

PROPOSAL FOR CREATION AND ASSESSMENT OF MARINE FISHERIES ✓
ENHANCEMENT RESERVES

As a logical extension to the work N.S.W. Fisheries has been carrying out on and off over the past 20 years or so in relation to the development of a system of marine and estuarine reserves in N.S.W. waters, I would like to propose a study aimed specifically at the uses and benefits of such reserves for fisheries enhancement and management purposes. The basic biological concepts behind such "marine fishery reserves" are outlined in detail in recent reviews by Bohnsack (1990) and Roberts and Polunin (1991), and summarised in the recent newspaper article by Gruson (1992) (see attachments). In principle, the basis of this concept is to set aside unfished areas of habitat in which fish (and also crustaceans and molluscs) of commercial and recreational importance can grow to maturity and reach large adult sizes at which their fecundity is greatly increased (see example of red snapper fecundity in Bohnsack's paper, attached), thus "seeding" surrounding fished areas with both increased numbers of juvenile recruits and surplus adults emigrating from these protected areas.

The "conservational" use of marine reserves in relation to fisheries enhancement in NSW has been considered important since the mid 1970's (e.g. Pollard 1977, 1980; Robinson and Pollard 1982), though the emphasis has mainly been concentrated on the protection and preservation of juvenile fish and their nursery habitats rather than the protection of adult breeding stocks. Some work along the latter lines, however, was carried out during the late 1970's and early 1980's for G.B.R.M.P.A. to determine the effectiveness of unfished reserves in enhancing populations of coral trout in the Capricornia Section of the Great Barrier Reef Marine Park (Pollard 1978, 1979; Craik 1980, 1981). The results of this latter work were generally confirmed by more recent studies carried out in the northern section of the Marine Park by Ayling and Ayling (1986). Johann Bell also used visual census techniques developed by our fish ecology group during the 1970's and later applied during the above studies (Bell et al. 1985) in a marine reserve in France during the early 1980's (Bell 1983), and has more recently presented a paper outlined some of the general concepts involved in fisheries conservation reserves at a conference in Corsica.

What is proposed here is to initially set aside replicate reserve areas as "experimental closures" in the vicinity of the Solitary Islands Marine Reserve (Pollard 1981) and to monitor populations of selected demersal reef species and their fisheries in and adjacent to these reserve areas. In view of their presently depleted status (see Table 1) and their importance in this general north coast area, the two species chosen for potential monitoring are Australian snapper

(catches of which have declined by over 20% since the decade from 1962/72) and eastern rock lobster (catches of which have declined by over 50% during this period) (see abstract from Cole, Ayling and Creese 1990, attached). Preliminary discussions have been held with Doug Ferrell and Gary Henry re the feasibility of monitoring the former, and with Steve Montgomery re the latter species. All agree that, particularly in view of the present serious state of the fisheries for these two species, fishermen in this area are concerned enough to probably support and co-operate in such a study rather than face potentially much more drastic management measures in the near future.

With particular regard to rock lobsters, preliminary results from the U.S.A. (e.g. Davis and Dodrill 1980; Davis 1981, 1989) and New Zealand (see MacDiarmid and Breen (1992) and other attachments) indicate that such reserves may be particularly effective in enhancing local populations when used in conjunction with other more standard fisheries management measures.

It is therefore proposed to request funding for this study from the Commonwealth through its "Ocean Rescue 2000" grant program, on both the bases of evaluating the potential uses of marine reserves for fisheries enhancement, and attempting to stem declines in the populations of these two important marine species.

In the meantime, I would like to discuss this concept further with Doug Ferrell and Steve Montgomery (and also Bert Sheridan, who is considering the population genetics aspects of such fisheries reserves) and to develop a potentially effective experimental design to form the basis of this grant application.

This overall concept was discussed in some detail at the recent International Conference on Artificial Habitats for Fisheries in Los Angeles, and the National Forum on Ocean Conservation in Washington, D.C., and also with Jim Bohnsack of the National Marine Fisheries Service, and it is currently being given very serious consideration in the south-eastern U.S.A.

This proposed project is directly related to the overall mission of NSW Fisheries in contributing to the "management of the aquatic habitat and fish resources in order to conserve fish stocks and optimise the sustainable yield for commercial and recreational fishers"; and to all of the immediate goals of the Research Institute in:

- (1) Providing assessment of the impact of existing, or proposed, fishing or other activities, on aquatic resources.
- (2) Identifying and evaluating alternative strategies which will lead to the optimisation of existing fisheries resources and the development of new potentials.

- (3) Determining how depleted resources, or damaged habitats, can best be restored.
- (4) Identifying the possibilities for enhancement of fisheries and assessing the implications of alternative strategies.

This proposal is particularly relevant to F.R.I. Strategy 5.5, in identifying opportunities for the enhancement of fish resources by assessing the potential to improve the productivity of natural habitats.

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Table 1. - Average annual catches (tonnes) and wholesale values (\$m at 1990 prices) of Australian snapper and eastern rock lobster landed in N.S.W. - 1962/72 and 1987/90.

	<u>Annual Catches (t)</u>				<u>Annual Values (\$m)</u>		
	<u>1987/88</u>	<u>1988/89</u>	<u>1989/90</u>	<u>1987/90</u>	<u>1962/72</u>	<u>1987/90</u>	<u>1962/72</u>
				(mean)	(mean)	(mean)	(mean)
<u>Snapper</u>	591	536	474	534	687	4.5	5.8
<u>Lobster</u>	98	79	88	88	179	2.1	4.2