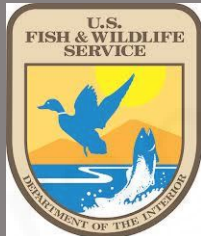


Juvenile Salmonid Prey Response to Adult Habitat River Restoration in CA



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Background

The addition of gravel is a popular tool to restore habitat for adult salmonids

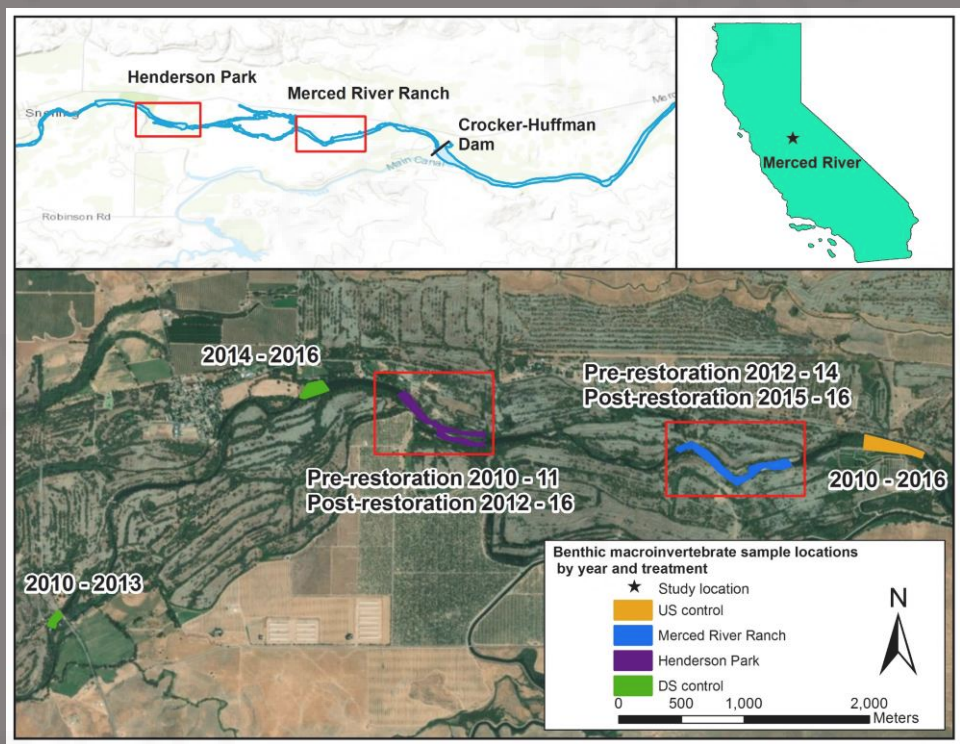


Adding mine tailing into the channel to restore spawning habitat

Question

Does the addition of gravel affect juvenile salmonids by altering benthic macroinvertebrate prey composition and density?

Study Site



Map of the study sites with treatment dates

Field Collection

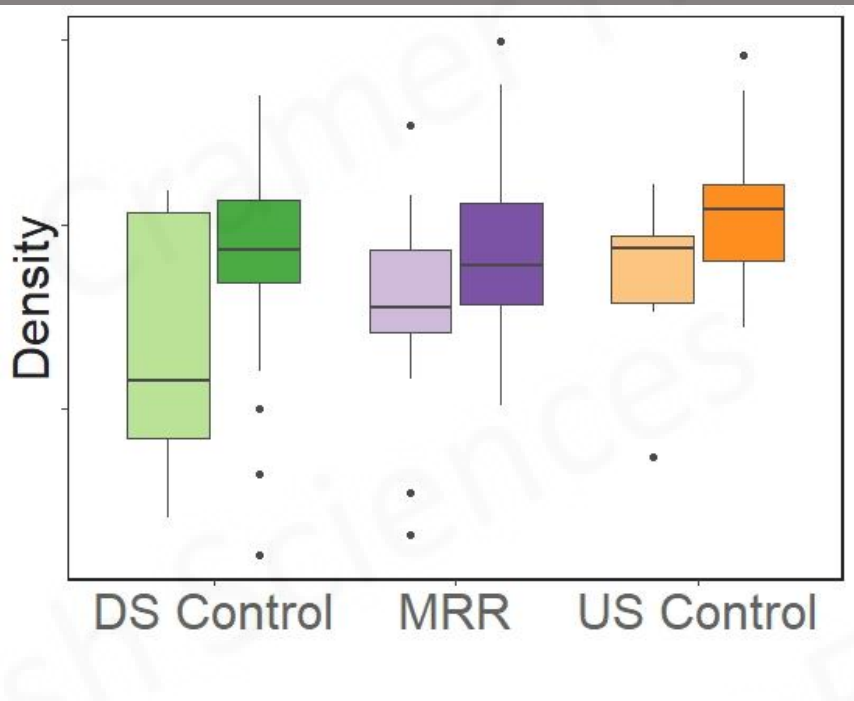
- BACI design
- Restored sites
 - Merced River Ranch (MRR)
 - Henderson Park (HP)
- Controls
 - Upstream (US)
 - Downstream (DS)
- Most samples collected during drought conditions (2012-2016)
- Collections made using Hess stream sampler



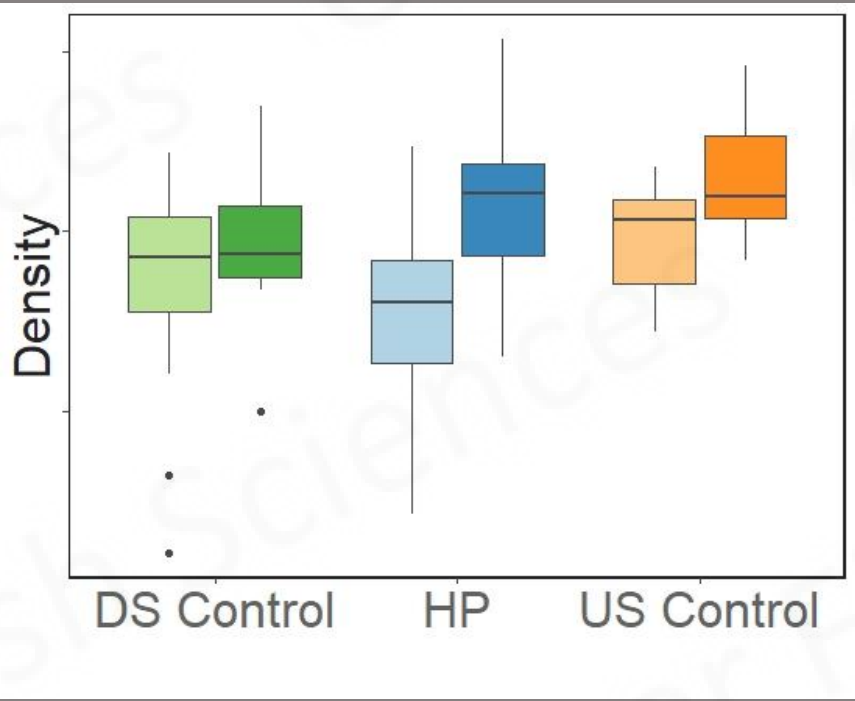
CFS staff operating a Hess sampler

Results

Prey Density



Plot of MRR log transformed prey density. Lighter colors represent pre-restoration timeframe, darker colors represent post-restoration timeframe



Plot of HP log transformed prey density. Lighter colors represent pre-restoration timeframe, darker colors represent post-restoration timeframe

- At HP, density was significantly greater post-restoration ($p<0.001$)
- At MRR, density was marginally significant greater post-restoration ($p=0.051$)
- Densities also increased at control sites during the study period, but were not significant

New Zealand Mud Snails (NZMS)

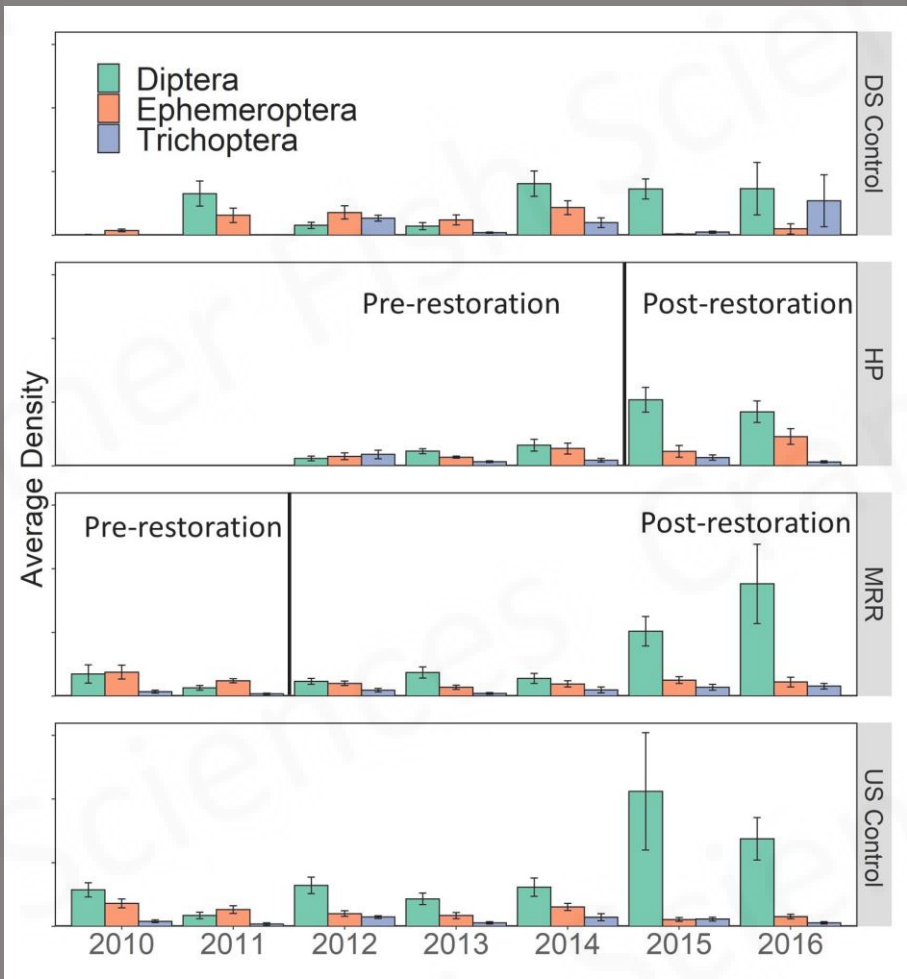
- High densities of invasive NZMS observed in US Control starting in 2013 but crashed in 2016



New Zealand Mud Snail (*Potamopyrgus antipodarum*)

Taxonomic Composition

- Diptera, Ephemeroptera, and Trichoptera accounted for 80% of total density
 - Diptera are early colonizers
 - Ephemeroptera and Trichoptera are sensitive to poor water quality
- Ephemeroptera and Trichoptera densities were relatively stable year to year
- Diptera densities increase started in 2015



Average density ($\pm$ standard error)

Conclusions

Restoration for adult salmon does not impair prey for juvenile salmon as benthic macroinvertebrate communities recover quickly following spawning gravel additions.

- Diptera may have taken advantage of low flow conditions
- NZMS may reduce prey availability for juvenile salmonids through competition with less defended prey
- External factors such as drought had a greater influence than restoration

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