Putah Creek Summary Report

November 2-4, 2009

State of California

Natural Resources Agency

California Department of Fish and Game

Heritage and Wild Trout Program

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Introduction

Putah Creek, in the Sacramento River Basin, is a popular trout fishery due, in large part, to its close proximity to both the Sacramento and San Francisco metropolitan areas. Originating at Cobb Mountain in the Mayacmas Mountains, Putah Creek flows southeast into Lake Berryessa (Figure 1). Monticello Dam regulates the release of cold water into Putah Creek as it flows east for approximately eight miles before being diverted into the Putah South Canal. Due to agricultural demands, flow is highest during the summer months; however, water released from Lake Berryessa is cold year-round and supports a wild trout fishery.

Prior to 2008, the California Department of Fish and Game (DFG) planted catchable-sized trout in Putah Creek and the segment between Lake Berryessa and Lake Solano supported both hatchery and wild coastal rainbow trout populations. As of 2008, Putah Creek was open to angling year-round and DFG fishing regulations were split: from the last Saturday in April through November 15th there was a five-fish bag limit with no gear restrictions. 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 the suspension of hatchery trout stocking in Putah Creek in 2008, there was public concern that the existing five-fish bag limit from April through November was no longer appropriate for the fishery and could lead to over-harvesting of wild trout during that time of year. Based on a recommendation by the DFG Heritage and Wild Trout Program (HWTP) to the California Fish and Game Commission in November, 2009, a new fishing regulation was put into effect on March 1st, 2010. Putah Creek is currently open to year-round zero-limit angling with artificial lures and barbless hooks only. The use of bait is prohibited and no fish may be retained.

In 2009, the DFG HWTP conducted single-pass electrofishing at five locations on Putah Creek downstream of Monticello Dam, at the boundary of Yolo and Solano counties, to better understand the size class and spatial distribution of fish, along with a determination of their origins (wild versus hatchery). 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. Wild Trout Waters may not be stocked with catchable-sized hatchery trout (Bloom and Weaver 2008). 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.

Figure 1. Overview map of Putah Creek with the headwaters circled in red and the 2009 survey area circled in blue

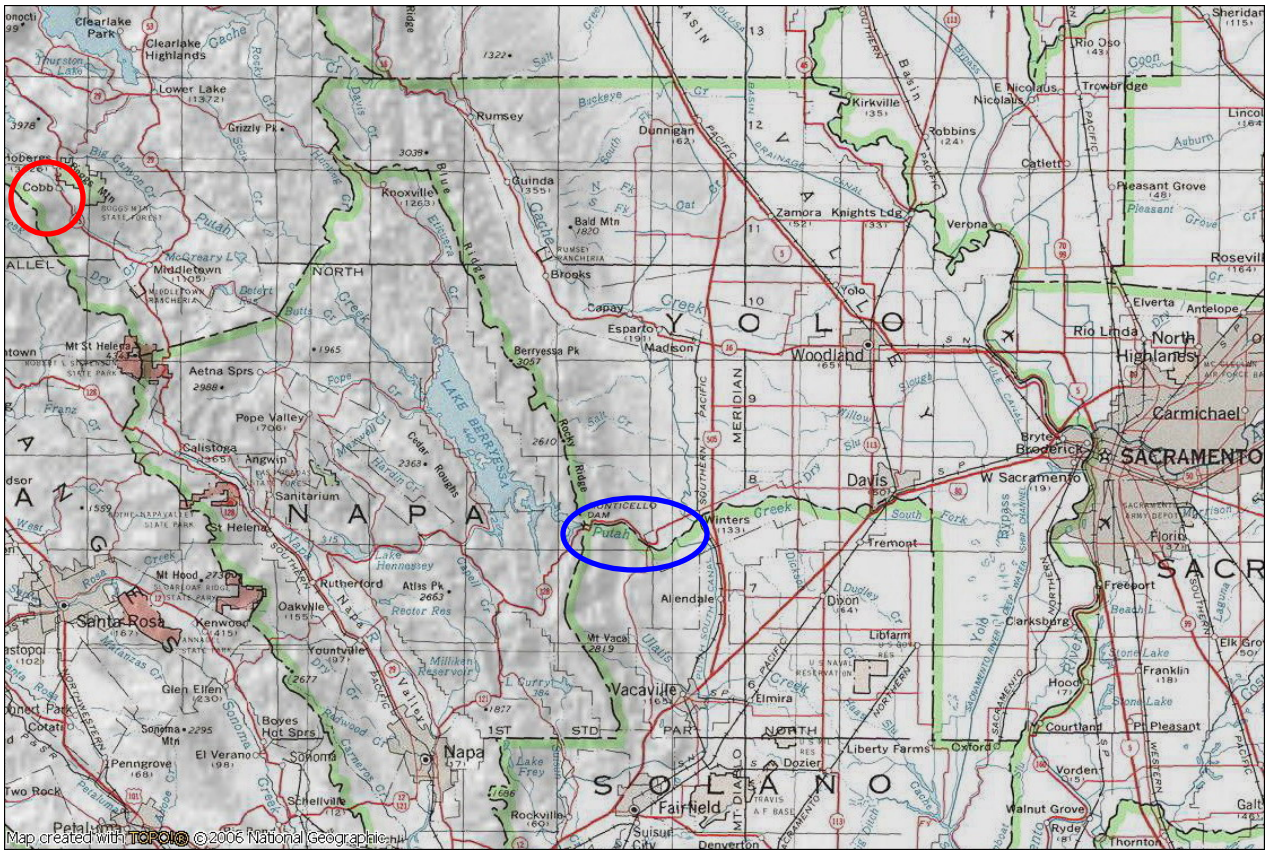
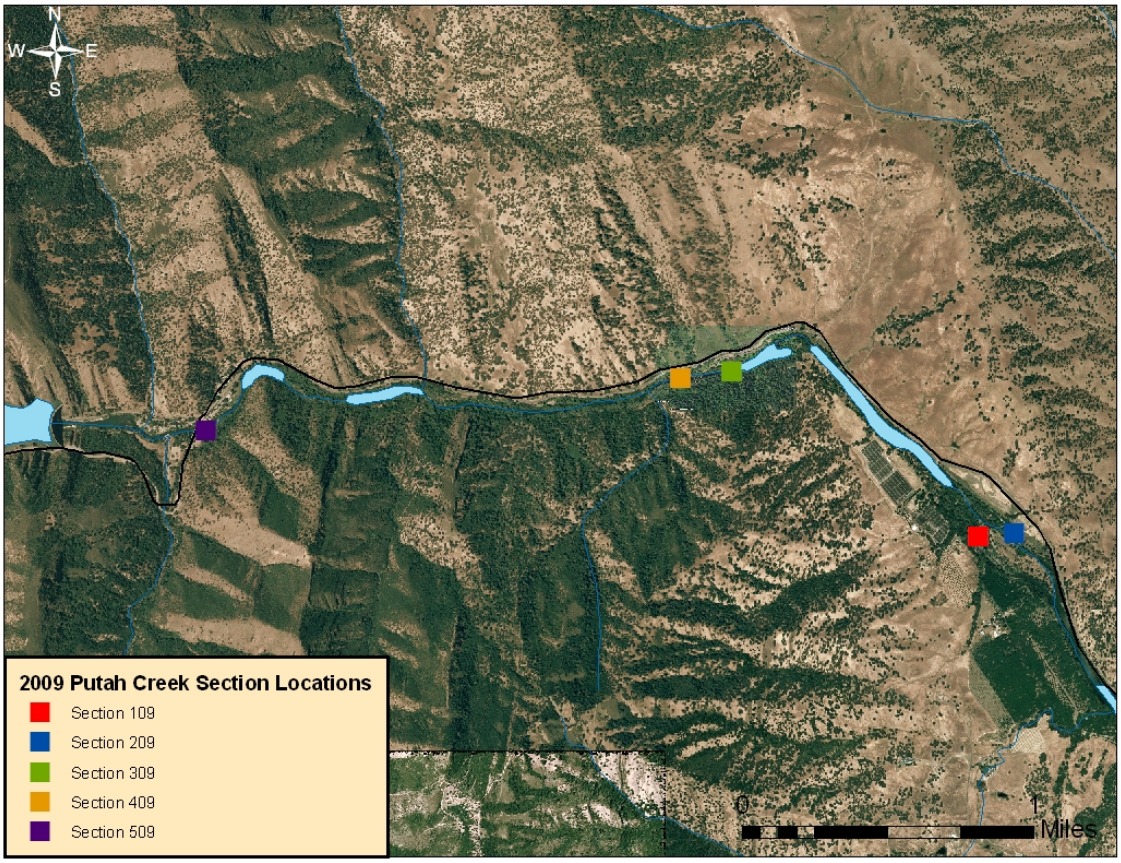


Figure 2. Map of 2009 Putah Creek section locations



Methods

In October, 2009, the HWTP conducted a reconnaissance of Putah Creek to select section locations for single-pass electrofishing. Considerations in selecting survey sites included survey feasibility, safety considerations (water depth, stream width, and flow), and access. In addition, sections were spread geographically throughout the area between Lakes Berryessa and Solano and were selected in order to represent the variety of habitat types present in the system including pools, flatwater, and riffles. From November 2nd through 4th, 2009, HWTP personnel, DFG staff, and numerous volunteers conducted single-pass electrofishing at five locations (Sections 109-509) using Smith Root backpack electroshockers. In Sections 309 and 409, a Smith Root tote barge was used in addition to the backpack electroshockers in order to provide better fish capture in areas with greater stream depths, widths, and/or more variable substrate composition.

Physical measurements of the stream and environmental conditions were taken, including air and water temperature (in the shade) and conductivity (both specific and ambient). These factors were used to determine appropriate electroshocker settings. GPS coordinates were recorded for both the upstream and downstream boundaries of the survey. Current weather conditions were noted and the area was scouted for any species of concern prior to commencing the electrofishing effort.

Based on stream width, habitat complexity, and water visibility, personnel needs were determined. For each of the surveys, individuals were assigned to shock, net, and tend live cars throughout the duration of the survey. Surveys proceeded in an upstream direction, with netters capturing fish and placing them in live cars to be held until processed. Live cars are 50-gallon plastic trash bins, perforated with holes to allow water circulation. Over the course of the survey, fish were handled carefully to minimize injury and stress. Each trout was identified to species, measured from head to tail (total length in millimeters), and weighed with a digital scale (in grams). For trout that were too large to be measured on the digital scale, a spring scale was used (measured in pounds). All other fishes (non-trout) were identified to species and the first 100 individuals of each species handled in each section were weighed and measured (randomly removed from the live cars using dip nets). If more than 100 individuals of a non-trout species were captured, the remainder was tallied.

To better understand age class structure, scale samples were collected from 106 trout from various size classes across all sections surveyed. These scales were collected midway between the dorsal fin and lateral line using a knife. Each scale sample was placed in a labeled envelope with a unique identification number that corresponded to the information recorded for individual fish on the datasheets. All samples were retained by HWTP biologists for internal processing. Fish were then recovered in live cars secured in the stream (with fresh flowing water) and released back into the section. Due to time constraints while surveying Section 209, a side-channel of the main-stem, non-trout species were tallied and neither weight nor length measurements were taken.

A habitat assessment was conducted to document resource condition by collecting base-line data on habitat types and quality, water conditions, substrate composition, discharge, bank condition, 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 was measured along the thalweg. The length of the section was divided into five cells of the same length. Wetted widths were measured at the center of each of the five cells using a range finder. Across each width transect, five depths were taken (also at the center of five evenly divided cells), and both widths and depths were 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). Section percentages were defined for each habitat type (riffle, flatwater, and pool) following Level II protocols as defined by the CSSHRM. Using visual observation, we quantified substrate size classes and the percentage of each class relative to the total bottom material within the wetted width and along the entire section length. 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. Streamflow was measured on November 2nd in Sections 109 and 209. Representative photographs of each section were taken.

Results

Putah Creek is a tailwater fishery dominated by deep runs interspersed with short riffles and few pools. There was little evidence of erosion, either during the survey or at bankful stage; aquatic vegetation was dense in areas and boulders and cobble comprised the majority of the substrate. Water temperatures ranged between 11 ºC and 14 ºC with water clarity estimated between one and four feet. The air temperature fluctuated between 15 ºC and 22 ºC, depending on the time of day. There were numerous braids in the channel, especially in the vicinity of Sections 109 and 209. Canopy cover ranged between 8% and 25%.

Table 1. Putah Creek 2009 electrofishing 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	Sacramento sucker	sculpin
109	603	24	226	3	124
209	304	6	92	9	89
309	303	53	4	1	40
409	285	90	0	0	37
509	645	145	2	6	80
Total	**2140**	**318**	**324**	**19**	**370**

Section 109 was located adjacent to Fishing Access 5 and was surveyed on November 2nd with four backpack shockers and six netters (Figures 2 and 3). Habitat was 80 % flatwater, 10 % riffle, and 10 % pool. The section length was 603 feet, with a 205-foot side channel and had an average wetted width of 78.4 feet and average water depth of one foot. Substrate was dominated by cobble with some gravel, and fish cover was provided mostly by vegetation and water turbulence. Cover was rated as fair in this section. Streamflow was measured at 60.21 cubic feet per second (cfs). A total of 24 coastal rainbow trout (*Oncorhynchus mykiss irideus*), 226 threespine stickleback (*Gasterosteus aculeatus*), three Sacramento suckers (*Catostomus occidentalis*), and 124 sculpin (*Cottus* sp.) were captured (Table 1). The sculpin were not identified to species; however, based on the geographic distribution of sculpin species in this part of California, they may have been either prickly sculpin (*Cottus asper*), riffle sculpin (*Cottus gulosus*), or both (Moyle 2002). In addition, New Zealand mud snails (*Potamopyrgus antipodarum*) and crayfish (not identified to species) were observed.

Figure 3. Site photograph of Section 109

Section 209 consisted of a side-channel braid in the vicinity of Section 109 and Fishing Access 5 (Figures 2 and 4). The section was 304 feet in length and was surveyed with two backpack shockers and three netters. Deep water habitat in this section was not shocked for safety reasons. Due to time constraints, non-trout were tallied by species and were neither measured nor weighed. Seventy-five percent of the habitat was flatwater and 25 % was pool. The majority of substrate was cobble, gravel, and organic matter. Fish cover was rated as good due to both aquatic and overhanging vegetation. The average wetted width was 32 feet with an average water depth of 1.4 feet. Streamflow was measured in this side-channel at 5.6 cfs. A total of six coastal rainbow trout, 92 threespine stickleback, nine Sacramento suckers, and 89 sculpin were captured (Table 1).

Figure 4. Site photograph of Section 209

Section 309 was a 303-foot flatwater section located in the vicinity of Fishing Access 3 (Figures 2 and 5). Two backpack shockers, one tote barge, and seven netters participated in the single-pass electrofishing effort. Both substrate and fish cover were dominated by boulders, with fish cover rated as good. The average wetted width was 51.4 feet and the average water depth was 11.3 feet. A total of 53 coastal rainbow trout, four threespine stickleback, one Sacramento sucker, and 40 sculpin were captured (Table 1).

Figure 5. Site photograph of Section 309

Section 409 was located upstream of Section 309 and was accessed via a foot-trail from Fishing Access 3. The section was 285 feet in total length with an average wetted width of 72 feet and average water depth of 2.3 feet. Habitat consisted of flatwater. Two backpack shockers, one tote barge, and six netters participated in the survey. Substrate and fish cover were dominated by boulders, with the latter providing good cover opportunity for fish. A total of 90 coastal rainbow trout and 37 sculpin were captured (Table 1). No site photographs were taken in this section.

Section 509 was located adjacent to Canyon Creek Resort and the Highway 128 Bridge which crosses the river due east of Monticello Dam (Figures 2 and 6). This section consisted of 60 % riffle habitat and 40 % flatwater and was 645 feet in length, with a 195-foot braid in the channel. The average wetted width was 84.6 feet and the average water depth was 1.5 feet. Four backpack shockers and six netters conducted the survey; the tote barge malfunctioned prior to commencing the survey and was not utilized. Fish cover was excellent in Section

509 due to a combination of aquatic vegetation, water turbulence, and boulders. Water clarity, as compared to the other surveyed sections, was lower due to water turbulence, aquatic vegetation, and shaded areas along the stream banks from overhanging vegetation. Substrate was dominated by cobble, boulders, and gravel. A total of 145 coastal rainbow trout, two threespine stickleback, six Sacramento suckers, and 80 sculpin were captured (Table 1).

Figure 6. Site photograph of Section 509

Table 2. Estimated number of coastal rainbow trout per mile in Putah Creek based on 2009 single-pass electrofishing surveys.

Section Number	Section Length (ft)	Number of coastal rainbow trout captured	Approximate number of coastal rainbow trout per mile
109	603	24	210
209	304	6	104
309	303	53	924
409	285	90	1667
509	645	145	1187
Average			**818**

Discussion

The coastal rainbow trout captured during our 2009 electrofishing surveys were closely examined to determine if they were of wild or hatchery origin. Fin erosion and/or deformities are common in fish raised in hatcheries and studies have shown that the dorsal fins of rainbow trout are the first to erode (Arndt et al. 2001, Wagner et al. 1996). Hatchery fish were identified primarily by closely examining the fin rays on the dorsal fin; fish with irregularities in the dorsal fin rays were presumed to be of hatchery origin. Other fins were also evaluated for signs of wear and/or fin ray abnormalities. If all fin rays were symmetrical and parallel, with no abnormalities, we identified the fish as wild. The majority of coastal rainbow trout captured during these surveys exhibited symmetrical fin rays and were presumed to be of wild origin. One coastal rainbow trout captured in Section 109 had irregular fin rays on the dorsal fin, but all other fins appeared intact; surveyors were unable to determine the origins of this fish.

The coastal rainbow trout captured during these surveys ranged in size from 84 millimeters (6.4 g or .01 lb) to 615 millimeters (3402 g or 7.5 lb) and included multiple size classes. Although single-pass electrofishing does not yield population estimates, an examination of the number of coastal rainbow in each section relative to section length was used to compare approximate fish densities across sections. Due to the limitations of single-pass electrofishing, and noting

personal observations by surveyors, it is acknowledged that fish (including trout) were missed in each of the sections surveyed; therefore, actual fish densities in the sections surveyed may be considerably higher. The highest number of trout relative to section length occurred in Section 409 (1667 estimated coastal rainbow trout per mile, Table 2). Sections 109 and 209 had the lowest number of captured coastal rainbow trout relative to section length (210 and 104 estimated fish per mile, respectively; Table 2). It is unclear whether these numbers are reflective of habitat preferences or poor capture efficiency (or both). Future utilization of other survey methods, such as multiple-pass electrofishing and/or mark-recapture studies, may improve our understanding of coastal rainbow trout population structure, dynamics, and instream distribution in Putah Creek.

Conclusion

Putah Creek supports native populations of coastal rainbow trout, threespine stickleback, Sacramento suckers, and sculpin. This popular fishery is publicly accessible along Highway 128 at multiple angler access locations and is open to year-round fishing. Based on the size class distribution and presence of wild coastal rainbow trout observed during our 2009 surveys, the HWTP proposes to move forward with Phase 2 candidate Wild Trout Water assessments. HWTP Phase 2 assessments provide a comprehensive evaluation of the fishery (species composition, population and biomass estimates, instream distribution, angler use and pressure, angler satisfaction) and associated habitat assessments. Due to deep water habitat and the presence of aquatic vegetation in Putah Creek, adaptive survey techniques need to be developed in order to collect population-level information (density and biomass estimates) typically gathered from multiple-pass electrofishing with the use of block nets. Block nets may not be effective for closing off sections of the population in Putah Creek. Currently, there are four Angler Survey Boxes located on Putah Creek and the Phase 2 assessment will, in part, examine voluntary angler data from these boxes to elucidate angling pressure, size classes of fish captured, and gear types utilized by anglers. In addition, scale samples collected during the 2009 surveys will be examined to better understand age and growth rates of coastal rainbow trout in Putah Creek.

In order to evaluate potential changes in this fishery due to the cessation of stocking and fishing regulation changes, the HWTP will continue to monitor

Putah Creek in 2010 and beyond.

References

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