Fish Use of the Inundated Waters of a Subtropical Saltmarsh – Mangrove Complex in Southeast Queensland

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Until recently saltmarshes were considered muddy wastelands fit only for filling, reclamation or for receiving dumped rubbish, and in parts of Australia as much as half of saltmarsh areas has been destroyed. Saltmarshes now are considered to be valuable coastal habitat important both in terms of their role in filtering surface overflow prior to it entering the sea and in their contribution to coastal productivity (Connolly & Bass, 1996). Part of the rationale for encouraging the conservation of saltmarshes has been their importance as fish habitat, especially for juveniles of economically important species.

There are very few studies of fish communities from saltmarshes in Australia. We cannot extrapolate directly from fish studies in northern hemisphere marshes because those marshes occur lower in the intertidal zone, in an equivalent position to mangroves in Australia (Adam, 1990). The only sampling of fish that occur naturally over the marsh flat at high tide in Australia has been in temperate waters, and those preliminary data based on sampling over three winter months in one area found low densities (0.04 fish/m^2) (Connolly *et al.*, 1997). Studies of subtropical fish communities from Australian saltmarshes have previously been conducted on Coomera Island in southern Moreton Bay (Morton *et al.*, 1987; Morton *et al.*, 1988). Fish were sampled by netting tidal creeks draining saltmarsh and semi-permanent pools on the marsh flat, and not by netting on the marshflat at inundation. The current study extends previous work showing the importance of mangroves as habitat for fish by sampling simultaneously a mosaic of saltmarsh - mangrove patches at Eden Island in southern Moreton Bay.

Despite the interest in saltmarshes and mangroves as fish habitat, no routine sampling method exists. In the present study, a 5x5 m buoyant pop net (1 mm mesh) with remote release was used to ensnare fish over a fixed area (Connolly, 1994). Fish were then retrieved from a collection pit once the tide retreated. This method was chosen because there is little in the way of above-ground structure prior to release. It can be used to sample quantitatively in habitats that include erect vegetation such as saltmarsh grasses and mangrove trees. An experiment to determine rates of recapture once fish are ensnared in the pop net showed that, on average, 93% of individuals of the most common midwater species (*Ambassis jacksoniensis*) were recaptured and that 82% of a common benthic species (*Mugilogobius stigmaticus*) were recaptured.

Fish were sampled at high tide, at night over three winter months (June - August 1996) in three habitats: upper saltmarsh, lower saltmarsh and mangroves. Mangroves typically occur lower in the intertidal zone than saltmarsh habitat, so fish were also sampled before and after high tide in mangroves when the water height was the same as that in the saltmarsh at high tide. Sampling at this lower water height in mangroves was typically done about one hour either side of slack high tide. A total of 126 net releases were made, with between 9 and 15 releases in each habitat at each sampling period.

In: Tibbetts, I.R., Hall, N.J. & Dennison, W.C. eds (1998) *Moreton Bay and Catchment.* School of Marine Science, The University of Queensland, Brisbane. pp. 471-472.

A total of over 3 000 fish of 19 species were captured. Total fish abundance (all species combined) and species richness increased over the three months of sampling. The perchlet, *Ambassis jacksoniensis*, was by far the most common species, constituting approximately 70% of total abundance, and occurring in 80% of samples. Fish densities (all species combined) were significantly higher in mangroves than either saltmarsh habitat at all sampling periods, and lower saltmarsh tended to have more fish than upper saltmarsh (though this trend was not always significant). Densities ranged from 0.1 to 0.8 fish/m^2 in saltmarsh and from 0.8 to 3.8 fish/m^2 in mangroves. Fish densities (all species combined, and all species excluding perchlet, tested separately) in mangroves at high tide (deep water) did not differ significantly from densities in mangroves sampled before or after high tide (shallow water). This is an important point, offering a first step in separating the importance of habitat to fish compared with the importance of water depth alone. We conclude that the difference in fish densities between saltmarsh and mangroves was not simply because mangroves have greater water depth at high tide. The differences between mangrove and saltmarsh fish assemblages are best explained by viewing the saltmarsh fish assemblage as a subset of the suite of species found in mangroves.

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