

Novel life-history data for threatened seahorses provide insight into fishery effects

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Life-history variables for three incidentally captured species of seahorse (Kellogg's seahorse *Hippocampus kelloggi*, the hedgehog seahorse *Hippocampus spinosissimus* and the three-spot seahorse *Hippocampus trimaculatus*) were established using specimens obtained from 33 fisheries landing sites in Peninsular Malaysia. When samples were pooled by species across the peninsula, sex ratios were not significantly different from unity, and height and mass relationships were significant for all species. For two of these species, height at physical maturity (H_M) was smaller than the height at which reproductive activity (H_R) commenced: *H. spinosissimus* ($H_M = 99.6$ mm, $H_R = 123.2$ mm) and *H. trimaculatus* ($H_M = 90.5$ mm, $H_R = 121.8$ mm). For *H. kelloggi*, H_M could not be estimated as all individuals were physically mature, while $H_R = 167.4$ mm. It appears that all three *Hippocampus* spp. were, on average, caught before reproducing; height at 50% capture (H_C) was $\geq H_M$ but $\leq H_R$. The results from this study probe the effectiveness of assessment techniques for data-poor fisheries that rely heavily on estimates of length at maturity, especially if maturity is poorly defined. Findings also question the sustainability of *H. trimaculatus* catches in the south-west region of Peninsular Malaysia, where landed specimens had a notably smaller mean height (86.2 mm) and markedly skewed sex ratio (6% males) compared with samples from the south-east and north-west of the peninsula.

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INTRODUCTION

The incidental capture of marine organisms has become a critical point of concern in fisheries management, as basic biological data for incidentally captured animals are often absent or sparse. The majority of studies on incidental capture have been focused on large or charismatic animals (Hall, 1997), yet the vast majority of animals that are incidentally caught are small fishes, maturing at lengths of <20 cm and weighing <100 g (Alverson, 1994; Kelleher, 2005). These smaller fish species may be discarded or retained and those that are retained are seldom monitored, making species-specific

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