

SUMMARY

Movement of the Common Coral Trout, *Plectropomus leopardus*

- i. Five tagging exercises have been completed over a period of 22 months from April 1992 to February 1994 on the cluster of reefs south of Innisfail (Beaver, Taylor, Farquharson, Little Potter (17 060 and 17 061) and Potter Reefs) in the Cairns Section of the Great Barrier Reef Marine Park which have been zoned for the Effects of Fishing Program Reef Experiment.
- ii. A total of 4627 *P. leopardus* have been tagged and released on the five reefs with a total of 443 returns to date from the public (300) and the four tag-recovery exercises (143).
- iii. Ninety-nine per cent of the research returns of *P. leopardus* were returned from their reef of release. One inter-reef movement was recorded from Taylor to Beaver Reef. The results of the research recovery exercises indicate movement of *P. leopardus* among reefs is negligible and unlikely to confound treatment effects in the proposed Effects of Line Fishing Experiment.
- iv. Thirty-six per cent of the public returns were returned from reefs other than the one on which they were released. The majority of inter-reef movement from the public returns was from Beaver (Closed) to Taylor Reefs and from Potter Reef to other reefs in the cluster. On the basis of the public returns, frequency of inter-reef movement of *P. leopardus* varies significantly among reefs within the cluster and ranges from 12% at Farquharson Reef to 40% at Potter Reef.
- v. It is suggested that the disparity in the extent of inter-reef movement of *P. leopardus* from Beaver Reef between the public and research returns is largely due to infringements, rather than a high level of movement from Beaver Reef. If this is the case, it is suggested that the level of fishing effort on Beaver Reef, in the form of infrequent pulse-fishing, may be enough to negate the potential effects of protection from fishing (i.e. higher abundance and protection of larger size classes of major target species). The catch per unit effort (CPUE) and length frequency data for *P. leopardus* tend to support this.
- vi. Such a level of infringement on reefs zoned Marine Park 'B', which are theoretically closed to fishing, questions the validity of using these reefs as 'unfished' or 'control' treatments for large-scale manipulative experiments designed to investigate the effects of fishing, as the treatment effect size is likely to be small.
- vii. Infringements do not explain the difference between estimates of inter-reef movement from research and public returns for the other reefs, and Potter Reef in particular. Furthermore, the research returns demonstrated a significant level of movement of *P. leopardus* among blocks within reefs which may represent movement of *P. leopardus* to spawning aggregations. Consequently, it is recommended that the movement study be continued as an integral part of the proposed manipulative experiment in order to: i) resolve the disparity between the estimates of inter-reef movement from the public and research returns, and ii) quantify the effect of a known change in abundance on the patterns of movement of *P. leopardus*.

Comparison of T-bar Anchor Tags and Standard Dart Tags

- i. The frequency of tag loss of dart and t-bar tags differed significantly for returns from the research recovery exercises but not for the public returns, with the frequency of loss of

t-bar anchor tags being significantly lower for returns from the research exercise. This suggests that although the rate of shedding of dart tags is higher than t-bars, the dart tags are more likely to be detected and returned by the public.

- ii. There was no difference in the frequency of loss of the different coloured t-bar tags used. Therefore, given the lower frequency of shedding, greater ease of application and lower cost of the t-bar anchor tags, it is recommended the t-bar anchor tags be used in future tagging programs of demersal reef fish on the Great Barrier Reef.

Catch Composition, Catch Per Unit Effort and Size Structure of Catch from Line Fishing

- i. A total of 8043 fish were caught from the five reefs over five trips. Catch was dominated by Serranidae, Lutjanidae and Lethrinidae which comprised greater than 97% of the total catch. Sampling by line-fishing was found to be very selective, with six species, *P. leopardus* (57%), *Cephalopholis cyanostigma* (12%), *Lutjanus carponotatus* (6%), *Lutjanus bohar* (3%), *Lethrinus miniatus* (3%) and *Lethrinus atkinsoni* (4%) dominating the catch.
- ii. Catch composition varied significantly among trips and reefs. *P. leopardus* comprised a greater proportion of the catch on the trips done during the spawning season (September 1992 and October 1993). This may be indicative of an increase in the catchability of *P. leopardus* during the spawning season and warrants further investigation.
- iii. The difference among reefs was mainly due to the higher proportion of *C. cyanostigma* and *L. bohar* and the lower proportion of *L. miniatus* and *L. carponotatus* at Taylor and Potter Reefs compared to the other reefs in the cluster. Catch per unit effort of *P. leopardus* varied significantly among trips and within reefs. However, there was no significant difference in CPUE among reefs. The pattern of CPUE among trips and within reefs indicates that the increase in CPUE occurs during the spawning season and is likely to be the result of an increase in the catchability of *P. leopardus* when the fish are aggregated to spawn.
- iv. It is strongly recommended that the temporal and spatial variation in catchability of *P. leopardus* by line fishing be investigated over a range of abundances of *P. leopardus*. Such information is essential for an accurate interpretation of changes in relative abundance from commercial line-fishing log book data and research surveys.
- v. The average size (mean length to caudal fork) of *P. leopardus* decreased significantly over the five trips, with a monotonic reduction in average size from April 1992 to February 1994. Mean size of *P. leopardus* varied significantly among reefs and blocks (block = within reef strata, 2-2.5 km stretch of reef perimeter) also, with Taylor Reef having a significantly greater average size than the other reefs and Beaver Reef having a significantly smaller average size than all other reefs.
- vi. Although the overall reduction in mean size of *P. leopardus* across all reefs is indicative of growth overfishing and cause for concern, in the absence of size-at-age information it is not possible to accurately interpret these effects in terms of differences in the population dynamics of *P. leopardus*. The significant effect of block on mean length of *P. leopardus* suggests that there may be significant differences in age-structure within reefs also. These results highlight the need for rigorous and powerful sampling programs, which include within reef strata, for monitoring changes in age-structure of target species.