Wolf Creek 2012 summary report

July 4-7, 2012

State of California

Department of Fish and Wildlife

Heritage and Wild Trout Program

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Introduction

Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*) are the native salmonid in the West Walker River watershed and are listed as Threatened under the Federal Endangered Species Act of 1973. Wolf Creek (Mono County) flows for approximately six miles from its headwaters near Sonora Pass in the Sierra Nevada Mountains to its confluence with the West Walker River, approximately 20 miles northwest of Bridgeport, CA (Figure 1). In 1991 and 1992, a restoration project was implemented in Wolf Creek to remove non-native fish and restore Lahontan cutthroat trout to its native habitat. A natural barrier exists in Wolf Creek which isolates the headwaters from upstream invasion of non-native trout. In 1993, 1999 and 2003, Wolf Creek was stocked with wild Lahontan cutthroat trout from Slinkard Creek; during this time, Wolf Creek was closed to fishing to protect the population of Lahontan cutthroat trout. In 2012, based on surveys conducted by various state and federal agencies throughout the duration of the restoration project, the wild trout population was determined to be stable and abundant enough to warrant sport fishing. A proposal was made to the California Fish and Game Commission (Commission) that Wolf Creek be opened to public angling. The Commission adopted new regulations for Wolf Creek, and effective in 2013, it was opened to fishing from August 1st through November 15th with gear restricted to artificial lures with barbless hooks and a daily bag and possession limit of zero fish. To monitor potential changes to the trout population due to changes in sport fish regulations, the California Department of Fish and Wildlife (CDFW) Heritage and Wild Trout Program (HWTP) conducted fisheries, habitat, and angling assessments in Wolf Creek prior to the opening of this fishery to angling. Goals and objectives included:

- Gather baseline fisheries and habitat information including size class distribution and abundance
- Determine upstream extent of fish distribution
- Gather baseline angler catch rate information

Methods

Multiple-pass electrofish

Five multiple-pass electrofish surveys were conducted in Wolf Creek (Sections 3-7) from July 5th-7th, 2012 to generate population-level data including species composition, size class structure, and estimates of abundance (Figures 2-3). These data can be compared over time to study trends in the population. Personnel included HWTP staff (Headquarters and Inland Deserts Region) and volunteers. The HWTP replicated two multiple-pass electrofish sections (Sections 4 and 7) established by the US Forest Service (USFS) in 2009 (Bridgeport Ranger District 2009). Photographs, handheld Global Positioning System (GPS) units and previous survey information were used to locate the USFS multiple-

pass survey sections. Three multiple-pass electrofish sections (Sections 3, 5 and 6) were newly established by the HWTP in 2012 and were selected randomly. The sample frame, from the natural barrier upstream to the presumed extent of fish distribution (Bridgeport Ranger District 2009) was delineated into 100-meter intervals using Geographic Information System software. Each interval was sequentially numbered and using a random numbers table, three points were selected. Using GPS equipment, surveyors navigated to each randomly selected point and determined survey feasibility. Specific section boundaries were chosen at areas where nylon mesh block nets could effectively be installed and maintained throughout the survey effort. Where feasible, the downstream mesh block net was installed at the randomly selected point. If a mesh block net could not be installed at the randomly selected location and/or flows and water depth were not conducive to backpack electroshocking, surveyors moved upstream and located the nearest suitable site. The upstream boundary of each section was selected at a location conducive to net placement with a minimum section length of 300 feet.

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 to hold the top of the net out of the water. The nets were routinely monitored and inspected throughout the survey to ensure their integrity and to prevent fish from moving into or out 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 (°C; in the shade) and conductivity (specific and ambient in microsiemens). These factors were used to determine appropriate electrofisher settings. Coordinates were recorded for both the upstream and downstream boundaries of the survey (North American Datum 1983). 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 were 32-gallon plastic trash bins perforated with holes to allow water circulation. Three to four passes were conducted within the sections, 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 total length (mm) and weight (g) were measured. 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 in each section to document resource condition by collecting base-line data on habitat types and quality, water conditions, substrate, 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 (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 2 protocols as defined by the CSSHRM (Flosi et al. 1988). 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 section were taken.

Fish measurements were entered into the CDFW Fisheries Information Sharing Host database and were extracted into MicroFish (MicroFish Software). Based on the capture rate (number of fish captured per pass) and probability of capture, a population estimate was determined for each species. MicroFish also calculated the average weight of each species by section. These data were used to determine biomass (lbs/acre) and density (fish/mi) of each species.

Single-pass electrofish

On July 4th, 2012, HWTP staff (Headquarters) conducted a single-pass electrofish survey in the upper portion of Wolf Creek to determine the upstream extent of Lahontan cutthroat trout distribution. Electrofisher settings (Smith Root backpack electrofishers) were established in the same manner described above and basic habitat attributes were recorded. Surveys proceeded in an upstream direction, with netters capturing fish and placing them in a five-gallon bucket to be held until processed. Over the course of the survey, fish were handled carefully to minimize injury and stress. All captured fish were measured to the nearest inch using a calibrated landing net and recovered before being released back into the section. Coordinates were recorded for the capture location of the upstream-most trout (North American Datum 1983; Figures 2-3).

Angling evaluation

Angling assessments were conducted by HWTP personnel (Headquarters) and volunteers in Wolf Creek from July 6th-7th, 2012 (Figures 2-3). Anglers used fly fishing gear and recorded their total effort (hrs) and location fished using GPS hand-held units (North American Datum 1983). All landed fish were identified to species. Using a calibrated landing net, total length of each fish (inches) was measured. Catch per unit effort (CPUE; fish/hr) was calculated for each angler and averaged across all anglers.

Results

Multiple-pass electrofish

The portion of Wolf Creek surveyed in 2012 (upstream of the barrier) flows through both low-gradient meadow habitat and medium-gradient forested reaches (Figure 4). In July, 2012, five sections were surveyed via multiple-pass electrofish methodology with a total survey length of 1596.0 ft (Sections 3-7). Across the five sections, the average wetted width was 13.5 feet, average water depth was 0.3 ft, and average streamflow was 0.7 cfs. Habitat was dominated by flatwater (77%) with some riffle (14%) and pools (9%). Bankful erosion ranged from 35% to 50%, active erosion ranged from 5% to 10%, and canopy cover ranged from 1% to 25%. Water temperature was between 9 and 15 °C and air temperature ranged from 13 to 26 °C. Overall instream fish cover was good with boulders and overhanging vegetation forming the dominant cover types (Figure 5). Substrate was dominated by boulder, cobble, and gravel (Figure 6). In total, the HWTP captured 236 Lahontan cutthroat trout with an estimated abundance of 852 fish/mi and 60.90 lbs/acre (Figure 7 and Table 1). Captured Lahontan cutthroat trout ranged in total length from 77 to 253 mm with a mean of 160 mm and weighed between 4.0 and 160.0 g with a mean of 47.3 g (Table 2). Surveyors also observed stonefly larvae (Order Plecoptera) and one aquatic garter snake (*Thamnophis atratus*).

Single-pass electrofish

One section was surveyed via single-pass electrofishing in Wolf Creek. The upstream-most Lahontan cutthroat trout was captured approximately 0.8 miles downstream of Wolf Creek Lake (Figures 2-3). Previous surveys conducted by the USFS Bridgeport Ranger District in 2009 showed Lahontan cutthroat trout distribution approximately one-half mile below this location (1.3 miles downstream of the lake). Surveyors did not document any year-round barriers to fish migration that limited upstream fish distribution, although a few seasonal barriers were documented. Lahontan cutthroat trout upstream distribution appeared to slowly taper off and may have been limited by habitat, temperature, and/or streamflow.

Angler evaluation

Seven individuals participated in the angling assessment and captured 74 Lahontan cutthroat trout in 52.7 hrs of effort (Table 3). Catch rates ranged from zero to 24.0 fish/hr with an average of 4.4 fish/hr. Size class distribution of captured Lahontan cutthroat trout was 16% small- and 84% medium-sized fish.

Discussion

Previous electrofishing surveys were conducted in Wolf Creek by the USFS in 2004 and 2009 (Bridgeport Ranger District 2004 and 2009; Table 4). Lahontan cutthroat trout abundance from these surveys was estimated at 236 fish/mi (2004) and 1804 fish/mi (2009). Abundance observed in 2012 fell within this range; however, it is unknown if differences in population size may be attributed to fluxes in the population, section location and selection method, and/or survey bias. The HWTP recommends continued population-level monitoring over time to gather baseline trend data.

Conclusion

Wolf Creek contains a wild, self-sustaining population of Lahontan cutthroat trout in their native drainage, which has resulted from multi-agency collaborative restoration efforts. The baseline information collected in 2012 will be valuable in evaluating possible post-regulation changes to the population. The HWTP recommends continued fisheries, habitat and angler assessments in Wolf Creek. Inland Deserts Region staff will coordinate with the USFS on installing Angler Survey Boxes as a tool to monitor angler use, catch rates, and catch sizes. The HWTP will continue to collaborate with local stakeholders including the USFS, US Fish and Wildlife Service, private landowners, anglers and other recreational users.

As part of this process, the HWTP recommends evaluating Wolf Creek and tributaries for designation as a Heritage and Wild Trout Water. Wild Trout Waters are those that support self-sustaining (wild) trout populations, are aesthetically pleasing and environmentally productive, provide adequate catch rates in terms of numbers or size of trout, and are open to public angling (Bloom and Weaver 2008). Wild Trout Waters may not be stocked with catchable-sized hatchery trout. Heritage Trout Waters are a sub-set of Wild Trout Waters and highlight populations of California's native trout that are found within their historic drainages.

References

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

Bridgeport Ranger District. 2004. Wolf Creek Mono County, California 2004 Fish & Habitat Survey Report. United States Forest Service. Humboldt-Toiyabe National Forest.

Bridgeport Ranger District. 2009. Wolf Creek Mono County, California 2009 Lahontan Cutthroat Trout Survey Report. United States Forest Service. Humboldt-Toiyabe National Forest.

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.

Figure 1. Vicinity map of 2012 Wolf Creek survey location

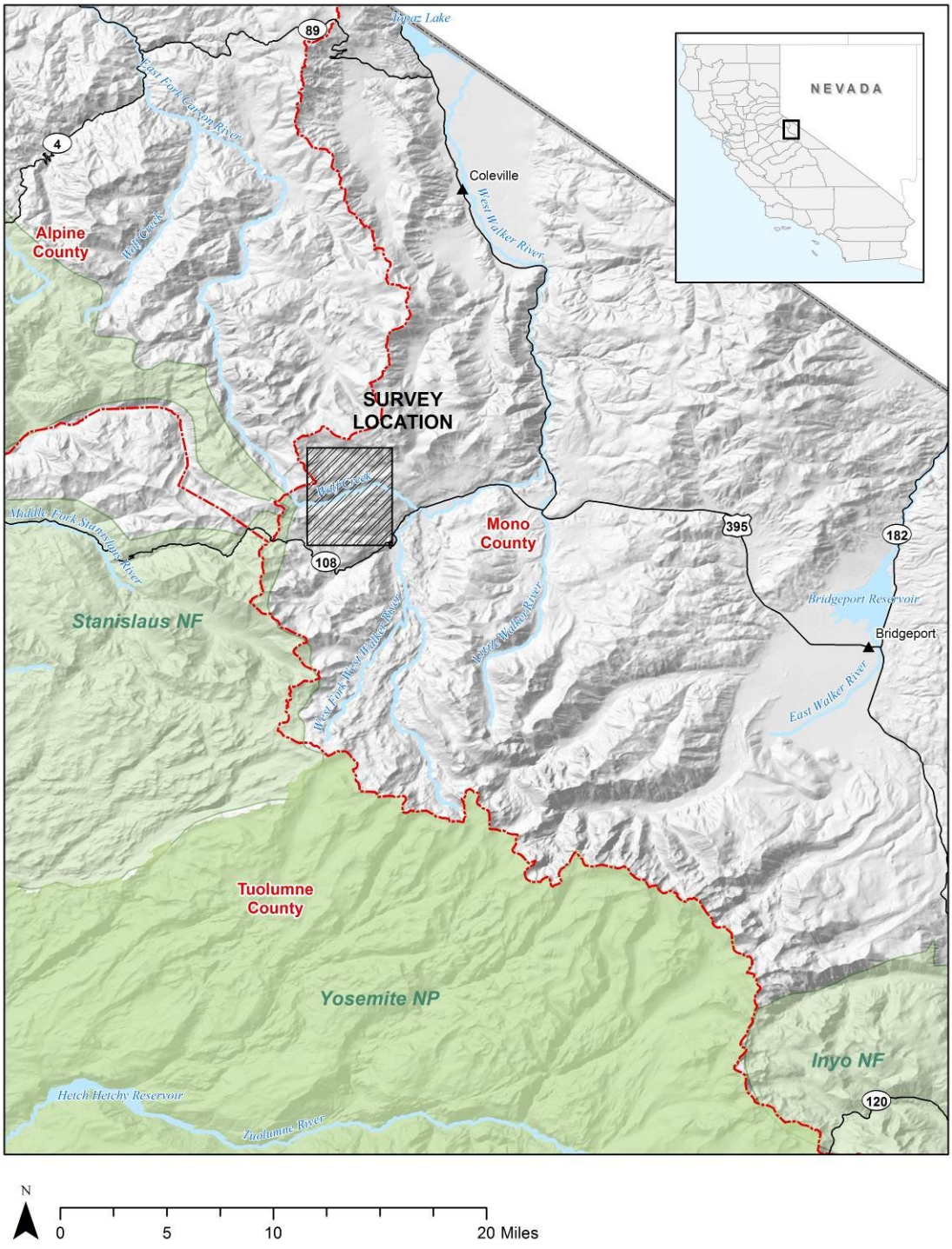

Figure 2. Detail map of 2012 Wolf Creek section locations and upstream-most fish capture locations

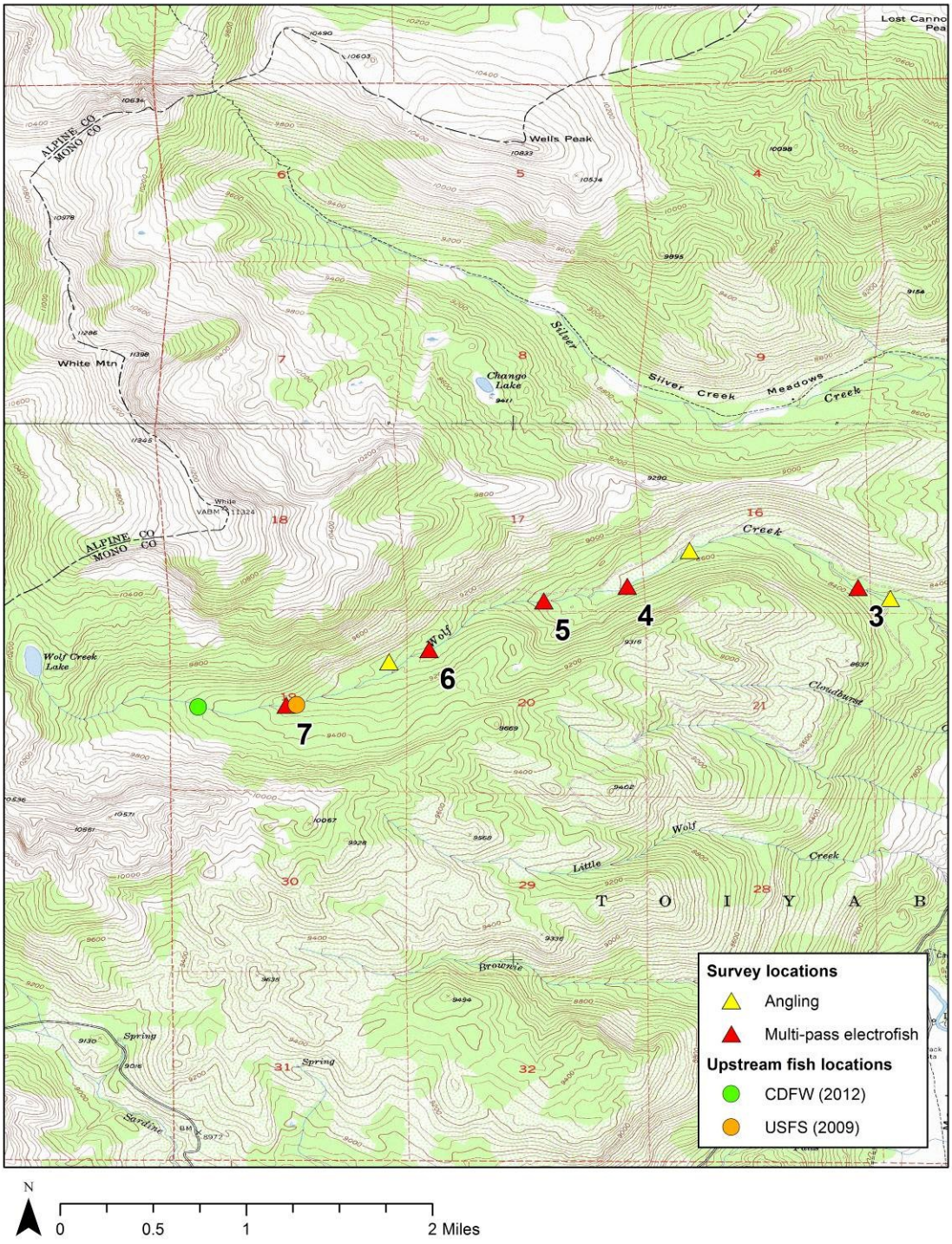

Figure 3. Aerial map of 2012 Wolf Creek section locations and upstream-most fish capture locations

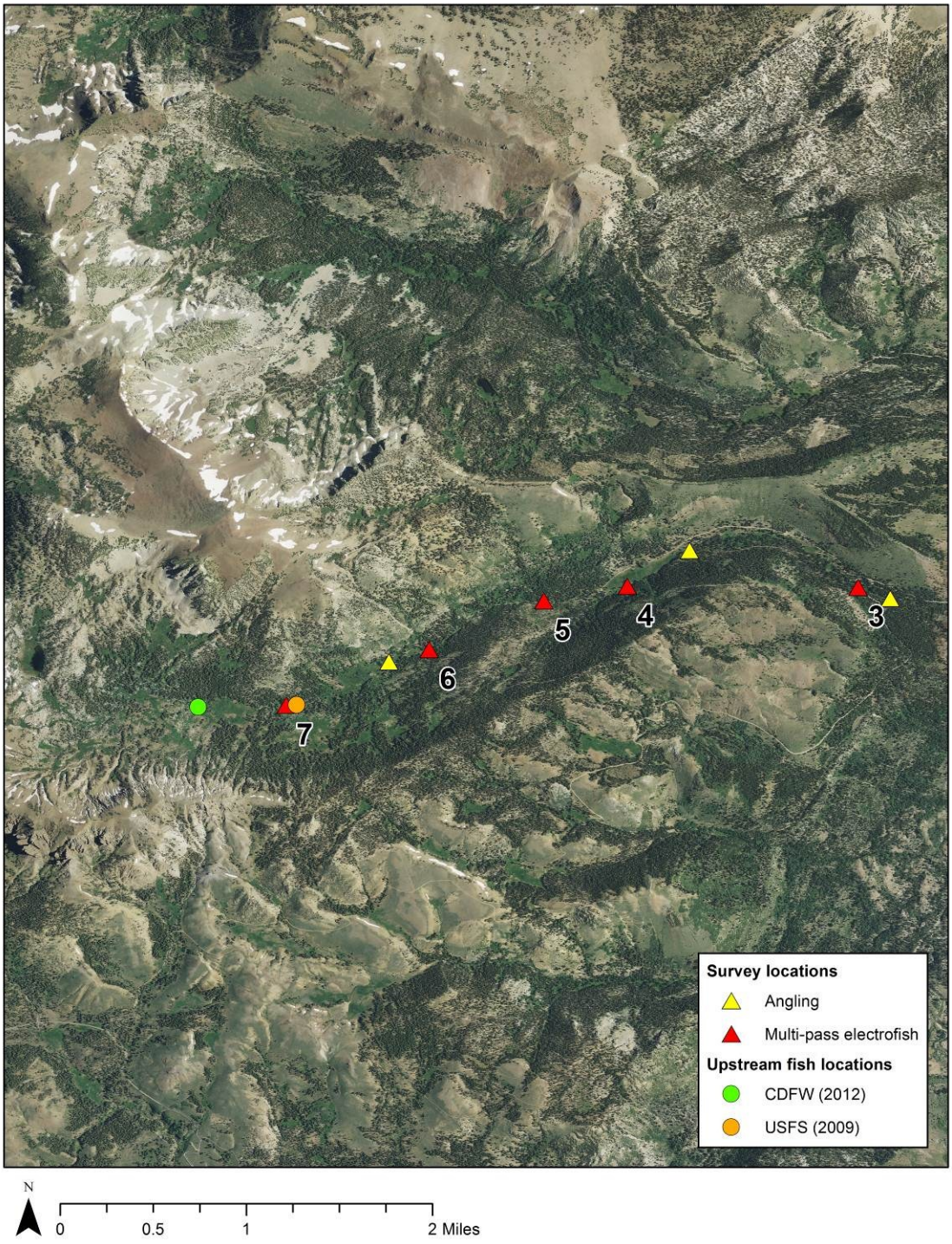

Figure 4. Representative photographs of Wolf Creek in 2012

Figure 5. 2012 Wolf Creek overall instream fish cover composition

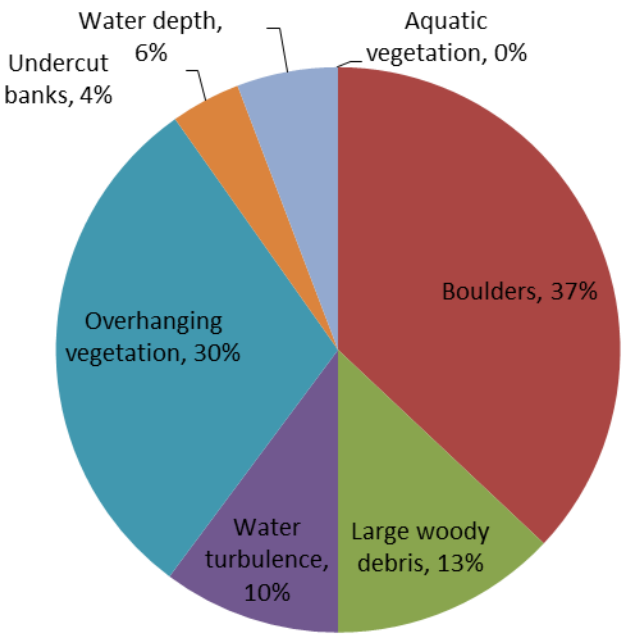

Figure 6. 2012 Wolf Creek overall substrate composition

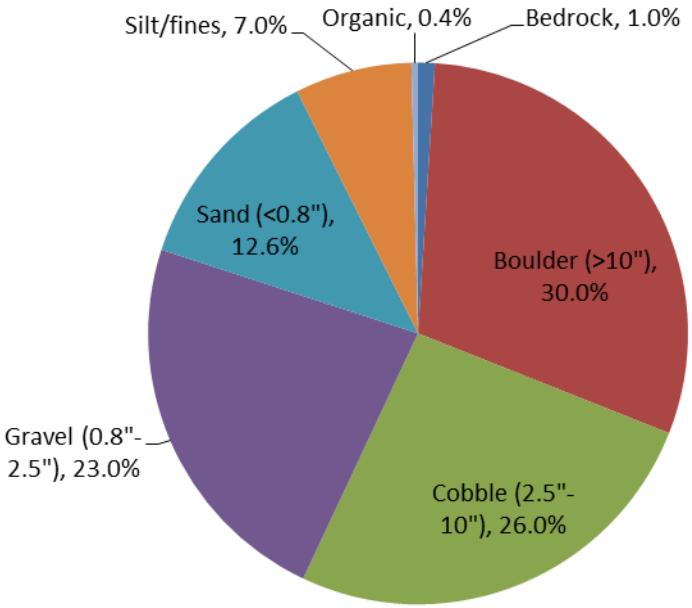

Figure 7. Photographs of Lahontan cutthroat trout captured in Wolf Creek in 2012

Table 1. Lahontan cutthroat trout abundance data from 2012 Wolf Creek multiple-pass electrofish surveys

Section	Section length (ft)	Total number captured	Estimated population	Estimated density (fish/mi)	Estimated biomass (lbs/acre)	Capture probability	95% confidence interval
3	345.0	54	57	872	30.32	60.0%	51-63
4	399.0	58	74	979	54.29	39.5%	50-98
5	223.0	35	37	876	47.19	59.3%	32-42
6	323.0	40	40	654	61.60	85.1%	39-41
7	306.0	49	51	880	111.12	53.3%	46-56

Table 2. Lahontan cutthroat trout size class data from 2012 Wolf Creek multiple-pass electrofish surveys

Section	Total number captured	Total length min (mm)	Total length max (mm)	Total length mean (mm)	Weight min (g)	Weight max (g)	Weight mean (g)
3	54	78	242	151	4.3	127.0	40.7
4	58	80	216	155	4.2	99.3	44.5
5	35	108	209	153	11.2	86.5	38.5
6	40	104	246	167	10.4	129.0	51.8
7	49	77	253	176	4.0	160.0	60.4
Total	236	77	253	160	4.0	160.0	47.3

Table 3. Wolf Creek 2012 angling data

Angler	Date	Effort (hrs)	Number of Lahontan cutthroat trout captured			CPUE (fish/hr)
			Small < 6"	Medium 6" - 11.9"	Total	
Corbett	7/6/2012	1.17	0	0	0	0.0
Dettmar	7/6/2012	1.75	0	0	0	0.0
Evans	7/6/2012	2.00	5	8	13	6.5
Higginson	7/6/2012	2.00	1	2	3	1.5
Mehalick	7/6/2012	1.25	3	10	13	10.4
Webster	7/6/2012	2.67	2	8	10	3.7
Corbett	7/7/2012	2.50	0	1	1	0.4
Mehalick	7/7/2012	2.50	0	3	3	1.2
Dettmar	7/7/2012	1.50	0	0	0	0.0
Higginson	7/7/2012	1.50	1	4	5	3.3
Webster	7/7/2012	1.25	0	2	2	1.6
Weaver	7/7/2012	1.00	0	24	24	24.0
			Average			4.4

Table 4. Lahontan cutthroat trout abundance data from 2004 and 2009 USFS multiple-pass electrofish surveys in Wolf Creek (Bridgeport Ranger District 2004 and 2009)

Year	Estimated density (fish/mi)	90% confidence interval
2004	236	35-447
2009	1804	1289-2319