- **Influence of intermittent stream connectivity on water quality and salmonid survivorship.**

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- Anthropogenic stress and climate change are causing an increasing number of California streams to become intermittent and are driving earlier and more severe summertime drying. The extent to which emerging water conservation alternatives impact flows or habitat quality (e.g. temperature, DO) for salmonids remains poorly understood. Here, we investigate the proximal drivers of salmonid mortality over a range of connectivity conditions during summertime intermittency in Salmon Creek watershed, Sonoma County, CA. Through extensive sampling in paired subwatersheds over a period of two years, we tested the hypothesis that accumulation of readily bioavailable DOC in poorly flushed pools drives DO decline associated with loss of salmonids. We then traced the origin and flow pathways of DOC throughout the watershed using Parallel Factor Analysis (PARAFAC). We obtained samples for DOC and stable isotope analyses at monthly intervals from 20 piezometers and surface water in the study reaches and from private wells and springs distributed throughout the watersheds. We also obtained *in situ* DO, conductivity and pH readings within stream study reaches. We determined DOC quality by SUVA (specific UV absorbance) and fluorescence index. We calculated stream metabolism rates using the single station method. In pools instrumented with DO sensors, we compared changing DOC quality during the summer months to changes in DO concentrations and stream metabolism. Our results show that the duration of complete disconnection of pools during the summer months and stream metabolic rates are positively correlated with salmonid mortality. Furthermore, our results indicate that salmonid mortality is greatest in disconnected pools with low DOC fluorescence indices and high SUVA values, indicative of terrestrially derived DOC and little or no groundwater inflow. Conversely low salmonid mortality was found in disconnected pools with high fluorescence index and low SUVA, indicative of microbially derived DOC. These pools showed clear signs of hyporheic inflow during summertime drying despite complete surficial disconnection. PARAFAC analysis pinpointed groundwater sources of hyporheic flow in the watershed, suggesting that targeted aquifer recharge may contribute to salmonid recovery by augmenting flow in summer refugia.

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ESA Conference Latebreaking Poster Session Abstract

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- DOC source tracing as a decision tool for salmonid conservation practices in North Coast California intermittent streams

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- Anthropogenic stress on water resources exacerbates harsh conditions of stream intermittency. This causes suitable conditions for salmonid populations in North Coast California intermittent streams to increasingly shift northward to wetter conditions. At the boundaries of this range wet season rainwater harvesting is a viable tool for alleviating ecological stress during the dry season. The ecological effect of such water replenishment practices has not yet been consistently monitored. We use two consecutive years of DOC measurements within the Salmon Creek watershed, Sonoma County, CA, coupled with fish population surveys to gain an understanding of the proximal drivers of salmonid survivorship under hydrological stress. Unique fluorescence and absorbance values of DOC compounds are used in mixed-effect models to trace changes in groundwater flow from wet to dry season. Furthermore the relationships between variable DOC quality and water flow regimes on the one hand and DO concentrations on the other are assessed. Concurrent fish surveys provide an insight into threshold levels of DO and water flow on salmonid survivorship. We predict readily bioavailable DOC to be strongly related to DO concentrations where supply of fresh surface water to pools is limiting. Furthermore we predict that salmon survival in isolated pools is thus primarily governed by the source and quality of DOC. A model of groundwater flow based on these assumptions will thus facilitate the implementation of adequate water replenishment strategies for the Salmon Creek community in an effort to preserve the habitat for keystone salmonid species.