Study 5

Temperature Monitoring of the Cold Water Pool in Millerton Lake

Public Draft
2013 Monitoring and Analysis Plan

SAN JOAQUIN RIVER
RESTORATION PROGRAM

September 2012

5.0 Temperature Monitoring of the Cold Water Pool in Millerton Lake

5.1 Statement of Need

Water temperatures affect all life stages of Chinook salmon. Currently in the study area, the availability and the effect that the Millerton cold water pool has on instream river temperatures are not well understood. Water temperature needs to be monitored to evaluate how releases from Millerton Lake's cold water pool relate to instream river temperatures.

5.2 Background

Water temperature exerts a substantial influence on the abundance, development, growth, and survival of fishes, including Chinook salmon (EPA, 1999; Myreck and Cech, 2001). Temperature is critical to the timing of life-history events, especially reproduction (Fry, 1971). High water temperatures result in physiological stress and increased metabolic demand, which may result in slower growth, increased susceptibility to disease, and lower survival rates. Understanding the longitudinal distribution of temperatures in relation to Restoration Flows on the San Joaquin River is critical to make flow schedule and stock selection recommendations.

Temperature sensors for monitoring the Millerton Lake cold water pool were initially deployed in spring 2004. The sensors monitor Millerton Lake inflow and outflow temperatures, and evacuation of the cold water pool. The data are used to calibrate and validate the CE-QUAL-W2 (W2) model of Millerton Lake temperatures providing Friant Dam release temperature inputs for the Hydrologic Engineer Center's System Water Quality (HEC-5Q) model of San Joaquin River temperatures. The data inform management of the cold water pool for downstream release temperatures.

5.3 Anticipated Outcomes

Analyses of temperature data will be used to evaluate the relative importance of the various factors that combine to produce observed stream temperatures, and to evaluate the impact of new flow schedules anticipated by the SJRRP on stream temperatures. Data can be used to inform decisions regarding methods for Chinook salmon reintroduction that could reduce thermal impacts. Water temperature monitoring evaluation will assist the SJRRP in making recommendations on specific actions relating to adaptive management of the SJRRP. Long-term monitoring is expected to allow informed decision

making to improve and/or offset adverse impacts as they may be determined by Interim Flow period monitoring and subsequent measurements of SJRRP success.

5.4 Methods

Temperature data collected at the base of Friant Dam from a temperature profile string and other locations within Millerton Reservoir will be compared to instream river temperatures.

5.4.1 Inflow and Outflow Temperatures

Hourly inflow temperatures will be collected in the San Joaquin River Channel where it enters Millerton Reservoir and at release points below Friant Dam using Onset temperature loggers. Hourly outflow temperatures will be measured at the three release points from Friant Dam and from the fish hatchery and worm farm. They are as described as follows:

- River outlet works (San Joaquin River) – TWTemp N36.99930, W119.70597
- Friant-Kern Canal – FKCANAL, N36.99697, W119.70453
- Madera Canal – MCTemp, N37.00220 W119.70769
- Main Outflow From Fish Hatchery/Worm Farm – FHTEMP N36.98485, W119.72133
- Secondary outflow from Worm Farm – FH2, N36.98563,W119.72028
- Millerton Inflows below Kerckhoff #2 PP – HW-TEMP N37.06938, W119.56102

5.4.2 Reservoir Temperature Profile

One temperature profiling string continuously monitors temperature stratification in Millerton Reservoir:

- Forebay Temperature String – In the old river channel upstream from Friant Dam, a full depth string located near the dam with 15 temperature loggers irregularly spaced to capture the detail in the epilimnion, metalimnion and, to a lesser extent, the hypolimnion.

String ID is MLSTRNG, Forebay Temp String on SS Relief Raft, GPS N37.00553, W119.69492

5.5 Schedule

Data has been downloaded twice annually in previous years. Frequency may increase, depending on input from the flow scheduling subgroup.

5.6 Budget

Estimated at $70,000 per year based on previous budget.

5.7 Deliverables

The deliverables for this study will be documented in the ATR reports and include Excel data. Updates to flow scheduling group depend on future coordination.

5.8 Point of Contact

Tracy Vermeyen/Reclamation

5.9 References

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