

Placer County Water Agency Middle Fork American River Project (FERC Project No. 2079)

WATER TEMPERATURE MONITORING PLAN



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List of Acronyms

CDFG	California Department of Fish and Game
FERC	Federal Energy Regulatory Commission
FYLF	Foothill yellow-legged frog
MFP	Middle Fork American River Project
NIST	National Institute of Standards and Technology
PCWA	Placer County Water Agency
Project	Middle Fork American River Project
QA/QC	Quality Assurance/ Quality Control
State Water Board	State Water Resources Control Board
USDA-FS	United States Department of Agriculture-Forest Service
USGS	United States Geological Survey
WTMP	Water Temperature Monitoring Plan

1.0 INTRODUCTION

This Water Temperature Monitoring Plan (WTMP) was developed for the Placer County Water Agency's (PCWA) Middle Fork American River Project (MFP or Project) located on the west slope of the Sierra Nevada range, primarily in Placer County, California.

The goal of the WTMP is to periodically characterize water temperature in the bypass and peaking reaches associated with the MFP during implementation of the new license. The water temperature monitoring is also designed to provide data at locations where fish and Foothill yellow-legged frog (FYLF) monitoring will be conducted during the term of the new license (PCWA 2011a and 2011b; SD A).

2.0 WTMP ORGANIZATION

The WTMP is organized into the following sections:

Section 3.0 WTMP Objective: This section defines the purpose of the WTMP.

Section 4.0 Monitoring Approach: This section describes the approach for general purpose monitoring of water temperatures over the term of the new license, including monitoring locations and schedule, monitoring methods, and analyses methods. The section also includes a description of the special purpose monitoring study on the Rubicon River.

Section 5.0 Reporting and Consultation: This section outlines reporting that will be required over the term of the new license and describes agency consultation that would be conducted following the completion of each monitoring period.

Section 6.0 Literature Cited: This section provides a list of documents or other resources that are referenced in the WTMP.

3.0 WTMP OBJECTIVE

The objective of the WTMP is to monitor water temperature at select sites in the bypass and peaking reaches associated with the MFP. This information will be used to characterize water temperatures within the studied reaches and will be used to aid interpretation of biological monitoring data.

4.0 MONITORING APPROACH

This section describes the approach for water temperature monitoring over the term of the license, including monitoring locations and schedule, sampling methods, and analyses methods. The monitoring approach is based on the water temperature monitoring program completed for the relicensing of the MFP (PCWA 2006; 2007a; and 2007b).

4.1 MONITORING LOCATIONS AND SCHEDULE

Water temperature will be monitored at 26 monitoring stations on the bypass and peaking reaches, which are identified in WTMP Table 1. These monitoring locations are depicted on WTMP Map 1.

Water temperature monitoring will be conducted:

- Annually for the first three years after license issuance; and then
- Coincident with any FYLF or fish surveys that may occur in Years 4 or 5 and with fish and FYLF surveys conducted during Years 7, 8, 13, 14, and thereafter for two consecutive years during every 10-year period for the term of the license consistent with FYLF and fish population surveys (PCWA 2011a and 2011b; SD A).

4.2 MONITORING METHODS

This section describes PCWA's water temperature monitoring program, including monitoring equipment and protocols for collecting, storing, and analyzing collected water temperature data. Collection of flow data, which will be used to help interpret the water temperature data, is also described. Data collection, storage methods, and analyses are consistent with those used for the studies completed during the relicensing of the MFP (PCWA 2006; 2007a; and 2007b).

4.2.1 Water Temperature Monitoring Equipment and Installation

Each water temperature monitoring station will be equipped with two temperature loggers set to record data at 15-minute intervals. The purpose of the redundant loggers is to minimize the probability that water temperature data at any particular site will be lost. Each water temperature logger will be installed in a non-descript metal box or pipe housing that requires specialized tools (e.g., key or wrench) to open, or equivalent. The housing will be labeled with contact information. The logger and housing will be secured to an anchor point (tree trunk, large boulder, etc.) using a 1/8-inch-diameter steel cable wire, or equivalent. The loggers will be placed in the thalweg of the channel to decrease the probability that the loggers could become dewatered during low-flow conditions.

4.2.2 Data Collection

Due to access limitations in the winter and spring, the water temperature loggers will be installed at the monitoring stations in the fall of the preceding year and maintained through the end of October of the monitoring year. The monitoring stations will be visited and data downloaded as soon as accessible in the spring or early summer when streamflow and access conditions permit. PCWA will visit the monitoring stations located at potential FYLF breeding locations first to ensure that the loggers are operating properly during the time when initiation of breeding occurs. The water

temperature monitoring sites will be visited and data downloaded at least once every two months between June and October.

During the time the data are downloaded from the logger, air and water temperature measurements, the approximate depth of the water temperature logger, and other observations will be noted on the data download data sheet. After the logger is removed from the water, it will be cleaned and visually inspected. The data will be downloaded into an optic shuttle and then later to a personal computer.

The equipment necessary to replace or fix an installation will be in the possession of the technicians downloading the data. Should a logger need to be replaced because of failure or vandalism, the technicians will be able to do so immediately to reduce the potential for additional data loss. Any loggers or optic shuttles that fail to download will be returned to the manufacturer in an attempt to recover the data.

Immediately after the raw water temperature data files are safely downloaded to a computer, back-ups will be recorded on two CDs that will be stored in different locations. Only after the raw water temperature data are safely backed up will the optic shuttle be cleared and data manipulated.

4.2.3 Flow Data Collection

Flow data will be obtained by PCWA from the compliance or United States Geological Survey (USGS) gage located closest to each water temperature monitoring station.

4.2.4 Data Quality Assurance/Quality Control (QA/QC)

A National Institute of Standards and Technology (NIST)-traceable digital thermometer will be used to measure the water temperature at each logger prior to data download. The water temperature reading from the NIST-traceable thermometer will then be compared to the last logger reading to evaluate potential drift of the logger. To minimize the potential for error in data collection, care will be taken to record the time when each temperature logger is deployed, removed and, if appropriate, re-deployed in the water.

Following data download, the data from each of the stream water temperature loggers will be visually and graphically inspected for anomalies. The data from the two loggers at each monitoring site will be compared to provide additional information on potential anomalies. Spurious data will be removed from the database. The raw data files will be retained in their unaltered state for future reference.

4.3 ANALYSES METHODS

Following Quality Assurance/ Quality Control (QA/QC), daily average maximum, and minimum water temperature will be determined from the 15-minute data. The daily average temperature and range for each monitoring station will be plotted with data from the previous monitoring efforts.

Hydrology data will be used to help interpret the water temperature data. The flow data will be summarized in graphs and tables illustrating daily average flow during the water temperature monitoring period.

5.0 REPORTING AND CONSULTATION

A Water Temperature Monitoring report will be prepared by PCWA and distributed to the United States Department of Agriculture-Forest Service (USDA-FS), State Water Resources Control Board (State Water Board), and California Department of Fish and Game (CDFG) for review and comment within 120 days following the end of the year the data were collected¹. The report, where appropriate, will follow the general presentation layout used in PCWA's earlier water temperature reports (e.g., 2005 and 2006 Water Temperature reports [PCWA 2006 and 2007b]). PCWA will also include any proposed changes in monitoring frequency or locations in the report. A 60-day review period will be provided to the agencies. Based on the results of the monitoring and/or comments received during the review process, PCWA and the agencies may call a meeting to discuss the results or modify the monitoring program. Within 60 days of receipt of comments, or 60 days following any meeting, comments will be addressed and the final report will be filed by PCWA with USDA-FS, State Water Board, and CDFG and Federal Energy Regulatory Commission (FERC).

6.0 LITERATURE CITED

- Placer County Water Agency (PCWA). 2006. 2005 Water Temperature Study Report. August. PCWA Middle Fork American River Project (FERC Project No. 2079), Pre-Application Document (PAD) – Supporting Document G. Submitted to FERC on December 13, 2007.
- _____. 2007a. PCWA Middle Fork American River Project (FERC Project No. 2079), Pre-Application Document (PAD). Submitted to FERC on December 13, 2007.
- _____. 2007b. 2006 Water Temperature Study Report. April. PCWA Middle Fork American River Project (FERC Project No. 2079), Pre-Application Document (PAD) – Supporting Document G. Submitted to FERC on December 13, 2007.
- _____. 2011a. Fish Population Monitoring Plan. Available in PCWA's Application for New License – Supporting Document A.
- _____. 2011b. Foothill Yellow-Legged Frog Monitoring Plan. Available in PCWA's Application for New License – Supporting Document A.

¹ Pertinent data collected at the four water temperature monitoring stations during the years with FYLF surveys will also be summarized in the FYLF Monitoring Reports.

TABLES

WTMP Table 1. Water Temperature Monitoring Locations.

Monitoring Station ¹		UTM (WGS84/ NAD83)		River Mile	General Purpose Monitoring
ID	Name	Easting	Northing		
Rubicon River and Tributaries					
RR30.2	Rubicon River downstream of Hell Hole Reservoir	724199	4326074	30.2	●
RR28.8	Rubicon River downstream of Intermittent Reach	722789	4324656	28.8	●
RR25.3	Rubicon River upstream of Deer Creek	720865	4319940	25.3	●
RR22.7	Rubicon River upstream of South Fork Rubicon River	719244	4316581	22.7	●
SF0.1	South Fork Rubicon River upstream of Rubicon River	719302	4316374	0.1	●
RR22.5	Rubicon River downstream of South Fork Rubicon River	719150	4316361	22.5	●
RR14.3	Rubicon River between South Fork Rubicon River and Big Grizzly Canyon Creek	710726	4310041	14.3	●
RR5.3	Rubicon River upstream of Pilot Creek	700778	4315974	5.3	●
PC0.1	Pilot Creek upstream of Rubicon River	700717	4316068	0.0	●
RR3.7	Rubicon River upstream of Long Canyon Creek	700418	4318194	3.7	●
LC0.1	Long Canyon Creek upstream of Rubicon River	700326	4318266	0.0	●
RR0.7	Rubicon River upstream of Ralston Powerhouse	697187	4319108	0.7	●
Middle Fork American River and Tributaries					
MF46.6	Middle Fork American River downstream of French Meadows Reservoir	717787	4331970	46.6	●
MF36.1	Middle Fork American River immediately upstream of Middle Fork Powerhouse	708245	4322433	36.1	●
MF35.5	Middle Fork American River downstream of Middle Fork Interbay	707472	4322410	35.5	●
MF29.4	Middle Fork American River downstream of Brushy Canyon Creek	701020	4321465	29.4	●
MF26.0	Middle Fork American River upstream of Ralston Afterbay Reservoir	696446	4320054	26.0	●

WTMP Table 1. Water Temperature Monitoring Locations (continued).

Monitoring Station ¹		UTM (WGS84/ NAD83)		River Mile	General Purpose Monitoring
ID	Name	Easting	Northing		
Middle Fork American River Peaking Reach and Tributaries					
MF23.1	Middle Fork American River downstream of North Fork of the Middle Fork American River	694003	4319890	23.1	●
MF14.3	Middle Fork American River upstream of Otter Creek	686039	4314393	14.3	●
NF20.8	North Fork American River immediately downstream of Middle Fork American River	669884	4309201	20.8	●
Small Bypass Streams					
DC8.4	Duncan Creek downstream of Diversion Dam	717486	4334533	8.4	●
NL3.1	North Fork Long Canyon Creek downstream of Diversion Dam	717941	4325450	3.1	●
SL3.2	South Fork Long Canyon Creek downstream of Diversion Dam	718818	4325494	3.2	●
Comparison Rivers					
NF21.4	North Fork American River immediately upstream of Middle Fork American River	670077	4309845	21.4	●
NF35.7	North Fork American River at Shirttail Creek	681473	4323725	35.7	●
NM2.3	North Fork of the Middle Fork American River upstream of the Middle Fork American River	697272	4321900	2.3	●

¹Where the locations are similar (e.g., immediately downstream of the dams), water temperature loggers will be installed in association with the flow compliance gage.

MAPS