

Predicting the impacts on fish of restoring flow intermittency in lowland streams

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Abstract: As part of an agreement to increase water-use efficiency in the Murray-Darling basin, a water-saving pipeline has been constructed to replace the Broken-Boosey Creek system as the primary means of delivering water supplies for irrigation. Consequently, this system, which for the past 100 years received highly regulated perennial flows, has now been restored back to a natural, intermittent system, with low flow and cease-to-flow periods occurring throughout the summer months. The collection of pre-restoration data from a number of sites along a hydrological gradient has enabled us to make predictions about what changes to expect once flows are altered. We expect that large-bodied native and exotic fish will be reduced while the small native fish fauna, indicative of an intermittent lowland system, is expected to bounce back due to an increase in slow-flowing spawning habitats and a release from predation pressures.

Project Aim:

- To identify relationships between the current hydrologic regime, physical habitat and fish assemblage structure.
- Predict the likely impacts of flow-regime restoration, particularly on fish
- Recommend management strategies for protecting ecosystem assets.

Methods;

- Fish surveys conducted bi-annually for 2 years across 10 sites.
- Continuous hydrologic monitoring at each site
- Bi-annual habitat surveys (channel morphology, wood loading, macrophyte surveys)
- Bayesian model averaging (winbugs, R)*
- $\text{Pr}(\text{occurrence}) \sim \text{Discharge} + \text{Flow Variability} + \text{Flow permanency}$
- Modelled for
 - present conditions (model building and testing)
 - Predicted future flow scenarios

Preliminary Results;

We expect that large-bodied native and exotic fish will be reduced while the small native fish fauna, indicative of an intermittent lowland system, is expected to bounce back due to an increase in slow-flowing spawning habitats and a release from predation pressures.

Application to Management/works to be undertaken

- Continued monitoring within the system
 - Assess our predictions regarding the fish fauna.
- Environmental flows down Broken Creek
 - Drought/habitat refugia
- Habitat restoration
 - Excavation of deep pools
 - Addition of LWD

Project Photographs



Further Reading

McMaster, D., Bond, N., Reich, P., and Lake, S. (2007). Research into the ecological impacts of flow regime reversal and weir removal in the Broken-Boosey Creek system: Final report on benchmarking data from 2005-2007. Final report to the Goulburn Broken Catchment Management Authority, June 2007.

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