

Heenan Creek 2010 Summary Report

June 14-30; September 27-30; November 4, 2010

State of California

Natural Resources Agency

Department of Fish and Game

Heritage and Wild Trout Program



Prepared by Jeff Weaver and Stephanie Mehalick

Introduction

The California Department of Fish and Game (DFG) Heenan Lake Wildlife Area is southeast of Markleeville in Alpine County, CA (Figure 1) and contains Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*), a federally threatened species. Heenan Lake was designated by the California Fish and Game Commission (CFG) as a Wild Trout Water in 1983 and was further designated as a Heritage Trout Water in 1999 for the population of lake-form Lahontan cutthroat trout within their native drainage. Wild Trout Waters are those that support a self-sustaining wild trout fishery, are aesthetically pleasing and environmentally productive, provide adequate catch rates in terms of numbers, size, or species 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 that highlight wild populations of California's native trout within their historic drainages.

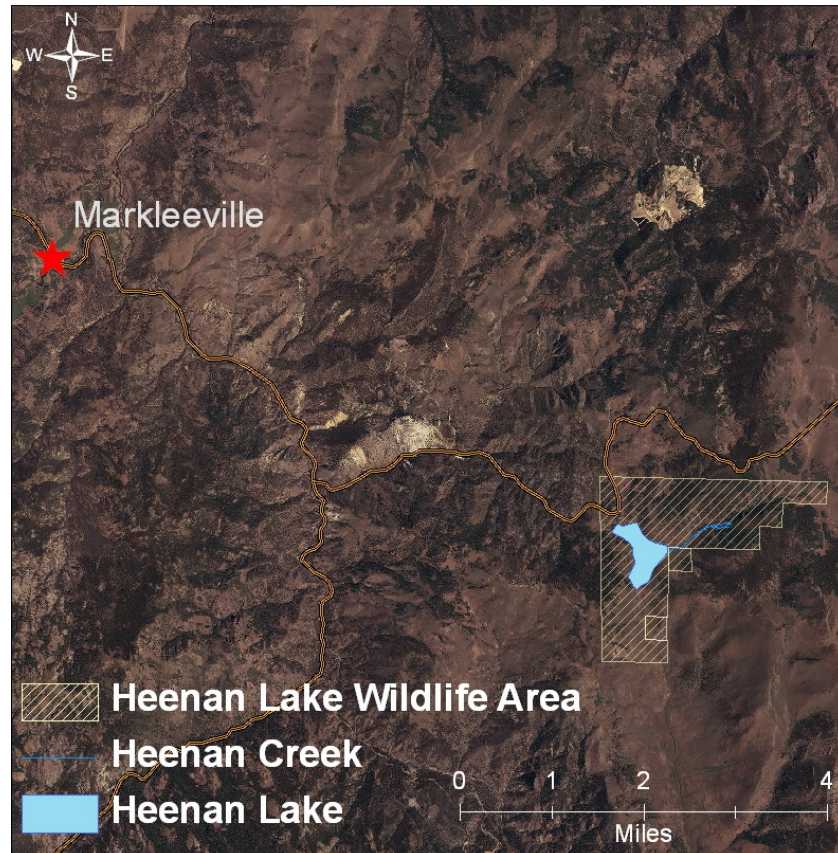
Heenan Lake contains two strains of Lahontan cutthroat trout. One strain, originally from Independence Lake, near Truckee, CA, is believed to be of pure genetic stock (Independence-strain); these fish are marked with an adipose fin clip and are an important brood-stock source used to support hatchery stocking efforts throughout California. The second strain was translocated into Heenan Lake in 1935 (Somer 2009) and is hybridized with rainbow trout (*Oncorhynchus mykiss*) of unknown origin (Heenan Lake-strain). These fish are identified by the presence of an adipose fin and are not used in brood stock management (naturally spawning Independence Lake-strain Lahontan cutthroat trout may also have an intact adipose fin; however, no trout with an adipose fin is used in brood stock management). A fish weir is in place near the mouth of Heenan Creek and a ladder structure directs adult spawners into the raceways constructed by the DFG for the purpose of spawning Independence-strain Lahontan cutthroat trout on an annual basis. During this process, all trout with an intact adipose fin are removed from the system.

Hybridized Heenan Lake-strain Lahontan cutthroat trout are present in Heenan Creek and a goal of the DFG Heenan Lake Fishery Management Plan (Somer 2009) is to remove these fish from Heenan Creek to avoid potential hybridization with Independence-strain brood stock. This population of introgressed fish poses an ongoing threat to the genetic integrity of Independence-strain Lahontan cutthroat trout in Heenan Lake. It is possible for these hybridized fish to move downstream from Heenan Creek into the lake and spawn with lake-dwelling fish in the inlet below the fish weir. Although these offspring would have an intact adipose fin and, therefore, would not be spawned in subsequent years, the continual influx of rainbow trout alleles into the lake population should be minimized and, if possible, eliminated.

The DFG Heritage and Wild Trout Program (HWTP) has conducted manual removal of fish in Heenan Creek since 2008 (Weaver and Mehalick 2008 and

2009). In an ongoing effort to continue to eradicate the stream population, the HWTP again removed fish using backpack electrofishers in Heenan Creek in 2010 and this report summarizes the methods and results.

Figure 1. Map of Heenan Lake Wildlife Area including Heenan Lake and Heenan Creek.



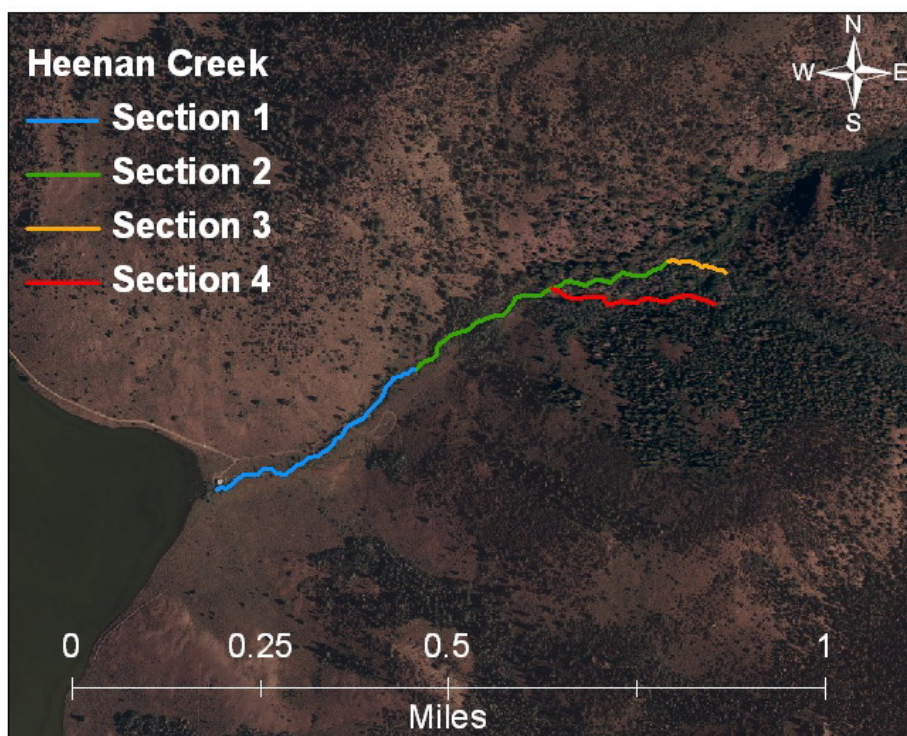
Methods

Manual removal efforts were conducted on June 14-30, 2010; September 27-30, 2010; and November 4, 2010. On June 14, at the start of the 2010 removal effort, the HWTP observed lake-form Lahontan cutthroat trout upstream of the fish weir. Lake-form Lahontan cutthroat trout were identified based on their size (typically larger than 12 inches) and morphology (lack of body spots and parr marks, spawning coloration, etc). Underwater examination of the weir identified structural damage (wooden boards were rotting and/or missing), allowing for adult fish from the lake to move upstream into Heenan Creek. DFG staff onsite at Heenan Lake on June 11, 2010 did not observe any lake-form fish upstream of the weir. Presumably, the breach in the weir occurred between June 11 and 14, 2010. A visual survey of Heenan Creek was conducted to identify the upstream distribution of lake-form fish; these fish were observed only in the lower 400 feet

of Heenan Creek. A small cascade (approximately three feet in height) through dense willows (which slanted downward over the water) prevented these fish from invading farther upstream. On June 16, 2010, DFG staff repaired the broken weir. Following repairs, the HWTP relocated the lake-form fish from Heenan Creek to Heenan Lake first using dip nets only (without electrofishing) and then with Smith Root backpack electroshockers. Fish were handled carefully to minimize injury and stress. All captured fish were examined for the presence or absence of an adipose fin and were tallied. Fish with an intact adipose fin were euthanized and removed from the system.

Following the relocation of lake-form Lahontan cutthroat trout, manual removal efforts of introgressed trout were conducted throughout Heenan Creek using Smith Root backpack electroshockers. All captured fish were measured to the nearest inch using a calibrated landing net (total length) and were euthanized and dispatched (buried or dispersed in dense vegetation). In 2008, Heenan Creek was subdivided into four sections from the fish weir upstream approximately one mile (Sections 1-4) for the purpose of monitoring removal efforts and fish densities in discrete portions of the drainage (Figure 2). In June, 2010, the HWTP completed a single-pass electrofishing effort of all four sections to determine the current distribution of fish in the system. Zero fish were captured in Sections 3 and 4 and all subsequent efforts in 2010 were therefore focused in Sections 1 and 2. In previous years, complete passes of each section were conducted; in 2010, areas where fish densities appeared the highest were targeted. Dense riparian vegetation that limited physical access to the creek was removed using a brush saw (particularly in the meadow habitat of Section 1). In all areas of the creek where gravel was located, HWTP surveyors actively trampled the streambed in an effort to dislodge eggs and limit recruitment.

Figure 2. Map of Heenan Creek section locations.



Results

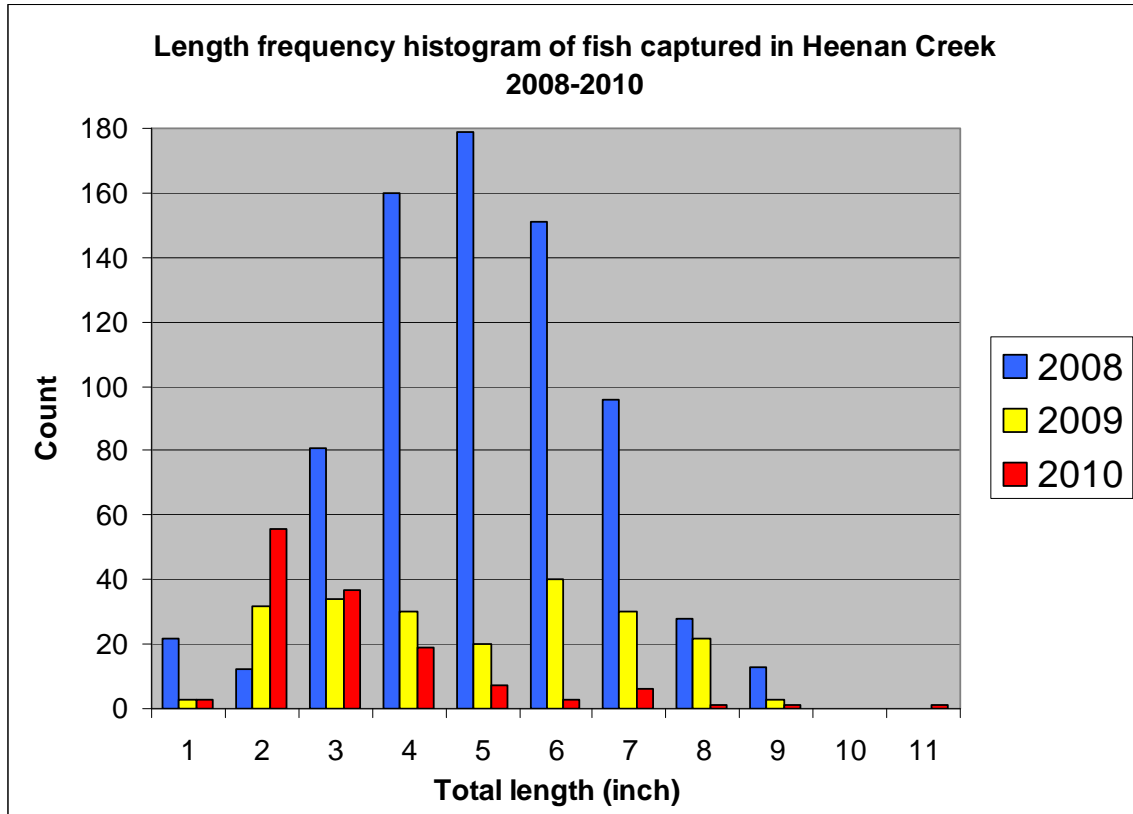
A total of 853 lake-form LCT were rescued following the breach of the weir. Of these, six had an intact adipose fin and were euthanized (<1%). An additional 39 fish were found dead on top of the weir (out of the water). A total of 134 stream resident fish were captured and euthanized in 2010 (Table 1). The majority of fish were captured in Section 2 (96%). During the September removal effort, all fish captured were from Section 2 (69 total) and were three inches or less in total length. Natural spawning of Lahontan cutthroat trout occurs in the spring and these fish were likely young of year. Section 2 is steeper in gradient and has greater habitat diversity than Section 1 and may be preferred trout spawning and rearing habitat. Section 1 flows through predominantly meadow habitat surrounded by thick willows (*Salix* spp.) and is dominated by silt substrates. Overall, 72% of the stream-resident trout captured in 2010 were three inches or less in total length (although an 11-inch trout was captured during the June effort and a nine-inch trout was captured in November).

Since 2008, there has been a large reduction in the number of fish captured in each subsequent year (Figure 3). In 2008, a total of 742 fish were captured with 90% having a total length between three and seven inches. In 2009, a total of 214 fish were captured with a relatively even distribution of fish between two and eight inches total length. As mentioned previously, of the 134 fish captured in 2010, the majority were three inches or less in total length.

Table 1. Summary of the number of fish captured in Heenan Creek in 2010 (not including lake-form fish). Dash mark indicates section was not surveyed.

	Section 1	Section 2	Section 3	Section 4	Total
June	5	57	0	0	62
September	0	69	-	-	69
November	-	3	-	-	3

Figure 3. Length frequency of fish captured in Heenan Creek 2008-2010 (not including lake-form fish observed in 2010 following the weir breach).



Discussion

Heenan Creek flows through montane chaparral, aspen groves, wet meadow complexes, and coniferous forest habitats. The meadow sections are densely vegetated with willows and physical access to the stream is generally quite limited in these areas. Removal of willows in 2010 increased access to the creek, increased backpack electrofishing coverage and efficiency, and is recommended for future efforts. Due to the small stream channel and heavily vegetated nature of this system, use of backpack electrofishers for manual fish removal is challenging and time-consuming and fish are likely missed with each pass. In order to ensure that complete removal of hybridized trout from Heenan Creek has been achieved, it is necessary to repeat this sampling effort in 2011 and beyond. Removal will likely need to occur multiple times within a given year, on an annual basis for the next several years in order to meet project success criteria. It is important to remove sexually reproductive trout from the system to break the spawning cycle. Additional monitoring will be required to ensure zero trout are captured over a multi-year period. Given the substantial depletion rate of fish greater than four inches from 2008 to 2010, it appears that larger fish are being effectively removed from the population. Although reproduction may have

been limited by manual removal efforts in this stream, the spawning cycle does not yet appear to be broken (given that an eleven-inch fish was captured in June, 2010 and a nine-inch fish was captured in November, 2010). Based on the higher proportion of two to four-inch fish captured in September, 2010, spawning likely occurred, yet it is noteworthy that the numbers of fish captured across all size classes are considerably lower than in 2009. In order to maximize the chances of halting spawning in this population, it is recommended that a removal effort be conducted as early as possible in the spring of 2011 before spawning occurs. However, due to high elevation, possibility of snow, and corresponding road closures in the area, access may be limited during the ideal timeframe (April to May, 2011).

The fish weir and its integrity as a fish barrier should be reevaluated for long-term project success. At a minimum, it should be examined each spring during high flows and before the spawning season to ensure its effectiveness as a barrier. In addition, it would be of value to better understand species composition and the proportion of hybrid fish found within the lake in order to gauge how much influence the Heenan Creek population has had on the lake's trout population assemblage. As outlined in the Heenan Lake Fishery Management Plan, long-term project success will be accomplished with the removal of all hybridized fish (in both Heenan Creek and Heenan Lake) and removal of the fish weir to allow fish passage and natural spawning of Independence-strain Lahontan cutthroat trout in Heenan Creek (Somer, 2009). Due to the presence of hybridized fish in both parts of this system, these objectives are not likely to be met until a chemical treatment of both the creek and lake can be performed. However, since a chemical treatment is unlikely to occur in the near future, the HWTP recommends continuing multiple (spring and fall) annual electrofishing removal efforts throughout Heenan Creek to minimize genetic threats to the Independence Lake-strain population.

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.

Somer, W. 2009. Heenan Lake Fishery Management Plan. State of California, The Resources Agency, Department of Fish and Game, North Central Region, Rancho Cordova, CA.

Weaver, J., and S. Mehalick. 2008. Heenan Creek 2008 Summary Report. State of California. Natural Resources Agency. Department of Fish and Game. Heritage and Wild Trout Program. Rancho Cordova, CA.