

UYRSP Water Temperature Monitoring

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Introduction

Stream temperature is an important consideration when evaluating the feasibility of introducing Chinook salmon and steelhead to the upper Yuba River. Accordingly, members of the Upper Yuba River Studies Program (UYRSP) habitat study team monitored water temperatures at various locations in the upper Yuba River watershed. Monitoring began in 2003 to provide the baseline data on current water temperatures in the study area. The methods used to monitor stream temperatures in the upper Yuba River watershed were described in Appendix F of the Draft Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment (Habitat Assessment Report) (CH2M HILL 2006). In October of 2006, CH2M HILL entered into an agreement with the Department of Water Resources to download and maintain the high priority data loggers deployed under the Upper Yuba River Studies Program. This technical memorandum describes maintenance and instream data collection activities performed under Task Order NDS-0906-4464-007.

Monitoring Activities

In October of 2006, 21 active water temperature monitoring sites were visited to download data from existing loggers. Loggers at seven of the sites were damaged and had to be returned to the manufacturer to recover the data. In total, data were recovered from 12 of the existing monitoring sites. Loggers at the remaining sites were missing, most likely due to vandalism or high water. Most of the loggers remaining in the downstream portions of the drainage, below reaches considered thermally suitable for supporting salmonids, and in the canals above Lake Spaulding were removed and used to replace lost and damaged loggers in higher priority locations in the upstream portion of the drainage. An additional monitoring location was established at a new site on the South Yuba downstream of Fall Creek, giving a measurement point between Langs Crossing and the existing location upstream of Canyon Creek. Following the field work in October 2006 a total of 14 water temperature monitoring sites were active.

In response to the question of whether water temperatures in the South Yuba were affected by the October 2004 change in operations at Spaulding 1 and 2 powerhouses, and to determine the influence of inflows from Jordan Creek on downstream water temperatures, additional data loggers were installed in May of 2007. Loggers were deployed at the following locations: (1) PG&E flow measurement weir below Lake Spaulding; (2) upstream

of Jordan Creek; and (3) Jordan Creek. A missing logger from the Middle Yuba below Wolf Creek was replaced at this time, and loggers at seven of the nearby sites were checked and downloaded.

In October of 2007, the loggers at the PG&E weir, upstream of Jordan Creek, and downstream of Jordan Creek were downloaded. The logger in Jordan Creek was apparently vandalized and removed from the stream, such that it could not be located for downloading. A replacement logger was re-installed in Jordan Creek. Table 1 provides a summary of temperature monitoring sites, their period of record and status of the logger as of October 2007.

TABLE 1
Water Temperature Monitoring Locations and Periods of Record in the Upper Yuba River Watershed

Monitoring Location	Period of Record	Status
Middle Yuba		
Below Milton Dam	6/11/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 12/31/2005 1/1/2006 to 10/19/2006	Active, funding currently unavailable for download
Between Box Canyons 1 and 2	6/19/2003 to 12/31/2003 1/1/2004 to 4/28/2004 7/9/2004 to 12/31/2004 1/1/2005 to 9/18/2005	Active, funding currently unavailable for download
Above Wolf Creek	6/19/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 12/31/2005 1/1/2006 to 4/17/2006	Active, funding currently unavailable for download
Below Wolf Creek	6/19/2003 to 12/31/2003 1/1/2004 to 4/28/2004	Active, funding currently unavailable for next download
Above Kanaka Creek	6/23/2003 to 12/31/2003 1/1/2004 to 4/26/2004	Discontinued
Below Kanaka Creek	6/4/2003 to 12/31/2003 1/1/2004 to 9/16/2004 1/1/2005 to 5/19/2005	Active, funding currently unavailable for download
Below Our House Dam	5/27/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 11/15/2005	Low Priority Discontinued
Above Oregon Creek	5/27/2003 to 12/31/2003 1/1/2004 to 8/25/2004	Low Priority Discontinued
Below Oregon Creek	5/27/2003 to 12/31/2003 1/1/2004 to 8/25/2004	Low Priority Discontinued
Above Confluence with North Yuba	6/18/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 11/14/2005	Low Priority Discontinued
Wolf Creek (tributary)	6/19/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 9/21/2005	Active, funding currently unavailable for download
Kanaka Creek (tributary)	7/23/2003 to 9/15/2003 4/28/2004 to 9/16/2004	Active, funding currently unavailable for download
Oregon Creek (tributary)	5/27/2003 to 12/31/2003 1/1/2004 to 8/25/2004	Low Priority Discontinued

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Monitoring Location	Period of Record	Status
North Yuba		
Below New Bullards Bar Dam	6/3/2003 to 12/31/2003 1/1/2004 to 8/25/2004	Low Priority Discontinued
Below Confluence with Middle Yuba	6/18/2003 to 12/31/2003 1/1/2004 to 8/25/2004	Low Priority Discontinued
Above Colgate Powerhouse	6/4/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 12/31/2005 1/1/2006 to 10/22/2006	Low Priority Discontinued
South Yuba		
Below Spaulding (PG&E weir)	5/15/2007 to 10/24/2007	Active, funding currently unavailable for download
Below Langs Crossing	6/11/2003 to 12/31/2003 1/1/2004 to 9/13/2004	Discontinued
Below Jordan Creek (Langs Crossing)	10/19/2006 to 10/24/2007	Active, funding currently unavailable for download
Below Fall Creek	10/20/2006 to 10/24/2007	Active, funding currently unavailable for download
Above Canyon Creek	7/24/2003 to 12/31/2003 1/1/2004 to 4/28/2004 9/15/2004 to 12/31/2004 1/1/2005 to 9/22/2005	Active, funding currently unavailable for download
Above Poorman Creek	6/16/2003 to 9/6/2003 4/29/2004 to 7/4/2004	Discontinued
Below Poorman Creek	6/16/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 12/31/2005 1/1/2006 to 10/20/2006	Active, funding currently unavailable for download
Missouri Bar	6/17/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 8/3/2005 11/16/2005 to 12/31/2005 1/1/2006 to 5/29/2006	Active, funding currently unavailable for download
Above Spring Creek	6/16/2003 to 9/18/2003 4/29/2004 to 8/23/2004	Low priority Discontinued
Below Spring Creek	6/17/2003 to 12/31/2003 1/1/2004 to 4/28/2004	Low priority Discontinued
Below Purdon's Crossing	Loggers missing before downloading	Low priority Discontinued
Above Rock Creek	4/29/2004 to 12/31/2004 1/1/2005 to 11/18/2005	Low priority Discontinued
Above Rush Creek	4/27/2004 to 8/25/2004	Low priority Discontinued

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Monitoring Location	Period of Record	Status
Below Rush Creek	9/15/2003 to 12/31/2003 1/1/2004 to 4/27/2004 9/25/2004 to 12/31/2004 1/1/2005 to 11/14/2005 1/1/2006 to 10/21/2006	Low priority Active, funding currently unavailable for download
At Bridgeport	6/3/2003 to 6/17/2003 4/28/2004 to 9/14/2004	Low priority Discontinued
Jordan Creek	Logger vandalized Replaced October 2007	Active, funding currently unavailable for download
Canyon Creek (tributary)	6/16/2003 to 12/31/2003 1/1/2004 to 4/29/2004	Active, funding currently unavailable for download
Poorman Creek (tributary)	5/27/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 9/22/2005 1/1/2006 to 3/17/2006	Active, funding currently unavailable for download
Spring Creek (tributary)	5/28/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 11/17/2005	Low priority Discontinued
Rock Creek (tributary)	6/15/2003 to 12/31/2003 1/1/2004 to 12/31/2004 1/1/2005 to 11/18/2005 1/1/2006 to 9/14/2006	Low priority Discontinued
Rush Creek (tributary)	5/27/2003 to 12/31/2003 1/1/2004 to 12/08/2004	Low priority Discontinued

Data Summary

Data from the upper portion of the South Yuba River recorded during the summer of 2007 are relevant to resolving the question of whether water temperatures in the South Yuba River were affected by the October 2004 change in operations at Spaulding 1 and 2 powerhouses, and in determining the influence of inflows from Jordan Creek on downstream water temperatures. High summer water temperature was identified in the Habitat Assessment Report as the factor most likely to limit successful introduction of Chinook salmon and steelhead into the upper Yuba River watershed. Data collected from October 2006 through May 2007, during the coldest portion of the calendar year, is of less value in determining the thermal suitability of water temperatures for salmonids.

Raw data recovered from the loggers in October 2006 and May and October 2007 are included on the data CD accompanying this tech memo. The data were converted to Excel spreadsheets, summarized to average daily temperatures, and the Maximum Weekly Average Temperature (MWAT) was computed for the summer period. Data from the upper portion of the South Yuba River recorded during the summer of 2007 are presented and discussed in the following sections.

South Yuba Below Spaulding (PG&E Measurement Weir)

The data logger is located immediately above the flow measurement weir maintained by PG&E and is accessed through the Spaulding powerhouses, measuring water temperatures at approximately 100 feet downstream of the water release point from Lake Spaulding into the South Yuba River. Water temperatures during the May-to-October time period showed little variation, both seasonally and daily (Figure 1). Average daily water temperatures were generally below 50°F (10°C) during the summer of 2007 and the MWAT was 50.4°F (10.2°C).

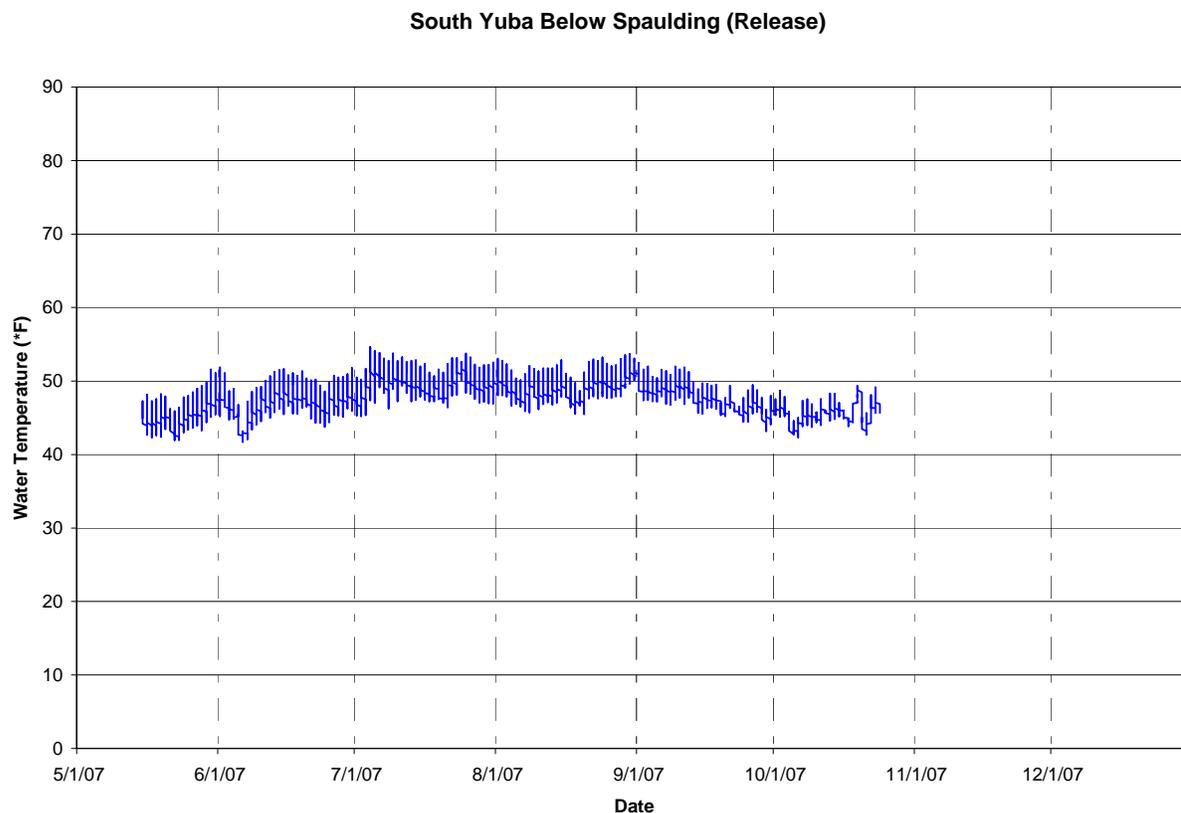


FIGURE 1

Water Temperatures Recorded in the South Yuba River at the PG&E Flow Measurement Weir Below Spaulding Powerhouse During the Spring and Summer of 2007

South Yuba Above Jordan Creek

The data logger was located approximately 200 feet upstream of the confluence with Jordan Creek in a deep pool/run area just downstream of the culverts carrying the South Yuba River under the access road on the east side of Jordan Creek. Similar to the monitoring location upstream at the release point, water temperatures during the May-to-October time period showed little variation, both seasonally and daily (Figure 2). Water temperatures were slightly higher than at the release point. Average daily water temperatures were generally below 52°F (11°C) during the summer of 2007 with a MWAT of 53°F (11.7°C).

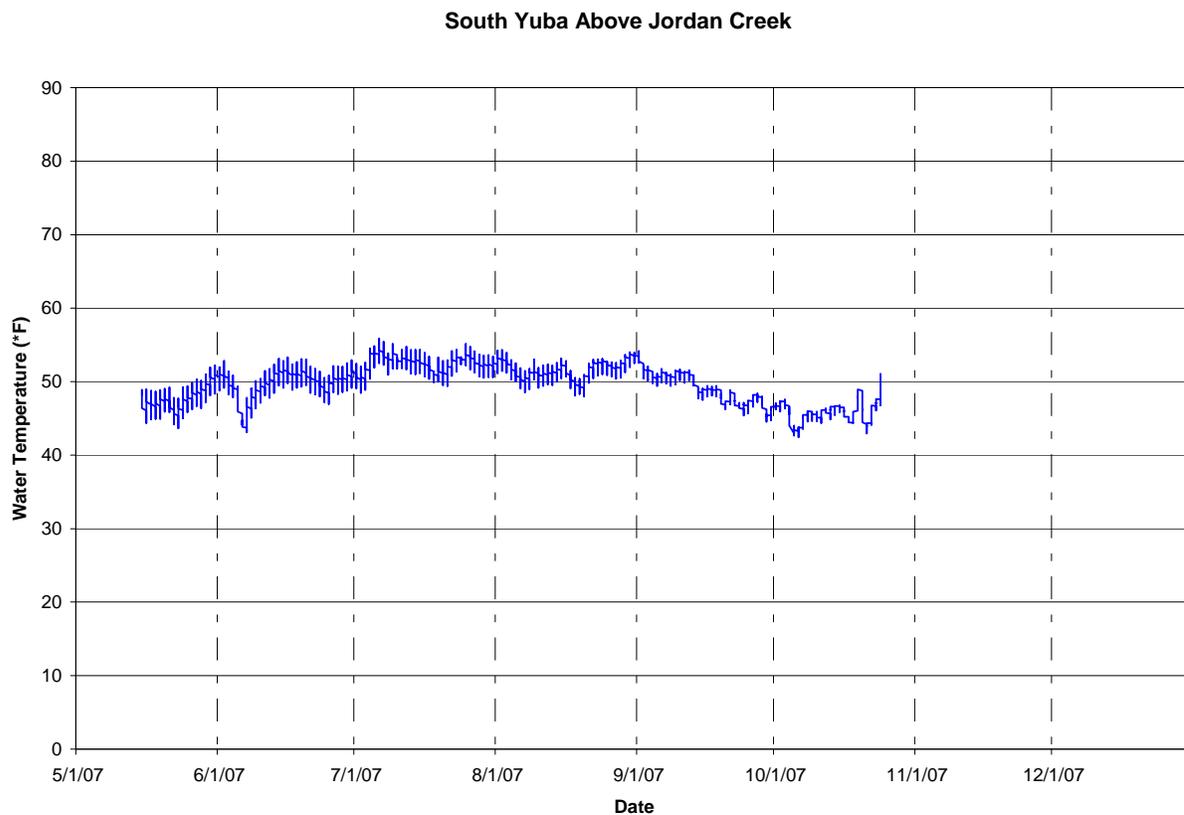


FIGURE 2
Water Temperatures Recorded in the South Yuba River Above the Jordan Creek Confluence
During the Spring and Summer of 2007

South Yuba Below Jordan Creek (Langs Crossing)

The data logger was located approximately 300 feet upstream of Langs Crossing, making this location comparable to previous monitoring location downstream of the flow measurement point at Langs Crossing. This location is also several hundred feet downstream of Jordan Creek and, in conjunction with the location above Jordan Creek, allows the influence of Jordan Creek on water temperatures in the South Yuba River to be determined. Water temperatures at this location were more variable than above Jordan Creek, both seasonally and daily (Figure 3). Average daily water temperatures were generally below 57°F (14°C) during the summer of 2007 with a MWAT of 57.7°F (14.3°C).

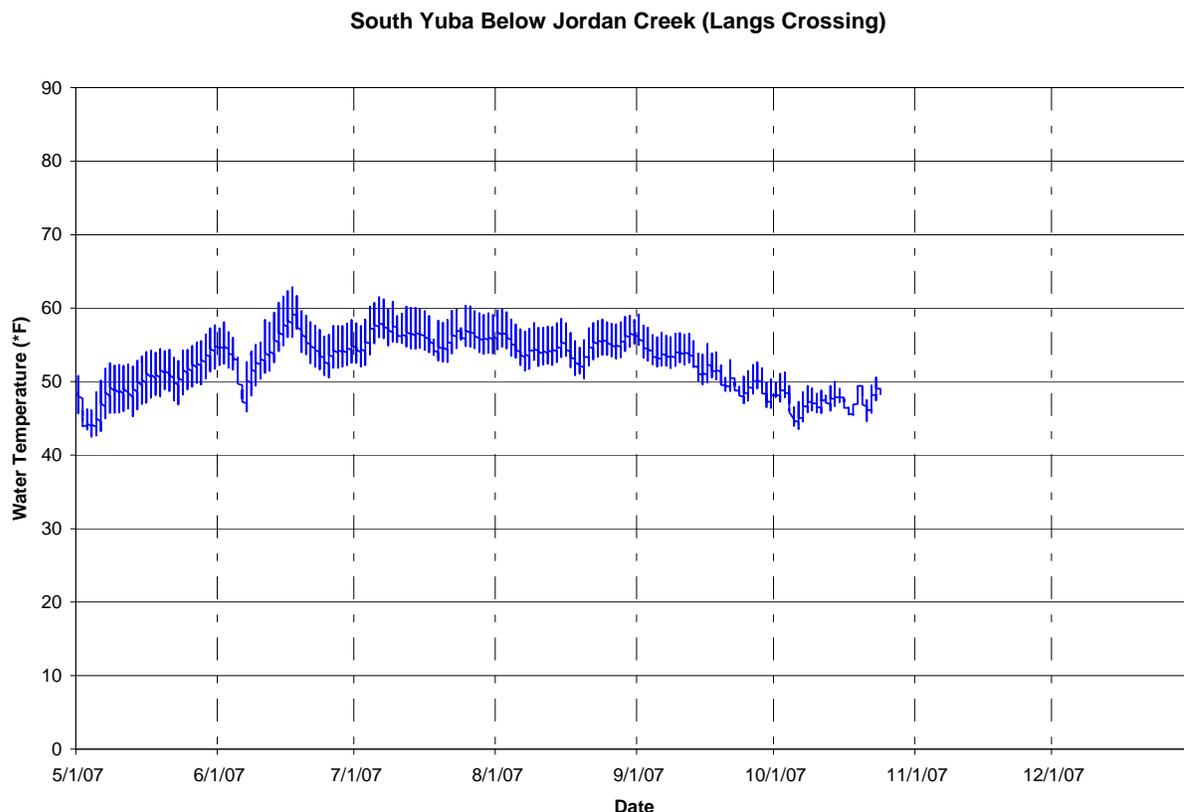


FIGURE 3

Water Temperatures Recorded in the South Yuba River Below the Jordan Creek Confluence Near Langs Crossing During the Spring and Summer of 2007

Current Status

Currently, 17 monitoring locations are believed to have active data loggers (refer to Table 1), although the logger status at most sites has not been verified since May 2007 due to a lack of funding. To date, no funds have been identified through the Upper Yuba River Studies Program for continuation of the water temperature monitoring program, which would include periodic maintenance and download of the loggers at priority sites. Pacific Gas & Electric (PG&E) is considering funding the downloading of loggers at sites which have not been downloaded since May 2007.

Literature Cited

CH2M HILL. 2006. Draft Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment. Prepared for the Department of Water Resources. Sacramento, California. June.