



# Operational Ranges of the River Murray Fishways – Summary

## Tactical Project 17

The successful design and optimal operation of vertical slot fishways relies upon an understanding of the way fishway hydraulic conditions influence the ability of fish to ascend. Observations of fishway hydraulics and fishway function at many vertical slot sites have been encapsulated in well-established hydraulic design criteria for use in Australia. These criteria have developed over time, often through the in-situ evaluations of fishway performance.

Passive Integrated Transponder (PIT tag) data collected for extended durations (up to 20 years) on the fishways of the Murray River present an attractive opportunity to learn more about fishway performance. The standalone analysis of PIT tag data is difficult as fish movement is driven by a range of external factors, including the time of year, river flows, temperature, and importantly the fishway hydraulic conditions.

This study involved the detailed reconstruction of the fishway hydraulic conditions at five selected sites (Locks 6-10) where PIT tag data has been recorded. This reconstruction covered around 20 years of fishway operation and involved tens of thousands of simulations of fishway hydraulics. Using this modelling, all fish movement events recorded using PIT tags can be associated with a detailed assessment of fishway hydraulics at the time of the event.

The PIT tag databases and hydraulics reconstructions have been combined into a single database. As a first use of this database, the information has been analysed to attempt to validate current fishway design criteria. This analysis relied heavily on comparisons of fish movement rates under typical and atypical hydraulic conditions. Historical variability of some hydraulic parameters was insufficient for a reliable correlation with fishway performance.

The analysis undertaken generally supports existing design criteria. Some apparent conservatism in the minimum depth and attraction flow criteria has been identified for the sites, and the new understanding of these limits is expected to modify this operation.

The study demonstrates the benefits of combining existing historical datasets with digital modelling and analysis tools. The database and methodology developed in this project will have ongoing use in the optimisation of specific aspects of fishway operation.