

Hydrologic variability, refugia, and population viability

Nick Bond¹, David Crook, Jane Hughes, Michael Stewardson
eWater Cooperative Research Centre. ¹ Project contact.

A project funded by eWater CRC (GBCMA partner)

Abstract: The role of refugia in preventing population losses from disturbances has become a central idea in managing issues such as drought. Yet, despite much discussion around the question of refugia, little information exists to guide managers on the functional role that such habitats play in allowing recovery from disturbances, how this varies among species, and how the number and location of refugia influences recovery from disturbances such as drought.

Project Aim:

In this study we are examining the influence of hydrology on the persistence of refuge pools, how different species utilize such habitats, and how dispersal ability affects recolonisation of stream reaches that lack local refugia.

Methods;

We have used helicopter surveys to map the distribution of refugia along entire stream lengths. This is a major step forward and a marked change from traditional survey methods. These “whole of stream” surveys have been used to guide on ground sampling of biota for examining the use of refuge habitats by different species, and also to collect genetic samples which will indicate dispersal patterns of different species. Genetic analyses are being complemented by sampling at ‘rewetted’ sites in winter to determine recolonisation of sites away from persistent refuges.

Preliminary Results

Preliminary results indicate that refuge habitats are patchily distributed and less common in more ephemeral streams. Channel size and morphology also influence the persistence of refuge pools, and in many stream reaches sedimentation has reduced the frequency of pools.

Application to Management/works to be undertaken

The goal of this study is to develop models that will predict how populations will respond to changes in the accessibility of refuge habitats. Such changes may be brought on by processes such as sedimentation, which affect the size and depth of pools, or changes in hydrology (e.g. associated with climate change or farm dams), which will affect the persistence of streamflows, and hence how long individual pools must persist. Observations also indicate that stock access poses a serious threat to the condition of a large number of refuge pools sampled as part of the project (e.g. see images below).

¹ Author affiliation.

² Co-author affiliation, address and contact details

Project Photographs



Photos show (Left) the location of pools (2007 summer) in the Granite Creeks area; (right) Stock damage and algal blooms in refuge pools on Pranjip Creek anabranch

Further Reading

Bond, N.R., Lake, P.S. & Arthington, A.H. (2008) The impacts of drought on freshwater ecosystems: an Australian perspective. *Hydrobiologia*, in press

Bond (2007) Identifying, mapping and managing drought refuges: a brief summary of issues and approaches. Technical report. eWater CRC, Canberra.

¹ Author affiliation.

² Co-author affiliation, address and contact details