

Trinity River Restoration Program Performance Measure:

Comparison of Turtles on the South Fork and Mainstem Trinity

Hypothesis: Increasing aquatic and terrestrial habitat diversity (including thermal diversity resulting from increased channel complexity) will increase turtle survivorship and recruitment of turtles.

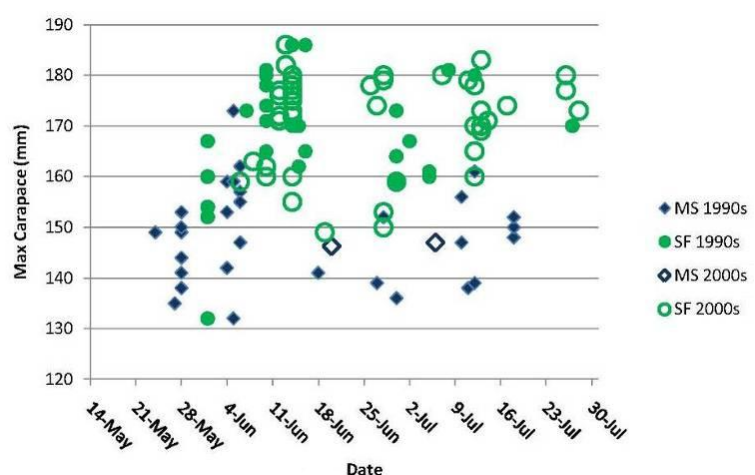
Importance: The western pond turtle (WPT) is a State Species of Special Concern, with habitat alteration being the primary threat. The amount of suitable rearing habitat in the Program area has diminished since Trinity and Lewiston Dams were built. By increasing the diversity of aquatic habitats available to various life stages (including thermal diversity), fisheries recovery efforts may improve conditions for western pond turtle populations.

Targets, Predicted or Desired Response: Structural and thermal habitat complexity is expected to increase as rehabilitation actions are implemented. We also expect the proportion of younger turtles within the population to increase with increased channel complexity (including side channels), which provides cover from predators, increased access to prey, and increased diversity of water temperatures. Survivorship of adults and younger turtles should increase with increasing spatial and temporal habitat complexity.

Technical Approach: To check whether turtle populations have benefited from management actions, we compared populations on the regulated (dammed) mainstem of the Trinity River, with a population on the free-flowing South Fork. Water is released from Trinity Dam from the cold lower strata near the bottom of the reservoir behind the dam (i.e., hypolimnetic release) resulting in artificially low water temperatures in the mainstem below the dam during the summer. In comparison the unregulated South Fork has warmer water temperatures during the summer months than the mainstem Trinity River.

Results: Population estimates for the main stem Trinity was 220 turtles, while 350 turtles was estimated for the South Fork in early 2000s. Density estimates from the 2000s compared closely with those of the 1990s (Ashton et al. 2011). The 1990s density for the mainstem Trinity was 19 turtles/hectare (ha) (Reese and Welsh 1998a) compared with the 2000s density of 18 turtles/ha. We found that turtles were smaller on the mainstem Trinity than on the South Fork, suggesting that the colder waters from the hypolimnetic releases were restricting growth in the mainstem population (Ashton et al. 2011). In addition, the later study found only two females bearing eggs on the mainstem Trinity (Figure 1) (Ashton et al. 2011).

Figure 1. Mean carapace size of gravid western pond turtles encountered in the 1990s and 2000s on the mainstem (MS) and South Fork (SF) of the Trinity River.



Our examination of western pond turtle ecology on the two forks of the Trinity River yielded results that imply the current management of the mainstem is having both short- and long-term negative effects on the mainstem turtle population (Ashton et al. 2011). In addition to reducing suitable habitat (Reese and Welsh 1998b), the altered flow regime and resulting colder water temperatures are the apparent cause of the differences in key metrics of population status, including basking behavior, growth, development, and body condition, with implications for reduced reproductive output and population fitness on the managed main stem.

Contact: Dr. Hartwell Welsh, hwelsh@fs.fed.us, (707) 825-5110, USDA Forest Service, Redwood Sciences Laboratory, Arcata, CA.

Nina Hemphill, nhemphill@usbr.gov, (530) 623-1812, U.S. Bureau of Reclamation, Trinity River Restoration Program, Weaverville, CA.