Napa River Steelhead and Salmon Monitoring Program

2014 Rotary Screw Trap Results

Technical Memorandum

October, 2014

NAPA COUNTY RESOURCE CONSERVATION DISTRICT
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INTRODUCTION

The Napa County Resource Conservation District (RCD) conducts fisheries monitoring in the Napa River watershed to collect data on native fish populations with emphasis on steelhead trout (*Oncorhynchus mykiss*) and Chinook salmon (*Oncorhynchus tshawytscha)*. The RCD's monitoring program includes adult spawner surveys, juvenile snorkel surveys, and outmigrant trapping with a rotary screw trap (RST) and fyke nets. The purpose of this program is to examine salmonid life history details, describe the composition of the Napa River fish community, and track ecological responses to ongoing habitat restoration.

This memo summarizes the results of rotary screw trap monitoring in the mainstem Napa River during the 2014 season. Reports from previous years, which contain detailed descriptions of methodologies and more extensive analysis, are available for download at: www.naparcd.org/rotary-screw-trap

Period of Operation

The rotary screw trap was operated for a total of 53 days between March 7 and May 4, 2014 (Figure 1).

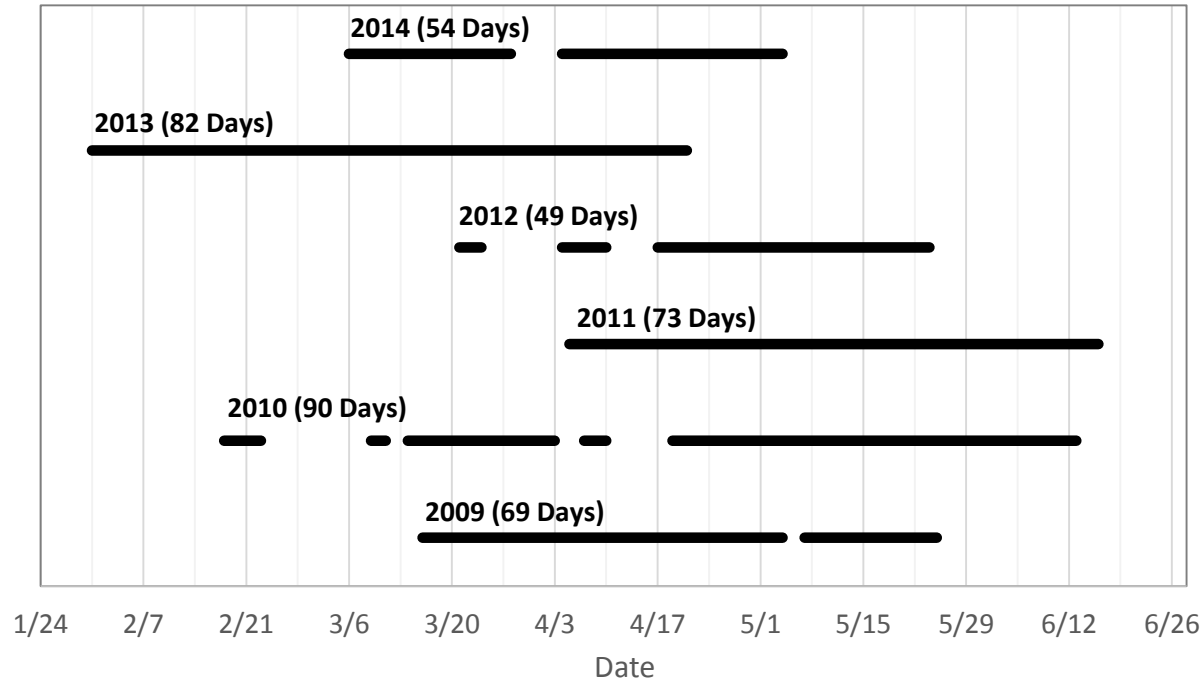

Figure 1. Napa River rotary screw trap periods of operation 2009-2014.
Note: gaps within each sampling season are due to high flow conditions when the trap cannot be operated

RESULTS:

Common Name	Scientific Name	2009	2010	2011	2012	2013	2014	Total
Steelhead / Rainbow trout	*Oncorhynchus mykiss*							
Fry / Parr (<130 mm)		941	94	7	152	3,025	303	**4,522**
Smolt (>130mm)		119	251	175	160	77	31	**813**
Adult or Resident (>300 mm)		0	3	4	0	3	0	**10**
Chinook Salmon	*Oncorhynchus tshawytscha*							
Parr / Smolt		1	1,520	7,377	488	19	0	**9,405**
Kokanee/ Sockeye Salmon	*Oncorhynchus nerka*							
Parr / Smolt		0	342	0	0	0	0	**342**
Pacific Lamprey	*Entosphenus tridentatus*							
Adult		25	11	38	64	9	14	**161**
Macrothalmia[1]		-	-	-	-	1	0	**1**
Ammocete[1]		-	-	-	9	4	7	**20**
River Lamprey	*Lampetra ayresi*							
Adult[1]		-	2	21	9	3	0	**35**
Macrothalmia[1]		-	-	-	-	15	0	**15**
Brook Lamprey	*Lampetra cf. pacifica*							
Adult[1]		-	0	64	7	174	120	**365**
Lampetra Sp. Ammocete[1]	*Lampetra sp.*	-	-	-	19	108	46	**173**
Unidentified Lamprey Sp.	-	216	248	111	25	6	0	**606**
Sacramento Splittail	*Mylopharodon conocephalus*	2	6	0	1	26	0	**35**
Hardhead	*Pogonichthys macrolepidotus*	0	0	1	0	0	1	**2**
Sacramento Pikeminnow	*Ptychocheilus grandis*	28	87	192	191	33	12	**543**
California Roach[2]	*Hesperoleucus symmetricus*	4,744	3,571	336	330	498	691	**10,170**
Sacramento Sucker	*Catostomus occidentalis*							
Adult		82	419	207	33	78	42	**861**
Juvenile / Larvae[2]		48,950	25,644	25,382	10,201	212	5,702	**116,091**
Tule Perch	*Hysterocarpus traski*	6	28	30	20	17	8	**109**
Prickly Sculpin	*Cottus asper*	242	124	62	66	329	184	**1,007**
Three-spine Stickleback	*Gasterosteus aculeatus*	116	76	273	50	34	37	**586**

Table 1. Native fish species collected annually in the Napa River rotary screw trap from 2009 through 2014.

[1] Juvenile and larval lamprey as well as adult river and brook lampreys were only differentiated consistently beginning with the 2012 season.

[2] Counts of larval sucker and small minnow specimens were visually estimated during periods of extreme abundance.

Common Name	Scientific Name	2009	2010	2011	2012	2013	2014	Total
Bluegill	*Lepomis macrochirus*	29	100	86	41	11	107	**374**
Redear Sunfish	*Lepomis microlophus*	0	8	0	0	0	1	**9**
Pumpkinseed	*Lepomis gibbosus*	0	0	1	0	0	0	**1**
Green Sunfish	*Lepomis cyanellus*	0	2	5	0	0	19	**26**
Black Crappie	*Pomoxis nigromaculatus*	1	0	1	1	1	0	**4**
Largemouth Bass	*Micropterus salmoides*							
Larvae / Juvenile		0	969	0	0	0	0	**969**
Adult		2	1	4	3	0	0	**10**
Western Mosquitofish	*Gambusia affinis*	1	0	2	3	1	1	**8**
Wakasagi	*Hypomesus nipponensis*	0	9	0	0	0	0	**9**
Threadfin Shad	*Dorosoma petenense*	0	2	3	1	0	0	**6**
Inland Silverside	*Menidia beryllina*	0	12	1	0	0	0	**13**
Fathead Minnow	*Pimephales promelas*	2	4	20	0	2	2	**30**
Common Carp	*Cyprinus carpio*	1	0	0	0	0	0	**1**
Golden Shiner	*Notemigonus crysoleucas*	1	11	18	1	22	2	**55**
White Catfish	*Ameiurus catus*	0	1	0	1	0	0	**2**
Brown Bullhead	*Ameiurus nebulosus*	2	3	3	3	0	2	**13**
Channel Catfish	*Ictalurus punctatus*	1	0	0	0	0	0	**1**
Striped Bass	*Morone saxatilis*	3	2	0	1	0	0	**6**
Non-Fish Taxa								
Bullfrog	*Rana catesbeiana*							
Larvae (tadpole)		500	1,401	632	111	54	255	**2953**
Adult		1	2	5	2	0	1	**11**
Pacific Chorus Frog (Larvae)	*Pseudacris regilla*	0	32	0	0	0	0	**32**
Signal Crayfish	*Pacifastacus leniusculus*	3	103	79	128	123	307	**743**
Red Swamp Crayfish	*Procambarus clarkii*	40	233	78	46	13	103	**513**
Red-eared Slider Turtle	*Trachemys scripta elegans*	0	3	1	1	1	0	**6**
Western Pond Turtle	*Actinemys marmorata*	2	1	1	1	1	1	**7**

Table 2. Non-native fish species and non-fish taxa collected annually in the Napa River rotary screw trap from 2009 through 2014.

During the 2014 season, a total of 1,677 fish (excluding larval Sacramento suckers) were collected in the RST (Tables 1 and 2). A total of 11 native fish species, 7 non-native fish species, and 4 other non-fish aquatic taxa were collected in 2014. Native fish species comprised 92% of the total catch (n=1,543) and non-native species accounted for 8% of the total catch (n=134). The 2014 catch total was notably lower than all previous sampling years, which may be attributed to the ongoing drought, reduced trapping efficiency at low flows, or some other unknown factors.

Catch-Per-Unit-Effort

Catch-per-unit-effort (CPUE) was calculated for steelhead and Chinook by dividing the total number of smolts captured by the number of days sampled per season. Results for steelhead CPUE show a relatively stable or slightly increasing trend from 2009 to 2012 followed by a sharp decline in 2013 and 2014 (Figure 2). This decline may be the result of poor trapping efficiency, differences in the sampling period from previous years, or a real reduction in steelhead smolt production.

Chinook catch rates during the past six years show large inter-annual variability (Figure 3). No Chinook salmon were collected during the 2014 sampling period. The variability in Chinook abundance from year to year suggests that the population is relatively small and sensitive to environmental variability (e.g. - streamflow, storm timing, etc.).

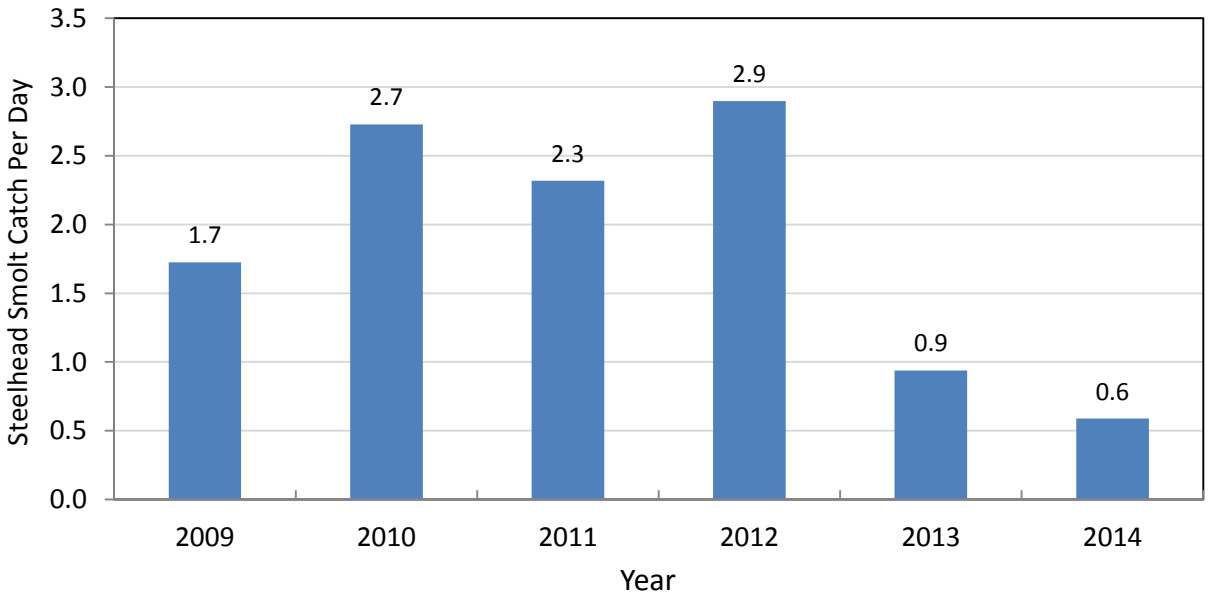

Figure 2. Steelhead smolt catch-per-unit-effort (CPUE) in the Napa River RST from 2009-2014.

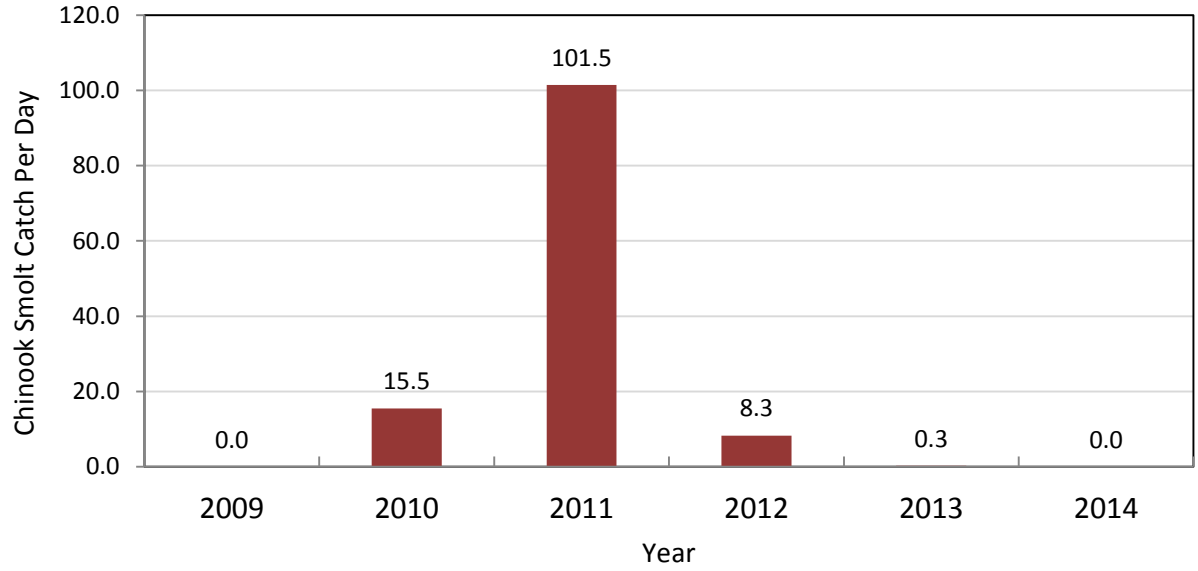

Figure 3. Chinook salmon smolt/parr catch-per-unit-effort (CPUE) in the Napa River RST from 2009-2014.

The median steelhead smolt length in 2014 was 170mm (~6.7 inches), which was the lowest value observed in the program's six-year history (Figure 4). Steelhead smolt length has averaged 186mm (~ 7.3 inches) from 2009-2014.

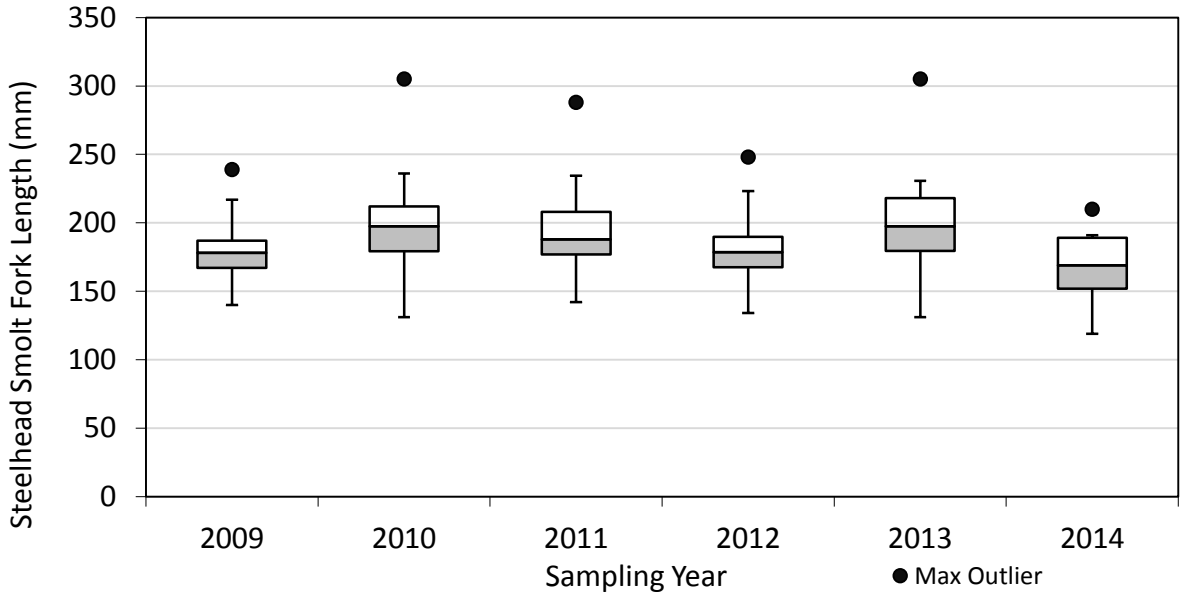

Figure 4. Steelhead smolt fork lengths from the Napa River rotary screw trap 2009-2014.
Note: The bottom and top of each box are the 25th and 75th percentiles respectively. The line near the middle of each box is the median, and the vertical lines (whiskers) represent the lowest and highest values within 1.5 times the inter-quartile range. The maximum outlier values represent the largest individual measurement for each year.

Rotary Screw Trap Efficiency Estimates

Trap efficiency is calculated on a weekly basis from results of continuous mark-recapture trials. Throughout the sampling season, individual steelhead and salmon collected in the RST are marked with fin clips and released approximately 1 km (~0.6 miles) upstream. The number of fish released is dependent upon catch rates, and therefore when few or no smolts are collected, efficiency releases cannot be conducted. The total number of marked smolts that are recaptured is then divided by the total number of unmarked smolts collected that week to yield an efficiency estimate.

A total of 18 steelhead smolts were marked and released upstream of the trap during the 2014 season (Table 3). Only one of these marked steelhead was subsequently recaptured. Given these small sample numbers, trap efficiency estimates could not be confidently calculated for the 2014 sampling season. The average RST efficiency in previous years has averaged about 15% for steelhead and 24% for Chinook (Koehler and Blank, 2013).

Year	Steelhead				Chinook			
	Total number of smolts captured	Number of marked smolts released upstream	Number of smolts recaptured	Estimated annual trapping efficiency	Total number of smolts captured	Number of marked smolts released upstream	Number of smolts recaptured	Estimated annual trapping efficiency
2010	242	201	23	11.4%	1,371	702	139	19.8%
2011	166	95	13	13.7%	7,265	914	121	13.2%
2012	142	84	17	20.2%	406	272	102	37.5%
2013	77	56	1	not calculated	19	10	1	not calculated
2014	31	18	1	not calculated	0	0	0	not calculated

Table 3. Rotary screw trap efficiency estimates from 2010-2014
Note: Efficiency releases were not conducted during the 2009 season.

FUTURE EFFORTS

RCD and our partners plan to continue operating the RST in the same location in spring 2015.

FUNDING

Operation of the RST in 2014 was funded by the County of Napa with volunteer assistance from the local non-profit organization *Napa River Steelhead*. Treasury Wine Estates provided river access and contributed staff time and equipment throughout the season.

LITERATURE CITED

Koehler, J.T., and P.D. Blank. 2013. Napa River steelhead and salmon smolt monitoring program. Annual Report Year 5. Napa County Resource Conservation District, Napa, California.

ATTACHMENTS

Attachment 1: Napa River Water Temperature and Flow Data

Attachment 1