	13.96	72	120	190
11	136	14.57	77	120	182
12	137	15.33	159	120	198
13	141	20.50	151	116	219
14	134	14.58	102	120	185
15	130	20.67	187	110	218
16	131	23.78	171	110	230
17	169	18.16	32	130	206
18	178	22.06	26	150	223
19	191	21.61	41	155	238
20	190	20.44	134	150	229
21	198	12.71	220	180	238
22	191	9.73	51	181	227
23	190	9.38	13	180	215
24	188	3.84	10	181	195
25	191	8.53	8	182	205
26	189	6.73	9	180	203
27	182	2.83	2	180	184

Appendix 25. Scott River 2007 average fork length by Julian week for steelhead 3+.

Julian week	average	s.d.	n	min	max
7	-----	-----	-----	-----	-----
8	-----	-----	-----	-----	-----
9	390	169.71	2	270	510
10	-----	-----	-----	-----	-----
11	-----	-----	-----	-----	-----
12	640	-----	1	640	640
13	-----	-----	-----	-----	-----
14	-----	-----	-----	-----	-----
15	268	-----	1	268	268
16	243	-----	1	243	243
17	310	-----	1	310	310
18	442	179.26	3	235	555
19	294	125.19	12	230	585
20	249	49.98	35	230	530
21	259	38.62	17	232	395
22	-----	-----	-----	-----	-----
23	-----	-----	-----	-----	-----
24	-----	-----	-----	-----	-----
25	-----	-----	-----	-----	-----
26	-----	-----	-----	-----	-----
27	-----	-----	-----	-----	-----

Appendix 26. Age Length cut-offs for Shasta River juvenile salmonids

Shasta River Steelhead age-length cut-offs for Julian weeks 7-28 based on 2006 scale ageing data

Julian Weeks	Age-Length Cut-offs				n
	Age 0+	Age 1+	Age 2+	Age 3+	
7 - 8	≤ 49	50 - 139	140 - 259	≥ 260	13
9 - 10	≤ 49	50 - 169	170 - 209	≥ 210	16
11 - 12	≤ 49	50 - 149	150 - 189	≥ 190	6
13 - 14	≤ 49	50 - 149	150 - 259	≥ 260	7
15 - 16	≤ 49	50 - 129	130 - 219	≥ 220	13
17 - 18	≤ 79	80 - 149	150 - 229	≥ 230	28
19 - 20	≤ 79	80 - 119	120 - 229	≥ 230	26
21 - 22	≤ 89	90 - 189	190 - 219	≥ 220	22
23 - 24	≤ 119	120 - 179	180 - 239	≥ 240	28
25 - 26	≤ 99	100 - 169	170 - 259	≥ 260	30
27 - 28	≤ 109	110 - 169	170 - 269	≥ 270	17

Shasta River Coho salmon age-length cut-offs for Julian weeks 7-28 based on 2006 scale ageing data

Julian Weeks	Age-Length Cut-offs			n
	Age 0+	Age 1+	Age 2+	
7 - 8	≤ 79	80 - 149	≥ 150	14
9 - 12	≤ 99	100 - 159	≥ 160	34
13 - 14	≤ 59	60 - 189	≥ 170	33
15 - 16	≤ 99	100 - 159	≥ 160	14
17 - 20	≤ 89	90 - 169	≥ 170	35
21 - 28	≤ 119	120 - 149	≥ 150	49

Shasta River Chinook salmon age-length cut-offs for Julian weeks 7-28 based on 2006 scale ageing data

Julian Weeks	Age-Length Cut-offs		n
	Age 0+	Age 1+	
7 - 8	≤ 50	≥ 110	1
9 - 12	≤ 79	≥ 80	16
13 - 14	≤ 79	≥ 80	14
15 - 16	≤ 89	≥ 90	18
17 - 20	≤ 119	≥ 120	20
21 - 28	≤ 159	≥ 160	36

Appendix 27. Age Length cut-offs for Scott River juvenile salmonids

Scott River Steelhead age-length cut-offs for Julian weeks 7-28 based on 2000 - 2006 scale ageing data

Julian Weeks	Age-Length Cut-offs				n
	Age 0+	Age 1+	Age 2+	Age 3+	
7 - 8	≤ 59	60 - 119	120 - 189	≥ 190	61
9 - 12	≤ 49	50 - 119	120 - 229	≥ 230	162
13 - 14	≤ 49	50 - 119	120 - 259	≥ 260	86
15 - 16	≤ 59	60 - 109	110 - 219	≥ 220	70
17 - 20	≤ 59	60 - 149	150 - 229	≥ 230	199
21 - 28	≤ 79	80 - 179	180 - 229	≥ 230	224

Scott River Coho salmon age-length cut-offs for Julian weeks 7-28 based on 2000 - 2006 scale ageing data

Julian Weeks	Age-Length Cut-offs			n
	Age 0+	Age 1+	Age 2+	
7 - 8	≤ 49	50 - 119	≥ 120	24
9 - 12	≤ 49	50 - 149	≥ 150	49
13 - 14	≤ 59	60 - 149	≥ 150	20
15 - 16	≤ 69	70 - 149	≥ 150	22
17 - 20	≤ 69	70 - 159	≥ 160	31
21 - 28	≤ 109	110 - 159	≥ 160	96

Scott River Chinook salmon age-length cut-offs for Julian weeks 7-28 based on 2000 - 2006 scale ageing data

Julian Weeks	Age-Length Cut-offs		n
	Age 0+	Age 1+	
7 - 8	≤ 99	≥ 100	0
9 - 12	≤ 129	≥ 130	1
13 - 14	≤ 99	≥ 100	0
15 - 16	≤ 69	≥ 70	1
17 - 20	≤ 119	≥ 120	4
21 - 28	≤ 129	≥ 130	27

Appendix 28. Additional fish species collected in the Shasta and Scott River rotary traps in 2007.

Additional fish species collected in the Shasta River rotary trap, 2007.

Common Names	Scientific Names	Number trapped
ammocoete	family Petromyzontidae	55
bluegill	<i>Lepomis macrochirus</i>	1
brook stickleback	<i>Culaea inconstans</i>	2
brown bullhead	<i>Ameiurus nebulosus</i>	30
fathead minnow	<i>Pimephales promelas</i>	8
golden shiner	<i>Notemigonus crysoleucas</i>	13
green sunfish	<i>Lepomis cyanellus</i>	17
Japanese pond smelt	<i>Hypomesus nipponensis</i>	25
Klamath River lamprey	<i>Lampetra similis</i>	10
Klamath small scale sucker	<i>Catostomus rimiculus</i>	1,841
large mouth bass	<i>Micropterus salmoides</i>	1
Miller Lake lamprey	<i>Lampetra (Entosphenus) minima</i>	1
Pacific Lamprey	<i>Lampetra tridentata</i>	4,467
river lamprey	<i>Lampetra ayresi</i>	274
sculpin	<i>Cottus spp.</i>	26
speckled dace	<i>Rhinichthys osculus</i>	867
yellow bullhead	<i>Ameiurus natalis</i>	173

Additional fish species collected in the Scott River rotary traps, 2007.

Common Names	Scientific Names	Number trapped
ammocoete	family Petromyzontidae	13,733
bluegill	<i>Lepomis macrochirus</i>	1
brook stickleback	<i>Culaea inconstans</i>	17
brown bullhead	<i>Ameiurus nebulosus</i>	1
fathead minnow	<i>Pimephales promelas</i>	115
golden shiner	<i>Notemigonus crysoleucas</i>	6
green sunfish	<i>Lepomis cyanellus</i>	1
Klamath small scale sucker	<i>Catostomus rimiculus</i>	27,097
marbled sculpin	<i>Cottus klamathensis</i>	160
Miller Lake lamprey	<i>Lampetra (Entosphenus) minima</i>	10
Pacific Lamprey	<i>Lampetra tridentata</i>	771
river lamprey	<i>Lampetra ayresi</i>	100
speckled dace	<i>Rhinichthys osculus</i>	6,130
yellow bullhead	<i>Ameiurus natalis</i>	1

Appendix 29. List of julian weeks and calendar equivalents

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

* = eight days only during leap years

** = eight day julian week