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The Resources Agency
DEPARTMENT OF FISH AND GAME

FINAL REPORT
SHASTA AND SCOTT RIVER
JUVENILE SALMONID OUTMIGRATION MONITORING PROJECT
P0610354

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Abstract

2009 was the tenth 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 2009 and to investigate the relationships between in-stream conditions and emigration patterns of juvenile salmonids.

Trap efficiencies were determined for all age classes of Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*) and steelhead (*Oncorhynchus mykiss*) in the catch and calculated weekly production estimates for each age class. The weekly mean fork length for all age classes of salmonids in the catch was determined from a measured sub-sample. Due to low numbers of coho expected in 2009, the correlation between 0+ steelhead trap efficiencies and 0+ coho efficiencies observed in previous years was used to produce estimates of trap efficiencies in 2009. The same method was followed with 2+ steelhead efficiencies to provide 1+ coho efficiencies.

Background

2009 was the tenth 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 2009.
- To investigate the relationships between in-stream 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, coho 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

The Shasta River was sampled 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. The live car was checked and algae build-up was removed at approximately 1700 hours daily and at 2200 hours as needed. The velocity of the water entering the cone was measured 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 salmonids in the catch.

Age Determination

The same age-length cutoffs for salmonids in 2007 were used in 2009. 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. The intervals are not absolute and 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 37 and 38.

Trap Efficiency Determinations and Production Estimates

When sufficient fish were in the catch, multiple trap efficiency trials were conducted to determine the mean weekly trap efficiency for 0+ Chinook (*Oncorhynchus tshawytscha*), 1+ coho (*Oncorhynchus kisutch*), 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+ salmonids were dyed by placing them in a solution of 0.6 grams of Bismarck brown mixed with 19 liters of water for 40 to 50 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). Zero was used 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 the seasonal trap efficiency was used 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, 1+ and 0+ coho were marked and released upstream of the rotary trap to produce weekly estimates of trap efficiency. Due to the low number of 0+ and 1+ coho projected for 2009, we chose to minimize our handling of the fish. The correlation between 0+ steelhead and 0+ coho trap efficiencies in 2005, 2006 and 2008 is expressed by the equation $y = 0.8224x + 0.0039$ (Chart 19). The weekly efficiencies for 0+ steelhead from 2009 were equal to X and we solved for Y to estimate the trap efficiency for 0+ coho. When no 0+ steelhead were marked during the week, the seasonal trap efficiency of 15.83% was used to estimate the number of coho fry produced in 2009. When marked 0+ steelhead were released but none were

recaptured during the week, the seasonal trap efficiency was correlated using the above equation to provide an efficiency for 0+ coho.

The correlation between the trap efficiency for 2+ steelhead smolts and 1+ coho smolts observed in 2004, 2005, and 2009 was used to estimate the number of coho smolts produced in 2009. This equation is expressed by $y = 0.7532x + 0.1485$ (Chart 20) where x is equal to 2+ steelhead efficiency and y is equal to 1+ coho efficiency. When marked 2+ steelhead were released but none were recaptured during the week, the seasonal trap efficiency of 19.87% was used to correlate trap efficiency for 1+ coho. When relatively large numbers of 1+ coho were in the catch, actual mark and recapture trials occurred.

Since no confidence intervals could be calculated with correlated efficiencies, it was necessary to use probable error instead. To determine probable error for weeks that were based on correlations, the formula $P.E. = 0.6745 [(1-r^2) / \sqrt{N}]$ was used to calculate high and low intervals for the estimate. R^2 is the correlation coefficient and N is the number of observations. ([Pearson's Correlation Coefficient](#)) ?? (properly site web article)

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 (Charts 22, 23). 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, Chart 21). 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 11, 2009. Trapping ended after 20 weeks on July 1, 2009. The trap fished 120 sets for a total of 2,572.23 hours. An estimated 266,708,605.9 cubic feet of water was sampled. The number of salmonids trapped, marked and recaptured by week, and weekly population estimates with a 95% Confidence Interval (CI) are shown in Appendices 1-9. Weekly mean fork lengths, sample size, minimum and maximum size and standard deviations for Chinook, coho, and steelhead are shown in Appendices 18-26.

Chinook 0+

An estimated 718,949 0+ Chinook (95% CI, 687,412 – 750,486) left the Shasta River during weeks 7 through 26. The greatest number of Chinook emigrated during week 12 (112,832, 95% CI, 104,849 – 120,815). This is equal to 15.7% of the total estimate (Charts 1 and 2). The mean fork length for 0+ Chinook during week 12 was 44 mm (Appendix 18).

Chinook 1+

An estimated 562 (95% CI, 303 – 821) 1+ Chinook emigrated from the Shasta River during weeks 8 through 19. The greatest number of 1+ Chinook left during week 15

(160, 95% CI, 1 - 338) (Appendix 2). This is equal to 28.5% of the total estimate. Seasonal trap efficiency of 22.09% was used to provide an estimate for Julian week 17 since no successful mark-recapture trial occurred. The mean fork length for 1+ Chinook during week 15 was 136 mm (Appendix 19). Chart 3 shows the average weekly fork lengths for 0+ and 1+ Chinook.

Coho 0+

An estimated 5,423 (P.E. 4.12%, 5200-5646) 0+ coho emigrated from the Shasta River during weeks 13 through 26 based on trap efficiencies compared to 0+ steelhead. The greatest number of Coho, 1364, left during week 20 (Chart 4). This is equal to 25.16% of the total estimate (Chart 5) and is based on the 0+ steelhead seasonal trap efficiency. Seasonal trap efficiency for 0+ steelhead (15.83%) was used to provide an estimate for 0+ coho during Julian weeks 12, 16, 17, and 20. During Julian weeks 13-15 and 18, 0+ coho trap efficiency of 13.41% was derived from a correlation between 0+ steelhead and 0+ coho efficiencies. The mean fork length for 0+ coho during week 20 was 59 mm (Appendix 20).

Coho 1+

An estimated 5,396 (P.E. 6.59%, 5040-5725) 1+ coho emigrated from the Shasta River from weeks 8 through 24. The greatest number of coho, 2,110, left in week 16. This number is based on actual mark-recapture trials and is equal to 39.10% of the total estimate (Chart 6 and 7). The correlation between 1+ coho and 2+ steelhead trap efficiencies were used to provide an efficiency and population estimate for 1+ coho during Julian weeks 7, 13-15, and 18-22. Seasonal trap efficiency for 2+ steelhead (28.63%) was used to provide a population estimate for Julian weeks 9 and 23. The mean fork length for 1+ coho during week 15 was 143 mm (Appendix 21).

Coho 2+

At least 98 2+ coho emigrated from the Shasta River during weeks 8 through 21. 94.89% of total trapped 2+ coho left during weeks 15 and 16 (Appendix 5). Due to limited mark/recapture trials for 2+ coho, we are unable to correlate efficiencies or provide an accurate population estimate for 2009. Chart 8 shows the average weekly fork lengths for 0+, 1+ and 2+ coho.

Steelhead 0+

An estimated 5,255 0+ steelhead (95% CI, 4,160 – 6,350) emigrated from the Shasta River during weeks 13-15, 18-19 and 21-26. The greatest number left during week 25 (1,517, 95% CI, 997 – 2,038) (Chart 9). This is equal to 28.9% of the total estimate for the period sampled (Chart 10). Seasonal trap efficiency of 15.83% was used to provide an estimate for Julian weeks 13-15 and 18 since no successful mark-recapture trials occurred. The mean fork length for 0+ steelhead during week 25 was 69 mm (Appendix 23).

Steelhead 1+

An estimated 1,980 1+ steelhead (95% CI, 1,557 – 2,403) emigrated from the Shasta River in weeks 8-26. The greatest number left during week 21 (388, 95% CI, 145 –

631) (Chart 11). This is equal to 19.6% of the total estimate for the period sampled (Chart 12). Seasonal trap efficiency of 24.18% was used to provide an estimate for Julian weeks 9-11, 15, 22-23, and 26 since no successful mark-recapture trials occurred.

The mean fork length for 1+ steelhead during week 21 was 157 mm (Appendix 24). Chart 13 shows average weekly fork lengths for 0+ and 1+ steelhead.

Steelhead 2+

An estimated 27,395 2+ steelhead (95% CI, 23,852 – 30,939) emigrated from the Shasta River during weeks 7 through 25. The greatest number left during week 16 (10,327, 95% CI, 8,601 – 12,053) (Chart 14). This is equal to 37.7% of the total estimate for the period sampled (Chart 15). Seasonal trap efficiency of 19.87% was used to provide an estimate for Julian weeks 9 and 23-25 since no successful mark-recapture trials occurred.

The mean fork length for 2+ steelhead during week 16 was 185 mm (Appendix 25).

Steelhead 3+

An estimated 2,689 3+ (95% CI, 1,768 – 3,610) emigrated from the Shasta River during weeks 8 – 17 and 19. The greatest number left during week 16 (1,307, 95% CI, 629 – 1,984) (Chart 16). This is equal to 48.6% of the total estimate for the period sampled (Chart 17). Seasonal trap efficiency of 10.12% was used to provide an estimate for Julian weeks 8, 10, 13, and 19 since no successful mark-recapture trial occurred.

The mean fork length for 3+ steelhead during week 16 was 247 mm (Appendix 26). Chart 18 shows average weekly fork lengths for 2+ and 3+ steelhead.

Temperature Monitoring

The Maximum Weekly Maximum Temperature (average of daily maximum temperature for each week) of 25.94°C occurred in Julian week 26. The Maximum Weekly Average Temperature of 22.59°C also occurred in Julian week 26 (Appendix 35). Water temperature recorded hourly and mean, maximum, and minimum temperatures recorded weekly are expressed on charts 22 and 23 respectively.

Discussion

Coho

The trap efficiencies between 1+ coho and 2+ steelhead smolts are well correlated because [we believe](#) both species are at the same life stage and are responding similarly to environmental conditions.

In response to high number of fish mortalities caused by heavy debris, sets were ended as necessary between 22:20 and midnight during weeks 18-20 and 23-24.

Due to limited mark/recapture trials for 2+ coho, we are unable to correlate efficiencies or provide an accurate population estimate for 2009.

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Chart 1

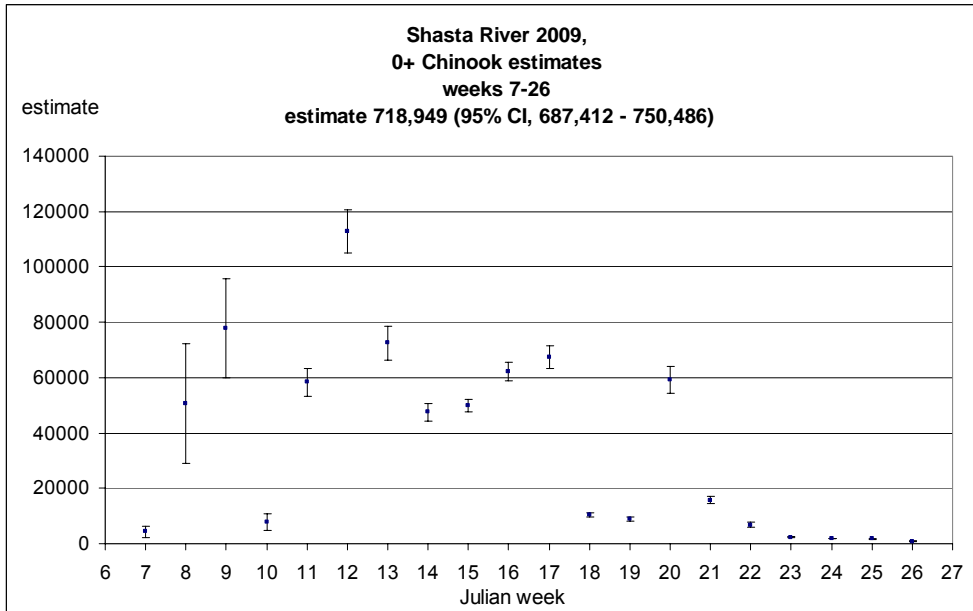


Chart 2

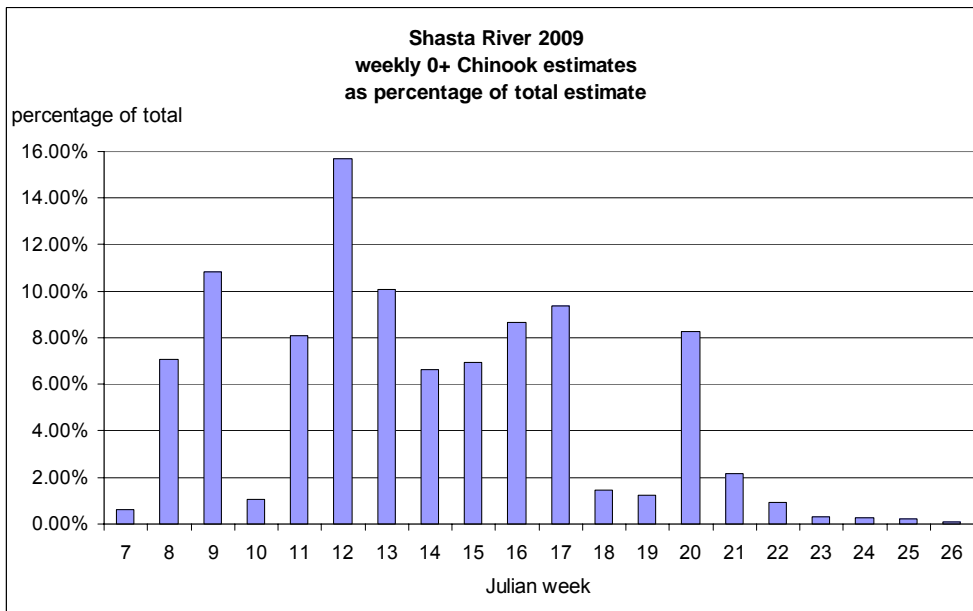


Chart 3

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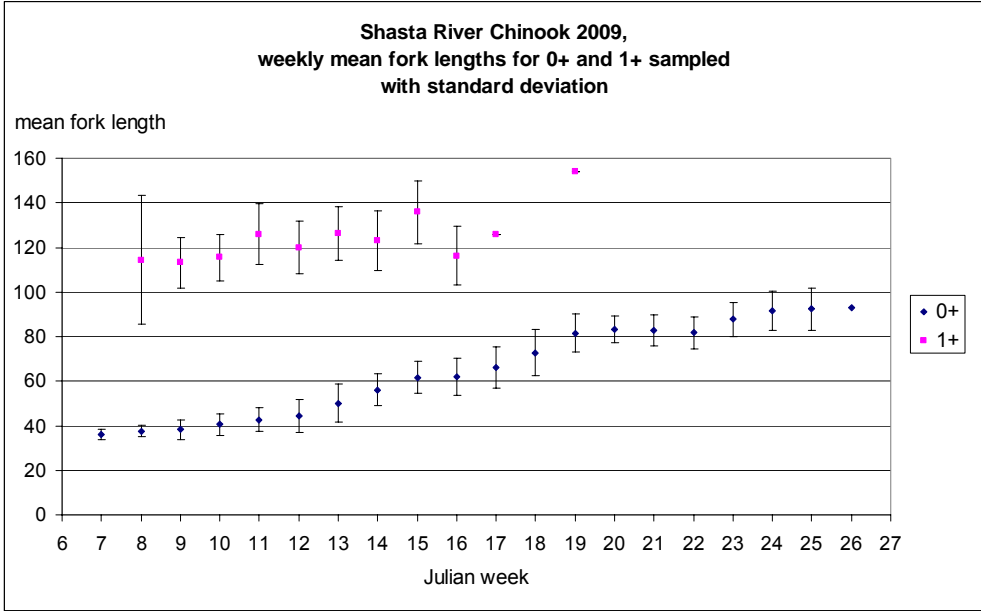


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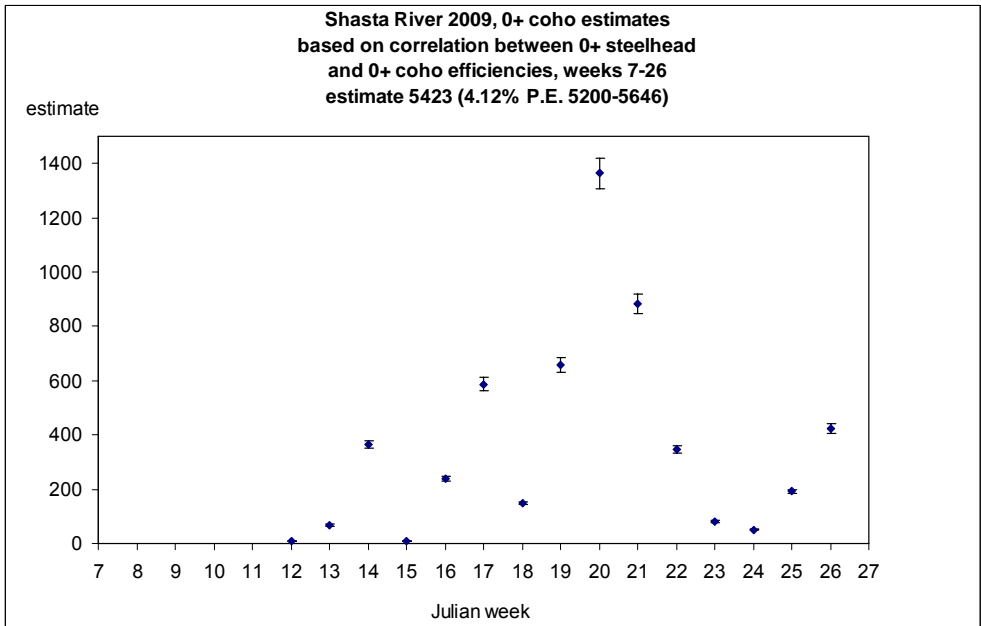


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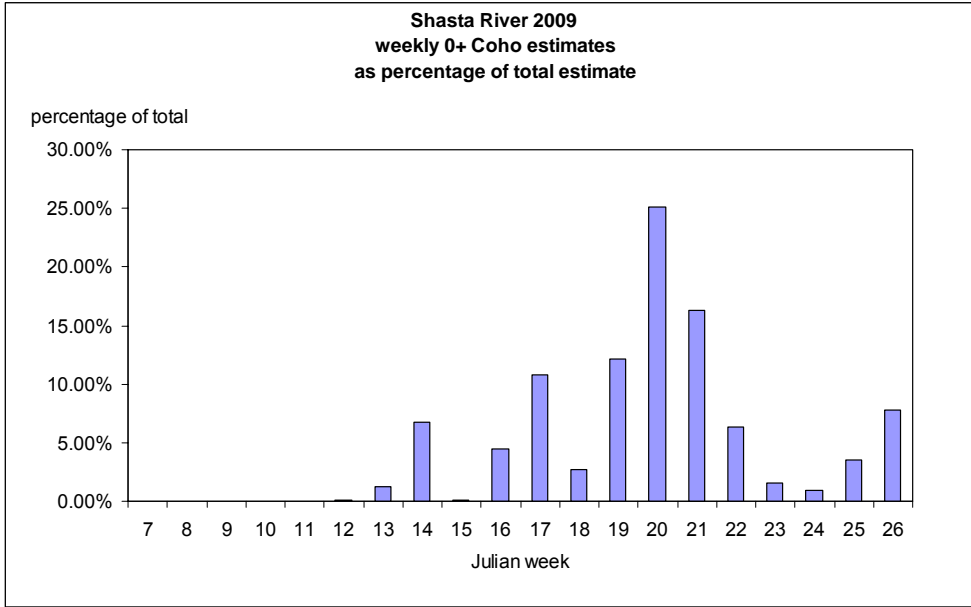


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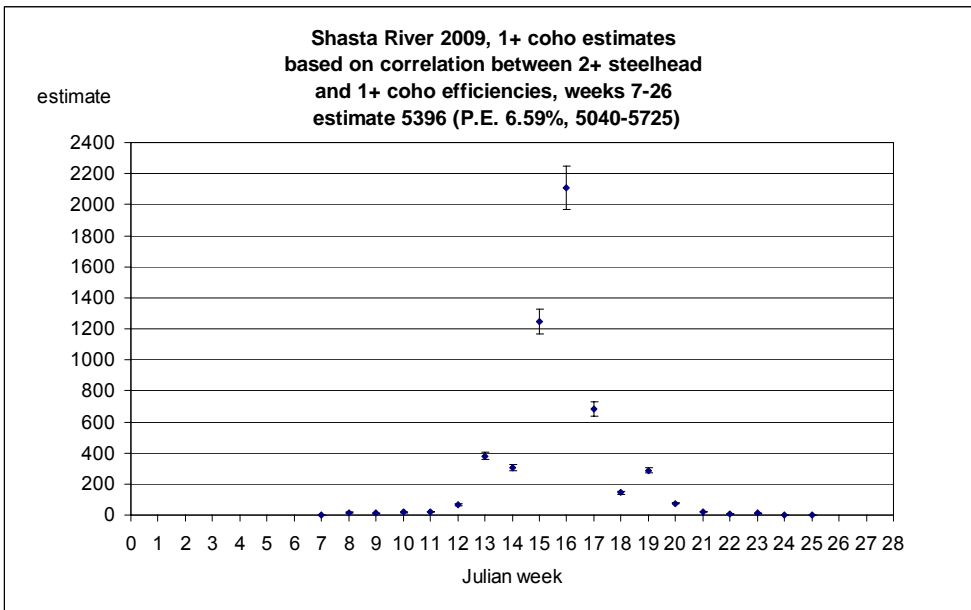


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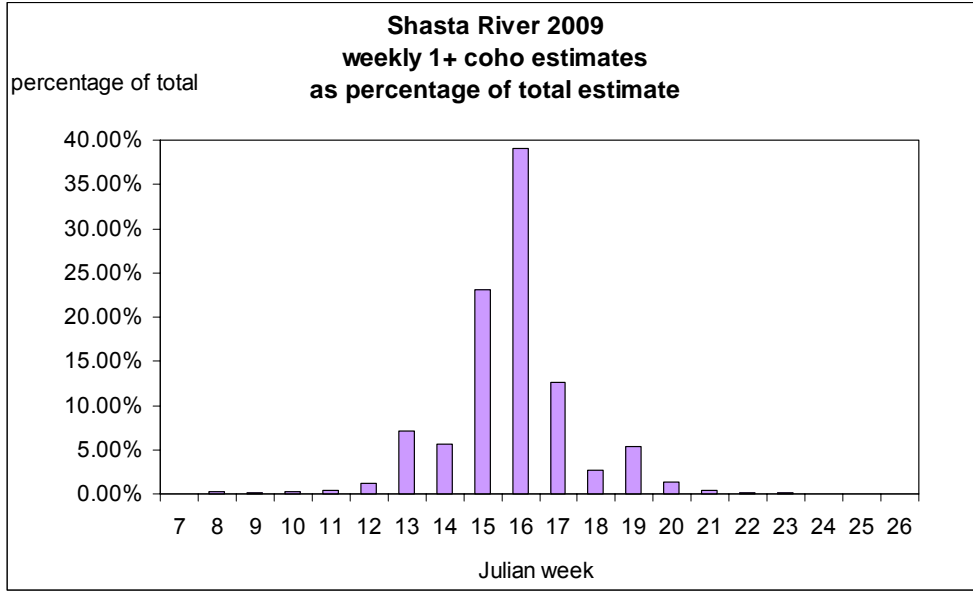


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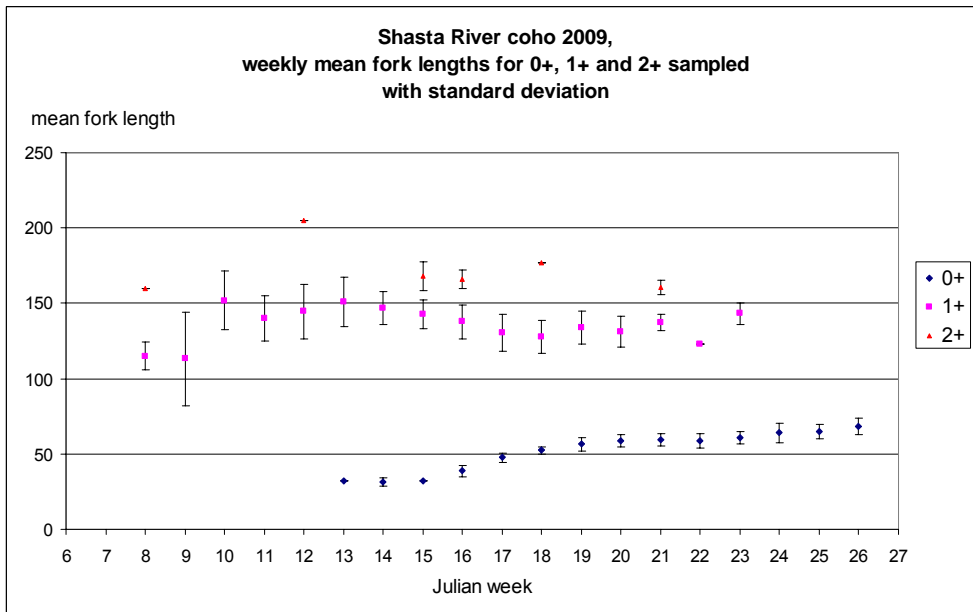


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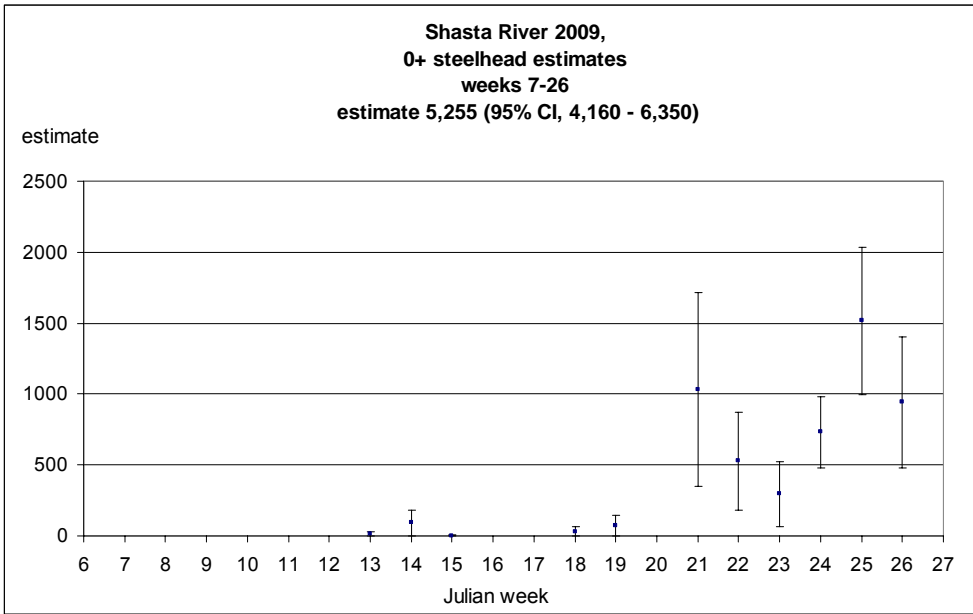


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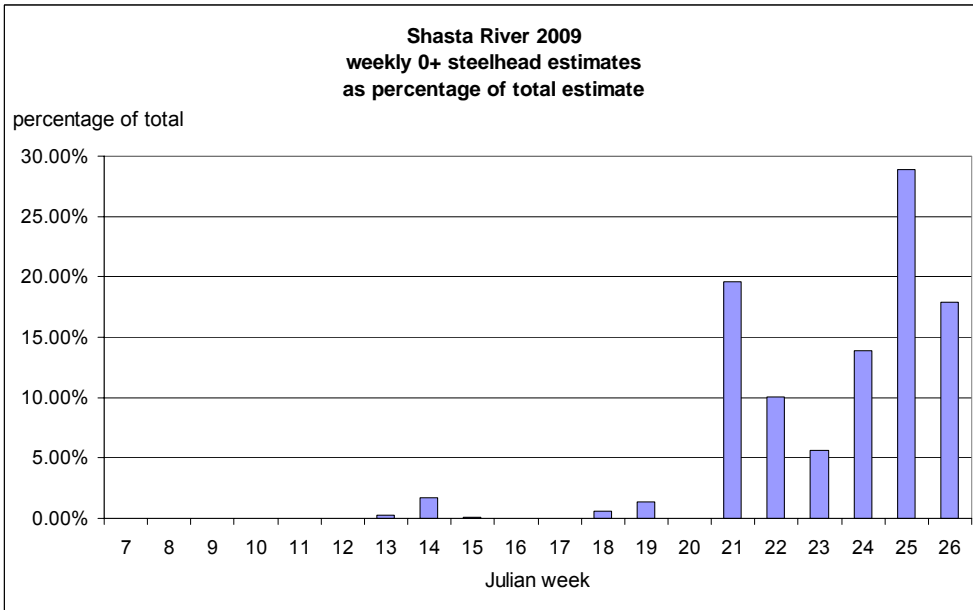


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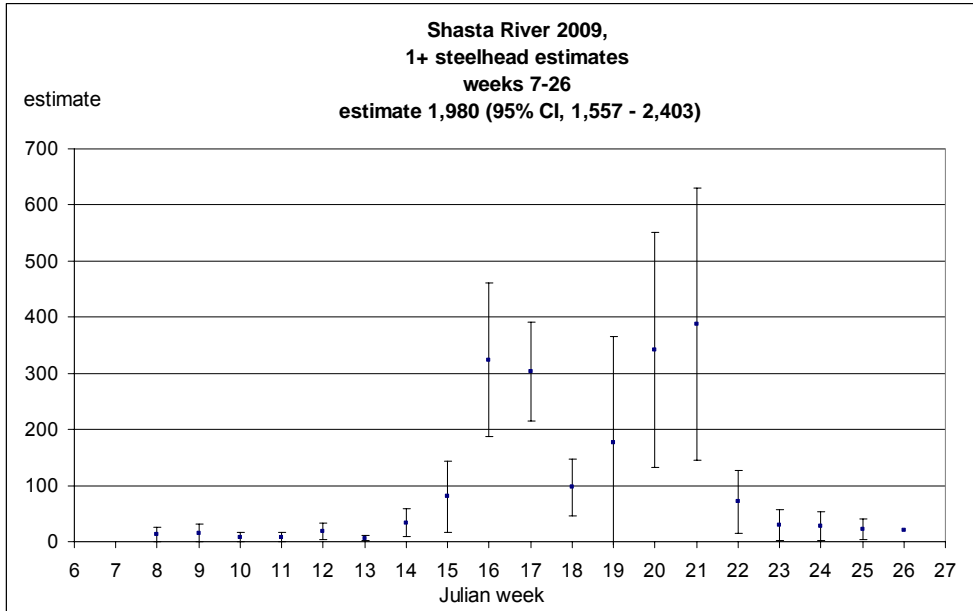


Chart 12

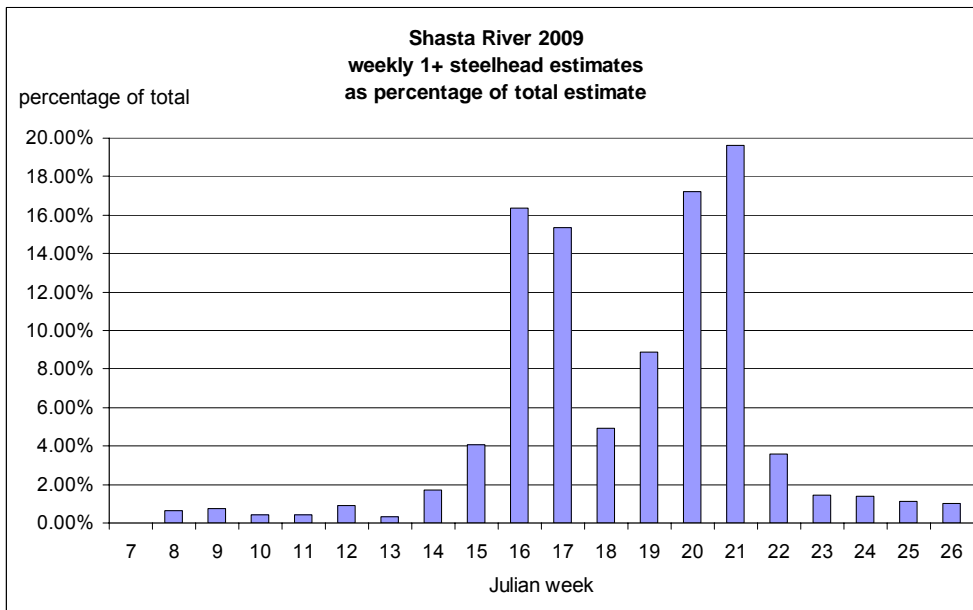


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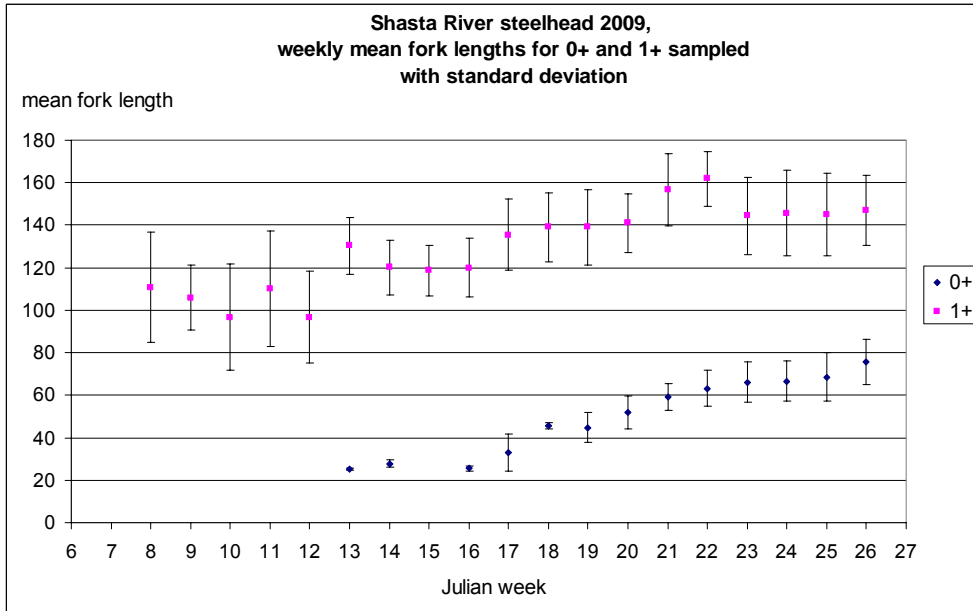


Chart 14

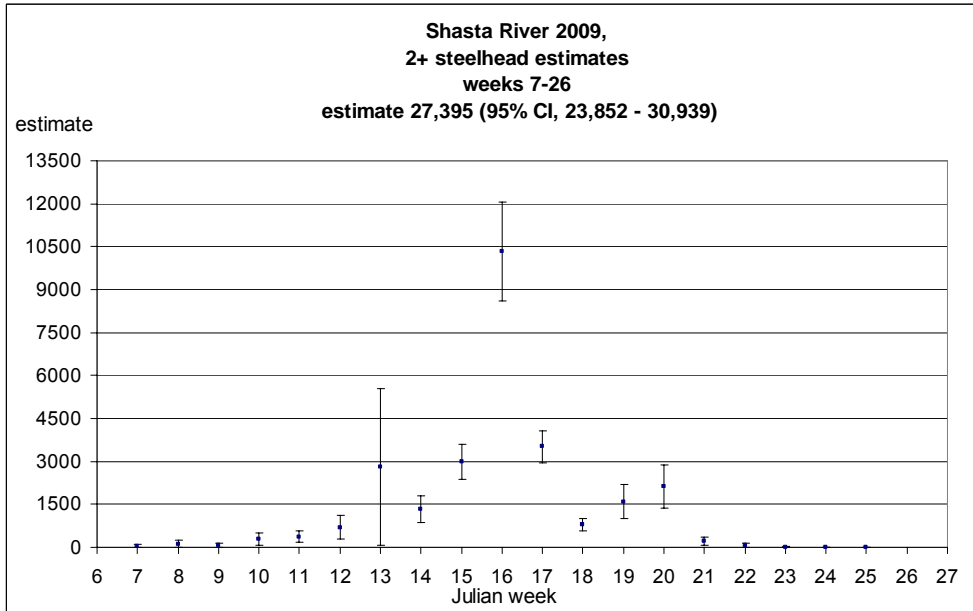


Chart 15

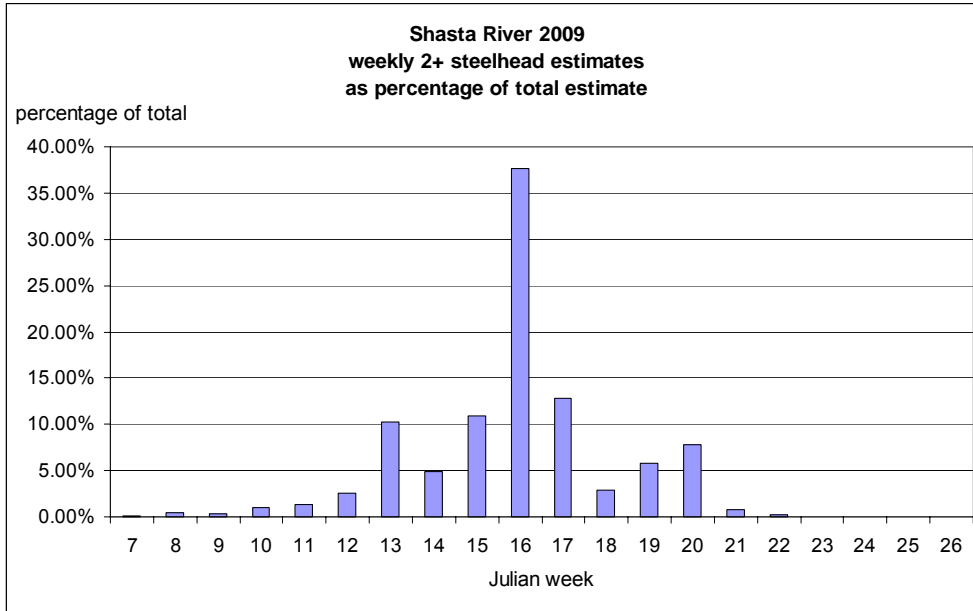


Chart 16

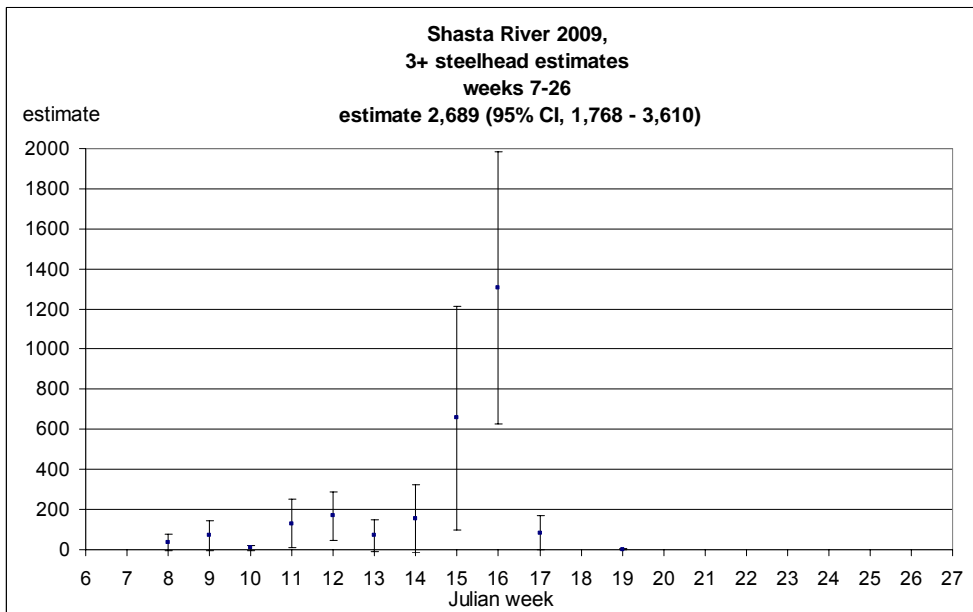


Chart 17

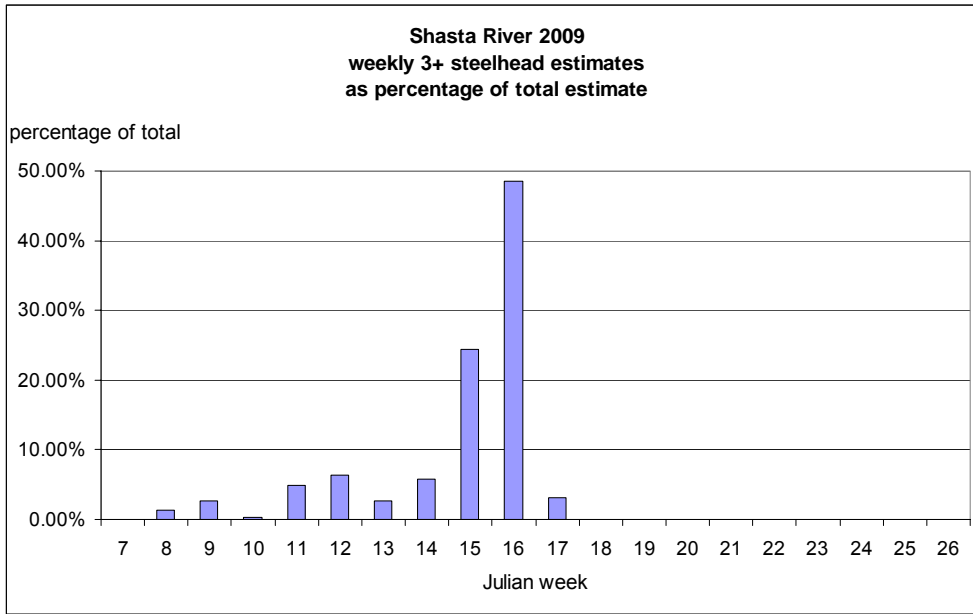


Chart 18

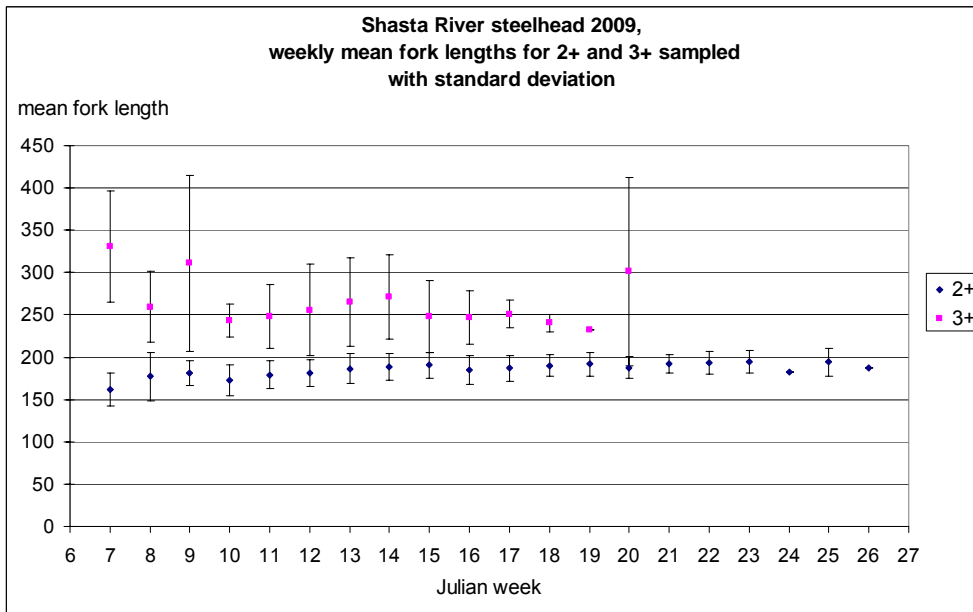


Chart 19

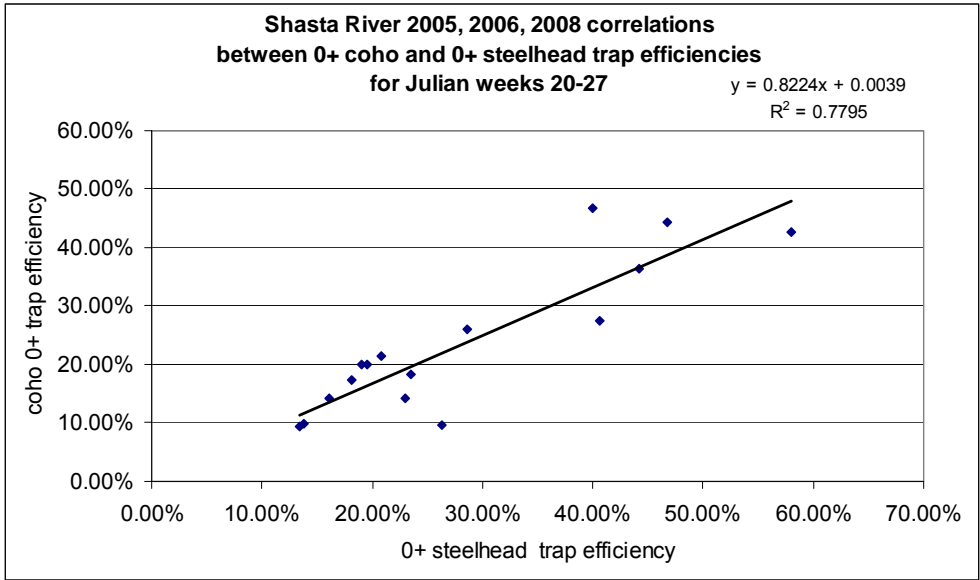
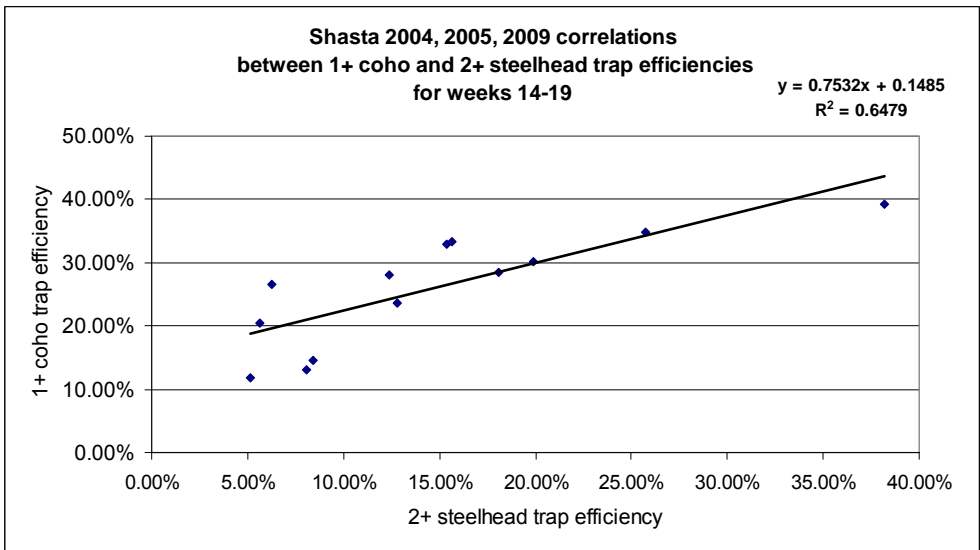


Chart 20



Coho smolt production and return rate

The estimate of the number of smolts produced in 2009 per returning adult in 2007 is shown in Table 1. The average number of smolts per adult produced has dropped to 20.23 smolts. The projected adult returns for 2010, 2011, and 2012 are shown in Table 2 using the average rate of return of 2.90%.

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Table 1
Coho 1+ produced per returning adult

Brood year	Adults	1+ produced in	Year	smolts per adult
2001	291	11052	2003	37.98
2002	86	1799	2004	20.92
2003	187	2054	2005	10.98
2004	373	10833	2006	29.04
2005	69	1178	2007	17.07
2006	47	208	2008	4.43
2007	255	5396	2009	21.16
2008	31	169*	2010	5.45
2009	9	165	2011	18.38
2010	156	2867	2012	18.38

*This number is based on estimates and correlation conducted in 2010

Projected production in 2011 and 2012 based on average production of 18.38% 1+ per adult observed for brood years 2001 – 2008

Table 2
Coho 1+ to adult survival

Brood year	Adults	Emigration year	1+ produced	% return	Adults returning in	Brood year
2001	291	2003	11052	3.37%	373	2004
2002	86	2004	1799	3.84%	69	2005
2003	187	2005	2054	2.29%	47	2006
2004	373	2006	10833	2.35%	255	2007
2005	69	2007	1178	2.63%	31	2008
2006	47	2008	208	4.33%	9	2009
2007	255	2009	5396	2.90%	156	2010
2008	31	2010	169*	2.90%	5	2011
2009	9	2011	165	2.90%	5	2012
2010	156	2012	2867	2.90%	83	2013

*This number is based on estimates and correlation conducted in 2010.

Projected 1+ estimate for 2011 and 2012 were made using the mean smolt per adult value (18.38%) from 2001 through 2008. The % return of brood year 2009 was not incorporated into the average smolt to adult rate because this number may be exaggerated.

Projected adult returns in 2010 - 2012 are based on the average 1+ smolt to adult survival rate for 2004 - 2008 (2.90%).

Chart 21

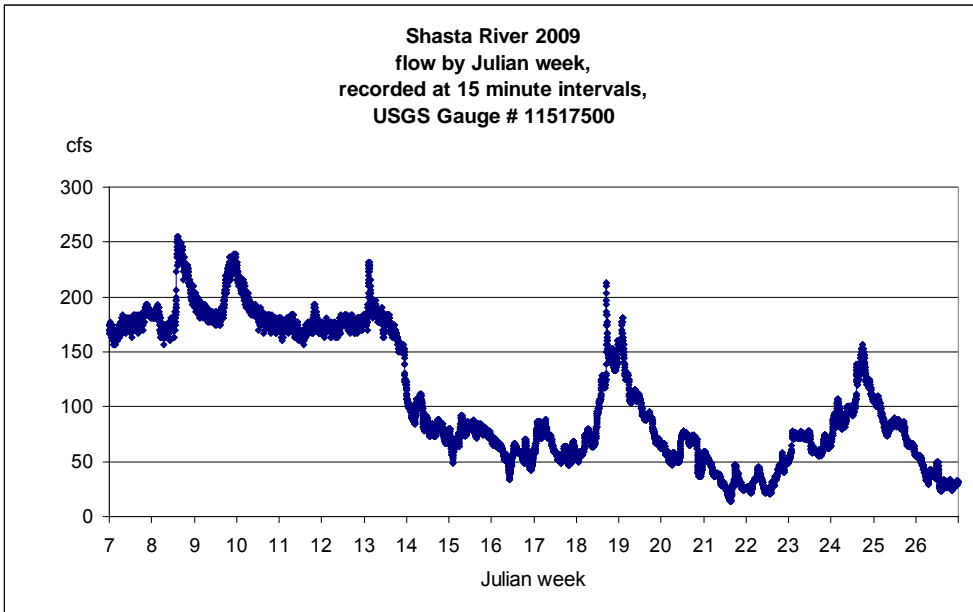


Chart 22

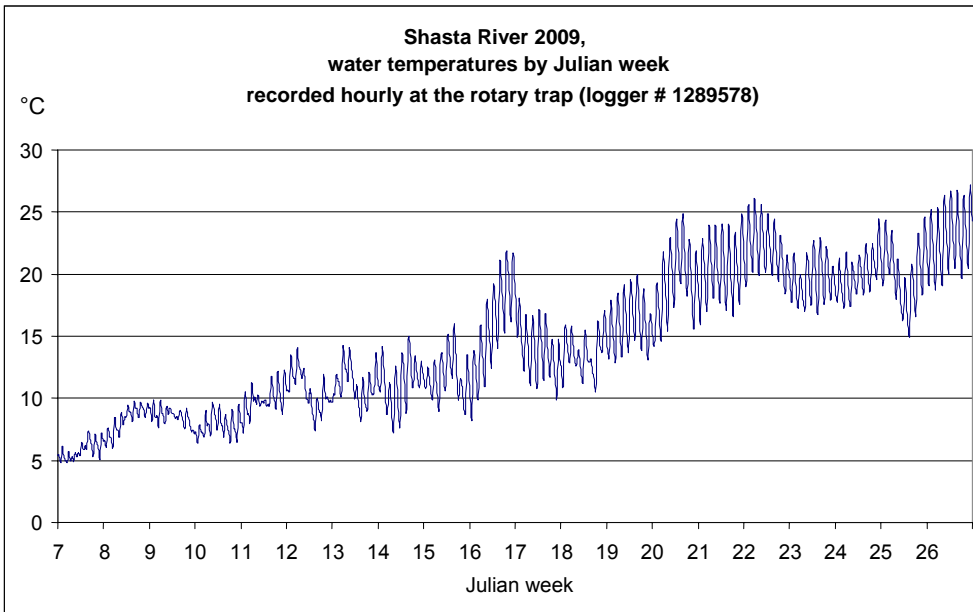
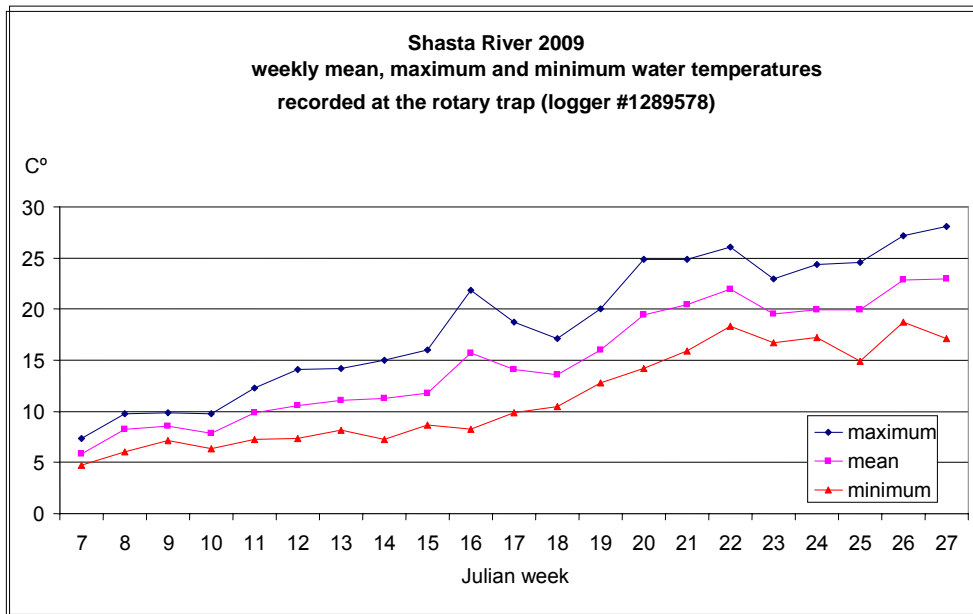


Chart 23



Scott River Rotary Screw Trap Summary

Methods

The Scott River was sampled 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 0900 hours. Velocity of the water entering each cone was measured at the beginning and end of each set with a flow meter manufactured by General Oceanics model 2030R. Total volume sampled was calculated 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 salmonids 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. Weekly efficiency trials were attempted depending on amount of fish captured for all age classes of all salmonids on the Scott River in 2009.

Three different seasonal trap efficiencies are calculated for 2009 because the sampling effort was different early vs. mid vs. late season. Early season trap efficiency was based on Julian weeks 7-11 when only the eight foot trap was fishing.

Mid-season trap efficiency was based on Julian weeks 12-18 when both five and eight foot traps were fishing. Late season trap efficiency was based on Julian weeks 20-26 when only the five foot trap was fishing in the former location of the eight foot trap.

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 (Chart 38). 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 11, 2009. Trapping ended on May 4, 2009. The trap fished 72 sets for a total of 1,597.33 hours. An estimated 143,021,086 cubic feet of water was sampled. The five-foot Scott River rotary trap began sampling six days per week on March 18, 2009. Trapping ended on July 1, 2009. The trap fished 76 sets for a total of 1,736.95 hours. An estimated 192,967,802.9 cubic feet of water was sampled during the season.

The number of fish trapped, marked and recaptured by week, and weekly estimates with 95% CI for all age classes of salmonids with population estimates are shown in Appendices 10-17. Weekly mean fork length, sample size, minimum and maximum size and standard deviation for each species and age class are shown in Appendices 27-34.

Chinook 0+

An estimated 930,731 0+ Chinook (95% CI, 876,028 – 985,433) left the Scott River during the period sampled. The greatest number of Chinook emigrated during week 16 (275,700, 95% CI, 242,140 – 309,261) (Chart 24). This is equal to 29.6% of the total estimate (Chart 25). Seasonal trap efficiency of 3.76% was used to provide an estimate for Julian weeks 8 and 10 since no successful mark-recapture trial occurred. The mean fork length for 0+ Chinook during week 16 was 40 mm (Appendix 27).

Chinook 1+

An estimated 9,695 1+ Chinook (95% CI, 6,978 – 12,413) left the Scott River during weeks 7-16. The greatest number left during week 8 (2,738, 95% CI, 1,409 – 4,067). This is equal to 28.2% of the total estimate. Mid-season trap efficiency of 18.52% was used to provide an estimate for Julian week 17 since no successful mark-recapture trial occurred.

The mean fork length for 1+ Chinook during week 8 was 92 mm (Appendix 28). Chart 26 shows the average weekly fork lengths for 0+ and 1+ Chinook.

Coho 0+

An estimated 3,899 0+ coho (95% CI, 3,061 – 4,736) emigrated from the Scott River during weeks 13–18 and 21-26. The greatest number left during week 17 (1,864 95% CI, 1,191 – 2,538) (Chart 27). This is equal to 47.8% of the total estimate (Chart 28). Mid-season trap efficiency of 16.67% was used to provide an estimate for Julian weeks 13-16 since no successful mark-recapture trial occurred. Late-season trap efficiency of 8.00% was used for Julian weeks 22 and 24. The mean fork length for 0+ coho during week 17 was 35 mm (Appendix 29).

Coho 1+

An estimated 62,220 (95% CI, 54,277 – 70,163) 1+ coho emigrated from the Scott River during weeks 7 – 18. The greatest number left during week 10 (13,029, 95% CI, 7,770 – 18,287) (Chart 29). This is equal to 20.9% of the total estimate (Chart 30). Late-season trap efficiency of 5.56% was used to provide an estimate for Julian week 20-24 since no successful mark-recapture trial occurred. The mean fork length for 1+ coho during week 10 was 91 mm (Appendix 30). Chart 31 shows the average weekly fork lengths for 0+ and 1+ coho.

Steelhead 0+

An estimated 919 0+ steelhead (95% CI, 20 – 1,817) emigrated from the Scott River during weeks 21 – 26. Week 26 is the only week when a successful mark-recapture trial occurred. Efficiency of 3.92% in this week may not be sufficient to create an accurate population estimate. The greatest number of steelhead was observed during week 25 (65 total trapped, Appendix 14). The mean fork length for 0+ steelhead during week 25 was 43 mm (Appendix 31).

Steelhead 1+

An estimated 88,424 1+ steelhead (95% CI, 74,354 – 102,494) left the Scott River between weeks 7 through 26. The greatest number left during week 11 (21,208 95% CI, 11,720 – 30,696) (Chart 32). This is equal to 24% of the total estimate for the period sampled (Chart 33). Early-season trap efficiency of 5.11% was used to provide an estimate for Julian week 8 since no successful mark-recapture trial occurred. Late-season trap efficiency of 4.50% was used for Julian weeks 21 and 23-26. The mean fork length for 1+ steelhead during week 11 was 78 mm (Appendix 32). Chart 34 shows the average weekly fork lengths for 0+ and 1+ steelhead.

Steelhead 2+

An estimated 8,334 2+ steelhead (95% CI, 4,325 – 12,342) left the Scott River in weeks 7 – 18. The greatest number left during week 16 (2,518 95% CI, 56– 4,980) (Chart 35). This is equal to 30.2% of the total estimate for the period sampled (Chart 36). Early-season trap efficiency of 3.49% was used to provide an estimate for Julian weeks 7-8 and 10 since no successful mark-recapture trial occurred. Mid-season trap efficiency of 2.98% was used for Julian weeks 17 and 18. The mean fork length for 2+ steelhead during week 16 was 128 mm (Appendix 33).

Steelhead 3+

A total of six 3+ steelhead were trapped in the Scott River in weeks 7, 8 and 15 (Appendix 17). Chart 37 shows the average weekly fork lengths for 2+ and 3+ steelhead.

Temperature Monitoring

The Maximum Weekly Maximum Temperature (average of daily maximum temperature for each week) of 22.93°C occurred in Julian week 26. The Maximum Weekly Average Temperature of 20.39°C also occurred in Julian week 26. (Appendix 36). Water temperature recorded hourly and mean, maximum, and minimum temperatures recorded weekly are expressed on charts 39 and 40 respectively.

Discussion?

-Due to high flows?? All data from JW 7-11 was derived only from 8' screw trap. 5' trap began fishing in Julian Week 12. All data are combined during Julian Weeks 12-18.
-Lost 8' screw trap 5-5-2009 due to high flow. On 5-4-2009 at 11:15 the flow was 685 CFS at the gauge. By 5-5-2009 at 11:15 the flow had raised to 3120 CFS. Moved 5' trap to 8' trap's former location and continued sampling on 5-13-2009. Only 1 day of data recorded for Julian Week 19. All further data derived only from 5' screw trap.
-Because successful mark/recapture trials only occurred during Julian Week 26, an accurate population estimate cannot be provided for 0+ steelhead.
- Since so few 3+ steelhead were trapped, and only 1 was marked, no accurate population estimate can be provided.

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-water year description, sets missed due to high flows?
-abundance trend over time for 2001-2010

TO BE CONTINUED

Chart 24

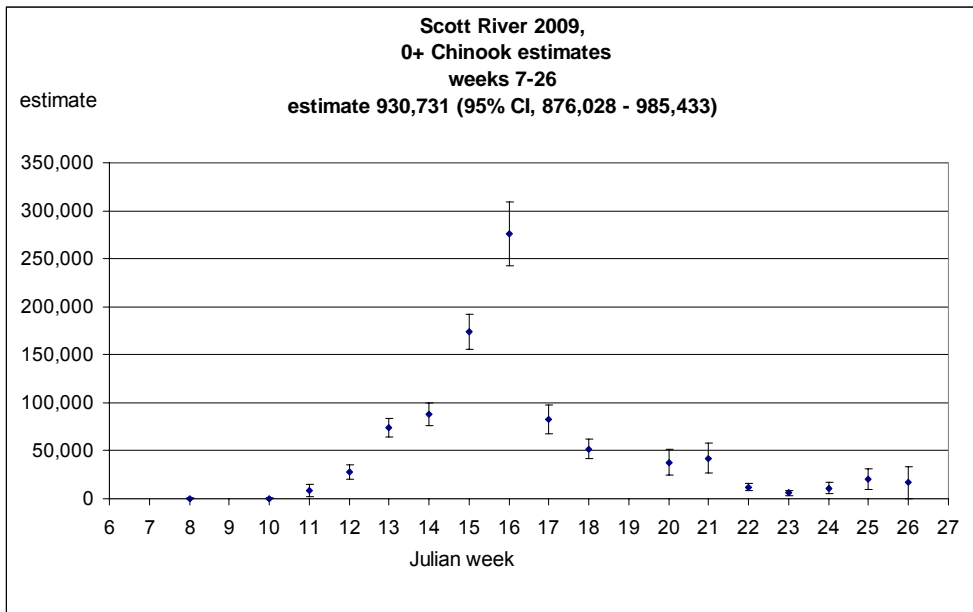


Chart 25

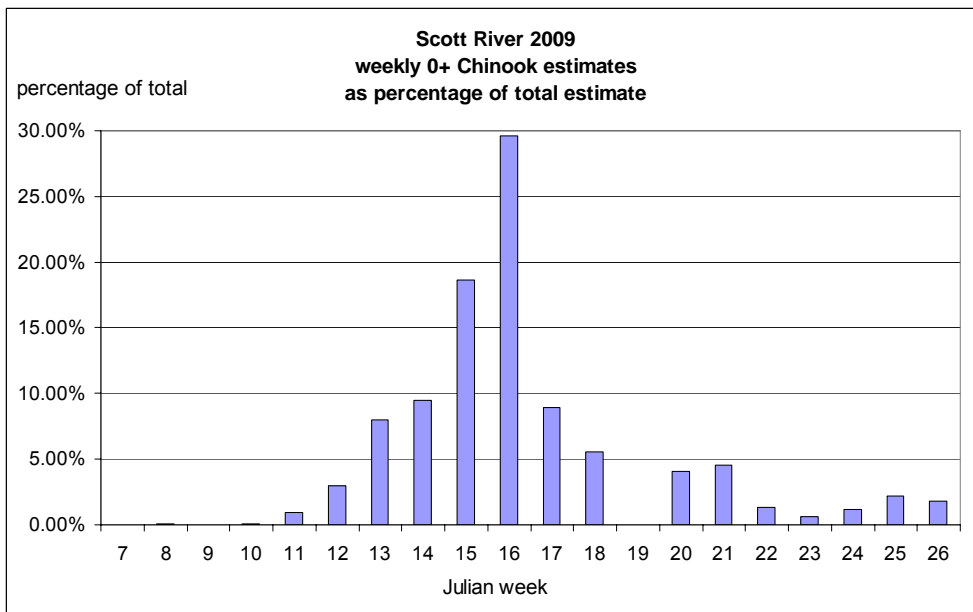


Chart 26

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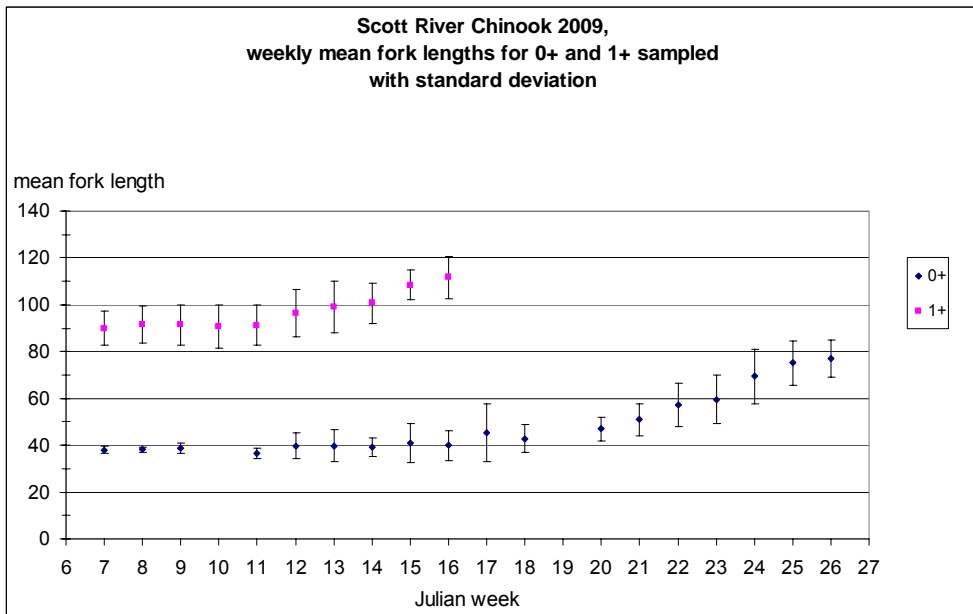


Chart 27

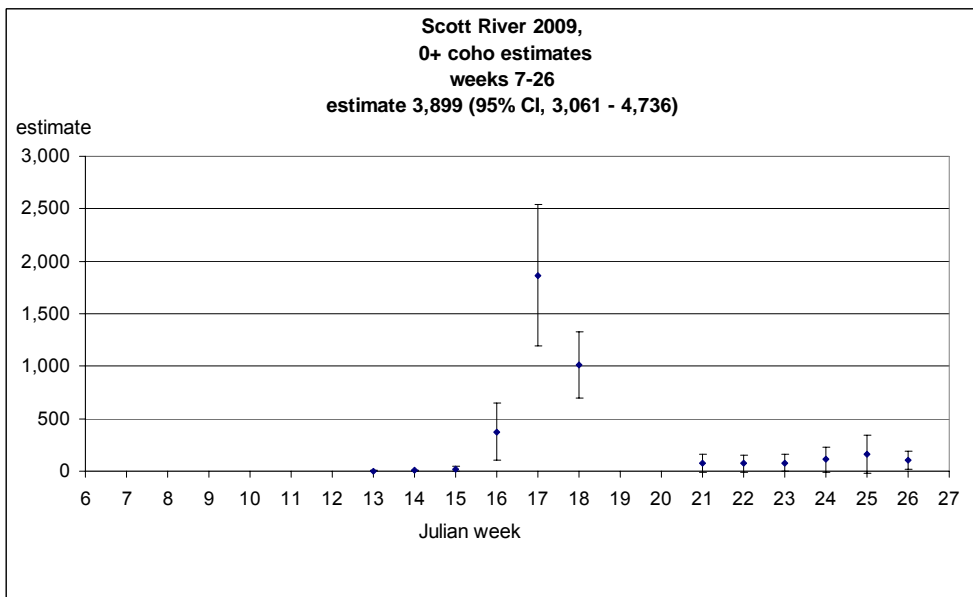


Chart 28

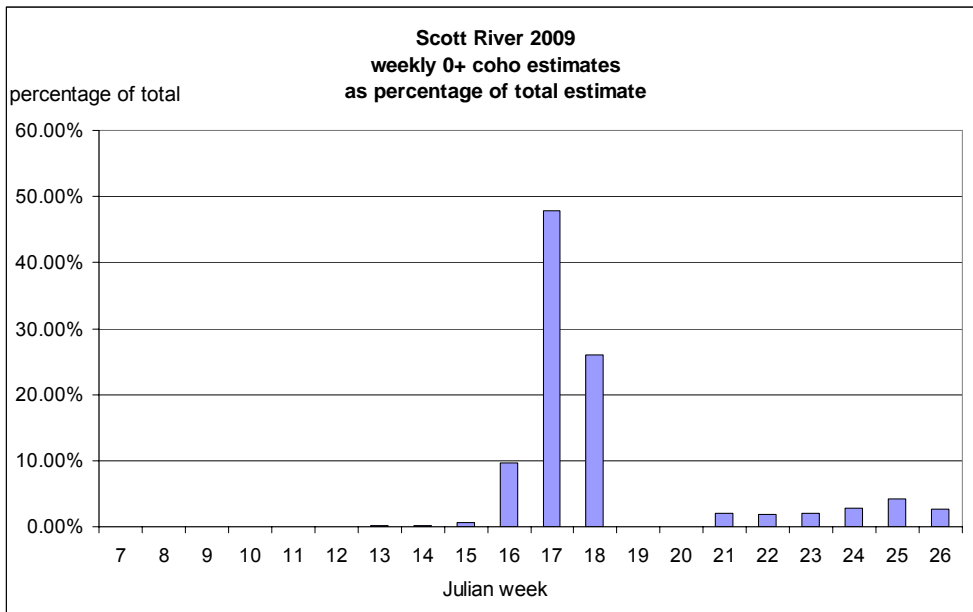


Chart 29

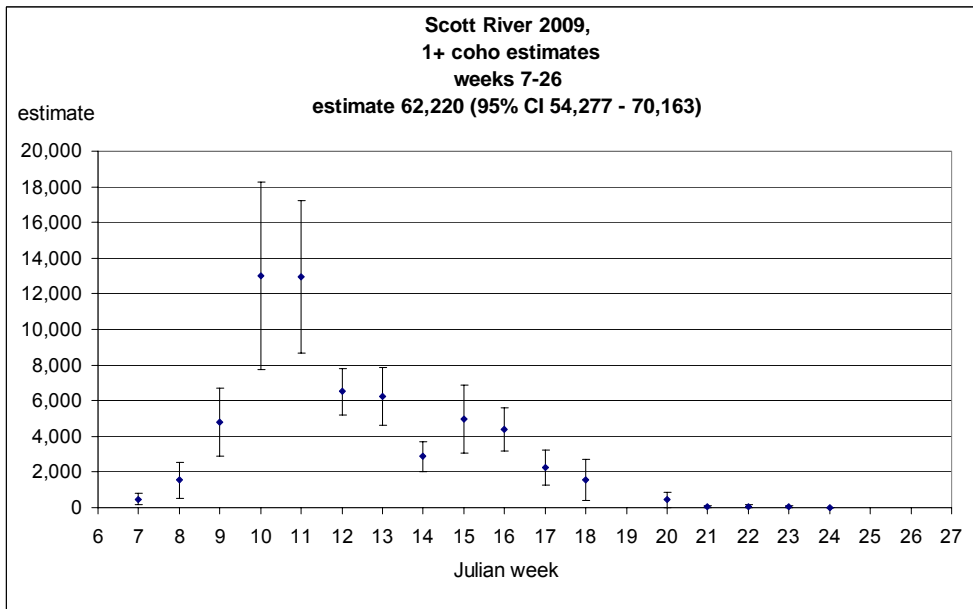


Chart 30

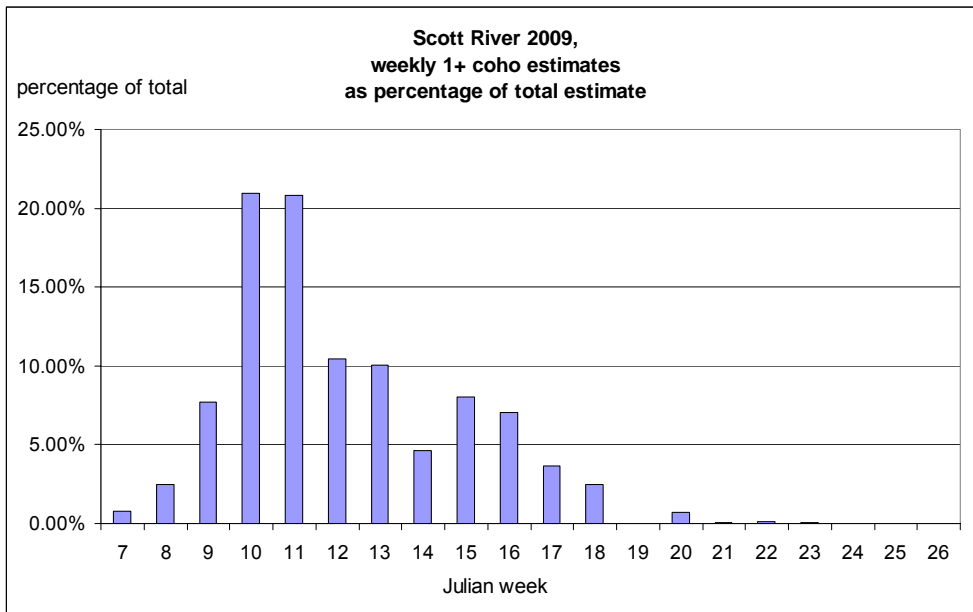


Chart 31

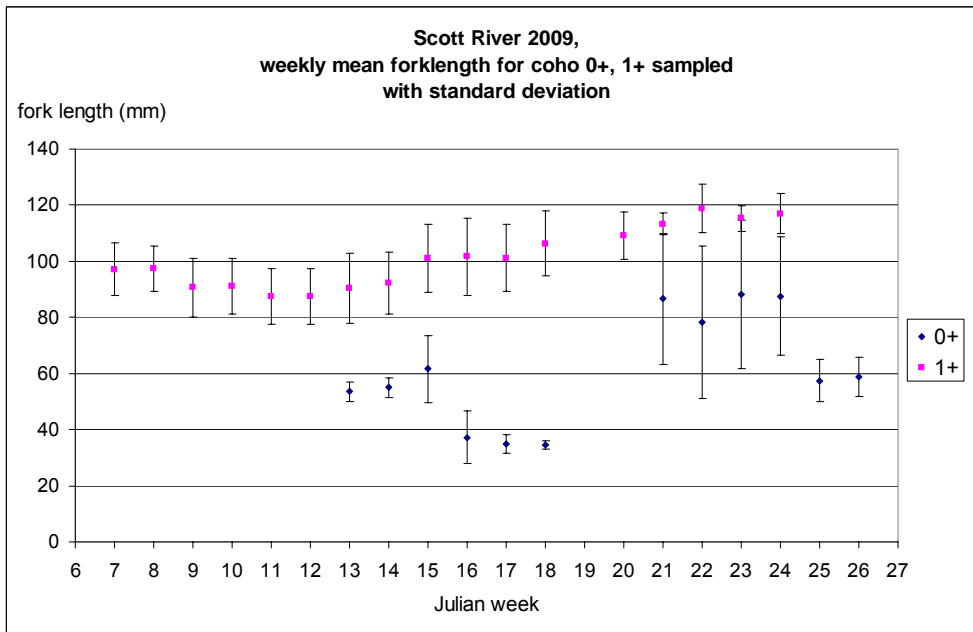


Chart 32

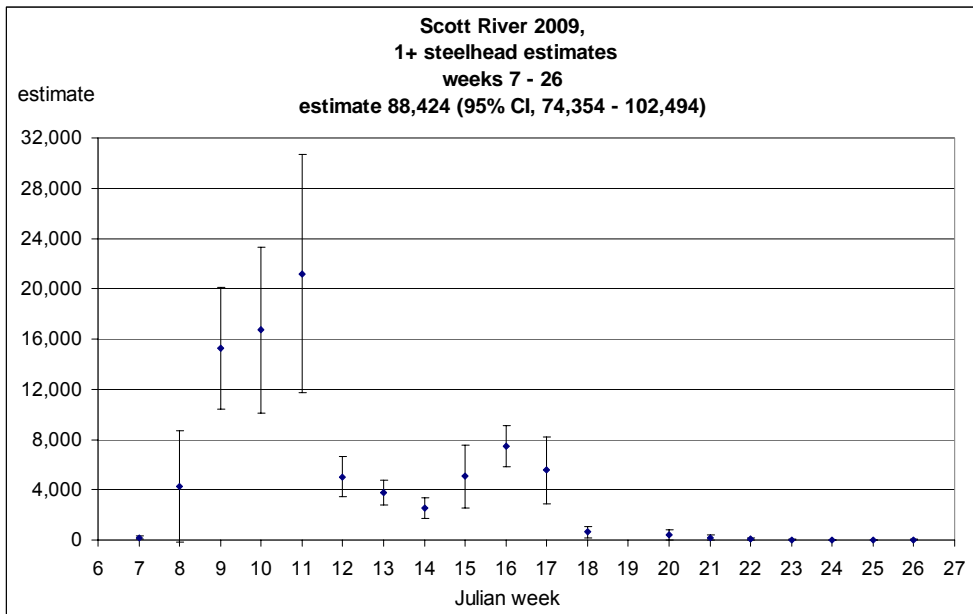


Chart 33

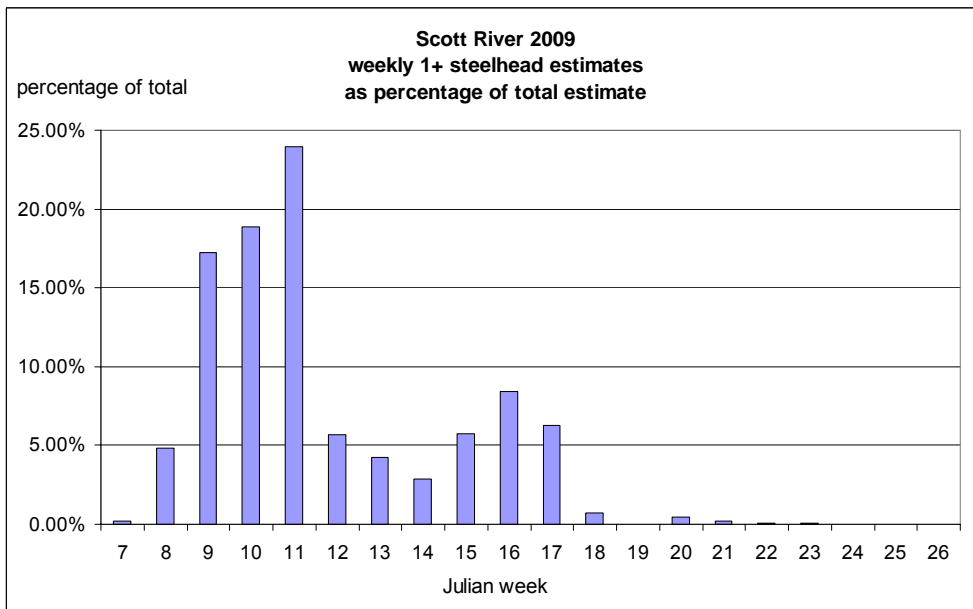


Chart 34

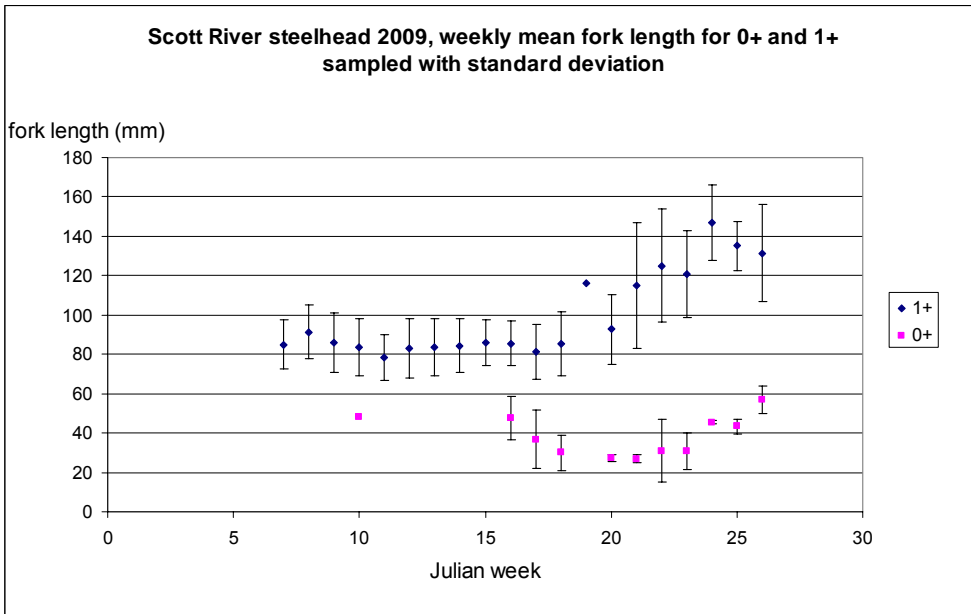


Chart 35

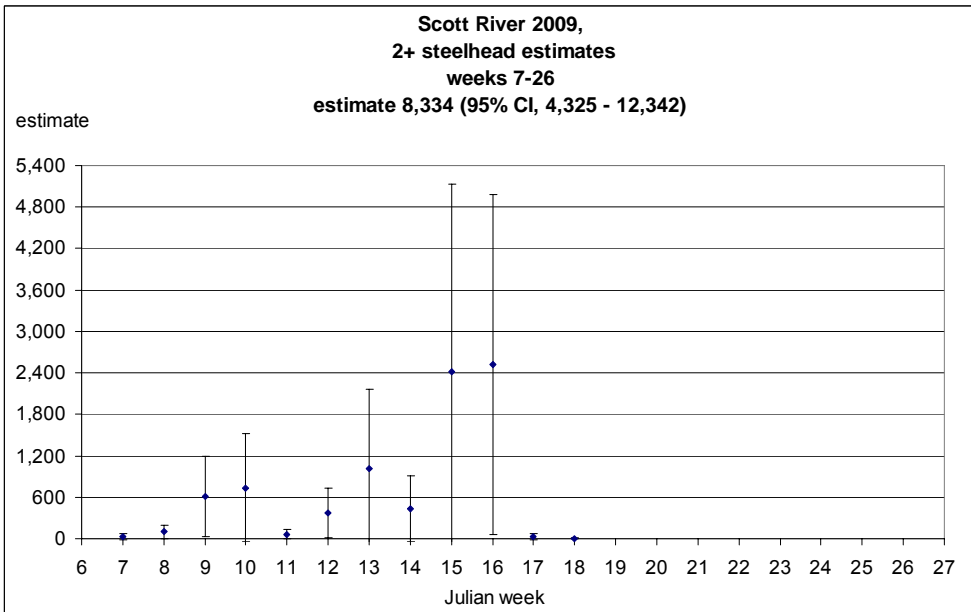


Chart 36

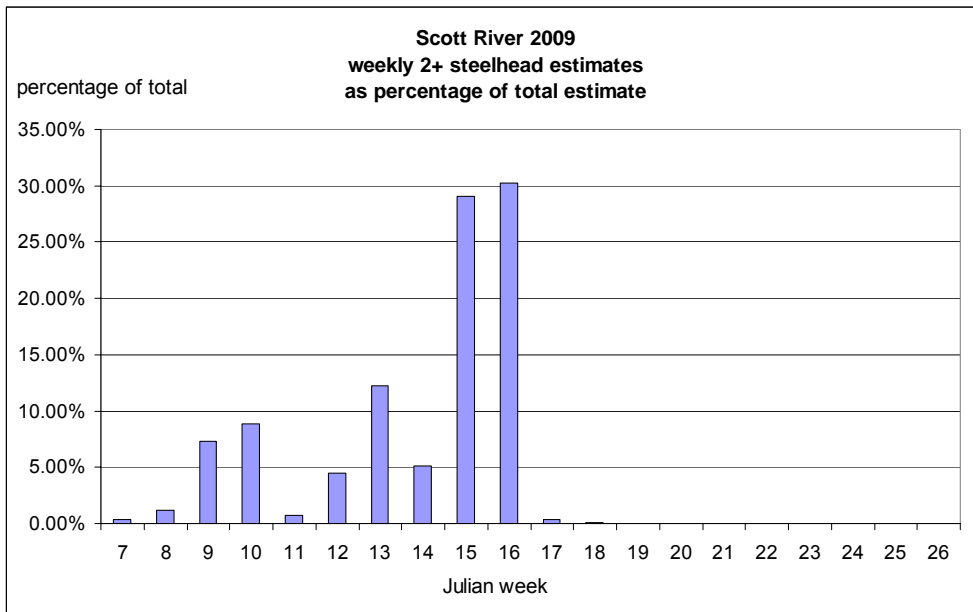


Chart 37

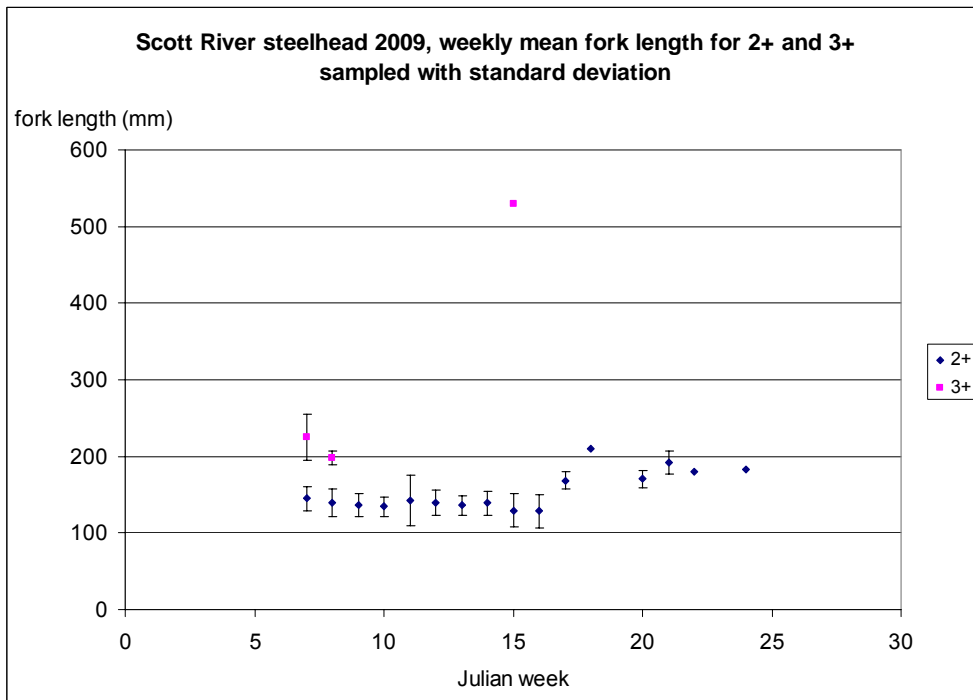


Chart 38.

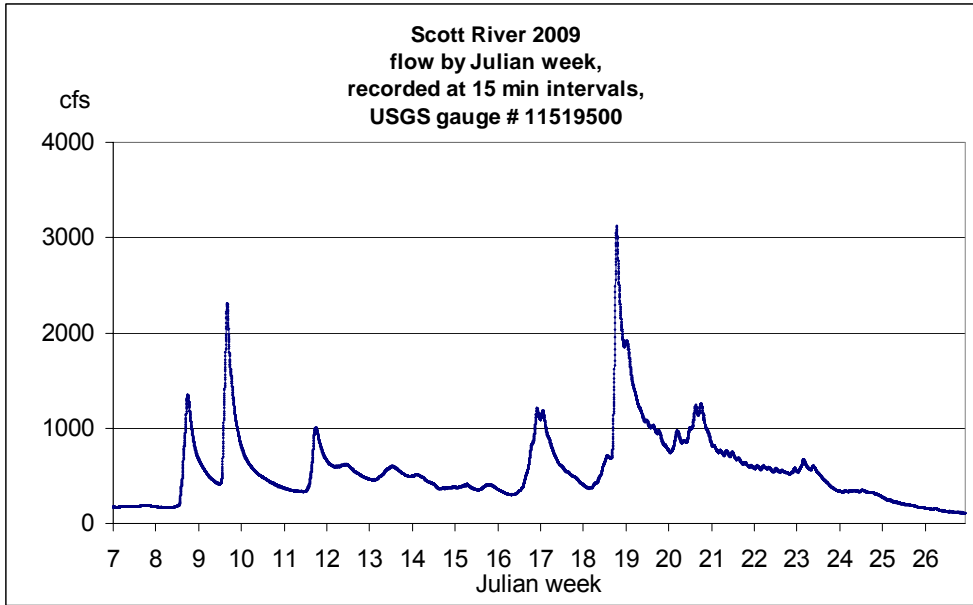
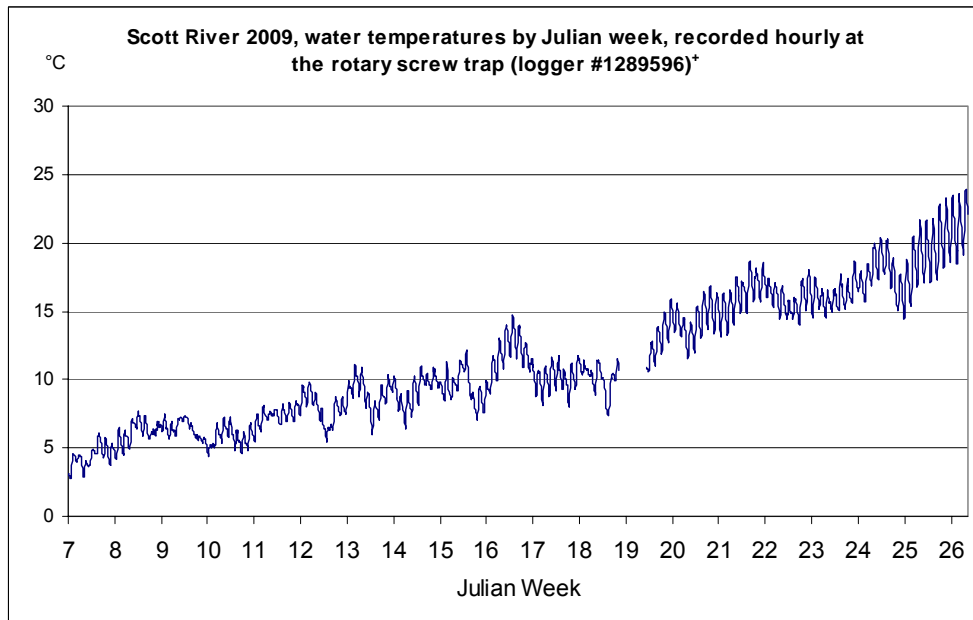
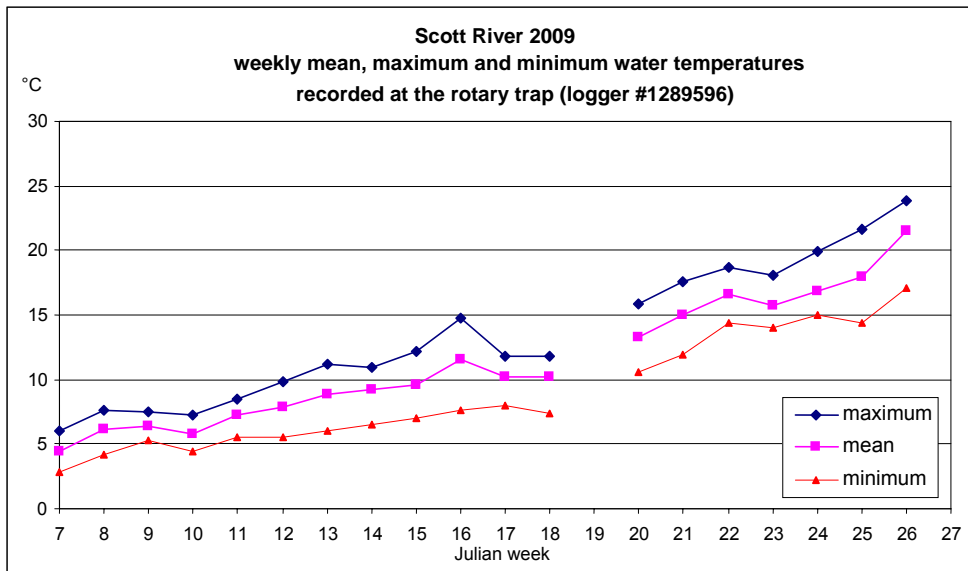


Chart 39



No water temperature available in Julian week 19 due to loss of trap and temperature logger.

Chart 40



No water temperature available in Julian week 19 due to loss of trap and temp logger

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 2009:

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Appendix 1. Catch Table Chinook 0+, Shasta River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Week popula estim		
7	367	12	379	18.59	379	193	16	8.29%	4.32		
8	1,329	67	1,396	17.12	1,396	726	19	2.62%	50.74		
9	2,667	52	2,719	17.61	2,719	2,033	70	3.44%	77.85		
10	499	25	524	15.38	524	353	23	6.52%	7.72		
11	11,479	315	11,794	15.30	11,794	2,183	441	20.20%	58.21		
12	26,453	500	26,953	10.54	26,953	2,494	595	23.86%	112.8		
13	13,418	458	13,876	8.09	13,876	2,369	453	19.12%	72.41		
14	12,569	203	12,772	17.29	12,772	2,397	643	26.83%	47.51		
15	24,676	536	25,212	18.65	25,212	2,003	1,013	50.57%	49.81		
16	22,584	360	22,944	11.22	22,944	2,295	846	36.86%	62.11		
17	26,892	214	27,106	12.70	27,106	1,499	603	40.23%	67.31		
18	4,155	27	4,182	7.23	4,182	1,209	484	40.03%	10.41		
19	3,750	146	3,896	8.75	3,896	731	319	43.64%	8.91		
20	16,124	824	16,948	9.42	16,948	1,458	416	28.53%	59.21		
21	4,875	38	4,913	12.55	4,913	1,397	437	31.28%	15.61		
22	1,552	51	1,603	8.10	1,603	917	215	23.45%	6.81		
23	976	18	994	15.04	994	661	282	42.66%	2.32		
24	803	96	899	13.41	899	745	358	48.05%	1.86		
25	759	3	762	17.63	762	380	170	44.74%	1.69		
26	229	1	230	12.08	230	266	77	28.95%	7.87		
Totals	176,156	3,946	180,102	266.71	180,102	26,309	7,480		718.9		

¹ Does not include recaptured fish.

² Million cubic feet.

³ Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of

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 Chinook 1+, Shasta River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weel popula estim		
7	0	0	0	18.59	0	0	0	-----	0		
8	5	0	5	17.12	5	3	2	66.67%	7		
9	12	0	12	17.61	12	11	1	9.09%	72		
10	14	1	15	15.38	15	11	3	27.27%	45		
11	13	0	13	15.30	13	7	6	85.71%	15		
12	13	0	13	10.54	13	11	1	9.09%	78		
13	15	0	15	8.09	15	15	1	6.67%	120		
14	19	0	19	17.29	19	11	3	27.27%	57		
15	20	0	20	18.65	20	15	1	6.67%	160		
16	4	0	4	11.22	4	2	1	50.00%	6		
17	1	0	1	12.70	1	1	0	22.09%*	2*		
18	0	0	0	7.23	0	0	0	-----	0		
19	1	0	1	8.75	1	0	0	-----	1		
20	0	0	0	9.42	0	0	0	-----	0		
21	0	0	0	12.55	0	0	0	-----	0		
22	0	0	0	8.10	0	0	0	-----	0		
23	0	0	0	15.04	0	0	0	-----	0		
24	0	0	0	13.41	0	0	0	-----	0		
25	0	0	0	17.63	0	0	0	-----	0		
26	0	0	0	12.08	0	0	0	-----	0		
Totals	118	1	119	266.71	119	87	19		562		

¹ Does not include recaptured fish.

² Million cubic feet.

³ Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of

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.

*Efficiency and population estimate based on seasonal trap efficiency of 22.09%.

Appendix 3. Catch Table coho 0+, Shasta River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	Adjusted trap efficiency ⁵
7	0	0	0	18.59	0	0	0	-----
8	0	0	0	17.12	0	0	0	-----
9	0	0	0	17.61	0	0	0	-----
10	0	0	0	15.38	0	0	0	-----
11	0	0	0	15.30	0	0	0	-----
12	1	0	1	10.54	1	0	0	15.83%*
13	9	0	9	8.09	9	0	0	13.41%
14	44	5	49	17.29	49	0	0	13.41%
15	1	0	1	18.65	1	0	0	13.41%
16	38	0	38	11.22	38	0	0	15.83%*
17	92	1	93	12.70	93	0	0	15.83%*
18	20	0	20	7.23	20	0	0	13.41%
19	80	0	80	8.75	80	0	0	12.14%
20	214	2	216	9.42	216	0	0	15.83%*
21	83	1	84	12.55	84	0	0	9.53%
22	44	0	44	8.10	44	0	0	12.73%
23	9	0	9	15.04	9	0	0	11.00%
24	10	0	10	13.41	10	0	0	19.87%
25	29	1	30	17.63	30	0	0	15.60%
26	41	0	41	12.08	41	0	0	9.68%
Totals	715	10	725	266.71	725	0	0	

¹ Does not include recaptured fish.

² Million cubic feet.

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 To reduce handling of 0+ coho, no mark/recapture trials occurred in 2009.

⁵ Adjusted trap efficiency is based on the correlation ($y=0.8224x+0.0039$), where y is 0+ coho efficiency and x is 0+ steelhead efficiency (see Chart 19). ¹ correlated with seasonal trap efficiency for 0+ steelhead.

⁶ Weekly population estimates derived from adjusted trap efficiency. There are no confidence intervals.

* No mark/recapture trials occurred for 0+ steelhead during these weeks; adjusted efficiency is based seasonal trap efficiency for 0+ steelhead.

Appendix 4. Catch Table coho 1+, Shasta River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	Adjusted trap efficiency	Adjust populat estima
7	0	0	0	18.59	0	0	0	14.85% ^x	0 ^x
8	4	0	4	17.12	4	4	1	25.00%	16
9	3	0	3	17.61	3	2	0	28.63% [*]	10 [*]
10	10	0	10	15.38	10	7	4	57.14%	18
11	8	0	8	15.30	8	5	2	40.00%	20
12	33	0	33	10.54	33	18	9	50.00%	66
13	64	1	65	8.09	65	1	0	14.85% ^x	381 ^x
14	94	0	94	17.29	94	9	0	14.85% ^x	306 ^x
15	404	0	404	18.65	404	0	0	14.85% ^x	1246
16	735	1	736	11.22	736	86	30	34.88%	2110
17	268	0	268	12.70	268	61	24	39.34%	681
18	46	0	46	7.23	46	0	0	14.85% ^x	144 ^x
19	75	1	76	8.75	76	0	0	14.85% ^x	287 ^x
20	19	0	19	9.42	19	0	0	14.85% ^x	75 ^x
21	6	0	6	12.55	6	0	0	14.85% ^x	21 ^x
22	1	0	1	8.10	1	0	0	14.85% ^x	5 ^x
23	3	0	3	15.04	3	0	0	28.63% [*]	10 [*]
24	0	0	0	13.41	0	0	0	28.63% [*]	0 [*]
25	0	0	0	17.63	0	0	0	28.63% [*]	0 [*]
26	0	0	0	12.08	0	0	0	-----	-----
Totals	1,773	3	1,776	266.71	1,776	193	70	-----	5396

¹ Does not include recaptured fish.

² Million cubic feet.

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 Limited mark-recapture trials performed. We minimized handling of coho due to projected low numbers of 1+ coho production in 2008.

^x Efficiency and population estimate based on correlation between 2+ steelhead and 1+ coho efficiencies in 2004, 2005, and 2009 (see Chart 20).

* Efficiency and population estimate based on seasonal efficiency for 2+ steelhead in 2009.

Appendix 5. Catch Table coho 2+, Shasta River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	Trap efficiency ⁵	Weekl populat estima		
7	0	0	0	18.59	0	0	0	---	---		
8	1	0	1	17.12	1	1	0	0.00%	---		
9	0	0	0	17.61	0	0	0	---	---		
10	0	0	0	15.38	0	0	0	---	---		
11	0	0	0	15.30	0	0	0	---	---		
12	1	0	1	10.54	1	0	0	---	---		
13	0	0	0	8.09	0	0	0	---	---		
14	0	0	0	17.29	0	0	0	---	---		
15	54	0	54	18.65	54	0	0	---	---		
16	39	0	39	11.22	39	11	4	36.36%	93.6		
17	0	0	0	12.70	0	0	0	---	---		
18	1	0	1	7.23	1	0	0	---	---		
19	0	0	0	8.75	0	0	0	---	---		
20	0	0	0	9.42	0	0	0	---	---		
21	2	0	2	12.55	2	0	0	---	---		
22	0	0	0	8.10	0	0	0	---	---		
23	0	0	0	15.04	0	0	0	---	---		
24	0	0	0	13.41	0	0	0	---	---		
25	0	0	0	17.63	0	0	0	---	---		
26	0	0	0	12.08	0	0	0	---	---		
Totals	98	0	98	266.70	98	12	4	---	93.6		

¹ Does not include recaptured fish.

² Million cubic feet.

³ Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of

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 6. Catch Table steelhead 0+, Shasta River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima		
7	0	0	0	18.59	0	0	0	-----	-----		
8	0	0	0	17.12	0	0	0	-----	-----		
9	0	0	0	17.61	0	0	0	-----	-----		
10	0	0	0	15.38	0	0	0	-----	-----		
11	0	0	0	15.30	0	0	0	-----	-----		
12	0	0	0	10.54	0	0	0	-----	-----		
13	5	0	5	8.09	5	4	1	15.83%*	15*		
14	21	3	24	17.29	24	7	1	15.83%*	91*		
15	1	0	1	18.65	1	4	1	15.83%*	3*		
16	16	1	17	11.22	17	0	0	-----	-----		
17	4	1	5	12.70	5	0	0	-----	-----		
18	9	0	9	7.23	9	6	1	15.83%*	32*		
19	18	0	18	8.75	18	7	1	14.29%	72		
20	86	1	87	9.42	87	0	0	-----	-----		
21	127	4	131	12.55	131	54	6	11.11%	1,02€		
22	89	1	90	8.10	90	40	6	15.00%	527		
23	46	0	46	15.04	46	31	4	12.90%	294		
24	156	22	178	13.41	178	114	27	23.68%	731		
25	285	4	289	17.63	289	146	27	18.49%	1,517		
26	111	2	113	12.08	113	124	14	11.29%	942		
Totals	974	39	1,013	266.71	1,013	537	88		5,25€		

¹ Does not include recaptured fish.

² Million cubic feet.

³ Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of

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.

*Efficiency and population estimate based on seasonal efficiency of 15.83%.

Appendix 7. Catch Table steelhead 1+, Shasta River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima		
7	0	0	0	18.59	0	0	0	-----	-----		
8	5	0	5	17.12	5	4	1	25.00%	13		
9	6	0	6	17.61	6	4	1	24.18%*	15*		
10	4	0	4	15.38	4	2	0	24.18%*	8*		
11	4	0	4	15.3	4	2	0	24.18%*	8*		
12	8	0	8	10.54	8	8	3	37.50%	18		
13	4	0	4	8.09	4	2	1	50.00%	6		
14	15	0	15	17.29	15	8	3	37.50%	34		
15	25	0	25	18.65	24	12	3	24.18%*	80*		
16	86	2	88	11.22	87	66	17	25.76%	324		
17	118	2	120	12.7	118	89	34	38.20%	303		
18	30	0	30	7.23	30	41	12	29.27%	97		
19	25	3	28	8.75	27	12	1	8.33%	176		
20	71	0	71	9.42	70	38	7	18.42%	341		
21	69	0	69	12.55	69	44	7	15.91%	388		
22	21	0	21	8.1	21	13	3	24.18%*	71*		
23	10	0	10	15.04	10	6	1	24.18%*	29*		
24	8	3	11	13.41	11	4	1	25.00%	28		
25	10	1	11	17.63	11	3	1	33.33%	22		
26	7	0	7	12.08	7	6	1	24.18%*	20*		
Totals	526	11	537	266.71	531	364	99		1,980		

¹ Does not include recaptured fish.

² Million cubic feet.

³ Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of

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.

*Efficiency and population estimates based on seasonal efficiency of 24.18%.

Appendix 8. Catch Table steelhead 2+, Shasta River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima
7	10	0	10	18.59	10	8	1	12.50%	45
8	19	0	19	17.12	19	11	1	9.09%	114
9	21	0	21	17.61	21	14	3	19.87%*	83*
10	41	0	41	15.38	41	33	4	12.12%	279
11	76	1	77	15.3	77	48	9	18.75%	377
12	97	1	98	10.54	97	71	9	12.68%	698
13	123	1	124	8.09	122	68	2	2.94%	2,80€
14	291	0	291	17.29	290	109	23	21.10%	1,32€
15	714	0	714	18.65	705	317	74	23.34%	2,98€
16	1,909	4	1,913	11.22	1,910	637	117	18.37%	10,32
17	995	0	995	12.7	988	461	129	27.98%	3,511
18	184	0	184	7.23	183	204	46	22.55%	798
19	255	4	259	8.75	254	156	24	15.38%	1,59€
20	310	0	310	9.42	308	193	27	13.99%	2,13€
21	47	0	47	12.55	46	37	7	18.92%	219
22	10	1	11	8.1	11	11	1	9.09%	66
23	5	0	5	15.04	5	4	1	19.87%*	14*
24	1	0	1	13.41	1	1	0	19.87%*	2*
25	3	1	4	17.63	4	2	0	19.87%*	9*
26	1	0	1	12.08	1	0	0	-----	-----
Totals	5,112	13	5,125	266.71	5,093	2,385	478		27,39

¹ Does not include recaptured fish.

² Million cubic feet.

³ Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of

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.

*Efficiency and population estimates based on seasonal trap efficiency of 19.87%.

Appendix 9. Catch Table steelhead 3+, Shasta River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima		
7	3	0	3	18.59	3	0	0	-----	-----		
8	10	0	10	17.12	10	4	0	10.12%*	36*		
9	14	0	14	17.61	14	9	1	11.11%	70		
10	3	0	3	15.38	2	5	1	10.12%*	8*		
11	28	1	29	15.3	28	13	2	15.38%	131		
12	36	0	36	10.54	35	28	5	17.86%	169		
13	17	0	17	8.09	15	7	1	10.12%*	70*		
14	24	0	24	17.29	24	12	1	8.33%	156		
15	75	0	75	18.65	73	35	3	8.57%	657		
16	138	0	138	11.22	137	123	12	9.76%	1,307		
17	12	0	12	19.10	12	20	2	10.00%	84		
18	2	0	2	7.23	2	0	0	-----	-----		
19	1	0	1	8.75	1	1	0	10.12%*	2*		
20	4	0	4	9.42	4	0	0	-----	-----		
21	0	0	0	12.55	0	0	0	-----	-----		
22	0	0	0	8.1	0	0	0	-----	-----		
23	0	0	0	15.04	0	0	0	-----	-----		
24	0	0	0	13.41	0	0	0	-----	-----		
25	0	0	0	17.63	0	0	0	-----	-----		
26	0	0	0	12.08	0	0	0	-----	-----		
Totals	367	1	368	266.71	360	257	28		2,68€		

¹ Does not include recaptured fish.

² Million cubic feet.

³ Adjusted total trapped includes live fish, mortalities and marked fish. Does not include recaptured or marked fish caught after the end of

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.

*Efficiency and population estimate based on seasonal trap efficiency of 10.12%.

Appendix 10. Catch Table Chinook 0+, Scott River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima
7	5	1	6	----	6	0	0	----	----
8	55	6	61	----	61	9	0	3.76%*	456*
9	56	29	85	12.98	85	0	0	----	----
10	50	7	57	14.05	57	8	0	3.76%*	394*
11	348	108	456	11.89	456	116	5	4.31%	8,892
12	1,704	110	1,814	31.14	1,814	751	48	6.39%	27,83
13	6,336	132	6,468	34.09	6,468	2,437	211	8.66%	74,38
14	7,073	194	7,267	37.65	7,267	2,499	205	8.20%	88,19
15	20,590	220	20,810	37.98	20,810	2,588	309	11.94%	173,76
16	23,227	1,760	24,987	35.64	24,987	2,614	236	9.03%	275,70
17	5,196	661	5,857	18.99	5,857	1,497	105	7.01%	82,77
18	2,723	28	2,751	12.39	2,751	1,681	88	5.23%	51,99
19	145	5	150	2.49	150	0	0	----	----
20	1,078	139	1,217	12.67	1,217	932	29	3.11%	37,84
21	1,117	26	1,143	15.24	1,143	997	26	2.61%	42,24
22	896	34	930	16.22	930	605	45	7.44%	12,25
23	471	14	485	11.69	485	247	19	7.69%	6,014
24	427	24	451	11.87	451	321	12	3.74%	11,17
25	556	16	572	9.59	572	420	11	2.62%	20,06
26	234	13	247	9.42	247	202	2	0.99%	16,71
Totals	72,287	3,527	75,814	335.99	75,814	17,924	1,352		930,73

¹ Does not include recaptured fish.

² Million cubic feet. (Note: Unable to estimate volume sampled in Julian Weeks 7 & 8 due to broken flow meter.)

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.

*Efficiency and population estimates based on early season trap efficiency of 3.76%. Only 4 days of efficiency estimates due to high flow and debris in Ju

Appendix 11. Catch Table Chinook 1+, Scott River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima
7	95	1	96	-----	96	52	15	28.85%	318
8*	192	0	192	-----	222	184	14	7.61%	2,73€
9*	58	0	58	12.98	197	169	14	8.28%	2,23€
10	139	1	140	14.05	139	98	8	8.16%	1,52€
11	102	1	103	11.89	107	79	3	3.80%	2,14€
12	28	0	28	31.14	70	46	7	15.22%	411
13	45	0	45	34.09	44	38	7	18.42%	215
14	18	0	18	37.65	18	11	3	27.27%	54
15	9	0	9	37.98	12	3	2	66.67%	16
16	8	0	8	35.64	8	9	1	11.11%	40
17	0	0	0	18.99	0	1	0	18.52%*	2*
18	0	0	0	12.39	0	0	0	-----	0
19	0	0	0	2.49	0	0	0	-----	0
20	0	0	0	12.67	0	0	0	-----	0
21	0	0	0	15.24	0	0	0	-----	0
22	0	0	0	16.22	0	0	0	-----	0
23	0	0	0	11.69	0	0	0	-----	0
24	0	0	0	11.87	0	0	0	-----	0
25	0	0	0	9.59	0	0	0	-----	0
26	0	0	0	9.42	0	0	0	-----	0
Totals	694	3	697	335.99	913	690	74		9,69€

¹ Does not include recaptured fish.

² Million cubic feet. (Note: Unable to estimate volume sampled in Julian Weeks 7 & 8 due to broken flow meter.)

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.

* Only 4 days of efficiency estimates due to high flow and debris.

*Efficiency and population estimates based on mid-season trap efficiency of 18.52% for Julian week 17.

Appendix 12. Catch Table coho 0+, Scott River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima
7	0	0	0	----	0	0	0	----	0
8	0	0	0	----	0	0	0	----	0
9	0	0	0	12.98	0	0	0	----	0
10	0	0	0	14.05	0	0	0	----	0
11	0	0	0	11.89	0	0	0	----	0
12	0	0	0	31.14	0	0	0	----	0
13	2	0	2	34.09	2	2	0	16.67%*	5*
14	3	0	3	37.65	3	1	0	16.67%*	5*
15	7	0	7	37.98	7	5	1	16.67%*	23*
16	59	15	74	35.64	74	26	4	16.67%*	375*
17	352	24	376	18.99	376	118	23	19.49%	1,864
18	183	1	184	12.39	184	214	38	17.76%	1,014
19	----	----	----	2.49	----	----	----	----	----
20	0	0	0	12.67	0	0	0	----	----
21	16	0	16	15.24	16	9	1	11.11%	80
22	14	0	14	16.22	14	7	1	8.00%*	72*
23	19	1	20	11.69	20	7	1	14.29%	80
24	14	0	14	11.87	14	19	2	8.00%*	111*
25	21	1	22	9.59	22	14	1	7.14%	165
26	20	1	21	9.42	21	19	3	15.79%	105
Totals	710	43	753	335.99	753	441	67		3,896

¹ Does not include recaptured fish.

² Million cubic feet. (Note: Unable to estimate volume sampled in Julian Weeks 7 & 8 due to broken flow meter.)

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.

* Efficiency and population estimate for Julian weeks 13-16 based on mid-season trap efficiency of 16.67%; Julian weeks 22 & 24 based on late-season tr

Appendix 13. Catch Table coho 1+, Scott River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima
7	74	0	74	-----	74	44	6	13.64%	476
8*	119	2	121	-----	121	102	7	6.86%	1,55€
9*	391	8	399	12.98	399	276	22	7.97%	4,80€
10	706	2	708	14.05	706	405	21	5.19%	13,02
11	723	15	738	11.89	732	600	33	5.50%	12,93
12	919	0	919	31.14	917	645	90	13.95%	6,510
13	666	3	669	34.09	669	513	54	10.53%	6,252
14	365	1	366	37.65	366	320	40	12.50%	2,86€
15	448	1	449	37.98	449	265	23	8.68%	4,97€
16	509	3	512	35.64	512	419	48	11.46%	4,38€
17	240	0	240	18.99	240	178	18	10.11%	2,261
18	76	1	77	12.39	77	120	5	4.17%	1,55€
19	-----	-----	-----	2.49	-----	-----	-----	-----	-----
20	39	1	40	12.67	40	26	1	5.65%*	437*
21	6	0	6	15.24	6	13	1	5.65%*	48*
22	11	0	11	16.22	11	8	0	5.65%*	68*
23	8	1	9	11.69	9	6	0	5.65%*	47*
24	2	0	2	11.87	2	2	0	5.65%*	5*
25	0	0	0	9.59	0	0	0	-----	-----
26	0	0	0	9.42	0	0	0	-----	-----
Totals	5,302	38	5,340	335.99	5,330	3,942	370		62,22

¹ Does not include recaptured fish.

² Million cubic feet. (Note: Unable to estimate volume sampled in Julian Weeks 7 & 8 due to broken flow meter.)

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.

* Only 4 days of efficiency estimates due to high flow and debris.

* Efficiency and population estimate based on late-season trap efficiency of 5.65%.

Appendix 14. Catch Table steelhead 0+, Scott River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima		
7	0	0	0	----	0	0	0	----	----		
8	0	0	0	----	0	0	0	----	----		
9	0	0	0	12.98	0	0	0	----	----		
10	0	0	0	14.05	0	0	0	----	----		
11	0	0	0	11.89	0	0	0	----	----		
12	0	0	0	31.14	0	0	0	----	----		
13	0	0	0	34.09	0	0	0	----	----		
14	0	0	0	37.65	0	0	0	----	----		
15	0	0	0	37.98	0	0	0	----	----		
16	12	2	14	35.64	14	7	0	0.00%	----		
17	16	1	17	18.99	17	4	0	0.00%	----		
18	43	2	45	12.39	45	18	0	0.00%	----		
19	1	0	1	2.49	1	0	0	----	----		
20	29	22	51	12.67	51	18	0	0.00%	----		
21	56	5	61	15.24	61	46	0	0.00%	----		
22	18	2	20	16.22	20	5	0	0.00%	----		
23	11	1	12	11.69	12	6	0	0.00%	----		
24	14	0	14	11.87	14	11	0	0.00%	----		
25	65	0	65	9.59	65	44	0	0.00%	----		
26	53	0	53	9.42	53	51	2	3.92%	919		
Totals	318	35	353	335.99	353	210	2		919		

¹ Does not include recaptured fish.

² Million cubic feet. (Note: Unable to estimate volume sampled in Julian Weeks 7 & 8 due to broken flow meter.)

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 15. Catch Table steelhead 1+, Scott River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima
7	47	0	47	----	45	27	6	22.22%	180
8*	376	0	376	----	375	25	1	5.11%*	4,281
9*	1,141	16	1,157	12.98	1,157	460	34	7.39%	15,23
10	753	3	756	14.05	756	507	22	4.34%	16,69
11	701	23	724	11.89	723	527	17	3.23%	21,20
12	547	2	549	31.14	548	321	34	10.59%	5,042
13	538	0	538	34.09	538	364	51	14.01%	3,776
14	313	2	315	37.65	314	276	33	11.96%	2,558
15	441	0	441	37.98	441	160	13	8.13%	5,072
16	785	17	802	35.64	802	688	73	10.61%	7,467
17	249	0	249	18.99	249	355	15	4.23%	5,540
18	51	0	51	12.39	51	72	5	6.94%	621
19	1	0	1	2.49	1	0	0	----	0
20	39	0	39	12.67	39	30	2	6.67%	403
21	16	2	18	15.24	18	17	1	4.5%*	184*
22	14	0	14	16.22	14	9	1	11.11%	70
23	6	1	7	11.69	7	4	0	4.5%*	30*
24	4	1	5	11.87	5	3	0	4.5%*	18*
25	8	1	9	9.59	9	1	0	4.5%*	17*
26	6	0	6	9.42	6	3	0	4.5%*	21*
Totals	6,036	68	6,104	335.99	6,098	3,849	309		88,42

¹ Does not include recaptured fish.

² Million cubic feet. (Note: Unable to estimate volume sampled in Julian Weeks 7 & 8 due to broken flow meter.)

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.

*Only 4 days of efficiency estimates due to high flow and debris.

*Efficiency and population estimate for Julian week 8 based on early season trap efficiency of 5.11%; Julian weeks 21 and 23 - 26 based on late-season tr

Appendix 16. Catch Table steelhead 2+, Scott River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima		
7	7	0	7	-----	7	4	0	3.49%*	31*		
8*	50	1	51	-----	51	1	0	3.49%*	99*		
9*	57	0	57	12.98	57	31	2	6.45%	608		
10	43	0	43	14.05	43	40	0	3.49%*	736*		
11	11	0	11	11.89	11	10	1	10.00%	61		
12	45	0	45	31.14	45	24	2	8.33%	375		
13	51	0	51	34.09	51	39	1	2.56%	1,020		
14	32	1	33	37.65	33	25	1	4.00%	429		
15	95	0	95	37.98	95	50	1	2.00%	2,420		
16	90	1	91	35.64	91	82	2	2.44%	2,510		
17	3	0	3	18.99	3	14	0	2.98%*	32*		
18	1	1	2	12.39	2	1	0	2.98%*	4*		
19	0	0	0	2.49	0	0	0	-----	-----		
20	3	0	3	12.67	3	1	0	-----	-----		
21	2	0	2	15.24	2	2	0	-----	-----		
22	1	0	1	16.22	1	1	0	-----	-----		
23	0	0	0	11.69	0	0	0	-----	-----		
24	1	0	1	11.87	1	0	0	-----	-----		
25	0	0	0	9.59	0	0	0	-----	-----		
26	0	0	0	9.42	0	0	0	-----	-----		
Totals	492	4	496	335.99	496	325	10		8,334		

¹ Does not include recaptured fish.

² Million cubic feet. (Note: Unable to estimate volume sampled in Julian Weeks 7 & 8 due to broken flow meter.)

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.

* Only 4 days of efficiency estimates due to high flow and debris.

* Efficiency and population estimate for Julian weeks 7-8 and 10 based on early season trap efficiency of 3.49%; Julian weeks 17 & 18 based on mid-seas

Appendix 17. Catch Table steelhead 3+, Scott River 2009.

Julian week	Live fish trapped ¹	Mortalities	Total	Volume sampled, MCF ²	Adjusted total trapped ³	Adjusted marked & released ⁴	Recaptured	% trap efficiency ⁵	Weekl populat estima		
7	2	---	2	----	2	0	---	---	---		
8 [†]	3	---	3	----	3	1	0	0.00%	---		
9 [†]	---	---	---	12.98	---	---	---	---	---		
10	---	---	---	14.05	---	---	---	---	---		
11	---	---	---	11.89	---	---	---	---	---		
12	---	---	---	31.14	---	---	---	---	---		
13	---	---	---	34.09	---	---	---	---	---		
14	---	---	---	37.65	---	---	---	---	---		
15	1	---	1	37.98	1	---	---	---	---		
16	---	---	---	35.64	---	---	---	---	---		
17	---	---	---	18.99	---	---	---	---	---		
18	---	---	---	12.39	---	---	---	---	---		
19	---	---	---	2.49	---	---	---	---	---		
20	---	---	---	12.67	---	---	---	---	---		
21	---	---	---	15.24	---	---	---	---	---		
22	---	---	---	16.22	---	---	---	---	---		
23	---	---	---	11.69	---	---	---	---	---		
24	---	---	---	11.87	---	---	---	---	---		
25	---	---	---	9.59	---	---	---	---	---		
26	---	---	---	9.42	---	---	---	---	---		
Totals	6	---	6	335.99	6	---	0	---	---		

¹ Does not include recaptured fish.

² Million cubic feet. (Note: Unable to estimate volume sampled in Julian Weeks 7 & 8 due to broken flow meter.)

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.

[†] Only 4 days of efficiency estimates due to high flow and debris.

Appendix 18. Shasta River 2009 average fork length by Julian week for Chinook 0+.

Julian week	average	s.d.	n	min	max
7	36	2.00	39	30	40
8	38	2.27	86	32	43
9	38	2.45	100	32	50
10	41	4.43	56	34	55
11	43	4.98	300	31	57
12	44	5.34	300	32	60
13	50	7.37	240	33	74
14	56	8.58	291	33	80*
15	62	7.13	300	41	79
16	62	7.13	299	44	85
17	66	8.38	301	47	89
18	73	9.38	211	53	96
19	82	10.30	219	56	115
20	83	8.62	300	54	106
21	83	6.09	250	62	99
22	82	6.79	209	64	104
23	88	7.13	180	68	114
24	92	7.61	254	70	112
25	92	8.84	213	64	121
26	93	9.47	114	53	110

*One fish with a fork length of 80 mm was still included in the 0+ totals, even though the cutoff length for 1+ was 79 mm. This fish was most likely 0+; the lowest fork length for 1+ Chinook in Julian week 14 was 96 mm. A new scale-age analysis is planned for 2010 to reconcile this discrepancy.

Appendix 19. Shasta River 2009 average fork length by Julian week for Chinook 1+.

Julian week	average	s.d.	n	min	max
7	-----	-----	-----	-----	-----
8	114	28.79	10	83	187
9	113	11.38	8	96	128
10	116	10.45	12	97	136
11	126	13.51	13	102	150
12	120	11.83	16	95	139
13	126	12.16	10	111	156
14	123	13.38	17	96	149
15	136	14.29	17	109	170
16	116	13.30	4	101	132
17	126	-----	1	126	126
18	-----	-----	-----	-----	-----
19	154	-----	1	154	154
20	-----	-----	-----	-----	-----
21	-----	-----	-----	-----	-----
22	-----	-----	-----	-----	-----
23	-----	-----	-----	-----	-----
24	-----	-----	-----	-----	-----
25	-----	-----	-----	-----	-----
26	-----	-----	-----	-----	-----

Appendix 20. Shasta River 2009 average fork length by Julian week for coho 0+.

Julian week	average	s.d.	n	min	max
7	-----	-----	-----	-----	-----
8	-----	-----	-----	-----	-----
9	-----	-----	-----	-----	-----
10	-----	-----	-----	-----	-----
11	-----	-----	-----	-----	-----
12	-----	-----	-----	-----	-----
13	32	-----	1	32	32
14	31	2.54	25	27	34
15	32	-----	1	32	32
16	39	3.71	14	35	49
17	48	3.11	46	40	54
18	52	2.64	15	47	56
19	56	4.25	25	47	63
20	59	4.17	57	46	66
21	59	3.81	48	51	72
22	59	4.95	26	46	69
23	61	4.08	4	58	67
24	64	6.53	10	53	72
25	65	4.84	30	54	73
26	68	5.55	40	59	88

Appendix 21. Shasta River 2009 average fork length by Julian week for coho 1+.

Julian week	average	s.d.	n	min	max
7	-----	-----	-----	-----	-----
8	115	9.02	4	104	126
9	113	31.07	3	88	148
10	152	19.21	10	110	171
11	140	14.83	7	120	162
12	145	18.11	33	78	165
13	151	16.31	55	106	190
14	147	10.90	50	110	172
15	143	9.54	106	112	159
16	138	11.23	158	100	159
17	130	12.35	156	108	160
18	128	11.01	46	107	152
19	134	11.20	76	98	158
20	131	10.13	19	118	161
21	137	5.75	6	129	146
22	123	-----	1	123	123
23	143	7.09	3	137	151
24	-----	-----	-----	-----	-----
25	-----	-----	-----	-----	-----
26	-----	-----	-----	-----	-----

Appendix 22. Shasta River 2009 average fork length by Julian week for coho 2+.

Julian week	average	s.d.	n	min	max
7	-----	-----	-----	-----	-----
8	160	-----	1	160	160
9	-----	-----	-----	-----	-----
10	-----	-----	-----	-----	-----
11	-----	-----	-----	-----	-----
12	205	-----	1	205	205
13	-----	-----	-----	-----	-----
14	-----	-----	-----	-----	-----
15	168	9.54	31	160	194
16	166	6.15	39	160	183
17	-----	-----	-----	-----	-----
18	177	-----	1	177	177
19	-----	-----	-----	-----	-----
20	-----	-----	-----	-----	-----
21	161	4.95	2	157	164
22	-----	-----	-----	-----	-----
23	-----	-----	-----	-----	-----
24	-----	-----	-----	-----	-----
25	-----	-----	-----	-----	-----
26	-----	-----	-----	-----	-----

Appendix 23. Shasta River 2009 average fork length by Julian week for steelhead 0+.

Julian week	average	s.d.	n	min	max
7	-----	-----	-----	-----	-----
8	-----	-----	-----	-----	-----
9	-----	-----	-----	-----	-----
10	-----	-----	-----	-----	-----
11	-----	-----	-----	-----	-----
12	-----	-----	-----	-----	-----
13	25	0.58	3	25	26
14	28	1.62	10	24	30
15	-----	-----	-----	-----	-----
16	26	1.17	12	24	28
17	33	8.54	3	25	42
18	46	1.53	3	44	47
19	45	6.99	10	31	56
20	52	7.99	39	38	70
21	59	6.28	45	49	73
22	63	8.44	38	50	91
23	66	9.53	7	57	85
24	67	9.40	64	47	88
25	69	11.25	71	42	109
26	76	10.82	33	56	106

Appendix 24. Shasta River 2009 average fork length by Julian week for steelhead 1+.

Julian week	average	s.d.	n	min	max
7	-----	-----	-----	-----	-----
8	111	25.97	5	81	137
9	106	15.48	6	79	120
10	97	24.90	4	73	129
11	110	27.29	4	75	139
12	97	21.46	8	69	132
13	130	13.28	3	115	138
14	120	12.93	15	98	139
15	119	11.85	23	99	139
16	120	13.75	76	76*	139
17	136	16.70	114	93	159
18	139	16.27	30	110	159
19	139	17.65	28	100	157
20	141	13.87	64	107	159
21	157	16.99	69	116	179
22	162	12.97	21	134	179
23	144	18.31	9	122	176
24	146	20.21	10	126	179
25	145	19.35	10	111	179
26	147	16.63	7	128	171

*The lower age-length cutoff for 1+ steelhead during week 16 was 80 mm. However, the max FL for 0+ steelhead observed in Julian week 16 was 28 mm, so this fish most likely belonged in the 1+ age class. A new scale-age analysis is planned for 2010 to reconcile this discrepancy.

Appendix 25. Shasta River 2009 average fork length by Julian week for steelhead 2+.

Julian week	average	s.d.	n	min	max
7	162	19.57	10	140	204
8	177	28.79	19	140	229
9	181	14.75	21	145	209
10	173	18.27	41	141	208
11	179	16.70	76	144	209
12	181	15.41	95	145	209
13	186	17.64	107	151	225
14	188	15.95	126	149	229
15	190	15.40	144	141	217
16	185	17.06	155	140	218
17	187	15.14	153	160	223
18	190	12.78	90	160	228
19	192	13.62	119	163	229
20	187	12.71	121	161	221
21	192	10.65	47	180	231
22	193	13.09	9	182	225
23	194	13.78	5	180	217
24	183	-----	1	183	183
25	194	16.47	4	180	214
26	187	-----	1	187	187

Appendix 26. Shasta River 2009 average fork length by Julian week for steelhead 3+.

Julian week	average	s.d.	n	min	max
7	331	66.05	3	257	384
8	259	42.11	10	230	370
9	311	103.76	14	210	530
10	243	19.16	3	221	256
11	248	37.91	29	210	390
12	256	53.75	35	210	490
13	265	52.29	16	231	450
14	271	50.02	22	235	425
15	248	42.36	70	220	550
16	247	31.86	105	220	465
17	251	16.74	12	230	283
18	241	10.61	2	233	248
19	232	-----	1	232	232
20	301	111.45	3	235	430
21	-----	-----	-----	-----	-----
22	-----	-----	-----	-----	-----
23	-----	-----	-----	-----	-----
24	-----	-----	-----	-----	-----
25	-----	-----	-----	-----	-----

26	-----	-----	-----	-----	-----
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Appendix 27. Scott River 2009 average fork length by Julian week for Chinook 0+.

Julian week	average	s.d.	n	min	max
7	38	1.41	4	36	39
8	38	0.98	6	37	39
9	39	2.21	15	36	43
10	-----	-----	-----	-----	-----
11	36	2.31	29	31	40
12	40	5.56	51	35	65
13	40	6.71	191	34	79
14	39	4.02	300	35	75
15	41	8.51	441	35	97
16	40	6.32	358	34	97
17	45	12.21	155	36	113
18	43	5.89	151	35	86
19	-----	-----	-----	-----	-----
20	47	5.07	100	38	66
21	51	6.74	53	37	69
22	57	9.13	100	40	83
23	60	10.30	101	42	86
24	69	11.57	45	47	93
25	75	9.38	102	51	94
26	77	8.04	81	58	93

Appendix 28. Scott River 2009 average fork length by Julian week for Chinook 1+.

Julian week	average	s.d.	n	min	max
7	90	7.18	96	73	104
8	92	7.80	118	74	112
9	91	8.45	100	74	112
10	91	9.34	105	70	133
11	91	8.41	106	70	116
12	96	9.99	70	74	116
13	99	10.96	45	80	133
14	101	8.40	18	90	115
15	108	6.36	12	102	121
16	112	8.88	8	100	130
17	-----	-----	-----	-----	-----
18	-----	-----	-----	-----	-----
19	-----	-----	-----	-----	-----
20	-----	-----	-----	-----	-----
21	-----	-----	-----	-----	-----
22	-----	-----	-----	-----	-----
23	-----	-----	-----	-----	-----
24	-----	-----	-----	-----	-----

25	-----	-----	-----	-----	-----
26	-----	-----	-----	-----	-----

Appendix 29. Scott River 2009 average fork length by Julian week for coho 0+.

Julian week	average	s.d.	n	min	max
7	-----	-----	-----	-----	-----
8	-----	-----	-----	-----	-----
9	-----	-----	-----	-----	-----
10	-----	-----	-----	-----	-----
11	-----	-----	-----	-----	-----
12	-----	-----	-----	-----	-----
13	54	3.54	2	51	56
14	55	3.46	3	53	59
15	62	12.09	7	35	69
16	37	9.33	11	32	65
17	35	3.29	58	32	58
18	34	1.39	31	32	38
19	-----	-----	-----	-----	-----
20	-----	-----	-----	-----	-----
21	87	23.26	12	38	108
22	78	27.11	9	46	105
23	88	26.58	13	45	109
24	88	21.27	8	52	104
25	58	7.50	6	49	70
26	59	7.02	3	52	66

Appendix 30 Scott River 2009 average fork length by Julian week for coho 1+.

Julian week	average	s.d.	n	min	max
7	97	9.25	74	65	117
8	97	8.09	81	75	116
9	91	10.54	127	62	116
10	91	9.83	144	69	119
11	87	10.07	139	65	114
12	87	10.08	292	64	131
13	90	12.55	295	60	138
14	92	11.15	230	63	126
15	101	12.20	247	75	146
16	102	13.74	290	70	146
17	101	11.86	179	70	155
18	106	11.50	76	78	133
19	-----	-----	-----	-----	-----
20	109	8.38	40	90	130
21	113	3.78	6	110	119
22	119	8.68	11	110	140
23	115	4.71	9	111	126
24	117	7.07	2	112	122

25	----	----	----	----	----
26	----	----	----	----	----

Appendix 31 Scott River 2009 average fork length by Julian week for steelhead 0+.

Julian week	average	s.d.	n	min	max
7	----	----	----	----	----
8	----	----	----	----	----
9	----	----	----	----	----
10	48	----	1	48	48
11	----	----	----	----	----
12	----	----	----	----	----
13	----	----	----	----	----
14	----	----	----	----	----
15	----	----	----	----	----
16	48	10.84	6	30	57
17	37	14.90	15	25	59
18	30	8.81	24	24	59
19	----	----	----	----	----
20	27	1.85	16	22	30
21	27	2.04	15	25	33
22	31	15.98	10	24	76
23	31	9.42	5	24	43
24	46	0.71	2	45	46
25	43	3.69	7	37	47
26	57	6.88	17	48	72

Appendix 32 Scott River 2009 average fork length by Julian week for steelhead 1+.

Julian week	average	s.d.	n	min	max
7	85	12.23	47	65	113
8	91	13.57	72	68	119
9	86	15.00	125	58	119
10	84	14.47	142	55	119
11	78	11.42	133	57	110
12	83	15.01	258	55	119
13	83	14.59	273	53	119
14	84	13.70	209	60	118
15	86	11.54	220	62	109
16	86	11.21	288	61	109
17	81	13.91	153	60	130
18	85	16.37	51	61	124
19	116	----	1	116	116
20	93	17.57	39	67	132
21	115	31.88	18	80	170
22	125	28.79	14	89	170
23	121	22.13	7	94	155
24	147	19.25	4	123	167

25	135	12.44	9	122	157
26	132	24.83	6	109	178

Appendix 33 Scott River 2009 average fork length by Julian week for steelhead 2+.

Julian week	average	s.d.	n	min	max
7	145	15.57	6	124	166
8	140	17.86	31	120	184
9	137	15.39	57	120	183
10	134	13.10	43	120	176
11	143	32.54	11	120	225
12	139	16.30	45	122	190
13	136	12.33	51	120	169
14	139	16.18	32	120	177
15	130	21.34	95	110	205
16	128	21.10	87	110	205
17	168	11.02	3	157	179
18	210	-----	1	210	210
19	-----	-----	-----	-----	-----
20	170	11.50	3	159	182
21	192	15.56	2	181	203
22	180	-----	1	180	180
23	-----	-----	-----	-----	-----
24	183	-----	1	183	183
25	-----	-----	-----	-----	-----
26	-----	-----	-----	-----	-----

Appendix 34 Scott River 2009 average fork length by Julian week for steelhead 3+.

Julian week	average	s.d.	n	min	max
7	225	29.70	2	204	246
8	198	8.49	2	192	204
9	-----	-----	-----	-----	-----
10	-----	-----	-----	-----	-----
11	-----	-----	-----	-----	-----
12	-----	-----	-----	-----	-----
13	-----	-----	-----	-----	-----
14	-----	-----	-----	-----	-----
15	530	-----	1	530	530
16	-----	-----	-----	-----	-----
17	-----	-----	-----	-----	-----
18	-----	-----	-----	-----	-----
19	-----	-----	-----	-----	-----
20	-----	-----	-----	-----	-----
21	-----	-----	-----	-----	-----
22	-----	-----	-----	-----	-----
23	-----	-----	-----	-----	-----

24	-----	-----	-----	-----	-----
25	-----	-----	-----	-----	-----
26	-----	-----	-----	-----	-----

Appendix 35. Shasta River 2009 Weekly temperature statistics (logger #1289578)

Julian week	Maximum	Avg. Max	Average	Avg. Min	Minimum	Max ΔT
7	10.57	9.45	8.66	8.04	6.97	1.90
8	9.41	8.71	7.84	6.97	6.51	2.08
9	10.10	9.27	8.40	7.57	6.61	2.52
10	10.69	9.25	8.29	7.35	6.08	3.24
11	12.85	10.88	9.42	8.09	5.85	3.46
12	13.31	12.66	11.18	10.00	9.14	3.49
13	12.61	11.71	10.42	9.36	8.79	3.57
14	13.35	10.59	9.14	7.94	6.48	4.96
15	14.51	12.07	10.49	9.09	7.85	4.87
16	17.63	14.64	12.52	10.72	7.44	5.68
17	17.15	14.44	12.82	11.27	9.41	5.59
18	16.70	15.59	13.39	11.46	9.58	5.73
19	18.49	16.44	14.29	12.30	11.03	5.49
20	20.87	18.35	16.26	14.39	11.59	5.64
21	15.77	14.75	12.98	11.32	9.53	6.00
22	19.70	18.42	16.64	15.09	12.46	6.21
23	20.94	19.32	17.61	16.07	15.10	4.62
24	23.91	22.02	18.96	16.15	14.07	7.00
25	25.77	22.22	19.42	16.73	15.65	6.97
26	26.92	25.94	22.59	19.47	18.13	7.26

Appendix 36. Scott River 2009 Weekly temperature statistics (logger #1289596)

Julian week	Maximum	Avg. Max	Average	Avg. Min	Minimum	Max ΔT
7	6.08	5.04	4.37	3.68	2.80	1.84
8	7.65	6.93	6.09	5.34	4.17	2.32
9	7.44	6.90	6.43	5.99	5.33	1.30
10	7.24	6.57	5.78	4.97	4.40	2.00
11	8.44	8.01	7.29	6.66	5.49	2.01
12	9.81	8.69	7.86	7.01	5.49	2.51
13	11.15	10.03	8.85	7.74	6.03	2.54
14	10.98	10.18	9.18	8.22	6.46	2.91
15	12.17	10.72	9.62	8.72	7.02	2.85
16	14.75	12.88	11.54	10.18	7.57	3.17
17	11.86	11.27	10.16	8.95	8.05	3.13
18	11.78	11.23	10.18	9.15	7.34	3.10
19	---	---	---	---	---	---

20	15.87	14.54	13.29	12.04	10.57	3.14
21	17.56	16.50	14.95	13.19	11.98	3.60
22	18.72	17.74	16.58	15.25	14.39	3.93
23	18.03	16.85	15.76	14.58	14.03	3.37
24	19.91	18.11	16.79	15.70	14.98	3.09
25	21.65	19.77	17.94	16.20	14.41	5.07
26	23.91	22.93	20.39	17.96	17.11	5.60

Appendix 37. 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 38. 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 39. Additional fish species collected in the Shasta and Scott River rotary traps in 2009.

Shasta River 2009

Common Names	Scientific Names	Number trapped
Ammocete	family Petromyzontidae	50
Bluegill sunfish	<i>Lepomis macrochirus</i>	2
Brown bullhead	<i>Ameiurus nebulosus</i>	14
Fathead minnow	<i>Pimephales promelas</i>	8
Golden shiner	<i>Notemigonus crysoleucas</i>	9
Green sunfish	<i>Lepomis cyanellus</i>	23
Japanese pond smelt	<i>Hypomesus nipponensis</i>	21
Klamath River lamprey	<i>Lampetra similis</i>	85
Klamath small scale sucker	<i>Catostomus rimiculus</i>	2,479
Largemouth bass	<i>Micropterus salmoides</i>	9
Marbled sculpin	<i>Cottus klamathensis</i>	94
Miller Lake lamprey	<i>Lampetra (Entosphenus) minima</i>	1
Mosquitofish	<i>Gambusia affinis</i>	2
Pacific Lamprey	<i>Lampetra tridentata</i>	3,576
Pumpkinseed sunfish	<i>Lepomis gibbosus</i>	7
Speckled dace	<i>Rhinichthys osculus</i>	232
Tui chub	<i>Gila bicolor</i>	7
Yellow bullhead	<i>Ameiurus natalis</i>	1,429

Scott River 2009

Common Names	Scientific Names	Number trapped
Ammocete	family Petromyzontidae	12,011
Brook stickleback	<i>Culaea inconstans</i>	150
Brown bullhead	<i>Ameiurus nebulosus</i>	3
Fathead minnow	<i>Pimephales promelas</i>	40

Japanese pond smelt	<i>Hypomesus nipponensis</i>	2
Klamath River lamprey	<i>Lampetra similis</i>	12
Klamath small scale sucker	<i>Catostomus rimiculus</i>	14,701
Marbled sculpin	<i>Cottus klamathensis</i>	222
Miller Lake lamprey	<i>Lampetra (Entosphenus) minima</i>	1
Pacific Lamprey	<i>Lampetra tridentata</i>	1,359
Speckled dace	<i>Rhinichthys osculus</i>	678

Appendix 40. 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>21</u>	<u>5/21 - 5/27</u>
<u>22</u>	<u>5/28 - 6/3</u>
<u>23</u>	<u>6/4 - 6/10</u>
<u>24</u>	<u>6/11 - 6/17</u>
<u>25</u>	<u>6/18 - 6/24</u>
<u>26</u>	<u>6/25 - 7/1</u>

* = eight days only during leap years

** = eight day julian week

<u>46</u>	<u>11/12 - 11/18</u>
<u>47</u>	<u>11/19 - 11/25</u>
<u>48</u>	<u>11/26 - 12/02</u>
<u>49</u>	<u>12/03 - 12/09</u>
<u>50</u>	<u>12/10 - 12/16</u>
<u>51</u>	<u>12/17 - 12/23</u>
<u>52</u>	<u>12/24 - 12/31**</u>