

Heenan Creek 2008 Summary Report

September 2nd-5th, 2008
November 14th, 2008

Heritage and Wild Trout Program
California Department of Fish and Game



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Introduction:

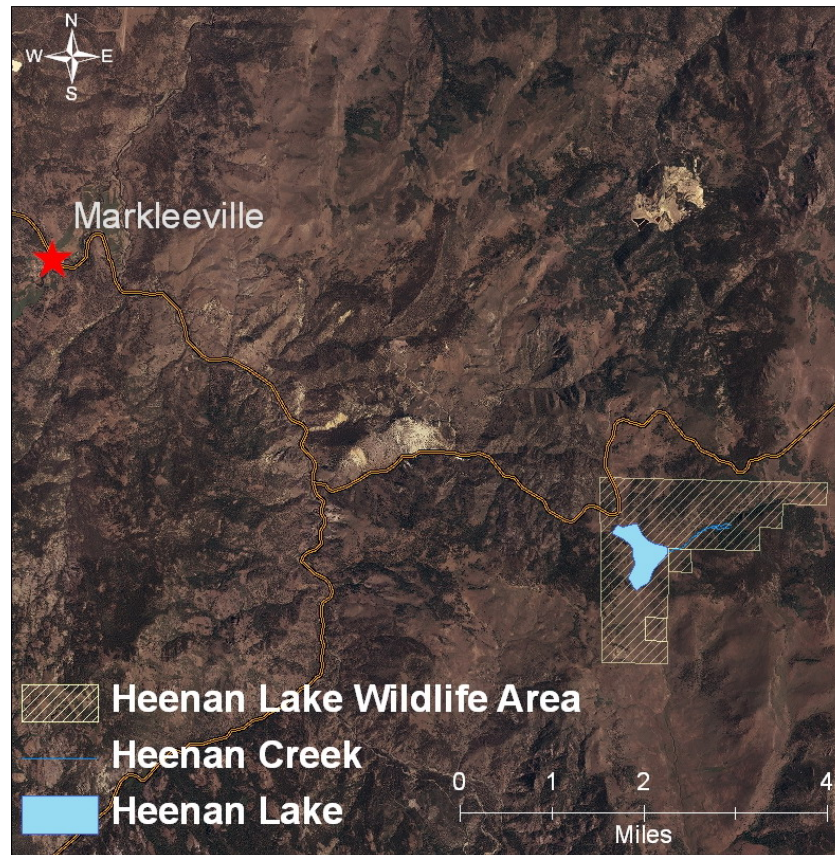
The California Department of Fish and Game's (DFG) Heenan Lake Wildlife Area (southeast of Markleeville in Alpine County, CA; see Figure 1) provides a popular seasonal fishery for Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), a federally-listed Threatened species under the Endangered Species Act. Heenan Lake was designated by the California Fish and Game Commission as a Heritage Trout Water in 1999 (it has been a Wild Trout Water since 1983) and supports lake-form Lahontan cutthroat trout, an important brood-stock source used to stock numerous waters throughout the state.

Due to stocking from different source populations dating back to the 1930s, there are two strains of Lahontan cutthroat trout in the lake. One strain, originally from Independence Lake, is believed to be of pure genetic stock; these fish are marked with an adipose fin clip and are used exclusively to support hatchery stocking efforts. The Heenan Lake strain, originally from the West Fork Carson River (first translocated into nearby Blue Lakes and, from there, into Heenan Lake) is known to be hybridized with rainbow trout (*Oncorhynchus mykiss* spp.) of unknown origins. These fish are identified by the presence of an adipose fin and are not used in brood stock management.

DFG has constructed a spawning shed, fish ladder, and fish weir on Heenan Creek, an inlet stream on the eastern shore of the lake. During the spring spawning season, fish that enter the inlet encounter the fish weir which prevents them from moving farther upstream into the system to spawn naturally. Instead, these fish travel into the spawning shed via the fish ladder and are examined for the presence or absence of an adipose fin. Only those Independence-strain Lahontan cutthroat trout with a removed adipose fin are selected for spawning. The eggs and milt are collected onsite and are then transported to DFG's Hot Creek Hatchery to be hatched and reared. There is a short section of Heenan Creek downstream of the fish weir (within the high water mark of Heenan Lake) where natural spawning can occur, although this is often limited in area during spring months when the lake level is generally high. It is not known how or when fish moved upstream of the weir and colonized Heenan Creek. These fish appear to be self-sustaining and are hybridized (Somer, pers. comm.).

As outlined in the Heenan Lake Fishery Management Plan, one of DFG's goals is to remove the hybridized Lahontan cutthroat trout in Heenan Creek to avoid potential interbreeding with the Independence-strain brood stock. In 2008, the HWTP conducted manual removal of these fish via electrofishing and this report summarizes our methods and results.

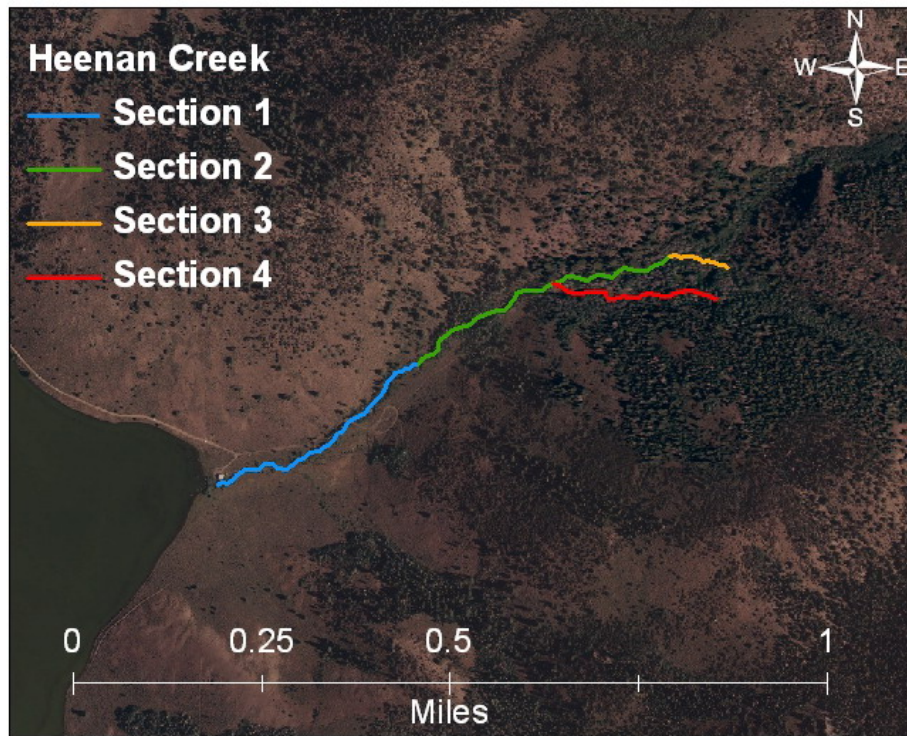
Figure 1. Map of Heenan Lake Wildlife Area including Heenan Lake and Heenan Creek



Methods:

Heenan Creek was subdivided into four sections from the fish weir (located adjacent to the egg-taking facility) upstream approximately one mile (Sections 1-4), for the purpose of determining the distribution and density of fish throughout this system (Figure 2). On September 2nd-4th, 2008, HWTP staff conducted a single pass electrofishing effort of all four sections. Due to shallow water in Section 4, we were unable to electrofish the entire section. Surveyors visually inspected this section and “spot-shocked” where feasible. Using a calibrated landing net, the total length of each captured fish was approximated to the nearest inch and these values were recorded on a data sheet. Representative photographs were taken of numerous fish to document morphological characteristics. All captured fish were euthanized and dispatched (buried or dispersed in dense vegetation).

Figure 2. Map of 2008 Heenan Creek Section locations



The first pass showed the distribution of fish to be limited to Sections 1 and 2; all subsequent electrofishing was concentrated in these two sections. On September 4th, 2008 we conducted a second pass on Sections 1 and 2, following the protocol outlined above.

On September 5th, 2008 we conducted a third pass of Section 1; due to time constraints we were unable to conduct a third pass on Section 2.

On November 14th, 2008, HWTP and DFG North Central Regional staff revisited Heenan Creek and conducted a final pass removal effort from the fish weir upstream to the natural fish barrier marking the end of Section 2 (which included the entire length of both Sections 1 and 2). Six staff divided into teams of two and leap-frogged each other in order to cover as much ground as possible. Fish were not tallied by section but for the entire day's effort. Depending on the team and the tools available, fish were measured to the nearest inch, nearest half-inch, or nearest millimeter. In addition, a total of 79 tissue samples were collected throughout the entire length of the stream for the purpose of genetic analysis. Tissue samples were collected by removing a portion of the caudal fin with a pair of scissors, per University of California at Davis Genomics Variation Laboratory Tissue Collection Protocols (Stephens, pers. comm.). Each tissue sample was placed in a labeled envelope with a unique identification number that corresponded to

information recorded for that fish on the datasheets. The HWTP has assumed responsibility of the tissue samples and is storing them until further analysis is necessary.

Results:

A total of 740 fish were captured throughout the multiple days of survey effort (Table 1). The distribution of fish was limited to Sections 1 and 2; the top boundary of Section 2 was a natural cascade approximately five feet in height and zero fish were found above this cascade (Figure 3). Section 4 consisted of a side channel or fork in the creek; zero fish were captured in this fork. The average fish length was five inches. There was great variability in morphological characteristics of these fish. Some appeared to more closely resemble coastal rainbow trout, others Lahontan cutthroat trout, and some had characteristics of both species (Figure 4). It was noted that three of the captured fish in Section 2 did not have adipose fins.

Figure 3. Photograph of natural fish barrier located at the upper extent of Section 2



Table 1. Summary of the number of fish captured by date and section

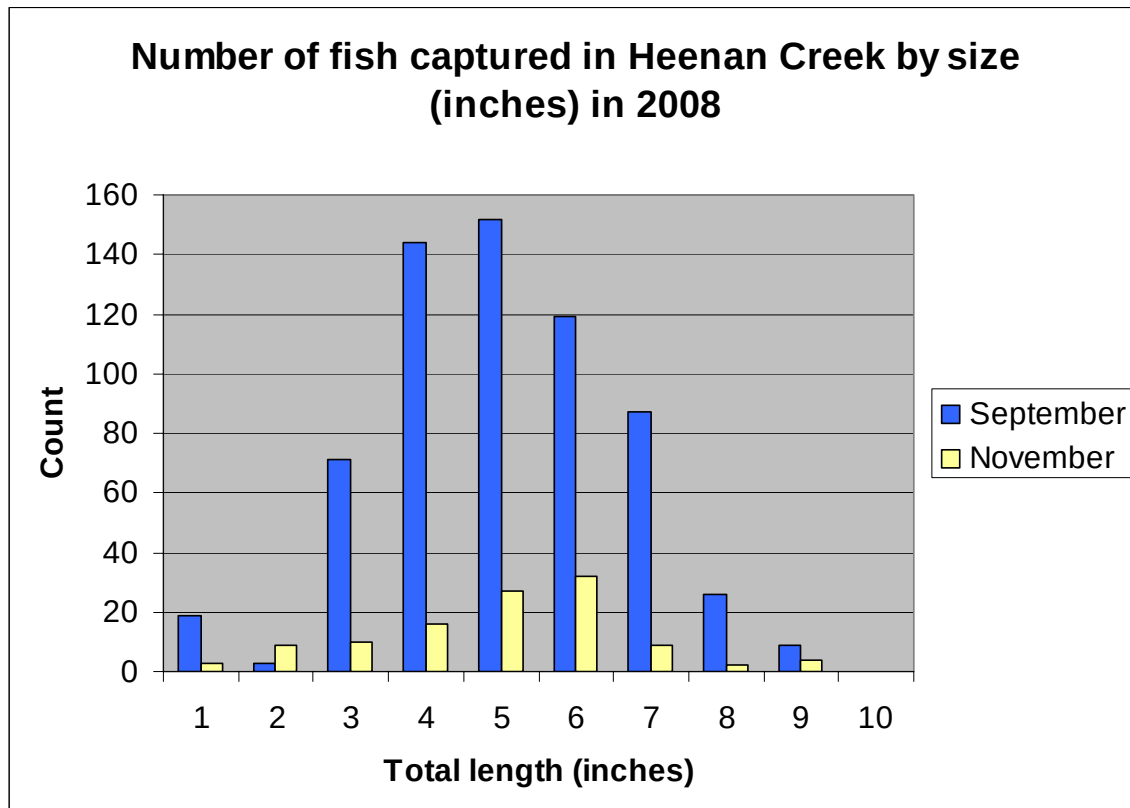
Survey Date	Section Number	Total Number of Fish Captured
9/2/2008	1	28
9/3/2008	1	45
9/4/2008	1	61
9/5/2008	1	25
9/3/2008	2	310
9/4/2008	2	159
9/3/2008	3	0
9/3/2008	4	0
11/14/2008	1 and 2	112

Total fish captured = 740

Figure 4. Photographs of fish captured in 2008 in Heenan Creek



Figure 5. Comparison of number of fish captured by size (total length in inches) between September and November survey effort in Heenan Creek, 2008



Discussion:

Heenan Creek flows through montane chaparral, aspen, wet meadow complexes, and coniferous forest habitats. The meadow sections are densely vegetated with willows and electrofishing was difficult in these areas. Water conductivity is relatively low. Due to the nature of this stream system, use of backpack electrofishers for manual fish removal is difficult, time consuming and fish are likely missed with each pass. For continued success, it is necessary to repeat this sampling effort in 2009 and beyond. The short-term goal is to remove enough adults to break the spawning cycle of these hybridized fish. Given the depletion rate of fish greater than six inches from the September to November surveys (Figure 5), it is possible that continued annual electrofishing and physical removal of fish will accomplish the goal of breaking the spawn. We recommend continuing removal efforts in 2009 and future years to ensure the successful eradication of these hybridized fish.

Anglers occasionally report catching “rainbow trout” in Heenan Lake (including a 23” and 26” rainbow trout caught in the inlet channel of Heenan Lake by one of our HWTP staff on September 4th, 2008). It is believed these fish originate in Heenan Creek and out-migrate to the lake. No fish larger than nine inches was observed in Heenan Creek.

Further assessment of the fish weir and its integrity as a fish barrier needs to be conducted. In addition, it would be useful to better understand species composition and the proportion of hybrid fish found within the lake. Long-term project success will be accomplished with the removal of all hybrid fish (in both Heenan Creek and Heenan Lake) and removal of the fish weir to allow fish passage and natural spawning in the inlet of pure-strain Lahontan cutthroat trout. Due to the presence of hybridized fish in both parts of this system, these objectives will not likely be met until a chemical treatment of both the creek and lake can be performed. However, since a chemical treatment is unlikely in the near future, we recommend continuing our manual removal efforts in 2009 and beyond.

References:

Behnke, Robert. 2002. Trout and Salmon of North America. Chanticleer Press, Inc. NY.

Simmons, Rachel and B. May. 2008. Redband Trout Genetics Report. Genomic Variation Laboratory, University of California, Davis.

Somer, Bill. 2008. Heenan Lake Fishery Management Plan. State of California; The Resources Agency; Department of Fish and Game North Central Region.