

# LATERAL MOVEMENTS OF FISH IN A LARGE, TEMPERATE RIVER SYSTEM

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Off-channel habitats play a crucial role in lifecycles of many riverine fish species. However the lateral movements of fish in lowland river systems are poorly-understood. We investigated movement of fish between the main river channel and different types of backwater habitats in a large, temperate river (the Waikato River, New Zealand) in relation to environmental gradients, i.e. water level, water temperature, flow velocity and water quality. Fish were sampled using directional fyke-nets in the river and a range of off-channel habitats (side arm, tributary leading to a lake and tributary leading to a wetland). The intensity and direction of fish movements between the river and off-channel habitats varied both temporally (diel and seasonal basis) and in relation to the character of the habitat, and we observed species- and age-specific patterns in behaviour. Seasonal movements were mostly driven by changes in river discharge and water temperature, particularly those associated with floods. Movement of shortfin eel (*Anguilla australis*) into the off-channel habitats at night was associated with flooding, whereas common bullies (*Gobiomorphus cotidianus*) were most abundant during the day, moving in both directions between off-channel and riverine habitats. Large numbers of inanga (*Galaxias maculatus*) moved into wetlands during a large and extended spring flood, whereas numbers moving into a connected lake system were significantly lower. This study emphasizes the importance of lateral connectivity and flooding in the functioning of river systems where numerous riverine native fish used off-channel habitats. Therefore management strategies that promote connectivity within lowland river-floodplain ecosystems and the natural flood regime are crucial to maximise habitat availability for native fish species. But successful management should also consider the potential negative and ongoing implications of non-native fish.