

Simulation Estimates of Annual Yield and Landed Value for Commercial Penaeid Prawns from a Tropical Seagrass Habitat, Northern Queensland, Australia

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Abstract

Concern over the loss of seagrass habitat has prompted examination of the value of the production of commercial prawns from such habitat. Cairns Harbour in tropical northern Queensland has 876 ha of mixed seagrasses, dominated by *Zostera capricorni* and *Halodule pinifolia*, that support a multispecies commercial penaeid prawn fishery offshore. Densities of juvenile commercial prawns estimated from seagrass surveys were used to project estimates of annual yield and landed value, using a deterministic simulation model employing lunar-period time steps. Estimates of the potential total annual yield from Cairns Harbour seagrasses for the three major commercial prawn species (*Penaeus esculentus*, *P. semisulcatus* and *Metapenaeus endeavouri*) were 178 t (range 81-316 t) year⁻¹ with a landed value of \$A1.2 million (range \$0.6 million to \$2.2 million) year⁻¹.

Introduction

Seagrass meadows are found in sheltered inshore waters throughout the tropics (den Hartog 1970). These habitats commonly support juvenile fishes and crustaceans. Artisanal and commercial fisheries exist for many of the species. Several tropical species of penaeid prawns depend on this habitat for their survival (Staples 1984; Coles and Lee Long 1985; Staples *et al.* 1985). Development of coastal areas has caused concern over the removal of seagrass habitat and the effect that this may have on commercial fisheries.

Cairns Harbour (Fig. 1) is typical of mangrove-lined bay and inlet systems in northern Queensland, Australia. A related study has examined the seagrasses of Cairns Harbour and their fish and prawn populations (Coles *et al.* 1993). Our joint aim was to establish a baseline for the harbour against which future changes could be assessed and quantified. In this context, the present study attempted to estimate the annual expected yield and landed value of commercial prawns that use the seagrass habitats within Cairns Harbour.

One way to estimate the prawn annual yield and landed value for the seagrass habitat of Cairns Harbour is to examine commercial logbook records. Although the requirement for seagrass habitat by juveniles of several commercial prawn species has been demonstrated by their co-distribution along the tropical Queensland coast, it has been difficult to verify the relative contributions of different juvenile-prawn habitat areas to commercial landings. There is strong spatial partitioning between commercial prawn species between different habitats (Staples *et al.* 1985) and between seagrass sites (Coles *et al.* 1987). Even within closely associated seagrass areas, Turnbull and Mellors (1990) found considerable variation in the density of juvenile prawns. With the uncertainty of directly relating commercial landings to production from seagrass sites, it was more appropriate to use landing records for comparative purposes only and to estimate expected yield and landed values by computer simulation from juvenile-prawn densities estimated from samples taken from seagrasses.