Bear Creek 2008 Summary Report

June 24-26, 2008

Heritage and Wild Trout Program
California Department of Fish and Game

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Introduction:

A fisheries and habitat assessment of Bear Creek was conducted by the California Department of Fish and Game's (DFG) Heritage and Wild Trout Program (HWTP) in June, 2008. Bear Creek, located in San Bernardino County, is designated by the California Fish and Game Commission as a Wild Trout Water from Bear Valley Dam downstream to the confluence with the Santa Ana River. This nine-mile stretch of river is managed by the HWTP and, as part of ongoing monitoring and management of this fishery, HWTP staff conducted multiple pass electrofishing and habitat assessments at three locations in 2008. Bear Creek supports wild populations of coastal rainbow trout (*Oncorhynchus mykiss irideus*) and brown trout (*Salmo trutta*) and is a popular southern California fishery.

Methods:

Surveys were conducted from June 24 through 26, 2008. Multiple pass electrofishing is used to generate population data including species composition, size and age class structure, and estimates of biomass and density. These data can be compared over time to study trends in the population. Three historic sections were selected to resurvey in 2008 (Sections 2, 3, and 6). To locate specific section boundaries, the HWTP used information from past surveys, including site sketches, written descriptions, and GPS coordinates.

Figure 1. Large-scale map of 2008 survey location (red star represents location of Bear Creek)

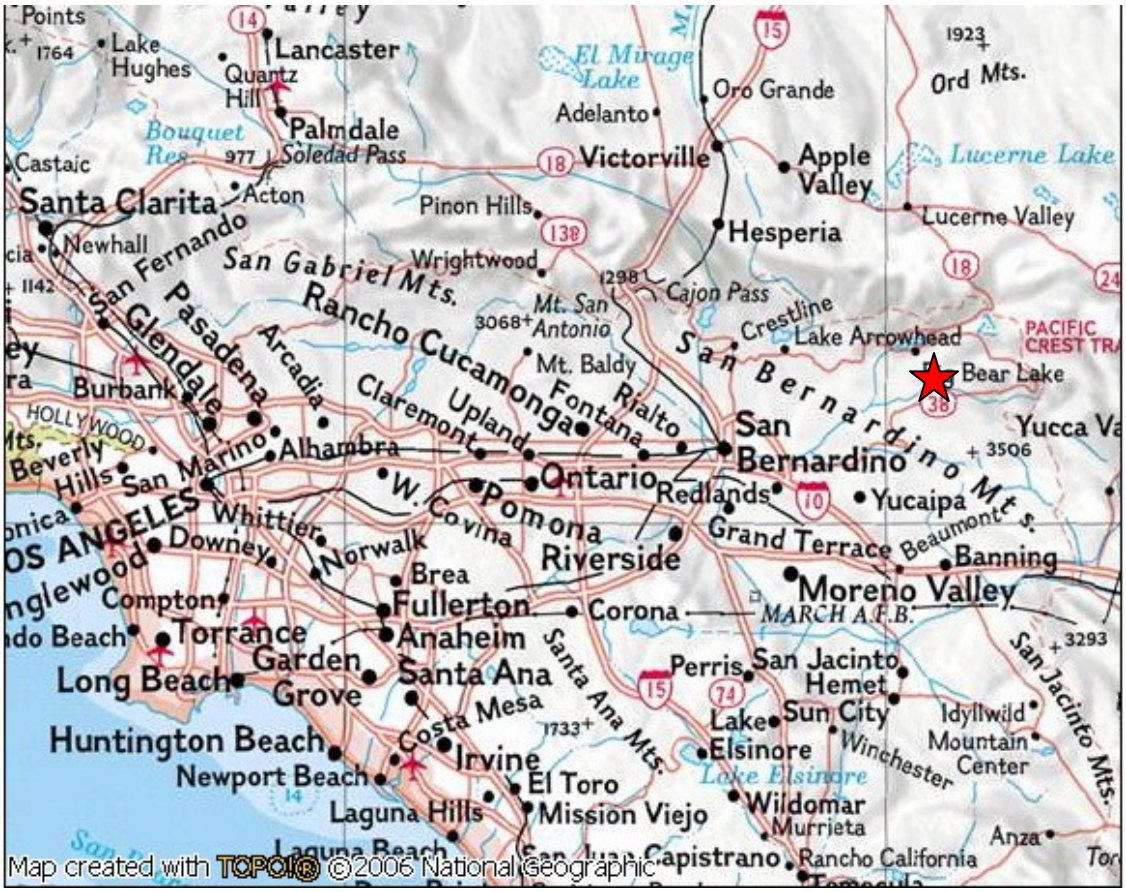
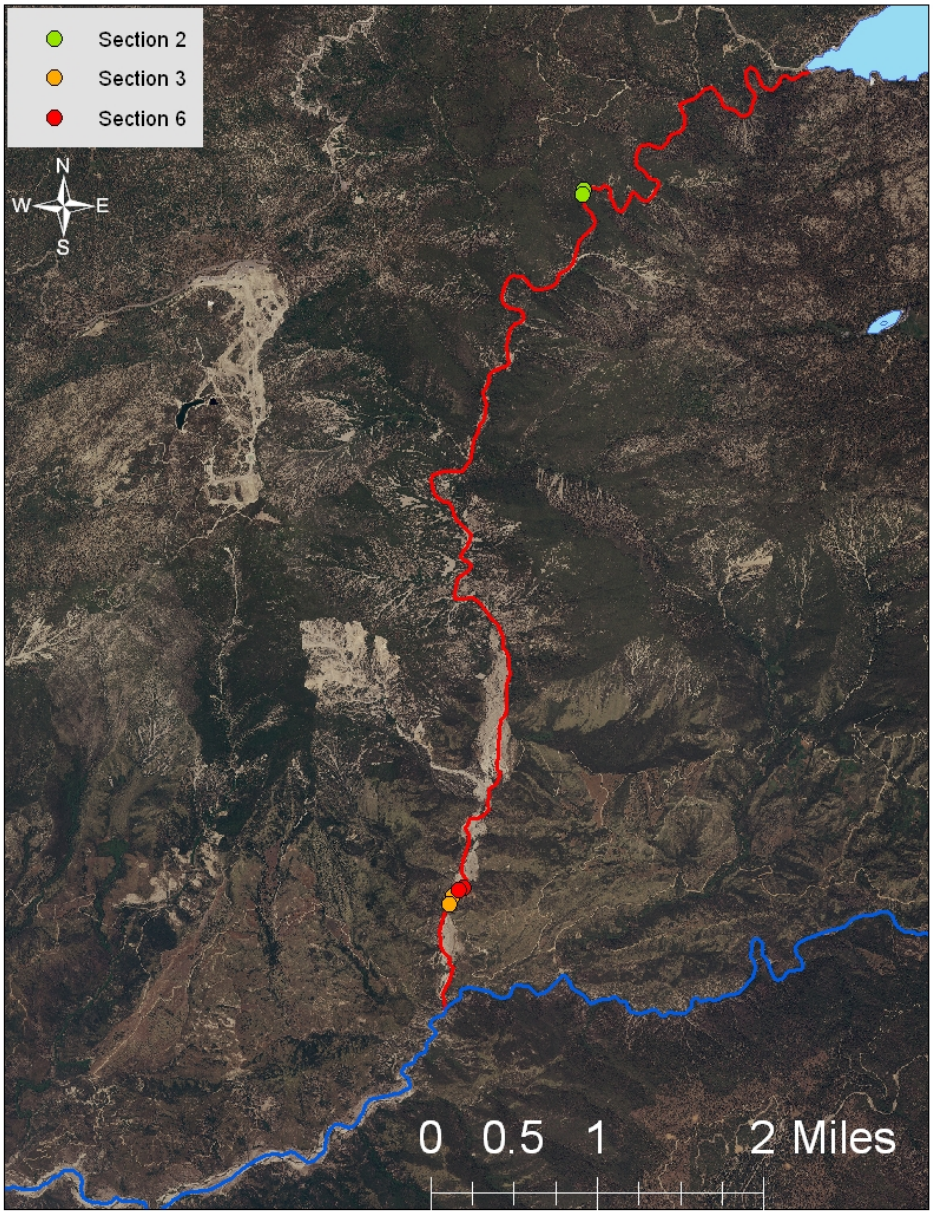


Figure 2. Map of 2008 electrofishing section locations on Bear Creek (red line represents Bear Creek Wild Trout-designated area; blue line represents Santa Ana River)



At each section boundary, nylon mesh block nets were installed across the wetted width, effectively closing the population within the section. Both sides of the nets were secured above bankful, heavy rocks were placed side by side along the bottom of the nets, and the nets were secured in such a way as to hold the top of the net out of the water. These nets were routinely monitored and inspected throughout the survey to ensure their integrity and to prevent fish from moving outside of the section during the course of the survey.

Prior to electrofishing, 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 surveys.

Personnel needs were determined based on stream width, habitat complexity, and water visibility. For each of the surveys, individuals were assigned to shock, net, and tend live cars for the duration of the effort. Surveys were initiated at the lower block net and 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. Three passes were conducted within each section, with fish from each pass stored separately. Over the course of the survey, fish were handled carefully to minimize injury and stress. Fish were processed separately by pass number. Each fish was identified to species and was measured from head to tail (total length in millimeters). Using a digital scale, weights were recorded (in grams). Fish were then recovered in live cars secured in the stream (with fresh flowing water) and released back into the section.

A habitat assessment was conducted to document resource condition by collecting base-line data on habitat types and quality, water conditions, substrate, discharge, bank condition, etc. 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 then divided into five cells of equal length. Wetted widths were measured at the center of each of the five cells. 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, 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 were measured. Representative photographs of the sections were taken.

Fish measurements were entered into the DFG FISH database and were extracted into MicroFish. Based on the capture rate (number of fish captured per pass) and probability of capture, a population estimate was determined for each species in each section. MicroFish also calculated the average weight of each species by section. We then used the population estimate to determine biomass (pounds per acre) and density (fish per mile) of each species. Fish biomass estimates incorporate habitat parameters such as section length, average wetted width, and average weight of fish (by species). Density

estimates are determined based on the population estimate and section length. Biomass and density estimates of the three sections were averaged to assess the overall fish populations in the Wild Trout-designated area of Bear Creek.

Results:

Section 2 was surveyed on June 24, 2008 with two shockers and three netters. This 135-foot section had an average wetted width of 12.5 feet and an average water depth of 0.6 feet. Weather was clear and sunny and the air temperature was 18º Celsius (C) at 9:40 a.m. The water temperature was 12º C. It should be noted, however, that it became much hotter later in the afternoon (temperatures were only measured in the morning). Section 2 was medium gradient (4.5%) with large boulders interspersed with sand. Boulders, overhanging vegetation, and water depth provided excellent fish cover. Discharge was calculated at 1.2 cubic feet per second (cfs). A total of 33 brown trout were captured (Table 1). No other fish species were observed. We estimated the density of brown trout in Section 2 at 1330 fish per mile with a biomass of 110 pounds per acre (Table 2).

Table 1. Summary of 2008 Electrofishing data on Bear Creek by section

	Species	Section Length (ft)	Number of Fish Captured				Capture Probability	Population Estimate
			Pass 1	Pass 2	Pass 3	Total		
Section 2	coastal rainbow trout	135	0	0	0	0	-	0
	brown trout		22	8	3	33	66%	34
Section 3	coastal rainbow trout	238	39	30	16	85	36%	115
	brown trout		44	14	4	62	71%	63
Section 6	coastal rainbow trout	200	36	22	10	68	48%	79
	brown trout		26	9	14	49	35%	67
	unknown trout		1	1	0	2	67%	2

Table 2. Summary of 2008 density and biomass estimates on Bear Creek by section

	Species	Section Length (ft)	Section Average Weight (g)	Estimated Biomass (lb/acre)	Estimated Density (fish/mi)
Section 2	coastal rainbow trout	135	-	0.00	0
	brown trout		57.0	110.29	1330
Section 3	coastal rainbow trout	238	18.7	46.65	2551
	brown trout		18.6	25.42	1398
Section 6	coastal rainbow trout	200	15.2	32.39	2086
	brown trout		25.2	45.55	1769
	unknown trout		2.5	0.13	53
Average of 3 Sections	coastal rainbow trout			26.35	1546
	brown trout			60.42	1499
	total trout			86.81	3062

Section 6 was surveyed on June 25, 2008 with three shockers and five netters. The temperatures at the start of the survey were 24º C (air) and 15º C (water). Section 6 was 200-feet in length and was comprised of riffle (60%), flatwater (10%), and pool (30%) habitat. Fish cover was rated as good and was provided mostly by water turbulence, water depth, boulders, and some overhanging vegetation. Substrate consisted primarily of cobbles with some gravel and boulders. Flow measurements yielded a discharge of approximately eight cubic feet per second. The average wetted width was 17.8 feet and the average water depth was 0.5 feet. Stream gradient was measured at approximately four percent. A total of 68 coastal rainbow trout, 49 brown trout, and two unknown trout species (both of these fish were smaller than 72 mm in total length and fish processors could not identify which species they were) were captured (Table 1). Based on section length and the capture probability of each species, we estimated that Section 6 had approximately 2086 coastal rainbow trout per mile (32 pounds per acre) and 1769 brown trout per mile (46 pounds per acre). A combination of all trout captured in Section 6 yields an overall trout density estimate of 3908 trout per mile with a biomass of 78 pounds per acre (Table 2). During fish processing in Section 6, it was very difficult to differentiate juvenile brown trout from juvenile coastal rainbow trout (fish less than 70 mm); as a result, many juvenile trout may have been misidentified.

Section 3 was surveyed on June 26, 2008 with three shockers and three netters. Water temperature was 15º C and air temperature was 26º C at 10:00 a.m. Section 3 was 238-feet in length and consisted of riffle (75%), flatwater (10%), and pool (15%) habitat. Boulders, water turbulence, water depth, and vegetation provided good fish cover in this medium gradient (5%) section. The average wetted width was 18.6 feet and the average water depth was 0.73 feet. Substrate was dominated by boulders and cobbles with some gravel and sand. A total of 85 coastal rainbow trout and 62 brown trout were captured

(Table 1). Based on section length and the capture probability for each species, we estimated 2551 coastal rainbow trout per mile (47 pounds per acre) and 1398 brown trout per mile (25 pounds per acre) (Table 2). This yields an overall trout estimate of 3949 trout per mile with a biomass of 72 pounds per acre in Section 3.

In order to assess the overall trout population of Bear Creek, we averaged the density and biomass estimates of the three sections. The average estimates were 1546 coastal rainbow trout per mile (26 pounds per acre) and 1499 brown trout per mile (60 pounds per acre) in Bear Creek in 2008. Overall, there are approximately 3062 trout per mile with a biomass of nearly 86 pounds per acre. A comparison of past electrofishing data on Bear Creek shows that from 1987 to 2008, the average total trout density was 3441 trout per mile with an average estimated biomass of 172 pounds per acre (Table 3). In 2008, our density estimate was similar to the average and our biomass estimate was lower than average.

Table 3. Comparison of total trout density and biomass estimates from electrofishing surveys on Bear Creek from 1987-2008.

Survey Year	Estimated biomass (pounds/acre)	Estimated density (total trout/mile)
1987	212	5768.33
1988	202	4741.87
1989	203	4428.33
1992	164	3822.67
1993	139	2250.33
1995	131	1362.67
1999	238	2106.33
2008	87	3044.67
Average	172	3441

Discussion:

Bear Creek is a medium gradient tailwater fishery supporting self-sustaining wild populations of both coastal rainbow and brown trout. Brown trout were dominant in the upper end of the watershed (in the vicinity of Glory Ridge and Section 2) and coastal rainbow trout were dominant in the lower sections near the confluence with the Santa Ana River. This nine-mile stretch of designated Wild Trout Water is fairly remote and can be accessed via four wheel drive roads at multiple access points. Current fishing regulations allow year-round angling (restricted to artificial lures with barbless hooks) with a two fish bag limit and these regulations appear to be effective in the continued management and conservation of this wild trout fishery.

Acknowledgements:

The HWTP greatly appreciated the help of numerous volunteers, including the Fisheries Resource Volunteer Corps and Deep Creek Fly Fishers, who are dedicated to protecting and conserving this wild trout resource.

References:

Flosi, Gary; S. Downie; J. Hopelain, et al. 1998. California Salmonid Stream Habitat Restoration Manual. State of California Resources Agency. 3rd Edition. Department of Fish and Game. Vol 1.