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Diets and trophic guilds of demersal fishes of the south-eastern Australian shelf

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Abstract. A total of 8200 stomach samples was collected from 102 fish species caught by trawl or gillnet during research surveys on the south-eastern Australian shelf from 1993 to 1996. Diet compositions were analysed based on percentages of wet weight of prey. Of the total fish examined, 70 species had sufficient stomach samples (i.e. >10) for further analysis. Ten trophic guilds were identified from cluster analysis. Benthic prey dominated the diets. However, analysis on a subset of 28 abundant species that were commercially and ecologically important, showed that pelagic prey was dominant, particularly for 12 quota species. This suggests that pelagic production contributes significantly to the trawl fishery production. Further analysis on the diets of these 28 species found that although fish was more important than invertebrate prey, there was no evidence of significant predation on commercially important species (quota species) by other fish species. A food web diagram was constructed, mostly based on the diet compositions, guild structure and relative abundance of commercially and ecologically important fish species, to show major trophic interactions of the shelf ecosystem.

Introduction

The south-eastern Australian shelf, off Victoria and New South Wales (NSW) (Fig. 1), has been supporting demersal fisheries since the early 1900s (Tilzey 1994). Over 22 species are being harvested, with average annual fishery landings of ~25 000 t (Tilzey 1999). However, ecological interactions among these harvested species and between the harvested species and other abundant species have not been well studied. Since most fish are harvested by demersal trawls, we initially believed that benthic production would be the most important contribution to fishery production, whereas pelagic contributions, from either on or off the shelf, were believed to be relatively minor. Also, predation on harvested species, which could provide additional information on relative importance of fishing effects on the demersal fish communities, is poorly understood.

Between 1993 and 1997, CSIRO Marine Research conducted intensive investigations of factors that affect fishery production on the south-eastern Australian shelf (Bax *et al.* 1999; Bax and Williams 2000; Williams and Bax 2001). The project was multi-faceted and investigated the association of fish assemblages with habitats, and the influences of physical and chemical variables of the habitat in the biological attributes of the assemblages (papers in this issue). This paper presents the major parts of the project results on the diets and trophic guilds of commercially and other abundant or potentially piscivorous fish species. Specifically, the aims of this study were: (1) to describe the diets of ecologically and commercially important fish species in the shelf; (2) to identify the trophic guild structure of the fish community; (3) to compare the relative importance of pelagic and benthic contributions to the fishery production by comparing pelagic and benthic prey sources of commercial species; and (4) to evaluate the magnitude of predation on commercially important (quota) species. A conceptual food web model was also constructed, based on the diet compositions and the guild structure of the

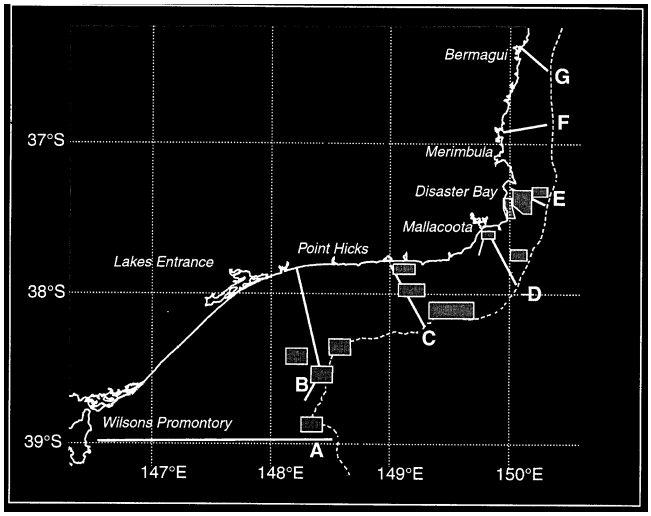

Fig. 1. Map of study area off south-eastern Australia, showing locations of transects A–G (bold lines) and mesohabitat study areas (greyed boxes).

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