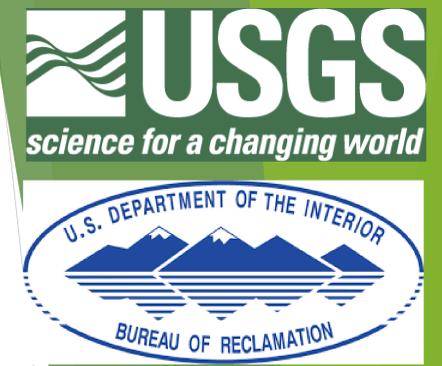


# Mortality of Endangered Juvenile Lost River Suckers Associated with Cyanobacteria Blooms in Mesocosms in Upper Klamath Lake, Oregon

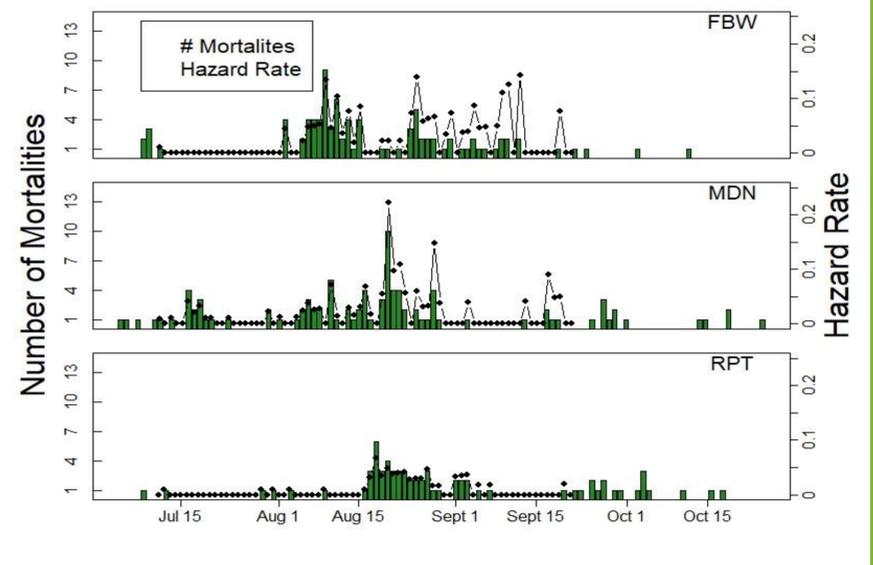


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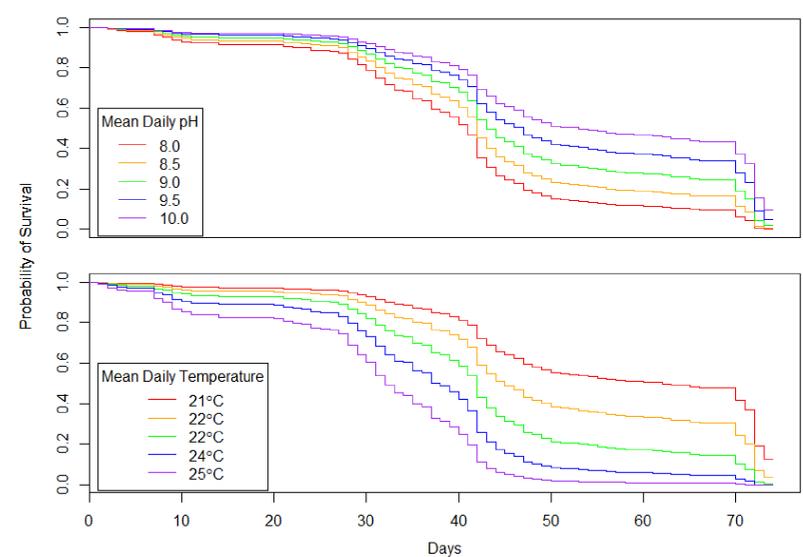
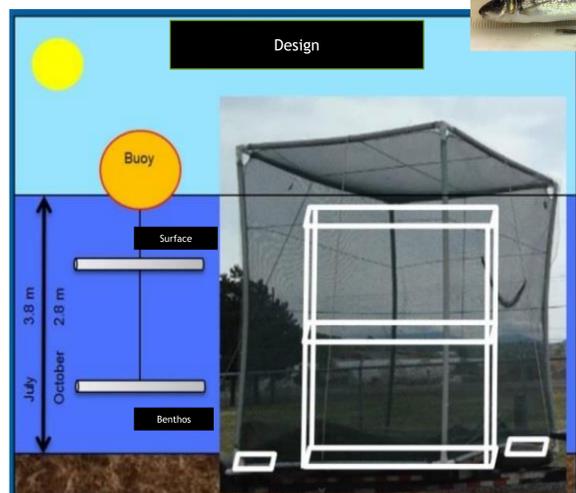
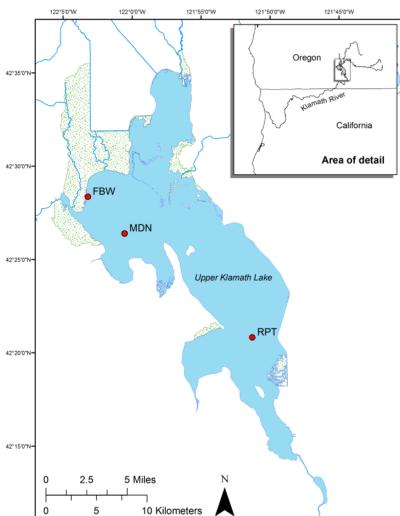
Unsustainably high mortality within the first two years of life prevents endangered Lost River suckers (*Deltistes luxatus*) in Upper Klamath Lake, Oregon, from recruiting to spawning populations.



Massive blooms of the cyanobacterium *Aphanizomenon flos-aquae* and their subsequent death and decay in Upper Klamath Lake are associated with high pH, low oxygen saturation, high total ammonia concentrations, and spikes in the cyanotoxin microcystin. Poor water quality within Upper Klamath Lake is considered the most likely cause of juvenile sucker mortality, but mechanisms causing high mortality are not known.



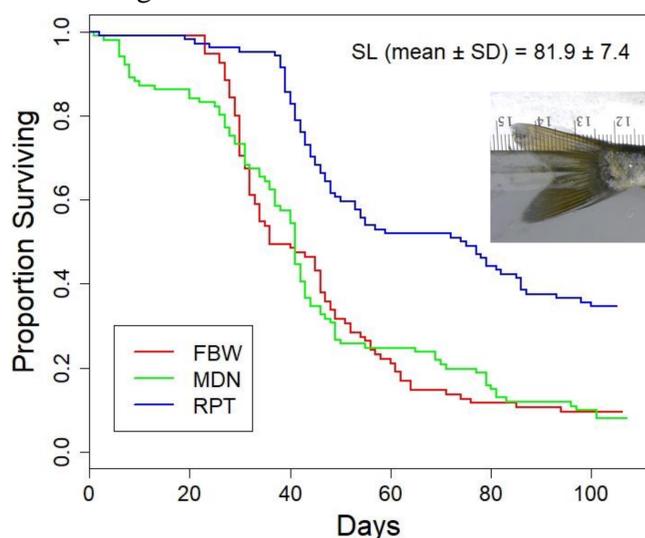
Mortality and hazard rate increased at different times at each site.



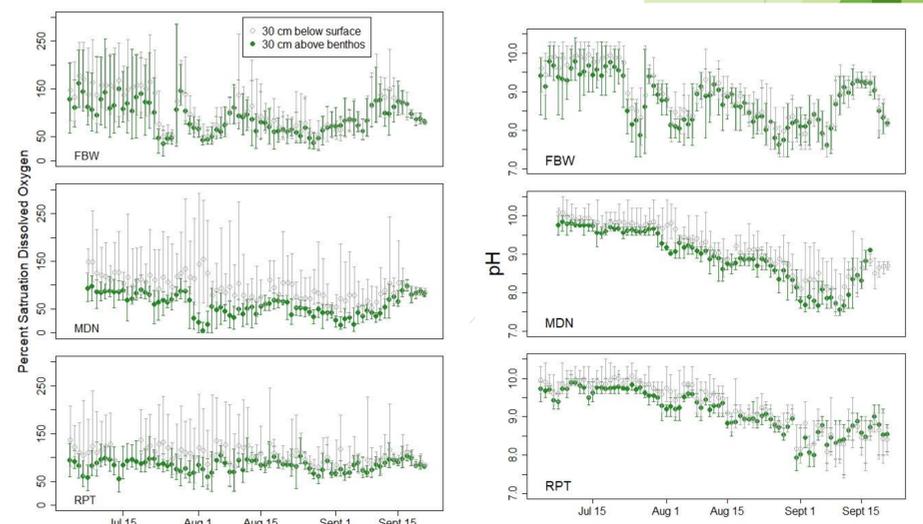
Survival probability at five levels of mean daily pH (top panel) or max daily temperature (bottom panel). In the top panel temperature was fixed to the dataset mean (22.1 °C). In the bottom panel mean daily pH was fixed to the dataset mean (9.18).

- Introduced PIT-tagged age 1 Lost Rivers suckers to three mesocosms in Upper Klamath Lake to determine the timing of juvenile sucker mortality relative to environmental conditions.
- Sucker mortality was inferred from a lack of movement detected on remote PIT tag detection equipment located at three depths within each mesocosm.
- Recorded pH, temperature, and dissolved oxygen hourly 30 cm above the benthos and below the surface.
- Collected ammonia and microcystin samples weekly.

Survival was greatest at the RPT site.



Dissolved microcystin never exceeded 3.5 µg/L and mortality was not associated with increases in the intracellular microcystin concentrations.



Mortality increased at FBW after a water column wide hypoxia and lower pH, at MDN, after a benthic only hypoxia and lower pH, and at RPT after no hypoxia occurred.