Pauley Creek 2010 Summary Report

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State of California

Natural Resources Agency

Department of Fish and Game

Heritage and Wild Trout Program

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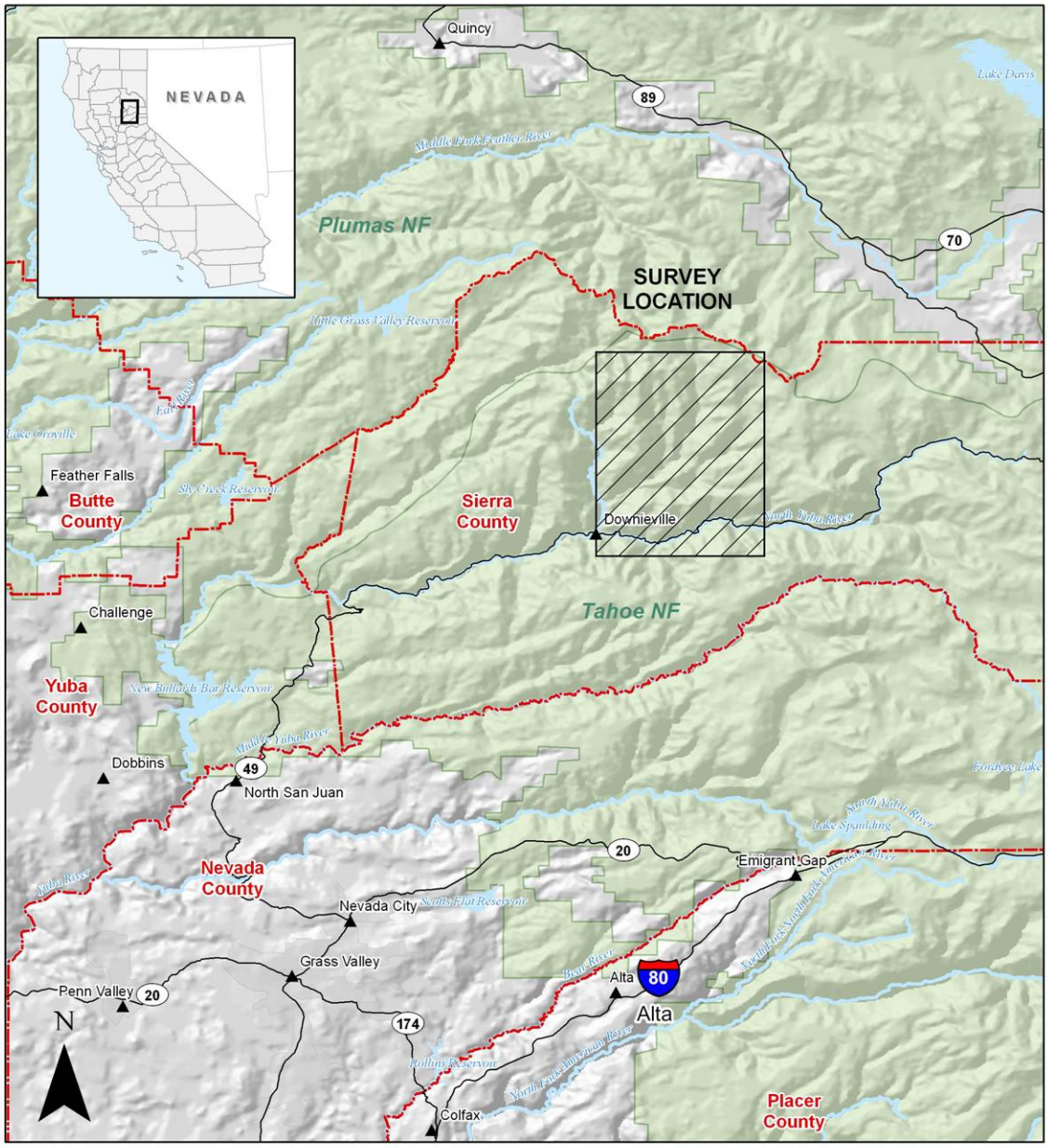
Introduction

Pauley Creek is a west-slope Sierra Nevada stream located in the Tahoe National Forest near Downieville, CA (Sierra County) and is tributary to the Downie River. In 2009 and 2010, the California Department of Fish and Game (DFG) Heritage and Wild Trout Program (HWTP) North Central Region conducted Phase 1 initial resource assessments on Pauley Creek via hook and line to identify whether it meets the minimum qualifications for designation as a Wild Trout Water (J. Hanson, DFG North Central Region, personal communication, 2010). 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.

Phase 1 assessments are designed to gather baseline data on the presence and origins of trout populations (wild versus hatchery), species distribution and size class structure, public access, habitat attributes, and catch rates. Pauley Creek flows through both federal and private lands, is accessible via a network of public roads and trails, and contains wild rainbow trout (*Oncorhynchus mykiss*). The DFG does not currently stock Pauley Creek with hatchery trout and fishing is permitted from the last Saturday in April through November 15 with a five-fish bag limit per day and ten fish in possession (DFG General Sierra District regulations). Based on Phase 1 survey results, the HWTP initiated a Phase 2 candidate water assessment of Pauley Creek in 2010 to evaluate the fishery (Figure 1). HWTP Phase 2 assessments provide a comprehensive evaluation of the fishery, habitat, and angler use including information on species distribution, size class structure, and abundance. The Phase 2 process generally occurs over a multi-year period and 2010 was the first year of Phase 2 assessments on Pauley Creek.

Figure 1. Vicinity map of 2010 Pauley Creek survey location.



Methods

Direct observation surveys were conducted at 34 locations (Sections 110-3410) on Pauley Creek in August and September, 2010 using snorkeling methods, an effective survey technique in many small streams and creeks in California and the Pacific Northwest (Hankin and Reeves, 1988; Figure 2). The surveys occurred along 15 miles of stream habitat and were spaced to the greatest geographical extent possible based on access locations and survey safety and feasibility. Portions of Pauley Creek flow through confined, steep gradient canyons and certain reaches were too remote and/or unsafe to survey due to extended hike times and/or the presence of impassable waterfalls. Specific section boundaries were located at distinct breaks in habitat types and stream gradient. Surveys were conducted in an upstream direction with between one and three divers. The number of divers was determined based upon wetted width, water visibility, and habitat complexity. Divers maintained an evenly-spaced line perpendicular to the current and counted fish by species. All observed trout were further categorized and counted by size class. Size classes were divided into the following categories: young of year (YOY); small (< 6 inches); medium (6-11.9 inches); large (12-17.9 inches); and extra-large (≥ 18 inches). YOY are defined by the HWTP as age 0+ fish, emerged from the gravel in the same year as the survey effort. Depending on species, date of emergence, relative growth rates, and habitat conditions, the size of YOY varies greatly, but is generally between zero and three inches in total length. If a trout was observed to be less than six inches total length but it was difficult to determine whether it was an age 0+ or 1+ fish, by default it was classified in the small (<6 inches) size class.

Divers were instructed in both visual size class estimation and proper snorkel survey techniques prior to starting the survey (establishing a dominant side, determining the extent of their visual survey area, how and when to count (or not count) fish observed, safety considerations, etc.). For each section, surveyors measured section length along the thalweg, water and air temperature, average wetted width and water depth, and water visibility. Habitat type (flatwater, riffle, or pool) was identified following Level 2 protocol as defined in the California Salmonid Stream Habitat Restoration Manual (Flosi et al. 1988). Representative photographs were taken and GPS coordinates were recorded for the section boundaries.

Figure 2. Overview map of Pauley Creek 2010 direct observation survey locations (Sections 110-3410).

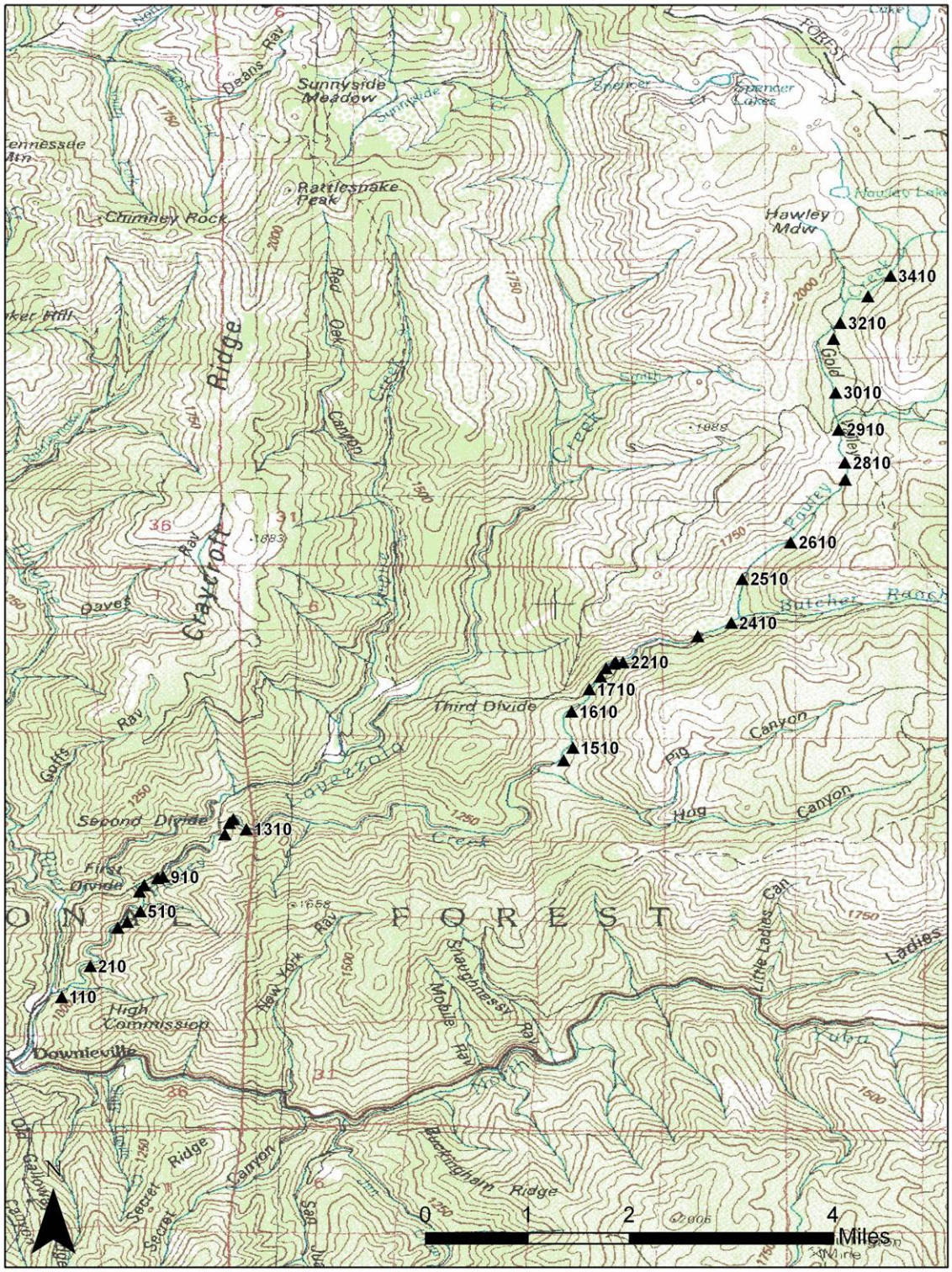


Figure 3. Detail map of Pauley Creek 2010 direct observation survey locations (Sections 110-1310).

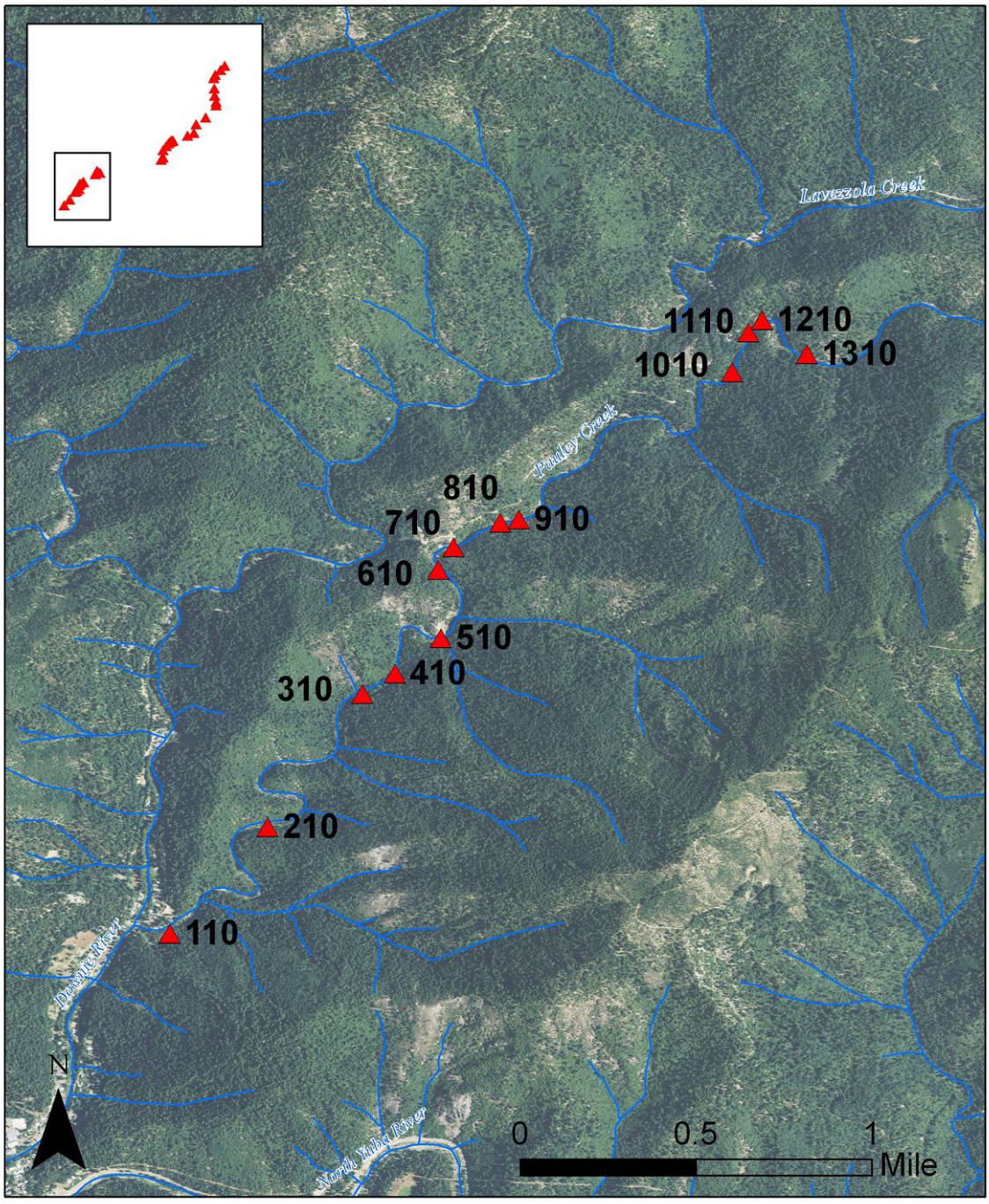


Figure 4. Detail map of Pauley Creek 2010 direct observation survey locations (Sections 1410-2610).

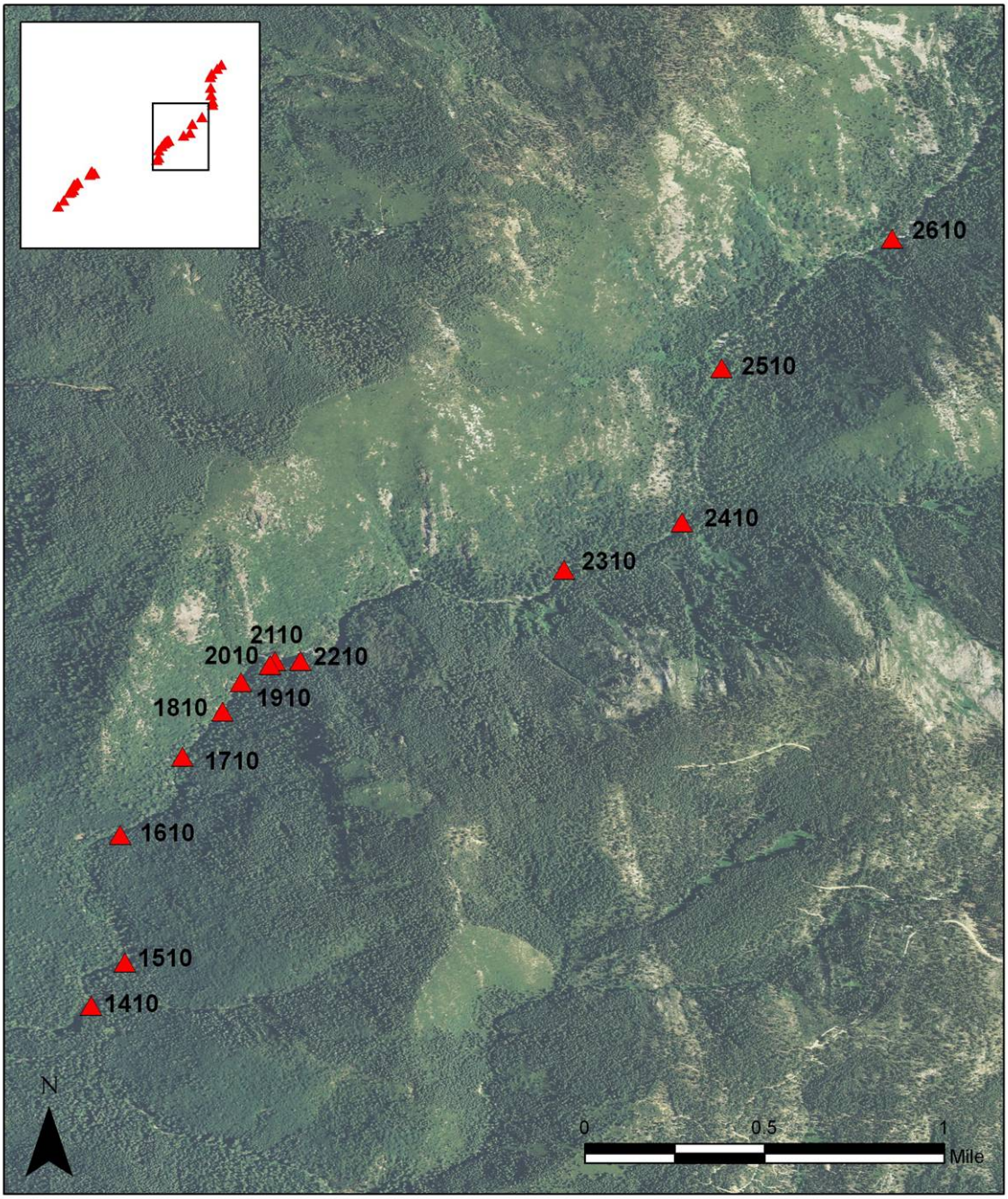
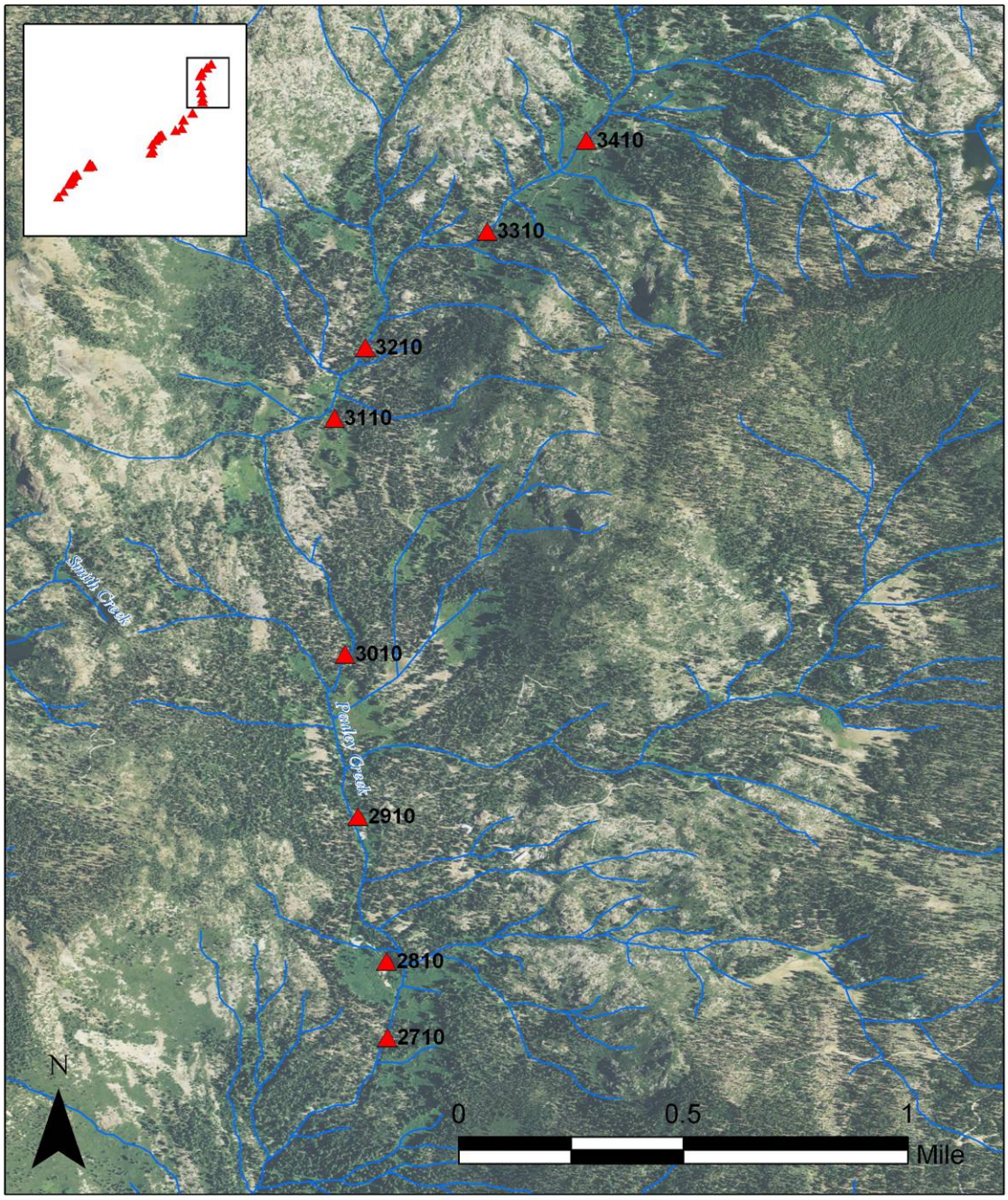


Figure 5. Detail map of Pauley Creek 2010 direct observation survey locations (Sections 2710-3410).



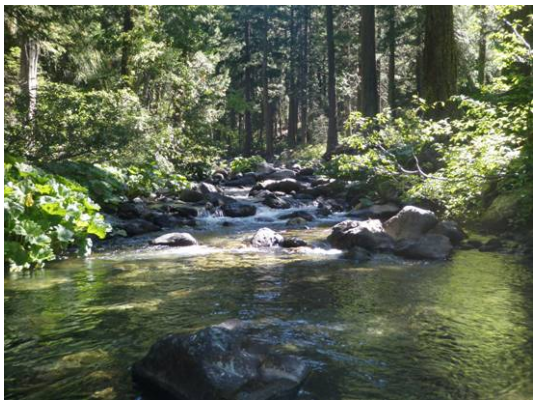
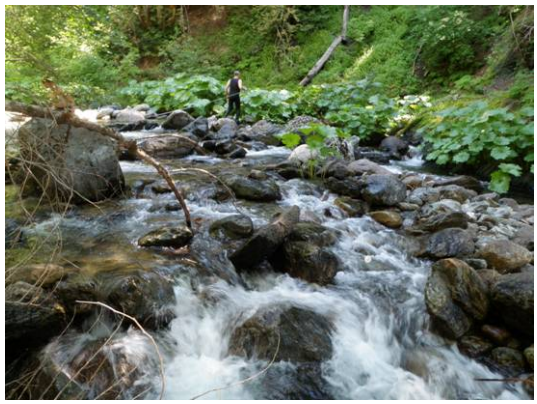
Results

A total of 3416 feet of stream was surveyed along 15 miles of Pauley Creek (34 sections) with an average wetted width of 24.1 feet and average water depth of 1.8 feet. The 34 sections surveyed were comprised of 69% flatwater, 17% riffle, and 14% pool habitat (Figure 6). Water temperatures ranged from 6 ºC to 15 ºC and air temperatures were between 8 ºC and 26 ºC. The weather was sunny and clear during the entire survey effort; however, due to high bedrock walls and/or overhanging riparian vegetation, the majority of sections were at least partially (if not fully) shaded. Substrate was cobble- and boulder-dominated with some bedrock and gravel. Water visibility ranged from two feet to greater than 20 feet; lower water visibility was generally attributed to water turbulence and/or bubble curtains. A total of 865 rainbow trout were observed with an estimated density of 1337 fish per mile (Table 1). No other fish species were observed. Size class distribution was 2% YOY, 64% small, 32% medium, and 2% large. No fish larger than 18 inches was observed. The coastal rainbow trout exhibited a diversity of phenotypic characteristics including varying degrees of coloration along the lateral line (from pale pink to brick red), varying degrees of body spotting (some heavily spotted along the dorsum, others lightly spotted), and varying degrees of coloration on the ventrum (from white to orange; Figure 7). Divers noted that many of the trout were oriented in a downstream-facing direction. Consideration should be given to conducting future dives in a downstream direction.

Table 1. Summary of Pauley Creek 2010 direct observation survey results.

Section number	Section length (ft)	Habitat type	Number of rainbow trout observed						Estimated density (fish/mi)
			YOY	Small < 5.9"	Medium 6" - 11.9"	Large 12" - 17.9"	Extra-large > 18"	Total	
110	165	40% Flatwater; 60% Riffle	0	6	3	0	0	9	288
210	147	Flatwater	6	30	8	0	0	44	1580
310	104	Riffle	0	4	2	0	0	6	305
410	74	Flatwater	0	14	2	0	0	16	1142
510	110	Flatwater	0	18	12	3	0	33	1584
610	112	Flatwater	0	30	7	0	0	37	1744
710	47	Flatwater	0	11	2	0	0	13	1460
810	50	Riffle	1	3	1	0	0	5	528
910	110	Pool	0	64	15	1	0	80	3840
1010	261	Riffle	4	41	10	0	0	55	1113
1110	107	Pool	0	42	16	0	0	58	2862
1210	145	Flatwater	1	40	9	0	0	50	1821
1310	67	Pool	1	15	6	0	0	22	1734
1410	50	Riffle	0	10	2	0	0	12	1267
1510	198	Flatwater	0	52	31	1	0	84	2240
1610	83	Flatwater	1	25	21	1	0	48	3053
1710	100	Flatwater	0	30	26	1	0	57	3010
1810	119	Flatwater	0	12	7	1	0	20	887
1910	33	Pool	0	4	3	0	0	7	1120
2010	32	Pool	0	20	16	0	0	36	5940
2110	55	Flatwater	0	19	10	1	0	30	2880
2210	56	Pool	0	16	16	0	0	32	3017
2310	130	Flatwater	0	0	3	1	0	4	162
2410	110	Flatwater	0	19	21	1	0	41	1968
2510	188	Flatwater	1	9	13	2	0	25	702
2610	52	Pool	0	4	5	4	0	13	1320
2710	54	Flatwater	0	0	0	0	0	0	0
2810	140	Flatwater	0	0	0	0	0	0	0
2910	193	Flatwater	0	2	3	0	0	5	137
3010	69	Flatwater	0	5	5	1	0	11	842
3110	92	Flatwater	0	8	3	0	0	11	631
3210	72	Flatwater	0	0	0	0	0	0	0
3310	24	Pool	0	0	1	0	0	1	220
3410	67	Flatwater	0	0	0	0	0	0	0

Figure 6. Photographs of Pauley Creek in 2010.



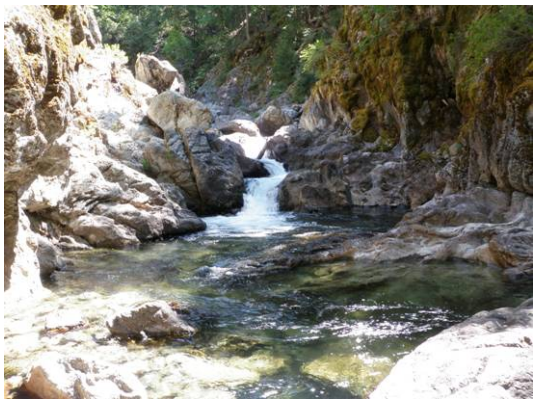




Figure 7. Photographs of rainbow trout from Pauley Creek in 2010.

Discussion

Pauley Creek meets multiple criteria for Wild Trout designation including the presence of wild trout populations with multiple age classes, no stocking of hatchery fish, suitable habitat, and public access. The majority of the watershed falls within United States Forest Service (USFS) administered National Forest lands with some roads and a trail network providing limited access; some portions of Pauley Creek are semi-remote and require instream hiking. The HWTP recommends pursuing Pauley Creek for designation as a Wild Trout Water through continued population-level monitoring and angler use assessments over a multi-year period. The use of Angler Survey Boxes (ASB) should be evaluated as a tool to monitor catch rates, catch size, and angler use, satisfaction, and preferences. The HWTP should collaborate with local stakeholders including the USFS, private landowners, holders of mining claims, and recreational users (including anglers). Off-highway vehicle use is very popular on surrounding trails and roads, with a widely known mountain biking trail network paralleling nearly the entire length of Pauley Creek. The effect(s) of this recreational use on both anglers and instream habitats (e.g., potential siltation from trail erosion) is currently unknown. Instream suction dredge gold mining occurred in Pauley Creek prior to the suspension of suction dredge gold mining in all California streams and rivers (CA Senate Bill 270; 2009). Although active mining was not occurring at the time of the 2010 survey, there was evidence of mining throughout the entire length of Pauley Creek including equipment, mining claims, and tailing piles (Figure 8). If suction dredging is reopened on Pauley Creek during the evaluation process for Wild Trout designation, the HWTP recommends monitoring potential aesthetic and biological effects to the wild trout fishery.

Figure 8. Photographs of suction dredging/mining equipment on Pauley Creek 2010.

References

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

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.

Hankin D.G., and G.H. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Canadian Journal of Fisheries and Aquatic Sciences. 45:834-844.