SUMMARY

1. The aim of this project was to explore the value of fish traps and drop-lines for monitoring changes in catch rates of fish species of commercial and recreational importance on the central Great Barrier Reef. Emphasis of the study was on:

   i. Quantifying the catch variability within a single depth zone on two different reefs
   ii. Determining the (statistical) sampling power of the traps to detect changes in catch rates, and
   iii. Determining the extent to which spatially stratifying sampling within the depth zone could increase the power to detect change.

2. Modified North West Shelf fish traps were used to sample reef fishes at two different sites in 40 m depth on each of Rib and Davies Reefs.

3. Over 1000 fish, mostly snappers (Lutjanidae) and emperors (Lethrinidae), were caught during nine days of sampling at each reef.

4. Drop-line sampling, carried out simultaneously with trapping on Davies Reef resulted in very low catch rates. We conclude that this technique has little value for systematic sampling or monitoring of reef fishes.

5. Species-specific differences in catch rates between traps set at night and those set during the day were found, as were differences in catch rates between different habitats within a depth zone.

6. Variability in catch rates at each site was examined, together with an analysis of the effect of sample size on these estimates. Catch rates of traps were characterised by a dominance of zero catches, by low means, high variances and a correlation between mean catch rates and their standard deviations.

7. Estimates of catch rates and their variances were inherently imprecise because of the statistical distribution of the catches. Very large sample sizes would not solve this problem even if logistically possible.

8. The statistical power of 2-sample *t*-tests to detect changes in catch rates of the traps was examined. Power was closely related to the (imprecisely estimated) coefficient of variation (CV = standard deviation/mean) of a sample and to the mean catch rate. The higher the catch rate, the greater the statistical power to detect a change in the sample mean. Mean estimates of CV ranged from 1.2 to 3.8, with over 90% between 1.2 and 2.6. Based on CVs of 1.2 - 2.6 and a logistic limit of 12 traps/set, the following estimates of minimum sampling effort to detect specified changes in mean catch rate were determined:

Change in Mean	Min. # of Traps	Min. # of Days
+200%	25 - 100	2 - 8
+100%	50 - 200	4 - 16
+50%	120 - 500	10 - 40
-50%	80 - 300	7 - 25
-75%	25 - 120	2 - 10

9. The suitability of fish trapping as a tool for monitoring changes in catch rates on the study reefs is limited, particularly if two days or less are available for sampling a site.

10. Spatially stratifying sampling within a depth zone will not increase statistical power to detect change by reducing variance per se but will increase such power if habitats with the highest catch rates can be identified and sampled - assuming these habitats are appropriate to the reason for monitoring in the first place.

11. In the context of the proposed Effects of Fishing Experiment, traps would be an effective monitoring tool only if large amounts of time (approximately > five days) were available to sample each critical habitat on each reef, or if only large (approximately 3-fold or greater) changes in catch rates were of interest.

12. Despite these limitations (10), traps may still be the most effective sampling tool for most snappers, emperors, nocturnal species and others below divable depths [equivalent studies of the effectiveness of line fishing have not yet been carried out]. If this is so, the Great Barrier Reef Marine Park Authority and fish scientists will have to live with these limitations and bear them in mind when designing and interpreting studies of these species.

13. Despite limitations for monitoring, the traps used in this project have proved extremely effective at determining the distribution of the target species below divable depths; determining depth, cross-shelf and within reef distributions and among-reef differences in catch rates, growth rates and age structures of populations.