

# Mainstem Trinity River Spawning Survey

The distribution of salmon spawning is monitored annually in the Trinity River by Trinity River Restoration Program (TRRP) partners for response on two scales. Redd distribution on a fine spatiotemporal scale is characterized for response to localized changes in channel morphology as they relate to spawning habitat. Spawning distribution on a broad spatiotemporal scale is characterized for the Program's influence on habitats for multiple life histories expressed in spawning distribution over multiple salmon generations. This recognizes that producing fish in the river that someday successfully return to spawn depends on in-river habitats that effectively meet the needs of salmon from spawning and egg incubation through smoltification and emigration.

## Short spatiotemporal scale:

The Trinity River Restoration Program aims to increase the Trinity River's ability to naturally produce Chinook Salmon by increasing the availability of juvenile rearing habitat through actions that alter the river's morphology. River morphology plays a key role in the suitability of habitat for spawning salmon (Beschta and Platts 1986, Geist and Dauble 1998, Hanrahan 2007). Changes at the rehabilitation site scale (e.g. the scale of constructed bar or side channels, 100 to 1,000 meters plus) occur rapidly through construction or through channel response to significant flow events. The localized use of spawning habitats should likewise respond quickly to these morphological changes (Figure 1).

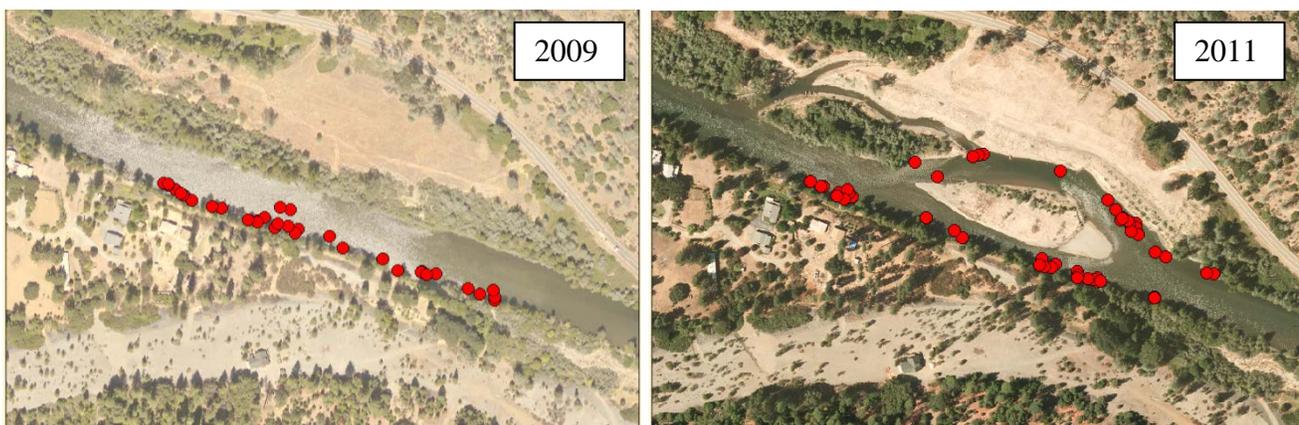


Figure 1. Before and after redd distribution at the Wheel Gulch Rehabilitation site – constructed 2010.

## Broad spatiotemporal scale:

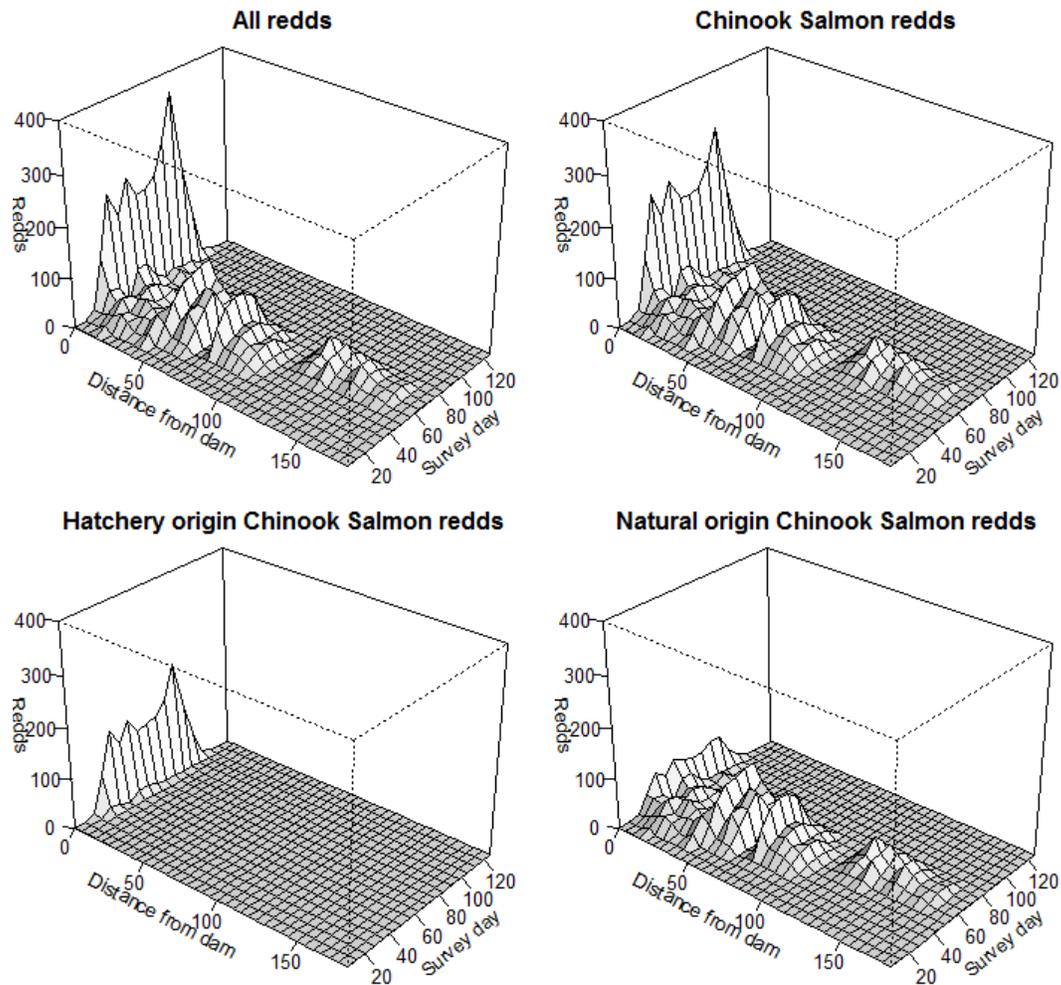
The broader spatial distribution of spawning by natural origin salmon is influenced not only by the spatial distribution of spawning habitat, but the distribution habitats for subsequent life stages. A lack of rearing habitat can result in underutilization of prime spawning habitat (Beschta and Platts 1986). Newly emerged salmon fry experience higher survival if they emerge from redds that are proximate to rearing areas of sufficient quantity and quality. Those fish are more likely to contribute to the distribution of fish returning to construct redds in natal spawning areas than are newly emerged fry that experience unfavorable rearing conditions.

Trinity River Hatchery is adjacent to Lewiston Dam where significant straying by hatchery fish into the river currently skews mainstem salmon spawning distribution (Figure 2). As TRRP management actions improve rearing conditions throughout the Trinity River corridor, it's expected that the spawning



distribution of natural origin salmon will increase in relation to the influence exerted by straying hatchery fish. At the system scale (64 km of river from Lewiston Dam to North Fork Trinity River and beyond) the distribution of spawners should respond to broad scale changes in the distribution of rearing habitat over a period that spans multiple salmon generations.

We map redds and carcasses throughout the mainstem Trinity River. We apply modeled distribution of species/origin from carcass data to estimate the makeup of redds and characterize spawning distribution by species and origin (Figure 2).



**Figure 2. Spatiotemporal salmon spawning distribution in the Trinity River 2012. Survey day 1 = September 1; survey day 120 = December 29. Distance covers 182 km from Lewiston Dam to the mouth at Weitchpec.**

### LITERATURE CITED

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- Geist, D. R., and D. D. Dauble. 1998. Redd site selection and spawning habitat use by fall Chinook salmon: The importance of geomorphic features in large rivers. *Environmental Management* 22:5, 655-669.
- Hanrahan, T. P. 2007. Bedform morphology of salmon spawning areas in a large gravel-bed river. *Geomorphology*, Volume 86, Issues 3-4 Pages 529-536