

Trinity River Restoration Program Performance Measure:

Temperature Target Performance

Hypothesis: Increasing habitat quality through managing temperatures for freshwater life stages of anadromous fish will improve salmonid production.

Importance: This performance measure tracks temperature target performance, a useful measure of the conditions which will influence pre-spawn mortality of adult salmonids. From Chapter 1 of the [Integrated Assessment Plan](#) (IAP):

Flow volumes and timing are designed to address both habitat and temperature needs for all riverine life stages of salmonids.

Objective: The objective of this assessment is to report on the performance of Reclamation in meeting the permit requirements specified in the [State Water Resources Control Board Order WR 90-5](#) and in the [Trinity River Record of Decision](#) (ROD).

Program Objective Relating to This Project Identified in the LAP:

Objective 2.2.1 Provide optimal temperatures to improve spawning success of spring and fall-run Chinook salmon

Targets, Predicted or Desired Response: Table 1 lists the summer and fall compliance points and temperature targets identified in the ROD, along with the dates for which the target applies. During below normal water years these dates and targets change (ROD). Figure 1 illustrates the location of the compliance points on the Trinity River. The July 1–Sep. 15 Douglas City target is for adult spring-run summer holding habitat; the Sep. 15–30 Douglas City target is for fall-run Chinook salmon spawning habitat; and the Oct. 1–Dec. 31 North Fork target is for Chinook, coho salmon, and steelhead spawning habitat.

Table 1. Trinity River Temperature Targets for adults by Reach and Date

Source	Target Reach	Dates	Target
Basin Plan for the North Coast Region (Regional Water Quality Control Board) WR 90-5	Lewiston to Douglas City	All Years	
	Lewiston to Douglas City	July 1–September 15	≤60 °F
	Lewiston to Douglas City	September 15–30	≤56 °F
	Lewiston to North Fork	October 1–December 31	≤56 °F

Technical Approach: Figure 1 is a schematic of the reservoir and river system managed by Reclamation for meeting Program temperature targets. Temperature compliance points include Trinity River at Douglas City (River Mile 93), Trinity River at the North Fork (River Mile 70), and Trinity River at Weitchpec (River Mile 0 – Confluence with the Klamath River, 43 river miles above the estuary).

Permanent temperature gages are installed near Douglas City and just above the confluence with the North Fork Trinity River. Daily average temperatures are reported via the [California Data Exchange Center](#) (CDEC). Daily means from Douglas City are reported in Figure 2 from 1993 to 2001 for the

months of July, August and September. These are the months of the hottest air temperatures and thus have the highest potential for warming the river. Consequently this is the period where the Basin Plan for the North Coast Region (Regional Water Quality Control Board) lists targets for temperature for Douglas City on the Trinity River. Note that there are three different target periods. We report on two targets from Douglas City for this performance measure.

The analysis presented in Figure 3 focused on spotlighting any target exceedances during the three periods associated with either Douglas City or the North Fork targets in 2010 and 2011. Both years are presented here because in 2010 temperature targets were exceeded and in 2011 they were not. A normalization approach was taken, normalizing the daily mean temperature, T , to the maximum observed daily mean temperature, T_{\max} , and the target, T_{target} . Equation 1 expresses this normalization. Note that there are three different target periods, and three corresponding T_{\max} values. Vertical axis values above the threshold of zero indicate an exceedance of the target.

$$\frac{T - T_{\text{target}}}{T_{\max} - T_{\text{target}}} \quad (1)$$

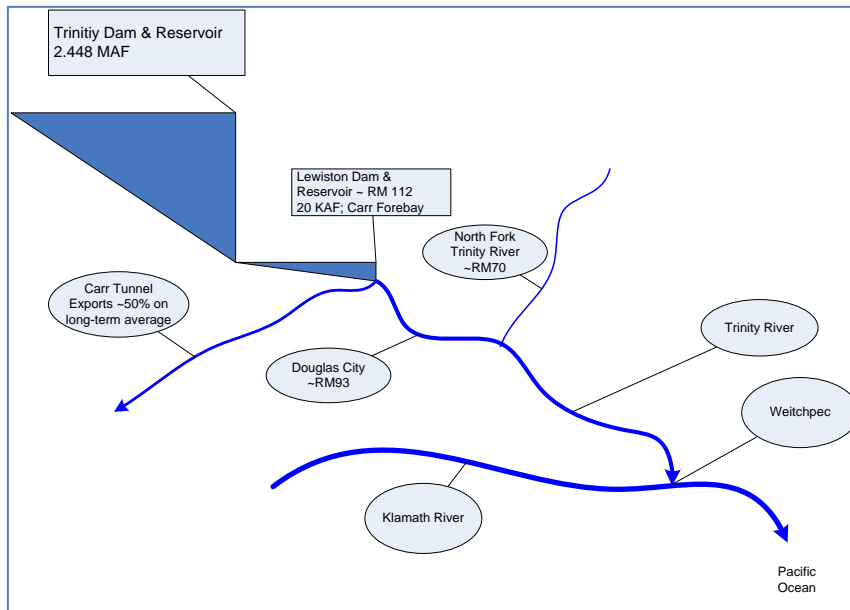


Figure 1. Schematic of Trinity River temperature compliance points and other landmarks.

Results: We examined temperature at Douglas City across the years and from July through September. Any periods when the temperature targets were exceeded by 0.1 degrees Fahrenheit or more were indicated by red in Figure 2. Later in the season temperatures were often below the targets (blue color in Figure 2). Figure 3 shows the target performance for water year 2010 and Figure 4 shows the data for 2011. In 2010, temperatures were exceeded for 6 days in August at Douglas City, with the maximum exceedance being 0.3°F. There was 1 day of exceedance on September 15, with the maximum exceedance being 0.1°F; and 4 days of exceedance at the North Fork beginning October 1, with the maximum exceedance being 1.1°F. In 2011 no temperature targets were exceeded for the summer and fall.

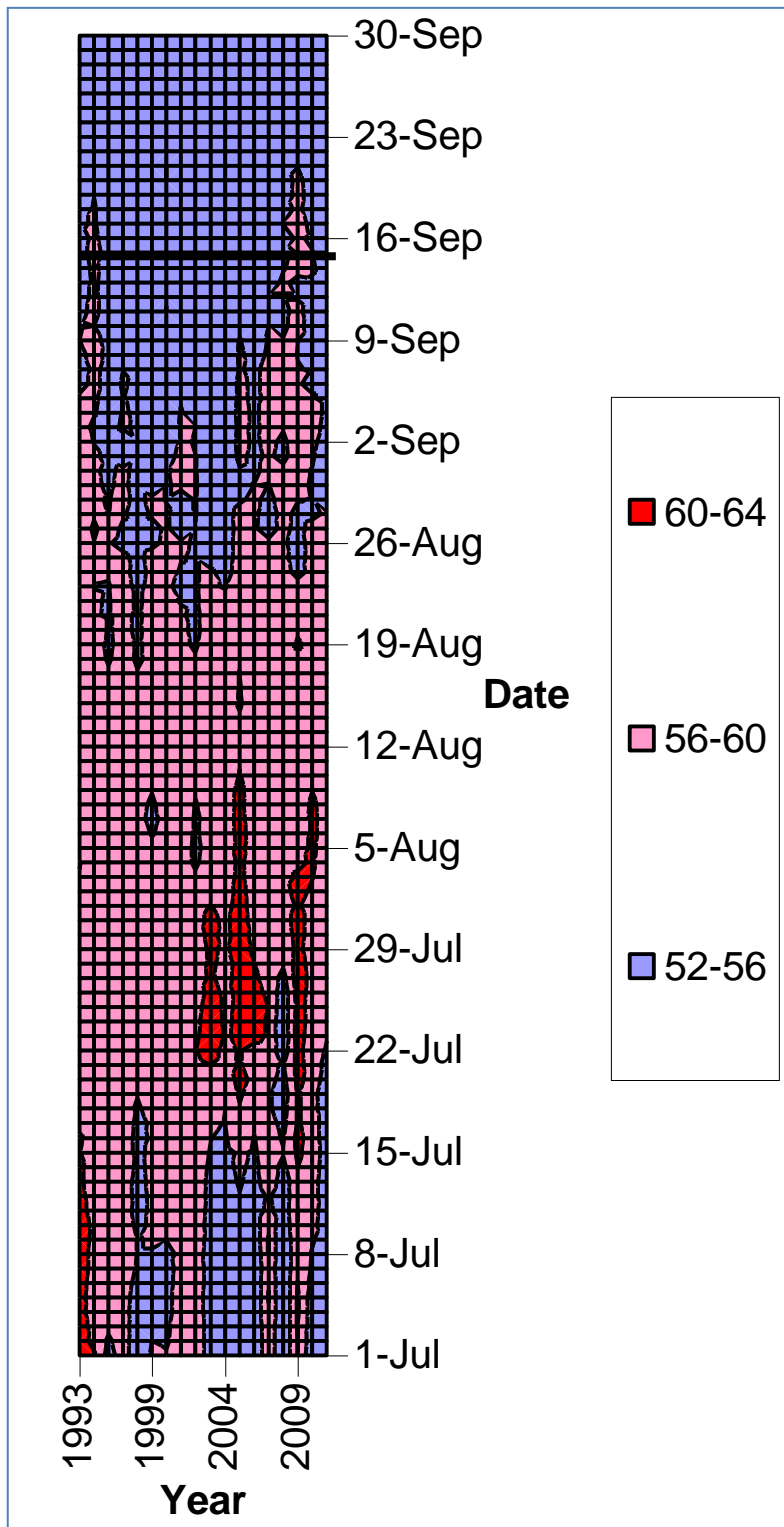


Figure 2. Water temperatures from 1993 to 2011 during warmest period of the year. Red indicates temperature target was exceeded, blue indicates temperatures well below targets. Black bar indicates division in time between the two targets.

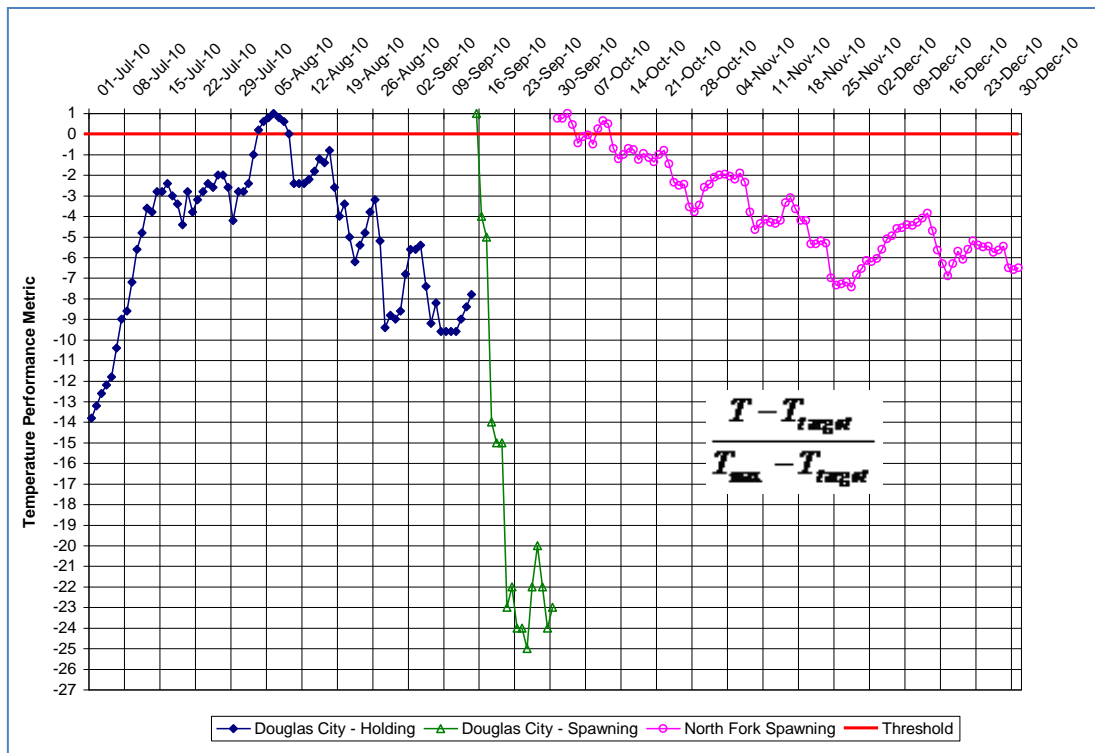


Figure 3. 2010 temperature performance at Douglas City. Each of the three target periods are shown by blue, green and pink lines.

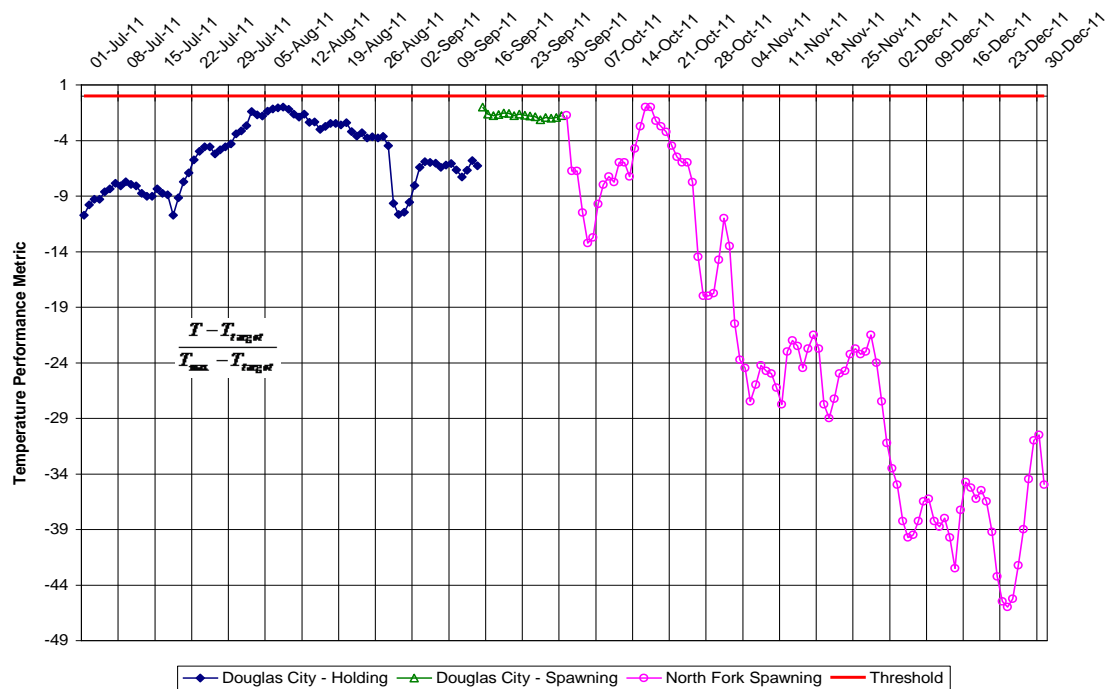


Figure 4. 2011 temperature performance at Douglas City, each of the three target periods are shown by blue, green and pink lines. No target exceedance in 2011.

Investigations into the management options for the Trinity Reservoir cold-water pool should continue, as the volume of that pool has a direct effect on the ability of Reclamation to meet temperature targets.

Sources of Information: This performance report is based on daily temperature measurements at two river stations as reported by [CDEC](#).

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