

Kettle Springs Field Note 8/31/09

Parks Creek, Shasta Springs Ranch, Emerson Investments Inc.
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Kettle Springs is a cold water tributary spring to Parks Creek that produces approximately 5 cfs of 13° C. water.¹ The spring is located at 041.5492241° N; 122.4268589° W (Figure 1 and 2). Parks Creek was the only known location in the Shasta River watershed where wild coho were known to spawn in 2008. Kettle Springs Creek provides the only currently accessible over summer rearing habitat for coho in Parks Creek and is the only known location where juvenile coho from Brood Year 2008 are currently rearing in the Shasta River watershed. Diversion of the spring water for irrigation is reducing the available habitat, warming the water, and displacing rearing coho.

Water Diversion from Kettle Springs

An earthen berm has been constructed around the springs in order to store and control the flow of water (Figure 1). When the control head gate to Kettle Springs Creek is open, the impoundment is drained and the full discharge of the spring heads northwest for 1.7 miles to Parks Creek (Kettle Springs Creek, Label 1 Figure 3). When the head gate is shut, the impoundment fills and spills out into the South Channel (Label 2, Figure 3). In this configuration, water in the South Channel travels southwest before looping back and returning to Kettle Springs Creek at Label 3, Figure 3). Typically flows of 1 to .5cfs are released into Kettle Springs Creek while the south ditch is flowing. On 8/20/08 the entire flow of the springs into Kettle Springs Creek was shut off (Cattle Springs memo 8/25/08).

Monitoring in 2009

During the summer of 2008 and in 2009 we observed juvenile coho and steelhead rearing in the pool directly downstream of the head gate that controls the flow into Kettle Springs Creek (Upper Kettle Spring Creek Pool, Figure 5). In 2009, we monitored water temperatures in this pool and at two additional locations shown in Figure 2. Temperatures were recorded hourly with two Onset temperature loggers at each location. We observed where the spring water was being directed during weekly visits to the site.

Monitoring Results

On 5/26/09, the head gate to the Kettle Spring Creek was shut and the impoundment was full with most of the spring flow was entering the South Channel. No salmonids were observed in the Upper Kettle Springs Creek Pool. On 6/2/09, the head gate was open and the full flow of the spring was entering Kettle Springs Creek. We counted approximately 100 juvenile steelhead and 6, 0+ coho. The operation of the spring remained this way for the next three weeks and we observed an increase in the number of juvenile coho and steelhead moving into the Upper Kettle Springs Creek Pool as water temperatures increased in Parks Creek and the Shasta River. The largest count of salmonids was observed during a sudden warming period on 6/23/09 when we counted 12, 0+ coho and approximately 125, 0+ steelhead in the Upper Kettle Springs Creek Pool. During this period, six coho were captured in the pool and PIT tagged.

On 7/7/09 the head gate to Kettle Springs Creek was once again closed down with most of the flow entering the South Channel. Following the reduction of flow into Kettle Springs Creek, we observed a drop in the number of juvenile coho and steelhead rearing in the Upper Kettle Springs Creek Pool. On 7/7/09 we counted only 30, 0+ steelhead and 3, 0+ coho. One of the PIT tagged coho from the pool moved downstream and was detected entering the Shasta River on 7/11/09. Warm water in the South Channel

Effect on stream temperature

Figure 4 shows the daily maximum, daily average and the daily minimum water temperatures in the Upper Kettle Springs Creek Pool from 5/26/09 through 7/14/09. The more stable temperatures recorded in the pool between 6/2/09 and 6/30/09 (Figure 4) coincides with the time period when the head gate from spring was open. We believe this is due to the greater volume of water entering the creek and absence of warming in the impoundment.

Figure 5 shows daily maximum water temperatures in Kettle Springs Creek that were recorded at the three locations shown in Figure 2. The red line is the maximum daily air temperatures recorded at the Weed airport. Following the reduction in flow observed on 7/7/09, we observed an increase in water temperatures in the Kettle Springs Creek. We believe that this is due to the reduced volume in the creek when the diversion is operating. On 7/14/09 a flow of only .77 cfs was measured in the Kettle Springs Creek. We have not recorded a net positive flow at this site since 7/21/09.

Summary

- Cold water springs in the Parks Creek watershed and the upper Shasta River provide critical over summer rearing habitat for coho.
- When cold water from Kettle Springs is left in the channel it creates an attracting flow for salmonids in search of over summer rearing habitat
- In 2008 and in 2009, juvenile coho in the Shasta River have demonstrated the ability to migrate over four miles upstream to rear in the outfall of cold springs.
- Kettle Springs Creek is the only known location in the Shasta watershed where rearing 0+ coho from Brood Year 2008 are surviving.
- Diversion of Kettle Springs water for irrigation in 2009 is reducing available habitat, warming Kettle Springs Creek and displacing the few surviving juvenile coho in the system.

The number of coho affected by the diversion of Kettle Springs in 2009 is small, but that's the point, there are very few left. If the springs are permitted to flow, there is a chance that coho possessing the life history tactic of migrating upstream to cold springs will survive. This tactic is essential to the survival of coho salmon in the Shasta River.

Based on the number of smolts produced in 2009, we project approximately 150 adults will return to the Shasta River in fall of 2010. The progeny of this cohort will need suitable summer rearing habitat in 2011 and 2012. The recommendations listed below are a start towards creating this habitat.

Recommendations

- Reach an agreement with Emerson Investments Inc. to keep the full flow of Kettle Springs in Kettle Springs Creek.
- Exclude livestock from the Kettle Springs Creek riparian area
- Initiate an active riparian restoration program on Kettle Springs Creek
- Develop cold spring management plans and juvenile coho access plans for Clear Springs on the Shasta River and Bridge Field Springs on Parks Creek

¹ On 8/6/08, a flow of 4.87 cfs was measured directly downstream of the spring inside the drained impoundment and a flow of 5.84 cfs was measured approximately 200 feet downstream in Kettle Springs Creek.

Figure 1 Kettle Springs impoundment with the head gate closed down and water being diverted out the South channel



Figure 2

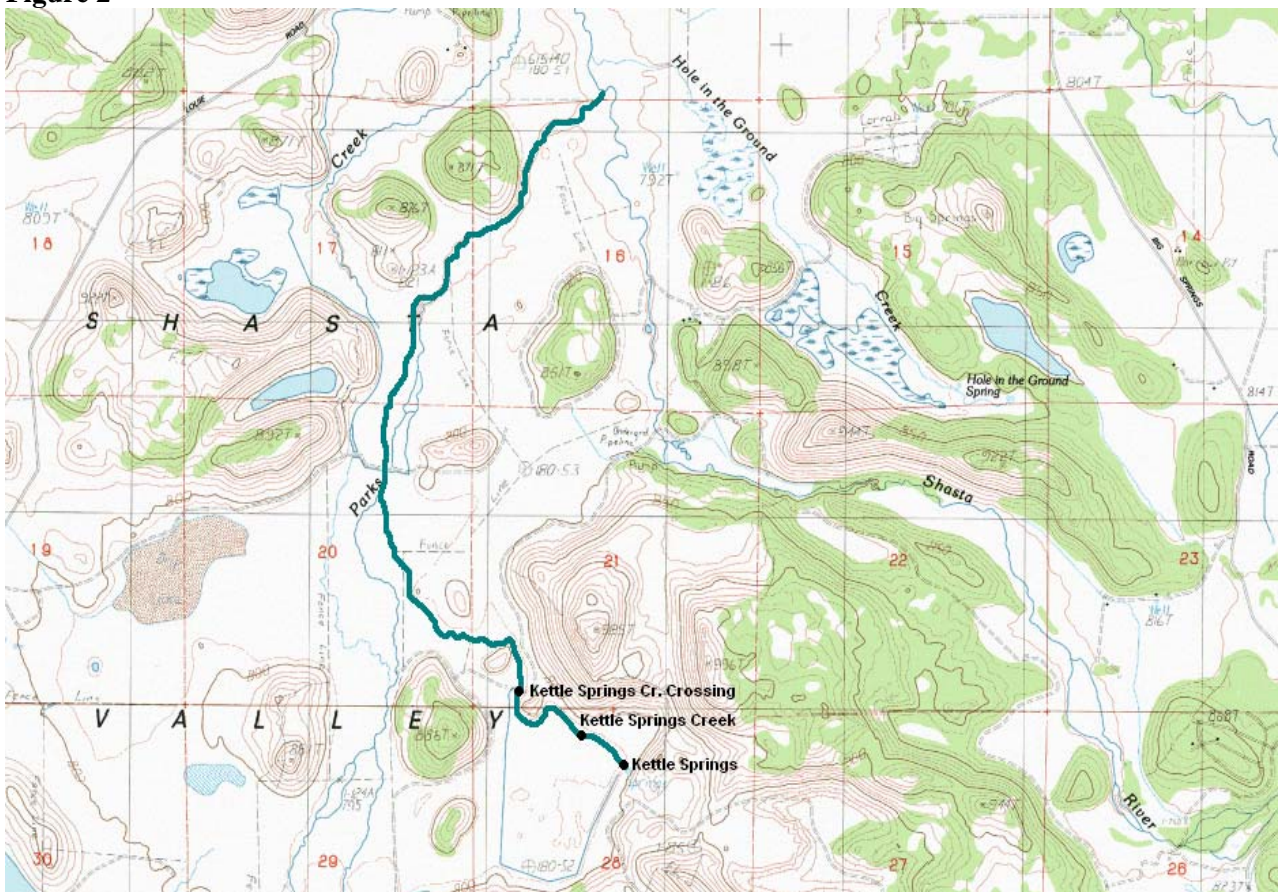


Figure 3

Upper Kettle Springs Creek Pool with the full discharge of Kettle Springs



Figure 4

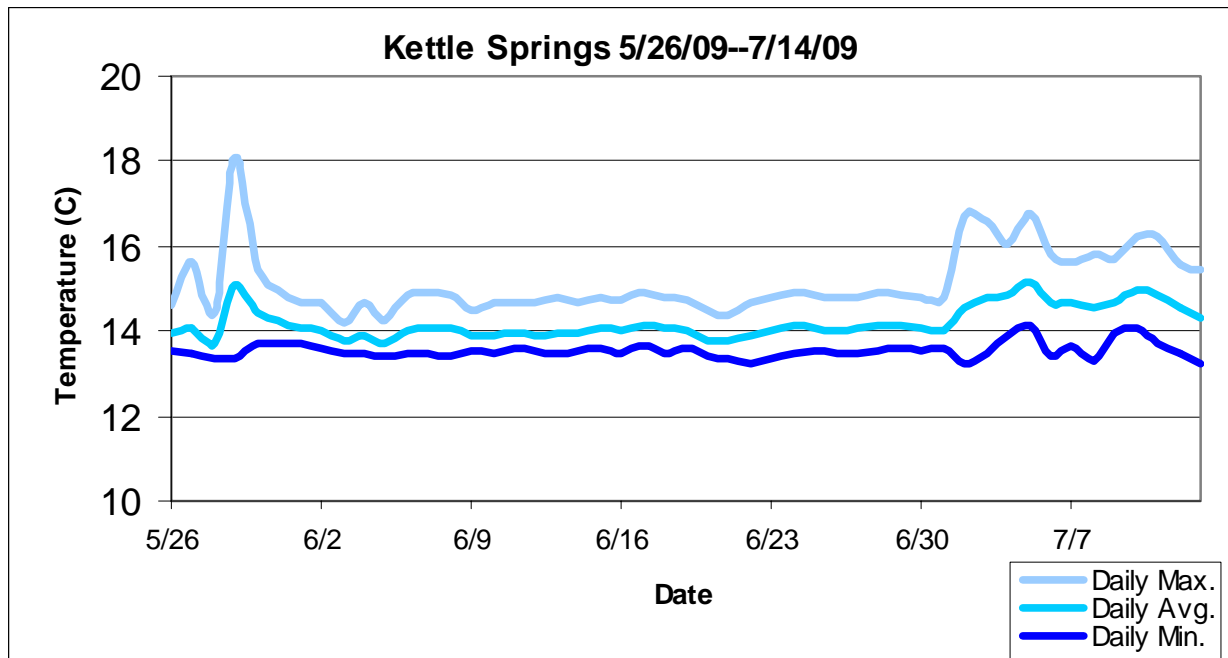


Figure 5

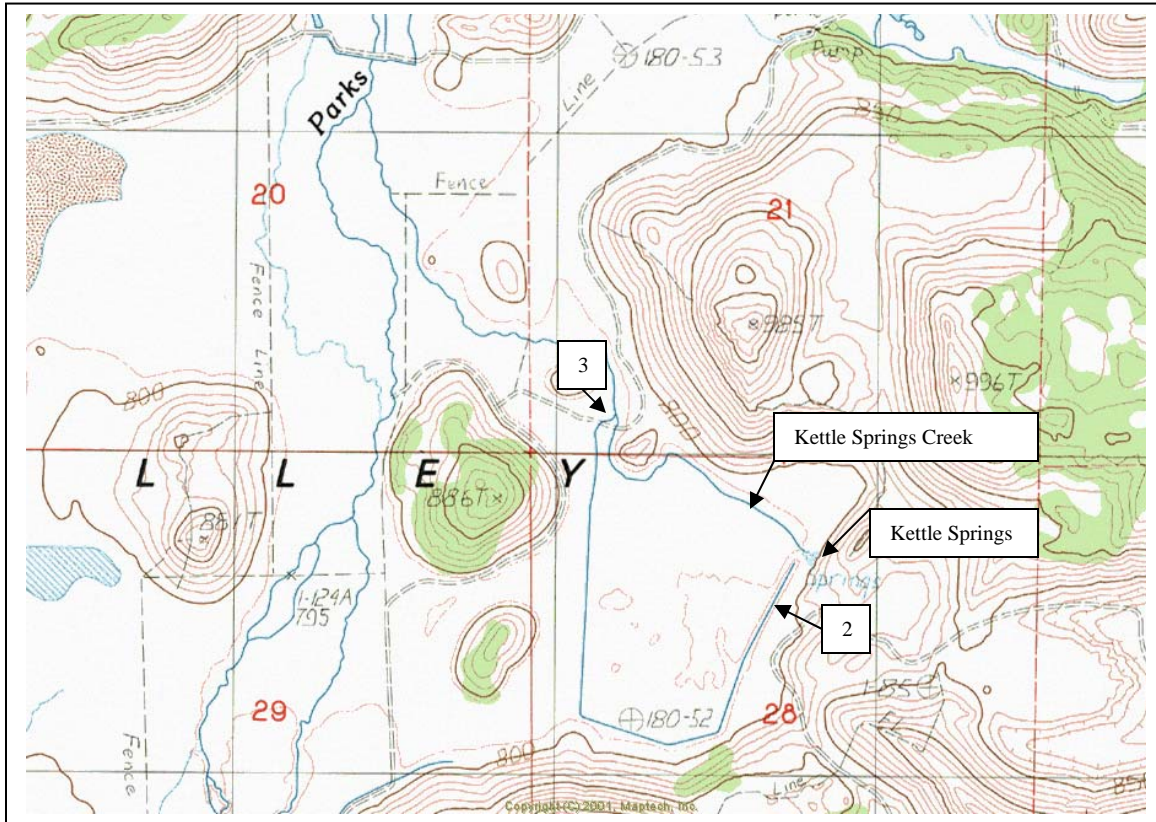


Figure 6

