Putah Creek 2013 summary report

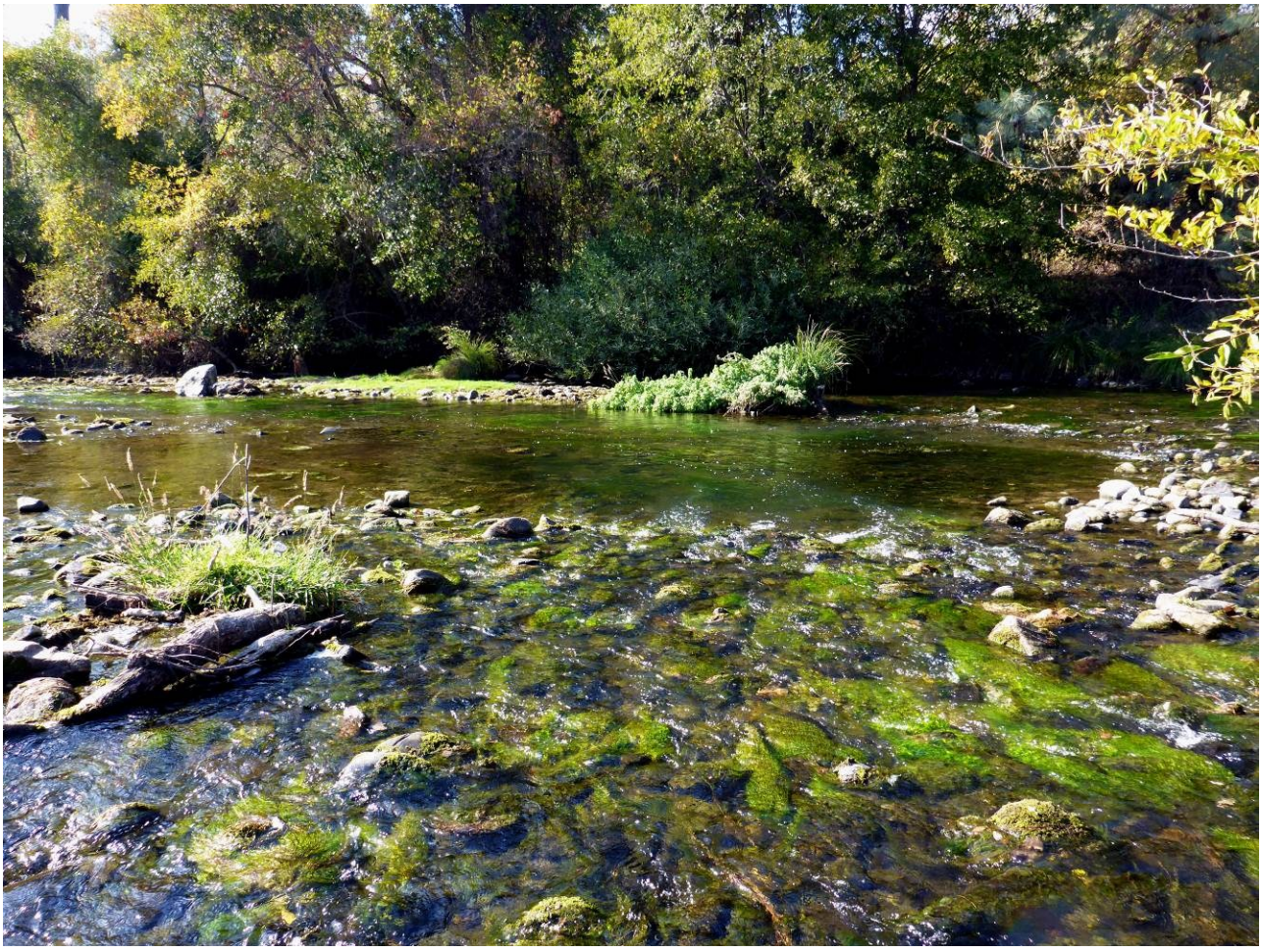
October 28-31, 2013

State of California

Natural Resources Agency

California Department of Fish and Wildlife

Heritage and Wild Trout Program



Prepared by Stephanie Hogan, Claire Buchanan and Cameron Zuber

Introduction

Putah Creek (Solano and Yolo counties) in the Sacramento River basin, supports a popular fishery for coastal rainbow trout (*Oncorhynchus mykiss irideus*) in their native range (Figure 1). The popularity is due, in large part, to its close proximity to both the Sacramento and San Francisco metropolitan areas. Putah Creek originates in the Mayacmas Mountains southeast of Clear Lake, CA, is impounded at lakes Berryessa and Solano, and flows into the Putah Creek Sinks in the Yolo Bypass. The inter-dam reach is approximately eight miles in length and is regulated by Monticello Dam on Lake Berryessa, which releases cold water year-round for agricultural demand.

Prior to 2008, the California Department of Fish and Wildlife (CDFW; previously Department of Fish and Game) planted catchable-sized trout in Putah Creek and the inter-dam reach supported both hatchery and wild rainbow trout populations. Hatchery trout stocking in Putah Creek was suspended in 2008 and the CDFW Heritage and Wild Trout Program (HWTP) began an evaluation of the wild trout fishery and existing management regime. At this time, Putah Creek was open to angling year-round and sport fishing regulations included a five-fish bag limit with no gear restrictions from the last Saturday in April through November 15th. For the remainder of the year, a zero-fish bag limit with gear restricted to artificial lures with barbless hooks was in effect. Due to concerns that the existing five-fish bag limit from April through November was no longer sustainable (due to lack of stocking) and could lead to over-harvesting of wild trout during that time of year, the HWTP proposed a regulation change in November, 2009 to year-round, zero-limit angling with artificial lures and barbless hooks only. On March 1st, 2010 the California Fish and Game Commission adopted this new regulation and the HWTP continued evaluating potential influences on the fishery from regulatory changes.

In 2009, the HWTP conducted single-pass electrofish surveys at five locations on Putah Creek in the inter-dam reach to better understand size class composition, spatial distribution and the ratio of hatchery to wild fish (Weaver and Mehalick 2009). This effort was a Phase 1 (initial resource) assessment to determine whether this fishery meets the minimum qualifications for designation as a Wild Trout Water. Wild Trout Waters are those that support self-sustaining trout populations, are aesthetically pleasing and environmentally productive, provide adequate catch rates in terms of numbers or size of fish, and are open to public angling (Bloom and Weaver 2008). Wild Trout Waters may not be stocked with catchable-sized hatchery trout. HWTP Phase 1 assessments are designed to provide baseline information on fish species composition, relative abundance and size of fishes (specifically trout), public access, aesthetics of the fishery, basic habitat attributes, and whether the trout present are of wild or hatchery origin. Based on the size class distribution and presence of wild rainbow trout observed during the 2009 surveys, the HWTP proposed to initiate a Phase 2 (candidate water) assessment. Phase 2 assessments provide a comprehensive evaluation of the fishery (species composition, abundance, instream distribution and angler use, success, satisfaction, and preferences) and associated habitat assessments and generally occur over a multi-year period. Following these recommendations, in 2013, the HWTP:

1. Conducted single-pass electrofish surveys at six locations, replicating prior

surveys to evaluate population trends over time, identify presence or absence of juvenile salmonids and determine whether natural recruitment of coastal rainbow trout was occurring.

2. In collaboration with Putah Creek Trout, maintained four Angler Survey Boxes (ASB) and analyzed voluntary angler data from 2008 through 2012 to better understand catch rates, catch size, angler preferences and angler satisfaction.

3. Used remote cameras to evaluate angler compliance of two ASB locations between June, 2011 and May, 2012.

Methods

Electrofishing

From October 28th through 31st, 2013, the HWTP conducted single-pass electrofishing at six locations (Sections 109, 309, 310, 409, 410, and 509) using Smith Root backpack electroshockers (Figures 2-3). All survey locations were previously established. Physical measurements of the stream and environmental conditions were taken, including air and water temperature (ºC) and conductivity (specific and ambient; microsiemens). These factors were used to determine appropriate electroshocker settings. Coordinates were taken for both the upstream and downstream boundaries of the survey using a Global Positioning System hand-held unit (North American Datum 1983). Current weather conditions were noted and the area was scouted for any species of concern prior to commencing the electrofishing effort. Surveys proceeded in an upstream direction, with netters capturing fish and placing them in live cars to be held until processed. Surveyors targeted shallow-water habitat in each section where water depths were conducive to backpack electrofishing and captured fish opportunistically. Live cars were 32-gallon plastic trash bins perforated with holes to allow water circulation; metal hardware cloth was secured around the outside to limit the electric field within the live car. Over the course of the survey, fish were handled carefully to minimize injury and stress. In each section, fish were identified to species. All salmonids and 100 of each non-salmonid species in each section were measured for total length (mm) and weight (g). All remaining non-salmonids were counted by species. Fish were recovered in live cars secured in the stream in areas with fresh flowing water and released back into the section.

A habitat assessment was conducted in each section to document resource condition and collect base-line data on habitat type and quality, water condition, substrate, discharge, erosion and other attributes. The HWTP habitat assessment is a pared-down synthesis of Rosgen (1994) and the California Salmonid Stream Habitat Restoration Manual (CSSHRM; Flosi et al. 1988). Section length (ft) was measured along the thalweg. The length of the section was divided into five cells of equal length and wetted width (ft) was measured at the center of each of the five cells. Across each width transect, five water depths (ft) were measured (also at the center of five evenly divided cells), and both width and depth was averaged for each section.

Stream characteristics, including active erosion (erosion occurring in the present), erosion at bankful and canopy closure were measured as percentages of either the total stream area (canopy cover) or bank area (erosion). The percent of riffle, flatwater and pool habitat was estimated following Level 2 protocol as defined by the CSSHRM. Using visual observation, substrate size classes and the percentage of each class relative to the total bottom material within the wetted width were quantified. A rating (between poor and excellent) was given to the instream cover available to fish and cover types were identified and defined as percentages of total instream cover. The change in water surface elevation (section gradient; %) and streamflow (cubic feet per second; cfs) were measured. Representative photographs of the section were taken.

Angler surveys

Voluntary angler forms were collected from each of the four ASB located in the interdam reach of Putah Creek (two near the Highway 128 Bridge and two near Fishing Access 5). All completed forms from 2008 through 2012 were analyzed, except those missing pertinent information (date, number of hours fished or size class of captured trout). Catch per unit effort (CPUE; fish/hr) was calculated for each angler day and averaged across all anglers by year.

Remote cameras

The HWTP installed Reconyx HyperFire trail cameras at the two ASB located near the Highway 128 Bridge from June 1st, 2011 through May 22, 2012. The cameras were aimed directly at the ASB and an adjacent trail providing angler access from a parking lot to the creek. Both locations were chosen because of presumed high angler use and a well-defined trail with surrounding riparian vegetation and/or a fence, creating a funnel point for angler access. The cameras were installed with an infrared (IR) detection mode that triggered the camera to take a series of five photographs when subjects moved into the camera view. Date and time were recorded for each photograph. The cameras were routinely serviced by HWTP personnel. The remote camera installed on the northern side of Highway 128 malfunctioned from March 3rd, 2012 through April 11th, 2012 and no data were collected.

Trials were conducted on June 1st, 2011 and August 13th, 2011 to test camera function. To confirm the camera's capability of capturing movement on the trail, HWTP staff passed by at varying speeds in both directions (walk, jog/fast walk and run/sprint) and stopped at the ASB to fill out a form.

Photographs were analyzed to determine how many anglers utilized each access point, what percent filled out an ASB form and what type of fishing gear was observed (fly, spin, both or unknown). An angler was identified by the presence of fishing gear or waders. When an angler was identified accessing the creek, subsequent photographs from both cameras for that day were carefully examined to determine if the subject was photographed leaving the area and/or completing a voluntary ASB form. In many instances, the form was visible when an angler was captured at the ASB and it was presumed the form was filled out. In a few instances, the form was not visible and the

time stamp was used to determine whether a form was completed. If the angler was at the ASB for less than 30 seconds, it was presumed a form was not completed. All other anglers were classified as “not filling out a form.” Since the cameras were installed at access points less than 0.1 mile from each other, photographs from both cameras were reviewed in concert to ensure anglers and non-anglers were not double-counted.

Results

Electrofish

The inter-dam reach of Putah Creek is a tailwater fishery dominated by deep runs interspersed with short riffles and few pools. Water temperature was approximately 12 ºC and water clarity ranged between zero and greater than four feet. Ambient conductivity averaged 244 microsiemens. Depending on the time of day, air temperature was between 12 and 20 ºC.

Section 109 was located in a side-channel downstream of Fishing Access 5 (Figure 4). Habitat consisted of 65% flatwater, 30% riffle and 5% pool. Aquatic vegetation was the dominant instream cover type (40%) with some water turbulence, large woody debris, overhanging vegetation and water depth. Substrate was dominated by cobble (76%). The section was 577.5 ft in length with an average wetted width of 80.2 ft and average water depth of 1.4 ft. Six shockers and six netters captured 115 coastal rainbow trout, 97 three-spine stickleback (*Gasterosteus aculeatus*) and 116 sculpin (*Cottus* sp.). Crayfish were observed in this section. In particularly wide areas of the creek, three to four shockers grouped together to increase the electrical field in a localized area (rather than spread out across the wetted width) and presumably increase capture efficiency. Captured coastal rainbow trout ranged in size from 74 to 577 mm total length with a mean of 156 mm.

Section 309 was a 226.5 foot-flatwater section located in the vicinity of Fishing Access 3 (Figure 5). Two backpack shockers, one tote barge and ten netters participated in the single-pass electrofish effort. Both substrate and instream cover were dominated by boulders, with instream cover rated as excellent. The average wetted width was 50.1 ft and average water depth was 2.1 ft. A total of 172 coastal rainbow trout, seven three-spine stickleback and 47 sculpin were captured (Table 1).

Section 310 was located in a side-channel adjacent to Fishing Access 4. Habitat was predominantly flatwater (60%) with 15% riffle and 25% pool habitat (Figure 6). The section was 331.0 ft in length with an average wetted width of 38.7 ft and average water depth of 1.8 ft. Overall instream cover was rated as excellent and cover types included water depth, large woody debris and boulders. Substrate was dominated by cobble with some gravel, silt and boulders. Even with the use of a tote barge, the upstream end of the section was too deep to effectively electroshock and the survey was abridged. A total of 176 coastal rainbow trout, 16 three-spine stickleback and 33 sculpin were captured.

An attempt was made to survey Section 409, located approximately 1000 ft upstream of

Fishing Access 3, but water depth was not conducive to wading. Only one-half of this historical section was surveyed and no habitat information was recorded. A total of 23 coastal rainbow trout, 15 three-spine sticklebacks and 22 sculpin were captured. Only trout were weighed and measured.

Section 410 was located in a side-channel directly downstream of the Highway 128 Bridge and adjacent to the Canyon Creek Resort (Figure 7). The section was 221.6 ft in length with an average wetted width of 34.5 ft and average water depth of 0.4 ft. Habitat included 70% flatwater, 25% pool and 5% riffle with excellent instream fish cover (aquatic and overhanging vegetation, boulders and large woody debris). Substrate was comprised of boulder, cobble, organic matter, gravel and silt in relatively equal amounts. A total of 24 coastal rainbow trout, 28 three-spine stickleback and 27 sculpin were captured.

Section 509 was also within the Canyon Creek Resort property and was located underneath the Highway 128 Bridge (Figure 8). The section was 619.6 ft in length. A side channel was present (119 ft) near the downstream survey boundary but was not surveyed due to insufficient personnel (the main-stem was wide and efforts were focused on this portion). The main-stem averaged 109.2 ft in width and 1.4 ft in depth. Riffle and flatwater habitat each comprised 50% of the section. Overall instream cover was excellent and was dominated by turbulence with some aquatic vegetation, boulders and water depth. Substrate in this section was predominantly boulders and organic matter but all forms of substrate were present except for bedrock. A total of 508 rainbow trout, 13 three-spine sticklebacks, and 129 sculpin were captured.

Angling

Data from the four ASB boxes on Putah Creek were examined for the years 2011 and 2012 and compared to previously reported data from 2008 through 2010 (Weaver and Mehalick 2009). A total of 261 forms were evaluated with a reported effort of 898 hrs and a reported catch of 472 trout (97% rainbow trout and 3% brown trout). Mean CPUE was 0.59 fish/hr in 2011 and 0.46 fish/hr in 2012 and were similar to earlier catch rates (Figure 9 and Table 2). The majority of fish reported caught in all years were medium-sized rainbow trout (Figure 10). Brown trout were reported caught in all years except 2012 and most were in the medium-size class. Anglers reported using all types of gear including lures, bait, and flies or a combination thereof; however, flies were reportedly used more often than other gear type (Table 3). Anglers appear to be slightly unsatisfied with the number and size of fish and slightly satisfied with their overall angling experience (Table 4).

Remote camera

The remote cameras captured 6,170 individuals, 2,023 of which were identified as anglers (33%; Table 6). Only 27 anglers were observed filling out a voluntary ASB form (1.3%) and 78% of these were downstream of the bridge (Figures 11-12 and Table 6). A majority of the anglers were photographed during the fall to winter months (September through February), whereas most non-anglers were observed in April, June, July and

August (Figure 13 and Table 5). December appeared to have the highest angler use (293 anglers).

Most anglers had fly fishing gear (78%); 21% had spin fishing gear, 0.4% had both fly and spin gear and the remaining 0.6% were unknown. Eighty percent of anglers were detected in both directions, whereas 20% were only photographed once and it could not be determined whether they filled out a form, although it was assumed they did not. The length of time between first and last detect varied considerably from a few minutes to 12 hrs. The average amount of time between first and last detect was 1.65 hrs (Table 6).

Discussion

A total of 995 coastal rainbow trout were captured within 1,982.3 feet of habitat surveyed in 2013 (not including Section 409). An additional 23 coastal rainbow trout were captured in the lower-most portion of Section 409 (section length not measured). Comparatively, in 2010, 35 coastal rainbow trout were captured in 2,474.7 feet of habitat (four sections). Relative abundance in 2013 was approximately 2,650 coastal rainbow trout per mile, compared to only 818 coastal rainbow trout per mile in 2009 and 75 rainbow trout per mile in 2010.

Prior to the angler survey box research project, it was presumed that angler compliance was low and this was corroborated by the number of anglers who were observed filling out a form on Putah Creek (1.3%). The low rate may be contributed, at least in part, to an online version of the form which some anglers may have used instead of filling out paper forms. In addition, there are other ASB on Putah Creek not part of the remote camera study and anglers fishing more than one access location may have used a different ASB at the end of their fishing effort. Many anglers captured on the remote cameras would approach the box, open the box, look at a form, but not fill out a form. It is possible that pencils were not available and these anglers intended to participate in the voluntary survey. There are 65 waters across California where the HWTP utilize ASBs. They are a cost-effective tool for monitoring the fishery and evaluating fishing regulations. Angler participation in these voluntary surveys may differ based on location or other attributes; however, they provide a relatively inexpensive way to monitor wild trout fisheries.

Conclusion

Putah Creek supports native populations of coastal rainbow trout, three-spine stickleback and sculpin. This fishery is publicly accessible along Highway 128 at multiple access locations, is open to year-round angling and receives a relatively high amount of angling pressure. It provides anglers with an opportunity to catch trophy-sized coastal rainbow trout in their native range and it appears the wild trout fishery has been increasing since 2007. This may correspond to the cessation of hatchery trout stocking. The HWTP has been evaluating Putah Creek for designation as a Wild Trout Water since 2008 and collecting baseline information on the fishery, conducting applied management research studies to better understand angler use, as well as restoring and enhancing spawning habitat. The HWTP recommends Putah Creek be designated as a

Wild Trout Water. Due to the connection with Lake Solano, the HWTP recommends evaluating whether trout utilize portions of Lake Solano during one or more life history stages and whether Lake Solano meets criteria for Wild Trout Water designation.

References

Bloom, R. and J Weaver. 2008. California Heritage and Wild Trout Program handbook (Draft). State of California Natural Resources Agency. Department of Fish and Game. Rancho Cordova, CA.

Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey and B. Collins. 1998. California Salmonid Stream Habitat Restoration Manual. 3rd Edition. Vol. 1. State of California Resources Agency. Department of Fish and Game. Inland Fisheries Division.

Rosgen, D.L. 1994. A Classification of Natural Rivers. Catena Vol. 22 169-199.

Salamunovich, T. 2009. 2008-2009 Trout spawning/redd surveys in the Putah Creek Interdam reach. Thomas Payne and Associates. Arcata, CA.

Weaver, J. and S. Mehalick. 2009. Putah Creek Summary Report. State of California Natural Resources Agency. Department of Fish and Game. Rancho Cordova, CA.

Figure 1. Vicinity map of Putah Creek 2013 survey location

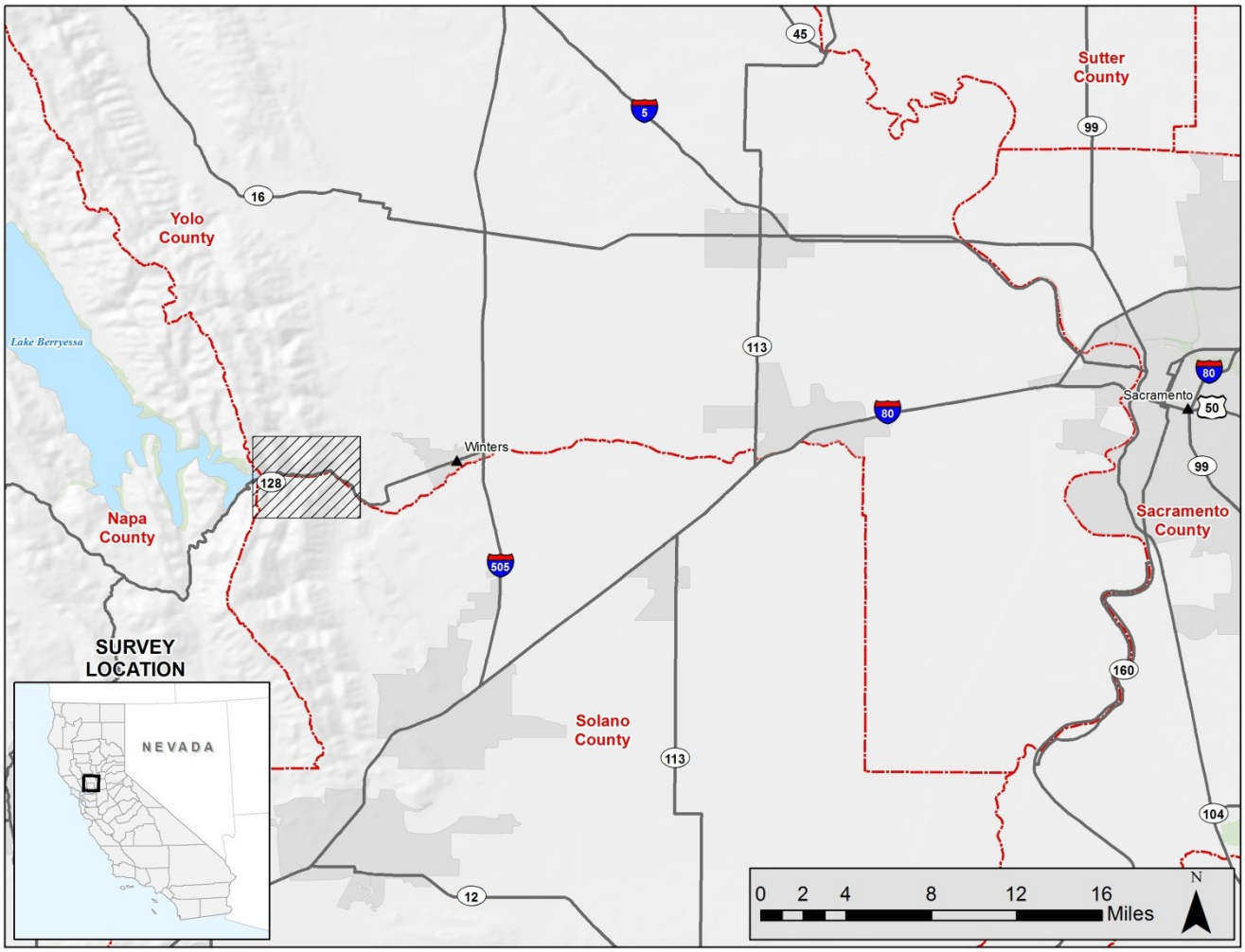


Figure 2. Detail map of 2013 Putah Creek survey sections

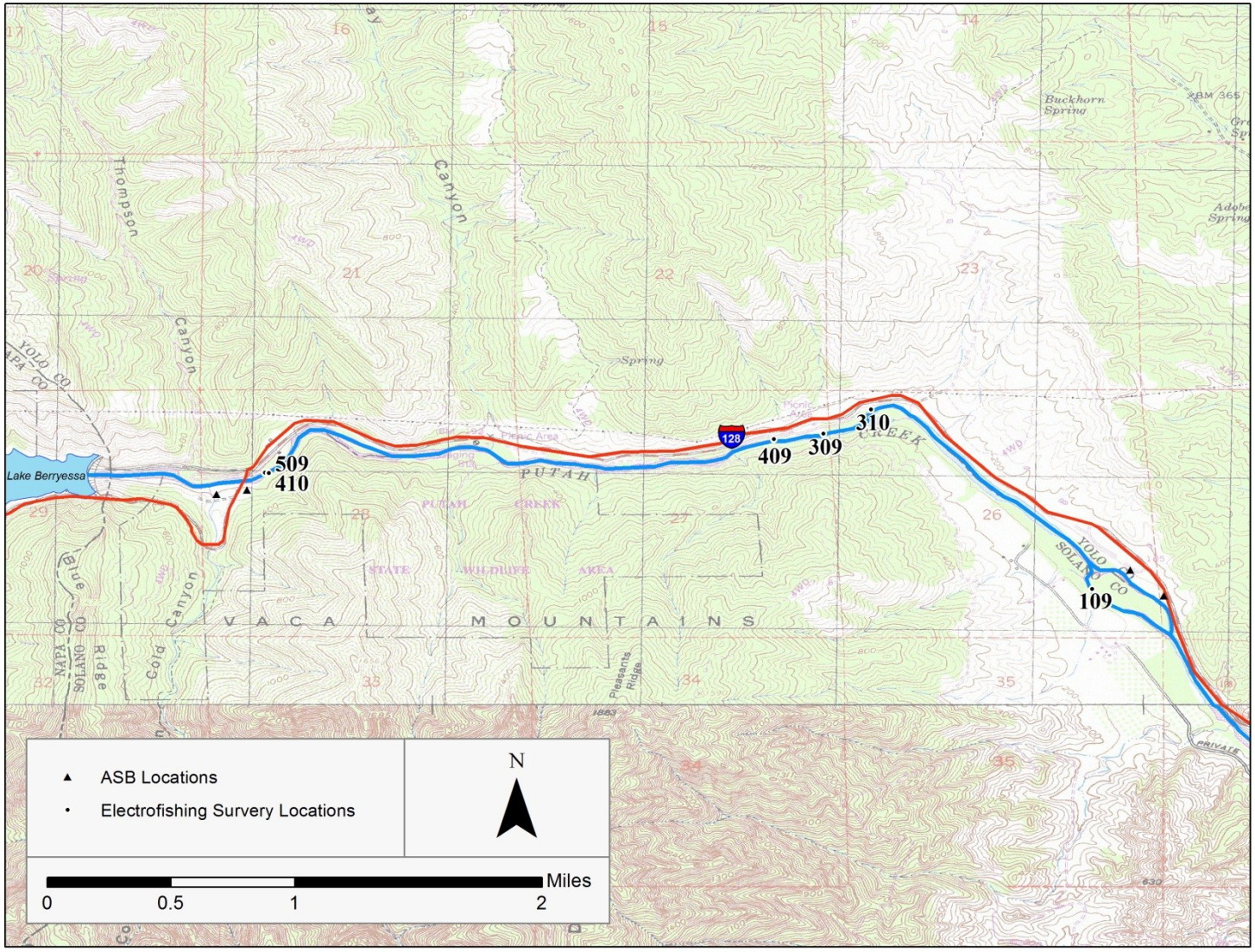


Figure 4. Representative photographs of Putah Creek Section 109

Figure 5. Representative photographs of Putah Creek Section 309

Figure 6. Representative photographs of Putah Creek Section 310

Figure 7. Representative photographs of Putah Creek Section 410

Figure 8. Representative photographs of Putah Creek Section 509

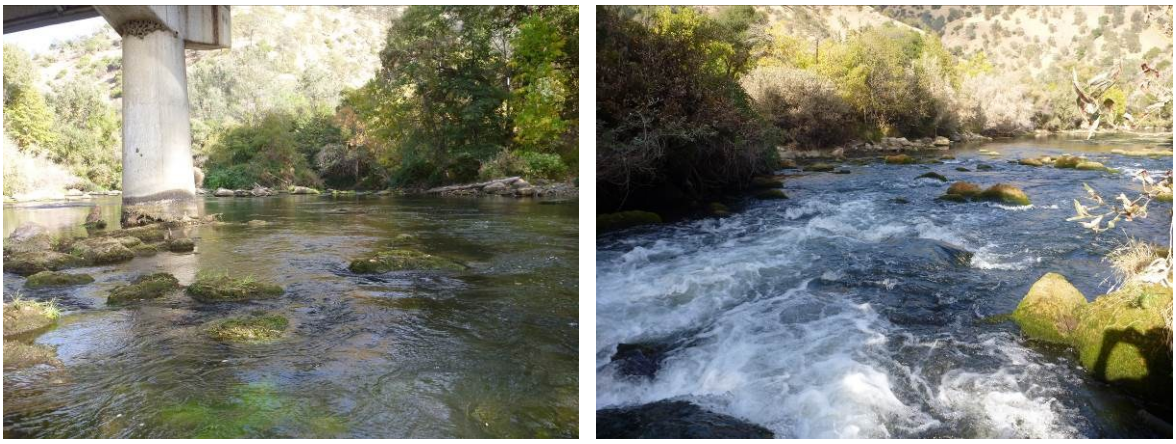


Figure 9. Graph of Putah Creek ASB reported CPUE (fish/hr) from 2008 through 2012

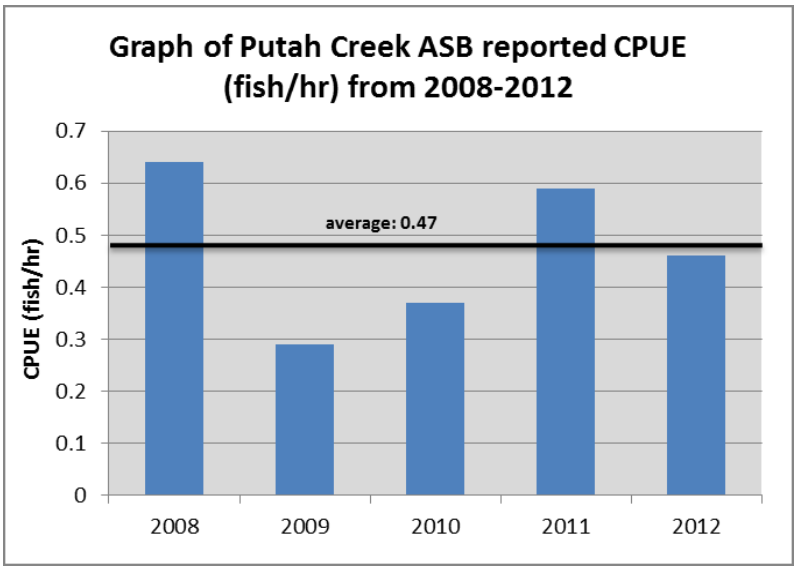


Figure 10. Percentage of fish reported caught by size on Putah Creek from 2008 through 2012

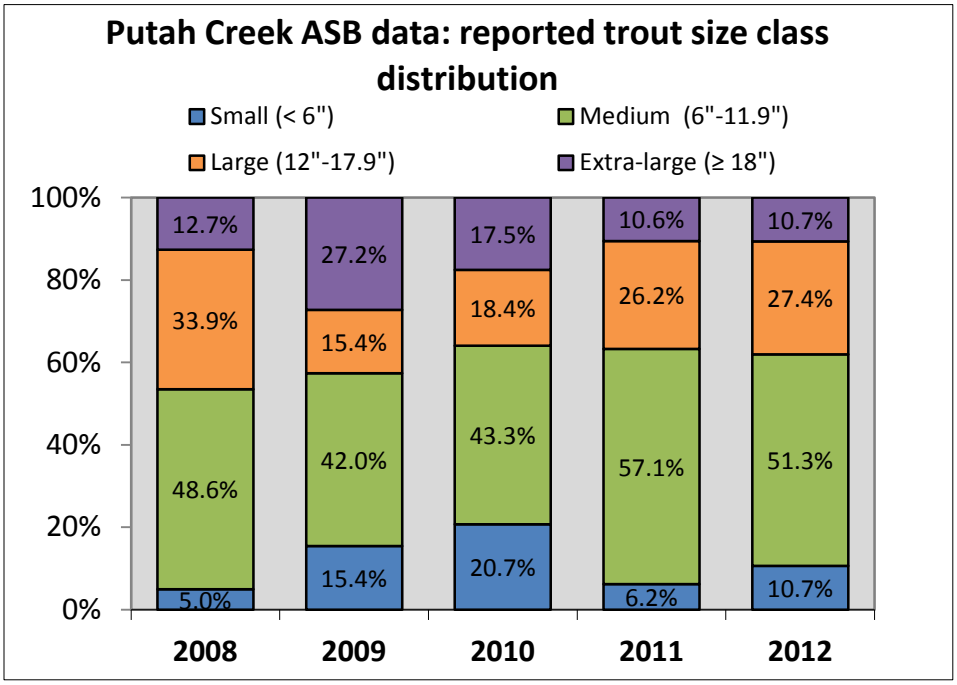


Figure 11. Remote camera photograph taken during trials to test capture range on the downstream ASB.

Figure 12. Remote camera photograph taken during trials to test capture range on the upstream ASB.

Figure 13. Number of anglers and non-anglers captured on remote cameras installed on Putah Creek from June, 2011 through May, 2012

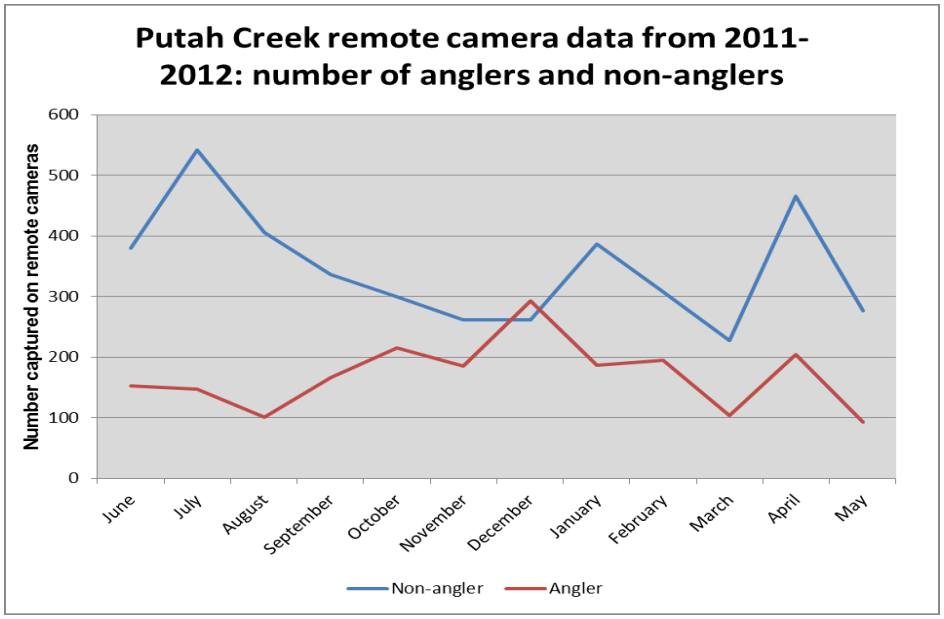


Table 1. Putah Creek 2013 electrofish data including the number of fish captured by species and section

Section number	Section length (ft)	Number of fish captured by species		
		coastal rainbow trout	three-spine stickleback	sculpin
109	577.5	115	97	116
309	226.5	172	7	47
310	337.4	176	15	33
409	-	23	22	15
410	221.6	24	28	27
509	619.6	508	129	13
Total	1982.6	1018	298	251

Table 2. Summary of Putah Creek ASB data from 2008 through 2012

Year	Number of anglers	Total number of hours fished	Total brown trout reported caught	Total coastal rainbow trout reported caught	Total trout reported caught	Catch per hour
2008	322	1227	5	785	790	0.64
2009	278	1043.7	6	299	305	0.29
2010	152	591.5	4	213	217	0.37
2011	136	461.5	14	261	275	0.59
2012	125	436.5	0	197	197	0.46

Table 3. Gear type reported from Putah Creek ASB data from 2008 through 2012

Gear	Five fish bag limit from last Saturday in April-Nov 15 with no gear restrictions; remainder of year zero bag limit with artificial lures with barbless hooks only				Year-round zero limit angling with artificial lures with barbless hooks only					
	2008		2009		2010		2011		2012	
	Number reported	Percent of total	Number reported	Percent of total	Number reported	Percent of total	Number reported	Percent of total	Number reported	Percent of total
Bait	72	22%	31	11%	1	1%	0	0%	0	0%
Fly	224	70%	208	75%	133	88%	127	93.5%	117	94%
Lure	12	4%	24	9%	17	11%	6	5%	3	2%
Bait & Fly	0	0%	1	0%	0	0%	0	0%	0	0%
Lure & Bait	8	2%	5	2%	0	0%	0	0%	0	0%
Lure & Fly	2	1%	0	0%	1	1%	0	0%	1	1%
Lure, Bait & Fly	0	0%	3	1%	0	0%	0	0%	0	0%
Unknown	4	1%	6	2%	0	0%	3	2%	4	3%

Table 4. Summary of Putah Creek ASB angler satisfaction data 2008 through 2012

Year	Number of forms	Angler satisfaction with number of fish captured	Angler satisfaction with size of fish captured	Angler satisfaction with overall fishing experience
2008	322	-0.2	0.1	0.5
2009	278	-0.7	-0.4	0.0
2010	152	-0.5	-0.3	0.0
2011	136	0.0	0.2	0.4
2012	125	-0.3	0.1	0.3
Average		-0.4	-0.1	0.2

Table 5. Number of overall anglers, anglers who filled out an ASB form and non-anglers captured on remote cameras installed on Putah Creek from June, 2011 through May, 2012

Month	Non-angler	Angler	Number of anglers captured filling out ASB form
June	380	152	4
July	542	147	2
August	405	101	0
September	336	166	2
October	300	215	6
November	261	185	2
December	261	293	3
January	386	186	3
February	308	195	2
March	227	104	0
April	465	204	2
May	276	93	1
Total	4147	2041	27

Table 6. Summary of ASB remote camera results

	Angler	Non-angler
Total detected	2023	4103
Detected filling out ASB form	27 (1.3%)	1 (< 0.1%)
Fly fishing gear	78%	-
Spin fishing gear	21%	-
Fly and spin fishing gear	0.4%	-
Unknown gear types	0.6%	-
First detect at downstream ASB	58%	-
First detect at upstream ASB	42%	-
Last detect at downstream ASB	48%	-
Last detect at upstream ASB	32%	-
No last detect	20%	-
Average time between first and last detects	1.65 hrs	-