Restocking of the Western School Prawn in the Swan-Canning Estuary

The Western School Prawn (Metapenaeus dalli; Figure 1) was the focus of a small commercial and iconic recreational fishery in the Swan-Canning Estuary.

However, catches declined significantly, with the commercial fishery closing in the mid-1970s and the popularity of the recreational fishery, which involved >50,000 people in the 1980s, also declining. Despite a reduction in fishing effort, stocks failed to recover. Restocking, i.e. releasing cultured individuals to rebuild stocks, was seen as a possible means of increasing the population of M. dalli and reinvigorate recreational prawning.

Between 2013 and 2016, 4.5 million prawns were grown in aquaculture and released into the Swan-Canning Estuary. In order to undertake the restocking responsibly, research was needed to enhance our understanding of the biology and ecology of M. dalli, (2) develop release strategies to maximize the survival of hatchery-reared prawns and (3) increase stewardship of the recreational prawn fishery and the Swan-Canning Estuary.

Methodology
The length, sex and abundance of prawns and fish were collected monthly at night, over 31 lunar months, from sites throughout the nearshore (<2m deep) and offshore (>2m deep) waters of the Swan-Canning Estuary using hand and otter trawls. Much of the sampling was conducted by students.

Biology and ecology of the Western School Prawn
Western School Prawns typically live for one year, with a small proportion surviving for a second year. They have a highly seasonal pattern of growth, increasing rapidly in size in summer (Oct-Apr), but with virtually no growth occurring in winter (May-Sept; Figure 2). Females grow about 25% longer than males but die faster, with very few reaching two years old. Breeding occurs mainly from November to February, when water temperatures are >18°C and salinity >25. Individuals complete their life cycle in the estuary.

There are clear spatial and temporal patterns in the abundance and distribution of M. dalli in the Swan-Canning Estuary; including the marked seasonality in their presence in the nearshore waters during the summer breeding season and a movement...
into offshore waters in autumn/winter. The abundances of prawns increased following the first three years of restocking.

Development of release strategy

Laboratory experiments and field observations showed that prawns remain buried in, or settled on the surface of the sediment during the day, but move up into the water column at night. Eight species of fish (i.e. several species of hardyhead and goby and the Gobbleguts, Common Silverbiddy and Black Bream), were found to predate on hatchery-reared prawns, with the abundance of many of these fish species increasing at night. Two species, i.e. Gobbleguts (Ostorinchus rueppellii) and the Common Hardyhead (Atherinomorus vaigiensis) were responsible for 99% of predation. Post-release mortality was 288% greater when the release of prawns occurred during the night and releases over sand (rather than seagrass) reduce the predation risk further (Figure 3).

A quantitative sediment map for the Swan-Canning Estuary was produced and the co-occurring fish and crustacean species collected during the sampling program to identify optimum release sites and times. Releases in the Lower Canning Estuary and Perth Water during early to mid-summer (December to January) were predicted to lead to maximum post-release survival. This tool could readily be applied to other species.

Community engagement

A citizen-science program, Prawn Watch, was designed to engage participants in the collection of mature females for the aquaculture of *M. dalli*, providing information on the biology and ecology of prawns, as well as encouraging stewardship of the recreational fishery and the estuary more broadly. A Prawn Watch smartphone app was also developed to collect data on the location of prawns in the Swan-Canning Estuary.

More information

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