Hydraulic habitat in the River Murray: the influence of geomorphology and large wood

By

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Abstract

Large wood provides habitat for native fish in the lowland rivers of Murray-Darling basin in south-eastern Australia. The reasons for this are not well understood but are believed to include the use of large wood for hydraulic refuge or shelter. The natural distribution of large wood in these rivers is not well understood, and little is known of the hydraulic conditions associated with large wood.

This study set out to describe more fully the natural large wood landscape in a lowland section of the River Murray, to investigate how hydraulic conditions associated with large wood varied spatially and temporally, and to investigate if hydraulic conditions influenced fish use of large wood. Five different types of large wood were selected, based on physical characteristics including structural complexity, angle to flow and distance from bank. Three different categories of meander bends were selected based on their planform geomorphology. Six replicates of each large wood/meander bend combination were identified, giving 90 different large wood pieces. These 90 large wood pieces were sampled for hydraulic conditions using an Acoustic Doppler Profiler (ADP). Sampling was undertaken at five different discharges (temporal scales). Data was assembled at the spatial scale of large wood pieces and then aggregated to 3 larger spatial scales. Hydraulic data were analysed for heterogeneity at spatial and temporal scales. The same large wood pieces were also electro-fished at two discharges.

A complex pattern of hydraulic heterogeneity was discovered. Spatial hydraulic heterogeneity was not apparent at low discharges, but appeared as discharge increased and was maximised at the highest discharge, but not at all spatial scales. Temporal hydraulic heterogeneity was evident at all spatial scales, but varied in nature between scales. Analysis of the electrofishing data indicated that one species, Trout Cod, was associated with particular hydraulic conditions. The ADP proved to be a valuable tool for the rapid collection of three-dimensional hydraulic data and a number of hydraulic variables were identified that may be significant to fish seeking hydraulic refuge.

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