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Ontogeny and ecology of snapper
(*Pagrus auratus*) in an estuary,
the Mahurangi Harbour

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Abstract

This thesis examined the use of an estuary by the sparid *Pagrus auratus*, commonly known as snapper. The density and distribution of snapper (juveniles through to adults) was quantified over multiple spatial and temporal scales and associated with habitat.

Juveniles enter or are spawned within the Mahurangi Harbour over the warmer months, with densities highest in March. Ontogenetic shifts in fine-scale habitat occurred. Fine-scale analysis from the beam trawl showed juvenile snapper (< 10 cm) were mostly associated with horse mussels. Larger juveniles (> 4 cm) were also associated with bare areas. The 0+ fish (from the DUV) occupied fine-scale habitat comprised of muddy to sand substrata with structure of sponges and horse mussels with and without epifauna. The remaining year-classes occupied a coarser substratum, with shell hash the major secondary structure. An artificial reef experiment showed juvenile snapper were attracted to artificial horse mussels with and without epifauna rather than bare areas or controls. The 1+ year-class increased their habitat range, occupying areas with more uniform substrata. A growth shift through to the 2+ year-class was not observed, and this may be due to increasing mortality, (natural or predation), or emigration out of the harbour. Densities of the larger year-classes decreased over the cooler months but not all snapper leave permanently, with tagging showing up to 80% of fish to be resident.

Ontogenetic shifts occurred in diet with growth. Juveniles < 2 cm consumed planktonic copepods, with > 2 cm consuming benthic copepods, mysid and caridean shrimps and polychaetes. Snapper > 10 cm consumed brachyuran crabs, caridean shrimps, bivalves, polychaetes and hermit crabs, with > 30 cm fish able to consume harder shelled molluscs and bivalves. The *a priori* habitats were equally productive in terms of prey, and this may be advantageous for juveniles who can then select a habitat for other qualities, i.e. protection from predation. Despite the potential of snapper to utilise any sort of structure as cover or for rest, most structure within the Mahurangi are biogenic and susceptible to anthropogenic effects, especially sedimentation. The loss or decline of these biogenic species may therefore have a significant impact on the way snapper utilise the Mahurangi. Overall, understanding the ontogeny of snapper within estuaries will contribute to better management strategies for snapper in general.

Dedication

This thesis is dedicated to the memory of my Dad, Peter Usmar, who lost his battle with bone marrow cancer in the first year of this study.

It was from you I developed a love of the sea and fishing. You taught me many things, especially that I could do anything!

I miss you every day.

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