Trinity River Restoration Program Performance Measure:

Chinook and Coho Salmon Rearing Habitat

Hypothesis: Restoration actions will lead to site-specific and restoration-reach increases in Chinook and coho salmon rearing habitat (hereafter rearing habitat) area. The restoration reach for this assessment is defined as the 64 km (40 miles) of mainstem Trinity River between Lewiston Dam and the confluence with the North Fork Trinity River.

Importance: The primary limiting factor for Chinook and coho salmon populations in the Trinity River is rearing habitat availability. The restoration strategy for the Trinity River is designed to restore fluvial-geomorphic processes downstream of Lewiston Dam. We anticipate that this strategy will lead to increased channel complexity and result in systemic increases in salmonid habitat quantity and quality in the entire Trinity River and particularly within the restoration reach. The restoration strategy is made up of four components including (1) mechanical channel rehabilitation, (2) flow management to drive fluvial processes that create and maintain salmonid habitats and provide suitable thermal regimes, (3) coarse sediment augmentation, and (4) watershed restoration. Although we anticipate the maximum change in rearing habitat at channel rehabilitation sites, we hypothesize that the restoration strategy will create synergistic effects, improving habitat throughout the restoration reach.

Objective:

General Objective from the Integrated Assessment Plan (IAP)
IAP objective 2.1.1: Increase/maintain salmonid fry and juvenile rearing habitat in the upper 64 km (40 miles) of the mainstem Trinity River by a minimum of 400 percent following rehabilitation of fluvial attributes.

Specific Objectives Relating to the General Objective:

1. Quantify the change in rearing habitat area and quality at an index streamflow from construction of channel rehabilitation sites.
2. Evaluate the effects of channel rehabilitation treatment types on streamflow to habitat relationships.
3. Estimate the quantity of rearing habitat within the restoration reach.
4. Evaluate the annual trend in rearing habitat area from rehabilitation actions within the restoration reach.

Targets, Predicted or Desired Response: We anticipate rearing habitat area to increase at channel rehabilitation sites from restoration. We expect this increase not only to occur immediately after construction but also to continue with high-streamflow events, riparian development, large wood recruitment, and time. The magnitude of change will vary by bank rehabilitation site and specific site design hypotheses and predictions. In addition, we anticipate rearing habitat conditions to improve outside of bank rehabilitation sites. We anticipate a measureable response in total habitat area and high-quality habitats through time. The interim target for rearing habitat increases is 400 percent of pre-ROD levels, but this target is currently under investigation in relation to measured response and system potential.

Technical Approach: Channel rehabilitation sites are assessed by measuring the rearing habitat area before and after construction. Post-construction assessments begin soon after construction and are repeated periodically to track the evolution of bank rehabilitation sites with time. For specific design features, the effects of channel rehabilitation on streamflow to habitat relationships were evaluated by measuring rearing habitat area at a variety of streamflows before and after construction.

Changes in the restoration reach are evaluated by measuring rearing habitat at randomly selected sites throughout the restoration reach using a rotating panel revisit design. By applying this study design annually, the synergistic effects of restoration actions will be documented and improve the understanding of how the Trinity River responds to specific management actions such as the differential effects of variable water year type streamflow allocations. Rearing habitat area is mapped within study sites following methods developed on the Trinity River, as described in Goodman et al. (2010). This technique provides a spatially explicit representation of rearing habitat areas within study sites.

Results: Figure 1 shows the changes in estimated fry and presmolt rearing habitat area at the Sven Olberston rehabilitation site following construction. Figure 2 shows the estimated total and optimal fry and presmolt rearing habitat available throughout the entire restoration reach in 2009 and 2010. The area estimates presented below were not significantly different between 2009 and 2010.

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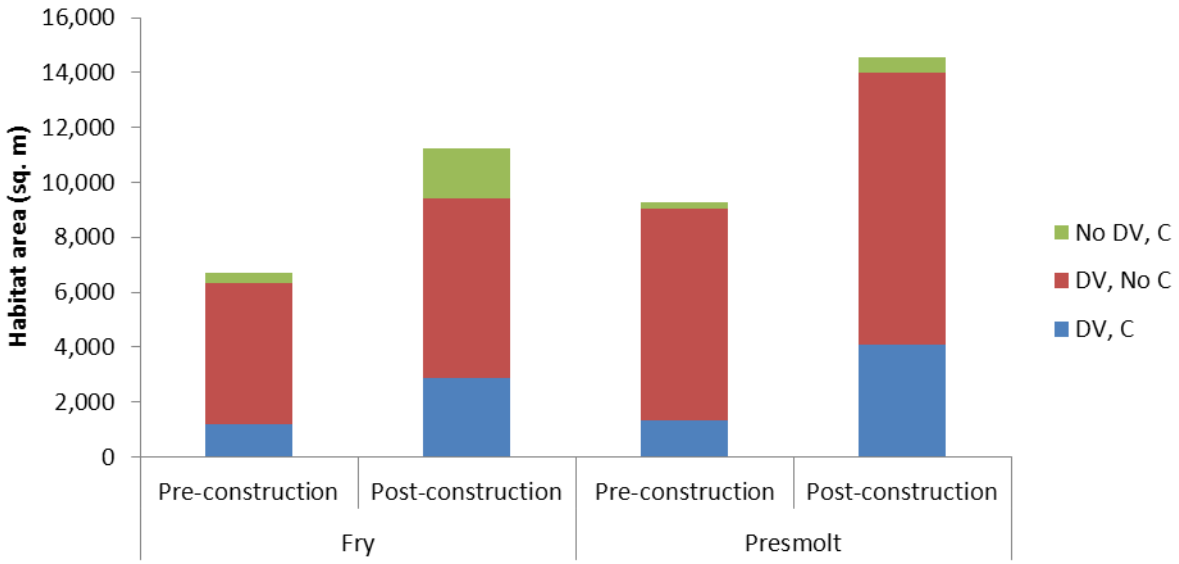

Figure 1. Available rearing habitat across the entire Sven Olberston rehabilitation site (RKM 178.94-179.6) at 8.6 m^3/s (300 cfs). Pre-construction conditions were measured in 2008 and post-construction conditions were measured in 2009.

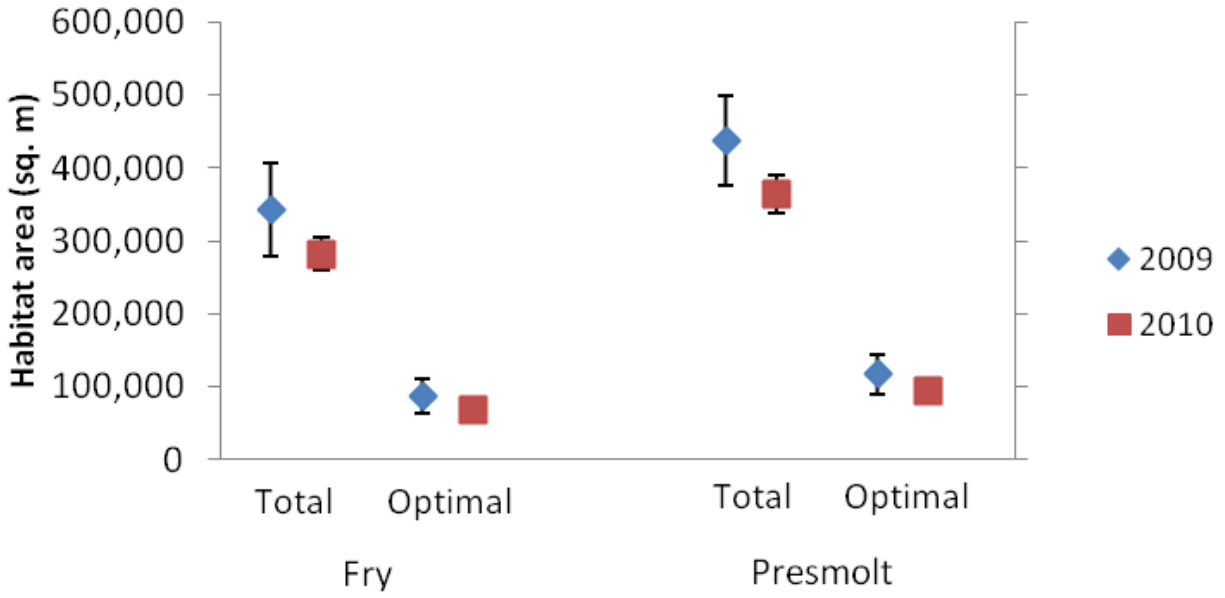

Figure 2. Total and optimal fry and presmolt rearing habitat available in 2009 and 2010. Error bars indicate a 95% confidence interval.