

Trinity River Restoration Program Performance Measure:

Change in Fine Sediment Storage

Hypothesis: Decreasing fine bed material storage in the Trinity River will increase the quality of the spawning gravel and decrease berm formation.

Importance: Years of low flows in the mainstem Trinity River after construction of Lewiston and Trinity Dams allowed large quantities of fine bed material to accumulate in the river channel and along the banks of the river. These fine sediments, which are defined in the [Trinity River Record of Decision \(ROD\)](#) as particles less than about 8 mm (about 5/16") in diameter, degrade aquatic habitat by reducing substrate permeability and by marginal deposition that leads to the formation of simple rectangular channel geometry. The [Trinity River Flow Evaluation, Wilcock et al. \(1995\)](#), and many others have documented the detrimental effects of excess fine bed material in the Trinity River downstream from Lewiston Dam. Reducing the supply and storage of fine bed material in the mainstem Trinity River is among the primary objectives of the ROD flow regime and of the watershed rehabilitation efforts undertaken by the Trinity River Restoration Program (TRRP).

Objective: Decreasing fine bed material storage throughout the TRRP domain is an objective discussed in the Flow Evaluation and in the ROD.

Related Objectives from the Integrated Assessment Plan:

- 1.4.1 Transport fine sediment through mainstem at a rate greater than tributary input
- 1.4.2 Reduce fine sediment supply from tributary watersheds

Targets, Predicted or Desired Response: A decrease equivalent to the volume of material stored in riparian berms and the channel is implied in the Flow Evaluation.

Source of Target for Performance Measure: Flow Evaluation, ROD and [Integrated Assessment Plan \(IAP\)](#).

Technical Approach: Changes in fine bed material storage were calculated in a similar manner to coarse sediment storage described in Section 3.1.3 of the IAP. Mainstem fine sediment monitoring makes use of the same bedload transport measurements needed for coarse sediment monitoring, plus concurrent sampling of the suspended load of fines. Four mainstem sediment sampling locations were established in the first 20 river miles below Lewiston Dam. Their positions with respect to Lewiston Dam and major tributaries are illustrated in Figure 1. The total fine bed material load is equal to the sum of the fine fraction of the bedload and the fraction of the suspended load greater than 0.5 mm in sieve diameter. Suspended sediments less than 0.5 mm are considered wash load in the Trinity River. The approach used for analyzing the sediment budget is described in detail in the 2009 and 2010 sediment budget reports ([Wilcock 2010](#); [Gaeuman and Krause 2011](#)). The fine bed material budget incorporates measured mainstem fine bed material fluxes and inputs from tributaries according to the general formula:

$$\Delta S = I_U + I_T - O$$

where I_U is the bedload input at the upstream boundary of the cell (zero in the case of Lewiston Dam), I_T is the bedload input from tributaries within the cell, O is the bedload output at the downstream boundary of the cell, and ΔS is the change in bedload storage in the cell.

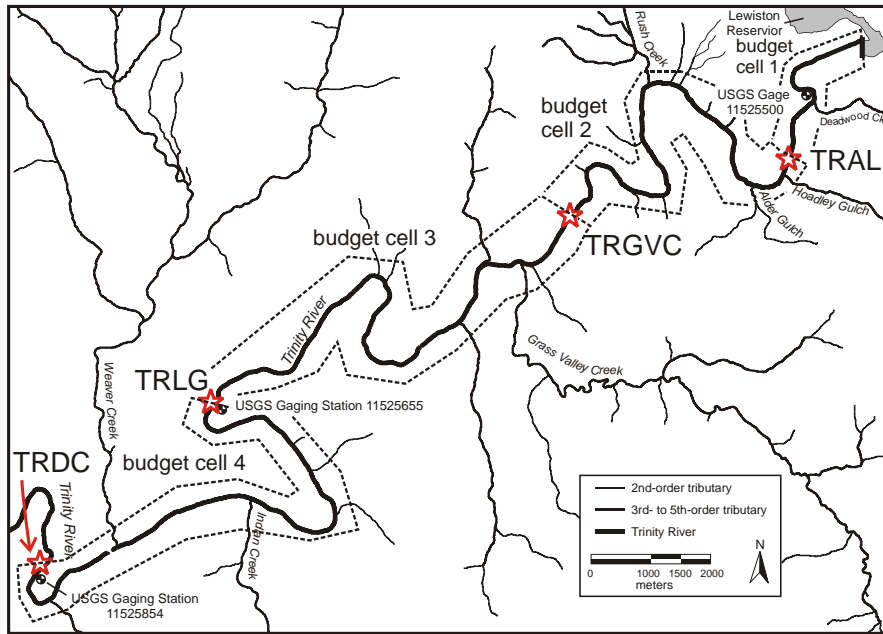


Figure 1. Map of the Trinity River basin downstream from Lewiston Dam showing the locations of fine sediment monitoring stations and sediment budget cells. From upstream to downstream, the four monitoring locations are referred to as Trinity River at Lewiston (TRAL), Trinity River at Lowden Meadows (TRLM), Trinity River at Limekiln Gulch (TRLG), and Trinity River at Douglas City (TRDC).

Results: Fine bed material storage is decreasing through much of the Trinity River corridor upstream of Reading Creek, and may be similar to pre-dam levels (see Figure 2). However, the uncertainty in fine bed material inputs from tributaries is large; and measurements of fine sediment storage throughout the mainstem channel (spawning gravels) are limited, so confidence in the broad applicability of these results to fish habitat and production through time will need to be investigated further.

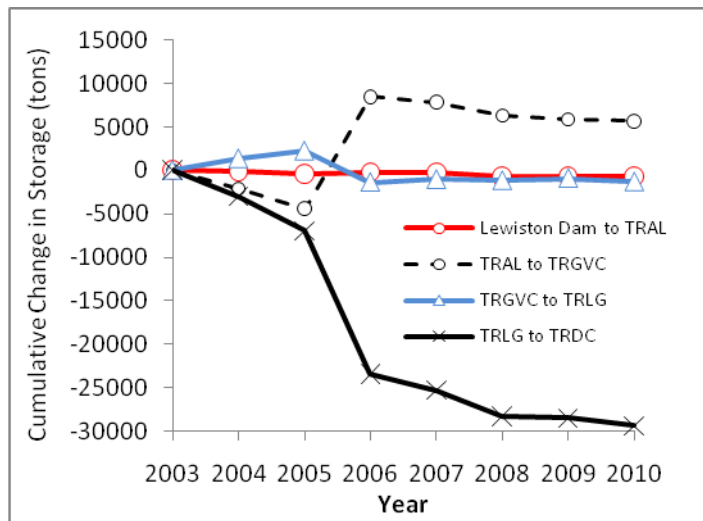


Figure 2: Cumulative changes in fine bed material storage for WY 2004-2010 with zero budget balance assigned to WY 2003.

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