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Investigating Reproductive Biology Issues Relevant to Managing the Western Rock Lobster Broodstock

Final FRDC Report – Project 2003/005

Melville-Smith, R., de Lestang, S., Beale, N.E., Groth, D. and Thompson, A.

Government of Western Australia
Department of Fisheries

Australian Government
Fisheries Research and Development Corporation

Western Australian Fisheries and Marine Research Laboratories

Fish for the future

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2003/005 Investigating reproductive biology issues relevant to managing the western rock lobster broodstock

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Objectives:

1. To investigate the implications of the setose and maximum size rules.
2. To undertake preliminary investigations into the implications of egg diameters being significantly smaller at the Abrolhos Islands than at the coast.
3. To quantify the extent of the breeding grounds, so as to weight the overall egg production index for the stock by the contribution of the management zones.

Non-Technical Summary

Increases in efficiency due to modern electronic equipment, improved fishing vessels and knowledge about the grounds and lobster behaviour, have all led to western rock lobster fishers becoming more efficient at catching western rock lobsters in Western Australia. One of the outcomes of these increases in efficiency has been an increase in pressure on the breeding stock. Managers have responded by introducing measures to protect the breeders. In 1993, this involved the imposition of measures to limit the exploitation of mature female lobsters by introducing a legal maximum size for females as well as the protection of setose (mature) females.

The combination of high exploitation rates and protection of large, mature females, but not males, has since resulted in very distorted sex ratios of mature animals across the fishery, particularly those over the maximum size limit. It is well known from laboratory studies on other species of lobsters, that highly distorted female-dominated sex ratios (such as has been caused in the wild by the setose rule), and large females being forced through lack of choice to mate with small males (such as has been caused in the wild by both the setose and maximum size measures) can lead to sperm limitation effects (fertilisation of eggs but reduced brood sizes). These same management measures could have more positive effects – for instance in some species, the older individuals produce larger eggs, that in turn produce larger larvae that have been shown to have better survival characteristics.

These, and other unknowns, led to the initiation of this research project aimed at investigating these biological issues. The outputs from this research, together with other data, provide an indication of the contribution to egg production of different management zones in the western rock lobster commercial fishery.

This study established that the sizes at which female and male western rock lobsters become mature is smaller in the northern part of the grounds than in the south. The study further showed that the size at first maturity has been decreasing in all areas of the grounds over the last 30 years. The reason for these changes may be due to warming of the water, which has occurred off