

EFFECTS OF RIVER HABITAT RESTORATION ON WATER TEMPERATURE DYNAMICS

Introduction

- Water temperature is one of the most important environmental factors impacting health and developmental processes for salmonids
- River temperatures can reach stressful levels during summer months for salmonids in the California Central Valley

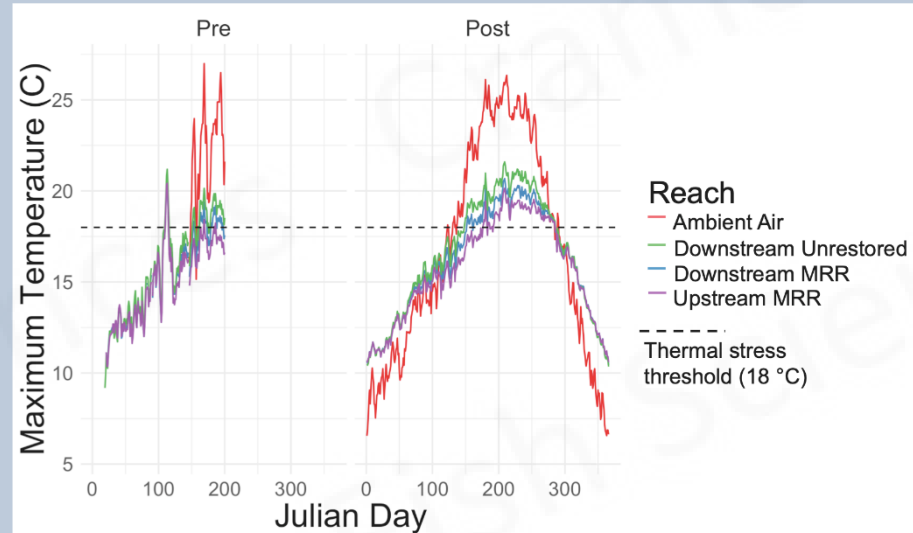


Figure 1. Annual average mean and maximum water temperature (°C) by Julian day

- Habitat Restoration may help to reduce temperature increase as water flows downstream

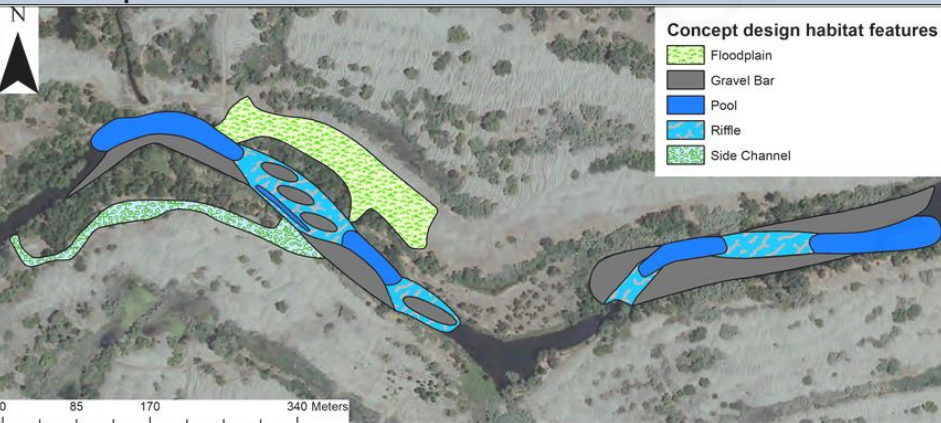


Figure 2. Conceptual design of Merced River Ranch Restoration Project

Methods

- Temperature loggers were installed upstream and downstream of the Merced River Ranch (MRR) Restoration Project beginning in April 2010 and ending in June 2018
- The rate of temperature warming was measured between restored and unrestored reaches, and before and after restoration

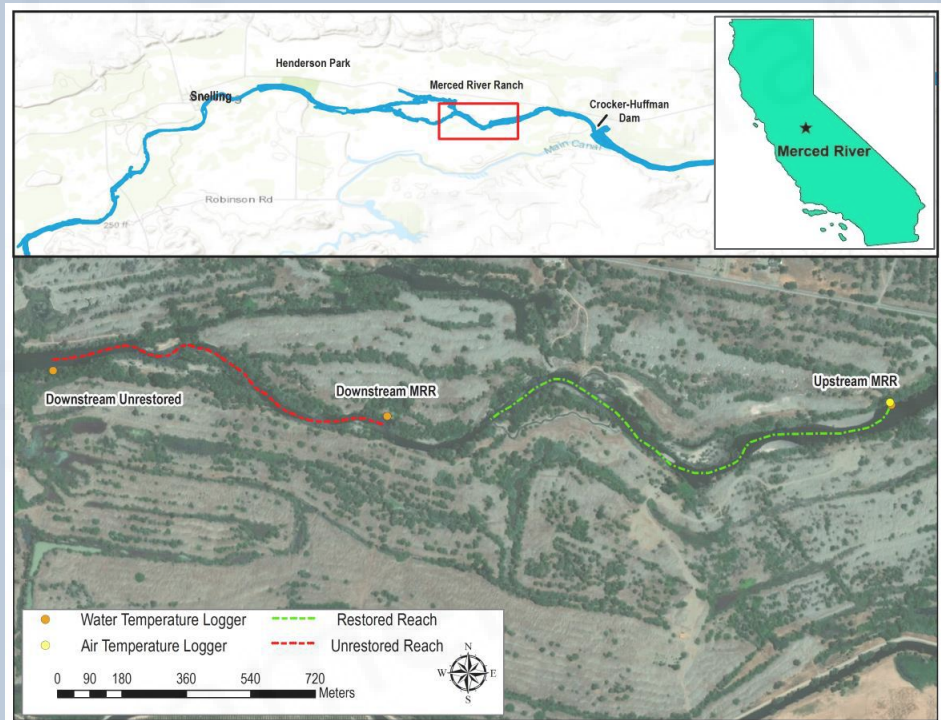


Figure 2. Map of study area



Results

- Water warming rate was reduced following restoration at MRR

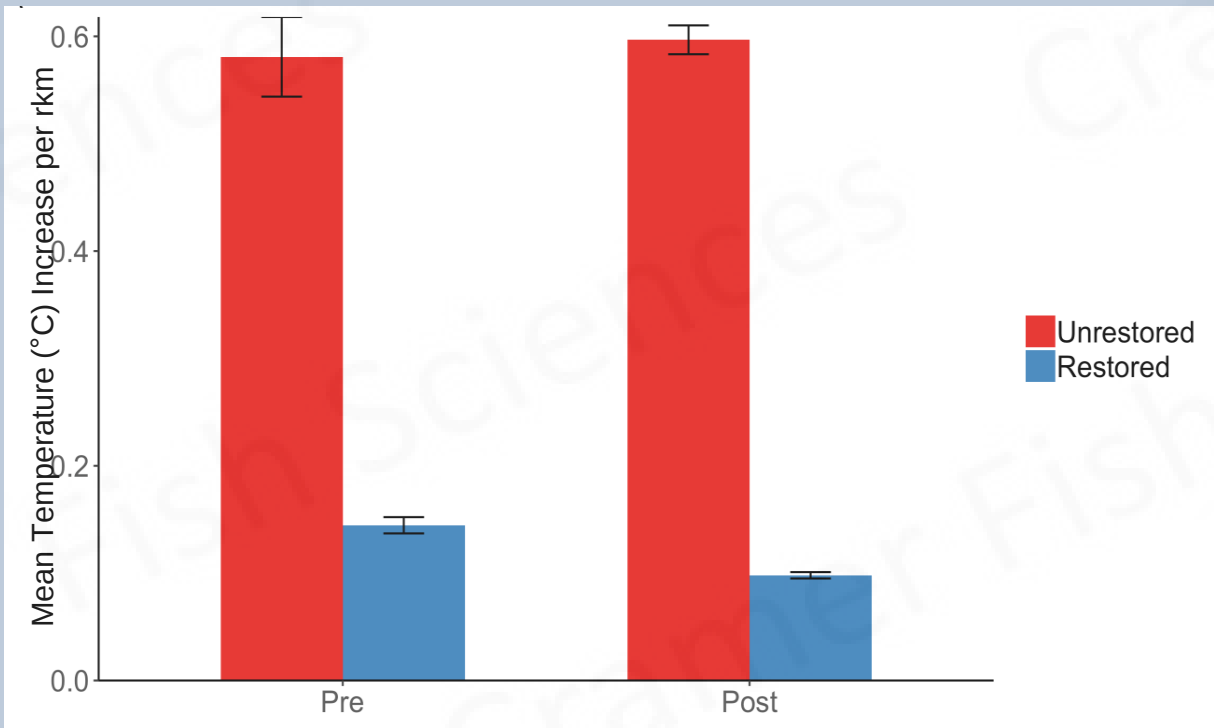


Figure 3. Mean temperature increase per river kilometer before and after restoration in restored and unrestored reaches

- Significant difference during over-summer steelhead rearing period

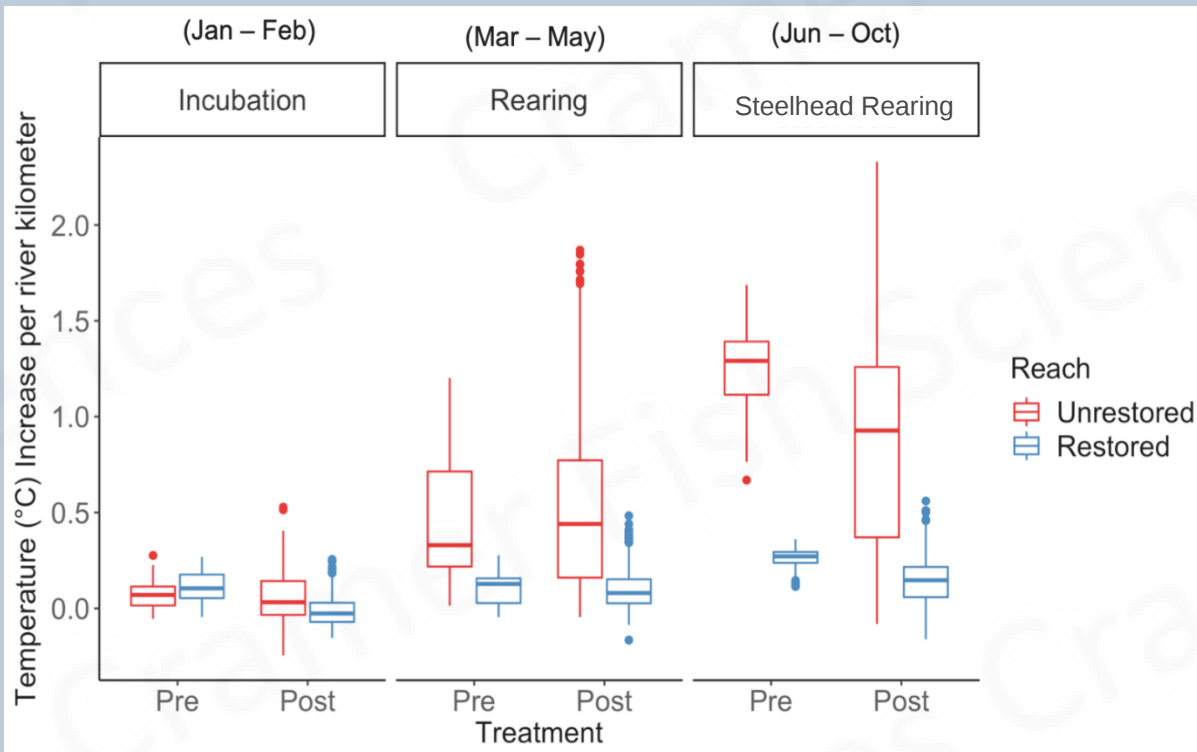


Figure 4. Increase in temperature per river kilometer before and after restoration in restored and unrestored reaches by season.

Discussion

- Preliminary results found significant reduction in warming rates following restoration during the summer months
- Gravel augmentation and riparian restoration may provide a non-flow management tool to help buffer against adverse impacts due to high summer temperatures for salmonids
- Understanding these interactions will be especially important when considering the effects of climate change

Future Directions

- This analysis was conducted opportunistically, thus we were not able to capture temperature data from a range of water year types prior to restoration in the unrestored reach
- Future temperature studies should include collecting data across multiple years at multiple control reaches, both before and after restoration
- In addition, multiple loggers should be strategically installed throughout the restoration area to document the relative effect of specific restoration actions



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For further information

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More information on this and related projects may be obtained at www.fishsciences.net