

**Scope of Work
Appraisal Study
Lewiston Reservoir Cold Water Transmission¹**

Introduction

The Trinity River Restoration Program seeks an Appraisal level study from Reclamation's Mid Pacific Region Planning Division (MP-700) for means to improve cold-water transmission through Reclamation's Lewiston Reservoir.

The goal of the Lewiston Reservoir Cold Water Transmission appraisal study is to either substantiate the need for and receive authorization to proceed with a feasibility study, or to receive approval to directly implement an alternative developed hereby using existing authorities (e.g., CVPIA § 3406(b)(1) and (b)(23) or other authorities). Any alternatives developed for the purposes of this Appraisal level study should be within the Purpose and Need Statement of the Mainstem Trinity River Fisheries Restoration Environmental Impact Statement/Report, Section 1.2.1, page 1-4, October 1999, Public Draft.

The objective of the appraisal study is to investigate structural and/or operational alternatives for improving the transmission of cold water, that is less than 50°F, through Lewiston reservoir, including changes at either the Trinity and/or Lewiston Dam facilities, or within Lewiston reservoir. The appraisal study will include review of the Klamath Basin Study, as that study may identify coordinated Klamath/Trinity River flow solutions, which might also partially address the Lewiston temperature situation.

In the near-term, the study outcome should increase the certainty of meeting down-river temperature targets. Another outcome of the study will be potential means for increasing our ability to adapt to climate change impacts on the cold-water yield to Trinity reservoir from the watershed.

Study Structure

MP-700 will develop alternatives aimed at improving the transmission of cold water discharged out of Trinity Dam through Lewiston Reservoir and into the Trinity River. Some concepts are presented in the following sections.

The order of alternative development is as follows:

1. MP-700 – Clarify concepts with TRRP and partners
2. MP-700 – Develop draft alternatives, including 1-2 page descriptions for review by TRRP
3. TRRP & Partners (Temperature Work Group and others) review and comment on draft alternatives
4. MP-700 – Revise alternatives based on comments
5. MP-700 – Repeat (3) until TRRP accepts alternatives for analysis

¹ Originally produced by Fred Holz, MP-700. Modified by Rod Wittler, NC-156.

- a. MP-700 – Describe final alternatives in 3-5 page summaries (each alternative should have a 3-5 page summary)
6. MP-700 – Analyze alternatives for:
 - a. Effectiveness –projection of reduced summertime and early fall temperatures of waters delivered to the Trinity River downstream of Lewiston Dam²
 - b. Constructed features
 - c. Operational changes
 - d. Potential Impacts, positive and negative
 - e. Initial Cost Estimate for implementing the alternative
7. TRRP – Review and comment on alternative analyses
8. MP-700 – Revise analyses based on comments. TRRP may fund additional analyses beyond those described herein and agreed to in the associated Project Management Plan (PMP)
9. Repeat (7) until TRRP accepts Report of Analyses in a final Appraisal Study report

Background

On September 7 and 8, 2010, Trinity River Restoration Program (TRRP) met with the Bureau of Reclamation, Mid-Pacific Planning Division (MP-700). TRRP initially requested that MP-700 perform a feasibility-level study of alternatives to manage the transmission of cold water out of Trinity reservoir through Lewiston Reservoir, and into the Trinity River. The group agreed on an appraisal-level study, given the need for congressional authorization for a feasibility study.

The 1955 Trinity River Act (Act) authorized the construction of the Trinity River Division and the transfer of the majority of the Trinity River flows to the Central Valley Project (CVP).

Decades of low flow resulted in:

- Encroached riparian vegetation and fine sediment in upper 40 miles.
- Reduced access to floodplain.
- Loss of critical habitat.
- Major decline of anadromous fisheries starting in the late 1970's.

In 1992, the Central Valley Project Improvement Act established a minimum annual Trinity River flow of 340,000 Acre Feet (AF). The December 2000 Record of Decision (ROD) stipulated permanent flow volumes for discharge to the Trinity River that on a long-term average amount to roughly fifty percent of the inflow to Trinity Reservoir. In 2005, the first ROD flows unconstrained by litigation were released, and the first channel rehabilitation project was completed.

The TRRP goal is to restore the river fisheries to pre-project populations under a ROD-specified flow regime. The ROD outlines a plan for recovery of the Trinity River and its fish and wildlife populations with 47 channel rehabilitation projects, which are being designed for flow releases specified for each of the five water year types—critically dry, dry, normal, wet, and extremely wet. The rehabilitation projects include construction of benches corresponding

² In conjunction with modelers from TRRP, CVO, and USFWS-AFO

to these various flow regimes. Projects emphasize forced meanders and side channels. Riparian vegetation removed during project construction is being replanted in order to re-establish necessary shaded riparian habitat.

Specific management techniques to be utilized within the Trinity River concern sediment, temperature, and salmonid habitat. Sediment management will involve placing 10,000 tons of gravel per year, mimicking natural sedimentation impeded by Trinity and Lewiston Dams.

Issues Driving Temperature Analysis

TRRP staff described that the particular geometry, hydrodynamics, and incidence of direct solar radiation in Lewiston Reservoir causes a significant increase in water temperature during the transmission of flow from Trinity Dam to flows discharged from the Lewiston Dam into the Trinity River. Reclamation's Central Valley Operations (CVO) office operates to meet temperature objectives listed in their water rights permit (WR90-5), the Basin Plan, and the Trinity EIS. Table 1 lists the compliance points, the temperature target, and the time of year for which the target applies during the different types of water years.

Table 1. Trinity River Temperature Targets 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 Lewiston to Douglas City Lewiston to North Fork	All Years	
		July 1–September 15	≤60 °F
		September 15–30	≤56 °F
		October 1–December 31	≤56 °F
Springtime Objectives of the Record of Decision for the Trinity River EIS/EIR (USFWS et al. 2000)	Lewiston to Weitchpec	Normal & Wetter Water Years	
		April 15–May 22	≤55.0 °F
		May 23–June 4	≤59.0 °F
		June 5–July 9	≤62.5 °F
		Dry & Critically Dry Water Years	
		April 15–May 22	≤59.0 °F
May 23–June 4	≤62.5 °F		
		June 5–June 15	≤68.0 °F

Concepts for Alternatives

Several alternative solutions will be developed around the following concepts:

➤ **Trinity Reservoir Management**

- Reclamation (MP-700 & CVO) will perform studies to develop a multi-year plan for preserving the cold-water pool. The parties will review temperature studies conducted for the 2000 Trinity EIS. Total Trinity Reservoir storage is

2.445 MAF; The Trinity Biological Opinion requires consultation if Reclamation forecasts operating below 600 TAF. Modeling in the 2000 EIS indicated that the ability to meet summer and fall temperature targets becomes less certain at reservoir volumes below ~1 MAF. This type of planning needs to consider safety of dam concerns and flood storage requirements, and whether these might be encroached upon under certain conditions. Operation and Maintenance practices also need to be revisited. There is a temperature model for Trinity Reservoir that is sufficient for the purposes of this study to reasonably simulate reservoir temperatures.

- Trinity Reservoir release requirements are currently exclusively based on inflow conditions that are determined based on a specific date. Neither existing soil moisture conditions, nor Trinity storage levels are currently taken into account in determining discharge requirements. A probabilistic decision-making component might be an additional factor in deciding the level of discharges from Trinity Dam.

➤ Lewiston Reservoir Management

- The current key to controlling release temperatures from Lewiston Reservoir is to decrease residence time of water within the reservoir. The current method to accomplish this is by diverting more water to the Sacramento River via the Carr Tunnel.
- One option for controlling temperatures would be to perform in-reservoir dredging. Modified reservoir bathymetry may facilitate cold-water plunging and decreased residence time in the reservoir. A CE-Qual-W2 model of Lewiston Reservoir is under development. This model will be used to provide guidance for possible dredging operations.
- Another concept is to drop reservoir levels in the summer to create more of a riverine, rather than reservoir, condition. This would impact recreation and may not be acceptable to the local community.

➤ Coordinated Trinity/Klamath Operations

- It is uncertain whether this alternative could improve the temperature regime below Lewiston; however, it will be studied under the Klamath Basin Study with a primary goal of better flow management. TRPP staff indicated that the RMA-11 model for the Trinity River is theoretically compatible with the RMA-11 model on the Klamath. However, they have never been run in a coordinated manner.

➤ Physical Modification of Lewiston Reservoir and/or Dam

- The construction of a pipeline from Trinity Power Plant to the Lewiston Dam has been proposed to divert the flows to be discharged to the Trinity River directly below Lewiston Dam. This could be accompanied by a pipeline to the Judge Francis Carr diversion, which would open up a pump-back or pump-storage possibilities.
- The construction of a 450 cubic feet per second pipeline buried in the bottom of the channel may also address the issue.
- Another possible solution is the enlargement of the small power plant at Lewiston, which might provide temperature control benefits.

- The complete removal of the Lewiston Dam is not an option. That would require major changes to hatchery operations, probably would not be acceptable to the local community, and does not fall within the Needs and Purpose of the Trinity EIS.

Analyses of Alternatives

<Need an introduction outlining the analyses MP-700 is proposing to conduct. They need to complete this section.>

- Investigate functioning of existing Lewiston temperature control devices. Could they be improved?
- The status of Trinity County Public Utility District's power plant needs to be investigated and its viability to provide temperature control. Trinity County Public Utility District (PUD) is actively working on a plan to enlarge the existing 250 kilowatt power plant. The new plant will be capable of utilizing the entire Trinity River flow, at least under normal runoff conditions. Their plan involves constructing additional penstock(s) over the dam. The PUD has apparently investigated alternative designs, specifically addressing temperature control within this improvement, but decided it would not solve the temperature problem, especially in light of the failure of the existing temperature control curtain to adequately control temperatures.
- <Others?>

Modeling Assumptions

Both temperature and flow modeling would likely be needed to fully explore and add definition to the alternatives, allowing for effective evaluation of costs and possible benefits associated with some or all of the alternatives.

Impacts Evaluation

MP-700 & TRRP staff will need to work with TRRP Partners to develop criteria or parameters that describe the efficacy of cold-water transmission through Lewiston Reservoir. These measures will form the basis of comparing and rating the various alternatives.

This complex situation will require a collaborative effort and integration of community, biological, and ecological needs, constraints and benefits.

MP-700 Budget

FY12 - \$150,000 (Approved by the Trinity Management Council)

Funding

MP-700 initially estimated \$100,000 to \$200,000 based on developing an appraisal study using existing information (i.e., flow and temperature modeling using currently available models). However, if the study needs to include original modeling, as well as detailed benefit and cost evaluations, this would increase the cost of the study.

Cost Estimates and Schedule

MP-700 will coordinate with MP-200, TRRP, and the Reclamation Technical Service Center to determine which organization has the expertise and time to perform the studies to estimate costs associated with each alternative.

<MP-700 should provide more detail of the budget once this Scope crystallizes>