Oversummer Survival of Juvenile Coho in the Russian River Basin

University of California Sea Grant Extension Program: Sarah Nossaman, Mariska Obedzinski, Nick Bauer, Henning Fett, Andrew Bartshire, Amelia Johnson, Desiree Delavega, and Paul Olin

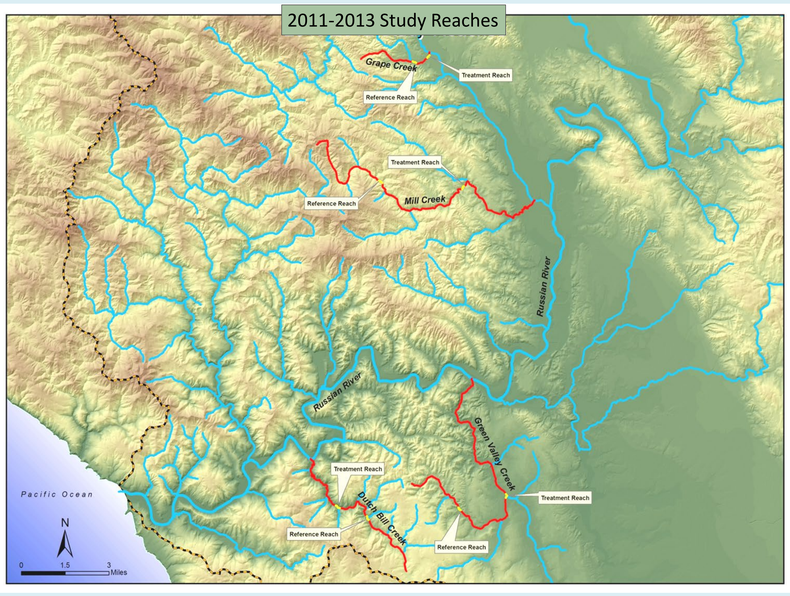
http://ca-sgep.ucsd.edu/russianrivercoho http://coho partnership.org

Overview

UC Sea Grant is conducting a study to correlate flow with oversummer survival of juvenile coho, through a collaborative effort known as the Russian River Coho Water Resources Partnership. The Partnership is working to return a viable, self-sustaining population of coho salmon to the Russian River watershed by improving spring and summer stream flow for coho smolts and rearing juveniles in five tributaries of high priority for coho recovery, including Dutch Bill, Green Valley, Mark West, Mill and Grape creeks. Program partners work with streamside landowners to develop flow enhancement projects, including frost protection fans, rainwater catchment basins, off-channel storage ponds and other alternatives to water diversions during the summer months.

UC Sea Grant's role in the Partnership is to monitor survival of juvenile coho before and after project implementation, in order to determine whether survival is increasing as a result of flow enhancement projects. This data is also being used to evaluate how much water Russian River coho need to survive throughout the critical summer months. Answering this question in varied and dynamic stream systems requires careful consideration of the complex relationship between flow, other environmental conditions, and survival.

Studies were conducted on pilot reaches of Green Valley, Mill and Grape creeks in the summer of 2010. Long-term study reaches were established and sampled on Green Valley, Mill, Grape, and Dutch Bill creeks in 2011- 2013.

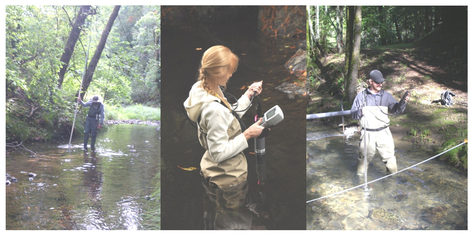


Monitoring Methods

A flow-impaired treatment reach is established, along with a reference reach, on each study stream. PIT tag antennas are installed at reach boundaries to track movement of tagged fish out of study reaches.

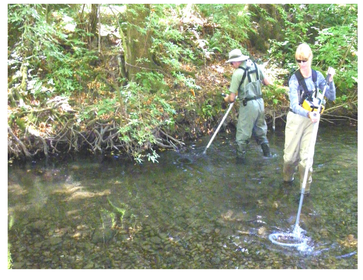
Approximately 500 PIT-tagged coho yoy are stocked into each study reach in late June. Release totals are adjusted based on the number of wild coho observed in each reach during spring snorkel surveys.

Young-of-the-year coho from the Russian River Broodstock Program are PIT tagged at the Warm Springs Hatchery in early June.



Habitat characteristics and dissolved oxygen are measured monthly. Flow and temperature loggers collect data on a continuous basis.

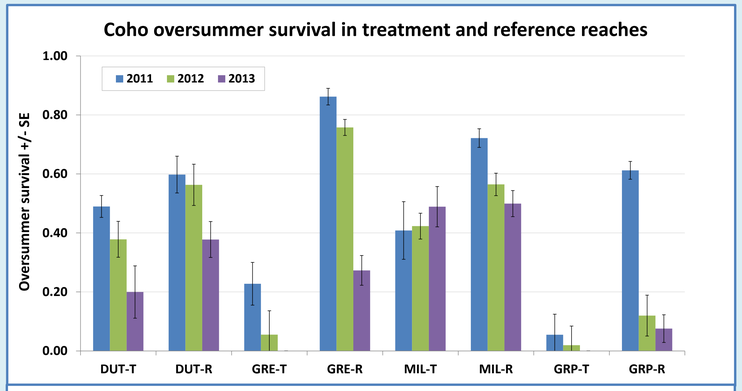
Paired PIT tag wanding samples are conducted at specified intervals between June and October to determine interval survival. Electrofishing is conducted in October to document oversummer survival and growth of stocked fish. This data is compared to flow hydrographs as a first step in defining minimum flow thresholds for juvenile coho. Environmental parameters, such as wetted volume and dissolved oxygen, are used as covariates in survival models in order to identify specific limiting factors associated with low flows.

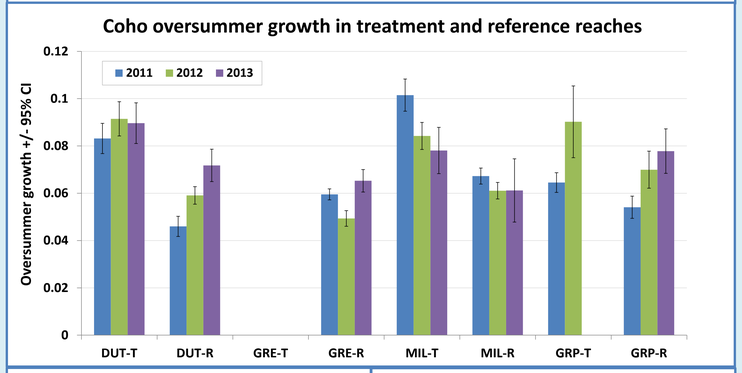


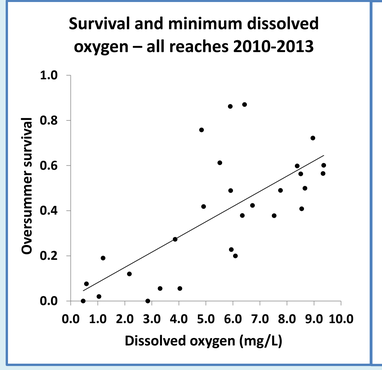
Acknowledgements

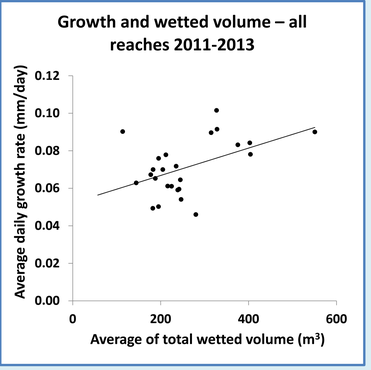
The Russian River Coho Salmon Water Resources Partnership also includes the Center for Ecosystem Management and Restoration, Trout Unlimited, Gold Ridge RCD, Sonoma RCD, and Occidental Arts and Ecology Center's WATER Institute. The Partnership is generously funded by the National Fish and Wildlife Foundation, with support from the Sonoma County Water Agency. Additional field support was provided by AmeriCorps CCNB and the US Army Corps of Engineers. This program was made possible through the gracious and ongoing support of private landowners.

Results









Conclusions

Between 2010 and 2013, oversummer survival of juvenile coho in the study reaches ranged from 0 to 87% and was consistently higher in reference reaches than in treatment reaches. Survival in 7 of 8 reaches declined in consecutive years, corresponding to a decline in annual precipitation. In the remaining reach (Mill treatment), survival was likely biased low in 2011 and 2012 due to the absence of an antenna at the upstream reach boundary. Relationships between flow and survival varied by stream. In reaches where pools dried as flow decreased, survival dropped significantly when average daily discharge fell below 0.1 or 0.2 cfs. In reaches where wetted volume in pools remained high, even when surface flow was 0 cfs, survival was markedly higher. Oversummer growth ranged from 0.05 to 0.1 mm/day and appeared to be greatest in reaches with lower fish density that retained flow connectivity over the study period. Of all parameters sampled, survival correlated most significantly to minimum dissolved oxygen values, while growth was most significantly related to wetted volume.