

Understanding larval dispersal to inform targeted restoration for the protection of vulnerable life stages.

Dr Eleanor Gee^{1,2}, Dr Cindy Baker¹, Dr Andrew Western², Dr Stephen Swearer²

¹Niwa, ²The University of Melbourne

New Zealand's indigenous freshwater fish species have a planktonic larval stage in which dispersal occurs from spawning sites to juvenile habitat. For diadromous species, such as the five galaxiid whitebait species, larval dispersal can occur across a multitude of habitat types, which in many cases includes estuaries and the sea. For most species, little is known of the geographic fate of these larvae, how long larval dispersal takes, and the influence of physical and behavioural factors on dispersal. These uncertainties prevent targeted restoration activities to protect the vulnerable larval life stage of our indigenous fishes. While hydrodynamic influences such as river and tidal currents play a large role in larval dispersal, many studies have found that behaviour is an important factor in determining larval dispersal patterns, despite the magnitude of hydrodynamic influences. However, little is known about the larval behaviour of New Zealand's indigenous freshwater fishes. Using the Australian estuarine-dependent black bream (*Acanthopagrus butcheri*) as a case study we present a combined laboratory, field and numerical modelling investigation, which examined the relative influence of larval behaviour and hydrodynamics on dispersal. In addition, we discuss the potential impact of larval behaviour on river and estuarine dispersal of two declining whitebait species; inanga (*Galaxias maculatus*) and giant kokopu (*G. argenteus*).