# MANAGING THE TORRES STRAIT AND GULF OF PAPUA LOBSTER FISHERIES

By R. Moore and J.W. MacFarlane
Fisheries Biologists, Daru and Kanudi Fisheries Research Stations

## INTRODUCTION

Every year, around about December, spiny lobsters (crayfish) move into the inshore reefs between Yule Island and Hisiu. These lobsters are traditionally fished by the villagers from this part of the coast.

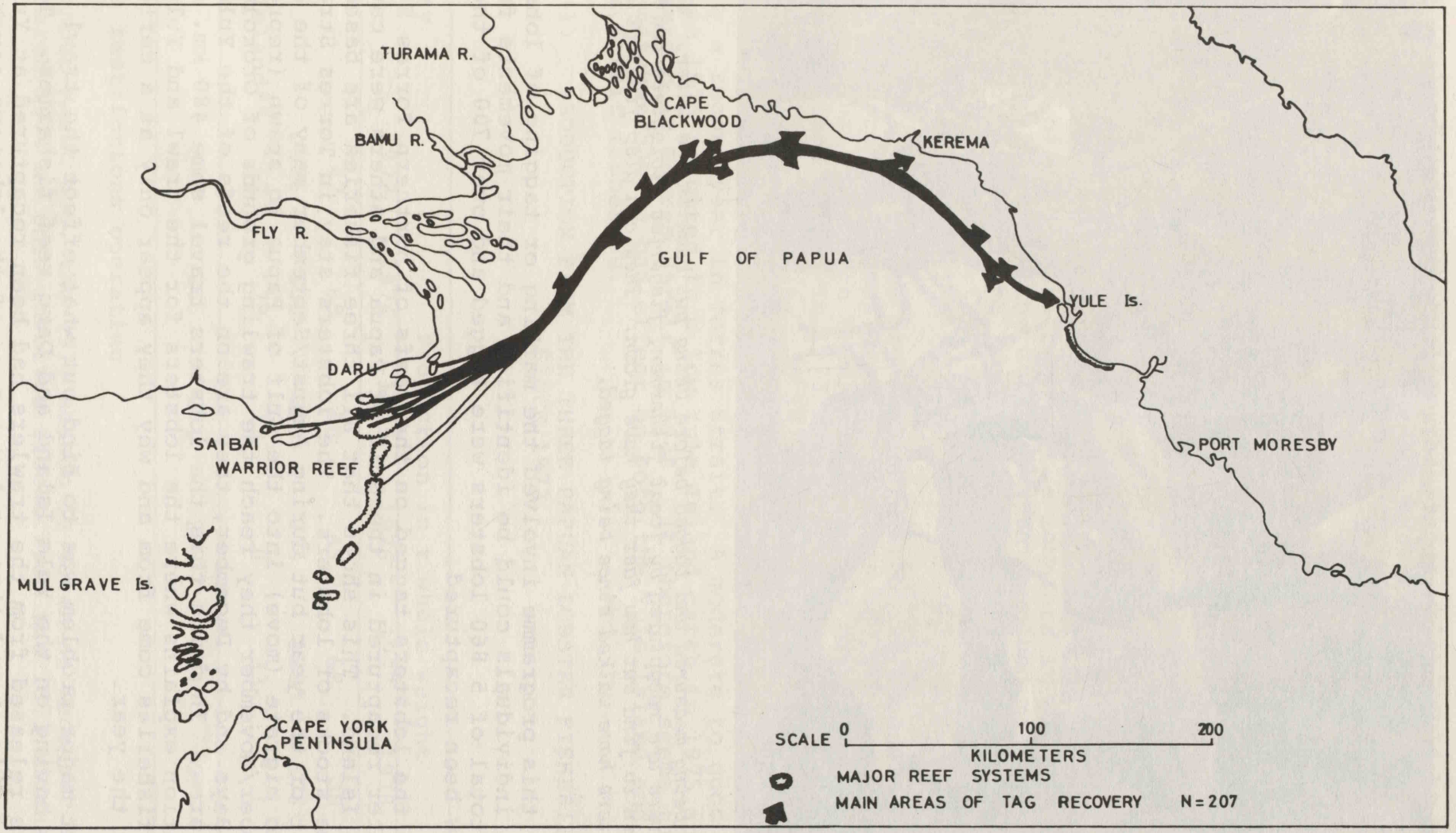
In 1961, cold storage facilities were installed at Yule Island because the traditional catches showed that this fishery had good commercial potential. However, there were large differences in the numbers of lobsters that appeared on the Yule Island reefs each year. This caused annual catches to vary from almost nil to about 80 t of whole lobsters. This variation together with the short lobster season (December to March), made it very difficult to set up a commercial fishery.

In Torres Strait however, spiny lobsters are found on the reefs all year round and in the mid 1960's commercial fisheries started to develop at Daru and on the Queensland reefs of the Strait. By 1971, Daru fishermen were taking 50 t/year and Queensland fishermen 240 t/year of whole lobsters. There were no large variations in catch from year to year. This fishery was therefore very different from that at Yule Island and although both caught the same type of lobster there appeared to be no relationship between them.

During the development of the Torres Strait fishery some lobsters were also being caught in the Gulf of Papua by the fisheries research vessel *FRV Tagula* and by some commercial prawn trawlers. These lobsters appeared on the prawn fishing grounds of Orokolo and Kerema Bays only during certain months of the year. Between August and December 1973 prawn trawlers caught 526 t of whole lobsters bringing the total catch for 1973 to 590 t with a current market value of K2 million. This made the lobster fishery the third most valuable fishery in Papua New Guinea after tuna and prawns.

## RESEARCH INTO THE LOBSTER FISHERIES

This large catch of lobsters half way between the Daru and Yule Island fisheries suggested that there could be some connection between them. In 1975 the Division of Fisheries started a research programme to look into this and to find out what effect the lobster trawl fishery was having on the traditional reef fisheries of Yule Island and Daru.




*Long range movements of tagged spiny lobsters* (Panulirus ornatus)

*Lobsters being measured and tagged before being put back in the water. When the lobsters are recaptured by local fishermen, fisheries biologists can measure them again to find out how fast they have grown. They can also find out how far the lobsters have walked since being tagged.*

Part of this programme involved the marking or tagging of lobsters so that individuals could be identified and their movements followed. A total of 5 860 lobsters were tagged and over 700 of these have now been recaptured.

Some of the lobsters tagged on the reefs of northern Torres Strait were later recaptured in the Gulf of Papua and others were caught at Yule Island. This shows that all three fisheries are based on the same stocks of lobsters. The lobsters stay in Torres Strait for most of the year but during August/September many of the adults start to migrate (move) into the Gulf of Papua to spawn (reproduce). By October/November they reach the trawling grounds of Orokolo and Kerema Bays and by December, they are on the reefs of the Yule Island area. In doing this the lobsters travel some 480 km. This information explains where the lobsters for the trawl and Yule Island fisheries come from and why they appear only at a certain time of the year.

The next major problem was to find out what effect the trawl fishery was having on the Yule Island and Daru reef fisheries. Tagged lobsters released from the trawlers had been recaptured at Yule Island. This showed that at least some of the lobsters caught by trawlers might otherwise have reached the Yule Island fishery. However, even before the development of the trawl fishery, catches

at Yule Island were much smaller than those which could be taken by the trawlers. Thus it seems that, even in a good season, Yule Island fishermen harvest only a small part of the total migration of lobsters.

Information collected during the research programme also showed that lobsters from Yule Island do not go back to Torres Strait. After the spawning season it seems that most of them die. The young lobsters which are born at Yule Island appear to be carried by sea currents from the spawning grounds to the Torres Strait region and the fishery there depends on their arrival. As long as enough lobster larvae had been released, there would be no damage to the Torres Strait fishery if all the adults which migrated into the Gulf of Papua were harvested.

From studies of the growth rate of the lobsters it was calculated that the migration into the Gulf of Papua involved mainly three year old lobsters. If the trawl fishery was affecting spawning, it would therefore have the greatest effect on the commercial stocks of lobsters in Torres Strait three years later.

Unfortunately, no figures are available from the Queensland fishery but figures from the three Papuan fisheries are given in Table 1. These show that the large trawl catch in 1973 was followed by a poor Yule Island season in 1973 and poor commercial catches in Torres Strait during 1976. In 1974, the trawlers found only a few of the groups of migrating lobsters so that their catches were poor. Yule Island, however, had a record season and this was followed in 1977 by a record year in Torres Strait. A moderate to good trawl catch in 1975 resulted in a low Yule Island catch in 1975 and a poor season in Torres Strait in 1978. It therefore seems that good trawl catches have a bad effect on both the Yule Island and the Torres Strait fisheries.

TABLE 1. PRODUCTION FROM THE THREE PAPUAN LOBSTER FISHERIES SINCE 1973

| Fishery | Production in t whole weight | | | | | |
|---|---|---|---|---|---|---|
| | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
| Daru | 47 | 68 | 58 | 45 | 68 | 38 |
| Trawl | 526 | 100 | 200 | 244 | 123* | 176* |
| Yule Island** | 17 | 78 | 13 | 0 | 33 | 1 |
| Total | 590 | 246 | 271 | 289 | 224 | 215 |

*Quota restrictions operating

**December-March e.g. the 1973 season is taken as December 1973 to March 1974 as this involves stocks from the 1973 migration.

*A large catch of lobsters taken during the day by Daru fishermen. The fishermen dived down and speared the lobsters in their underwater rock shelters.*

By 1976, the situation had become more serious. The size of the migration had been reduced as a result of large trawl catches in 1973 and trawl operators were now more experienced at locating groups of lobsters so that the migration was intensively fished. Because of this, it seems that, in 1976, a very large proportion of the lobsters was harvested by the trawlers. Production from the Yule Island fishery was nil.

## MANAGEMENT REGULATIONS INTRODUCED

On the basis of this information the Division of Fisheries decided to introduce management measures during the 1977 season. The object of these measures was to protect spawning and the Yule Island reef fishery while still allowing trawlers to harvest part of the migration. Using the information available from previous trawl catches, the trawling grounds were divided into a pre-spawning area (west of longitude 146°E.) and a post-spawning area (east of this line). In the pre-spawning area, vessels were to be allowed to catch 7.5 t of whole lobsters each. The remaining lobsters would then pass into the post-spawning area and, when the fisheries research staff had determined that the majority of the female lobsters had released their larvae, trawlers were to be allowed to take a further 15 t/vessel from this area.

Trawling for lobsters would then stop until most of those left had reached Yule Island. At this point the trawlers might be allowed free access to any lobsters still on the trawling grounds.

With these regulations in force, fisheries research staff joined the trawlers at sea to collect detailed information on the 1977 lobster migration. A programme of experimental trawling was also carried out using commercial vessels. These trawled in areas which were not normally fished but from which the Division of Fisheries required information. Vessels taking part in these experiments were allowed to take more lobsters to make up for the lost fishing

time. Co-operation from the trawl companies was excellent and without the genuine assistance given by them to fisheries staff on board, much of the information could not have been collected.

The first phase of the management regulations went smoothly and vessels took the quota from the pre-spawning area without difficulty. However, sampling in the post-spawning area showed that few of the lobsters migrating through this area had released larvae. Although most of the females carried eggs under their tails, these eggs developed much more slowly than expected. In fact, the eggs were carried for about a month before the larvae actually hatched. With the speed at which the lobsters were travelling (an average of 6 km/day) most of the lobsters would have reached the Yule Island reefs before larvae were released. This meant that there was no possibility of allowing lobsters to release larvae before being taken by the trawlers.

Phase two of the management programme was therefore delayed until the 9th of December 1977 by which time large numbers of lobsters had reached Yule Island. No major trawl catches were made after this date and the total catch for this fishery ended at only 123 t of whole lobsters. In the following months, traditional fishermen at Yule Island made good catches, landing a total of 33 t of lobsters, which is well above average. There also appeared to be a high level of spawning so that there should be good commercial catches in 1980.

Because of the restrictions imposed in 1977, lobster spawning was protected and the Yule Island fishery had a successful season. Considering the lobster fisheries of 1977 as a whole, reduced catches by the trawl fishery resulted in a drop in total production to 224 t. As plenty of lobsters appeared to take part in the migration that year, it is likely that many more could have been caught without damaging the fishery. Future management should therefore be aimed at setting trawl quotas which allow a reasonable proportion of the migration to be harvested while making sure that enough lobsters pass through the trawling grounds for spawning and the Yule Island fishery.

*A typical trawler in the Gulf of Papua. The nets have been brought on board to allow the catch to be emptied on to the deck.*

*Sorting prawns and fish on board a trawler in the Gulf of Papua*

1978 SEASON

As no information was available from the Queensland fishery it was difficult to estimate the size of the 1978 migration. Due to the effects of the 1975 trawl fishery, a reduced migration was expected and from a study of the Daru fishery, it was estimated to be equivalent to that of 1976 (about 250-300 t of whole lobsters). The trawl quota for the year was therefore set at 176 t, which would allow 74-124 t to pass through to Yule Island. As the previous best catch from Yule Island was 78 t, this would be enough both for spawning and for the Yule Island fishery.

The 1978 trawl season went smoothly and all lobster quotas were taken early in the season. Research effort was then directed to Yule Island, but the expected lobsters never arrived. By the end of the Yule Island season in March 1979 only one tonne of whole lobsters had been landed. Diving by research staff confirmed that no major concentrations of lobsters had entered the reefs off Yule Island. One exception was a small, isolated reef some 10 km N.W. of Yule Island which did receive part of the migration but was too deep to be fished by local fishermen.

Research was also carried out to determine if any lobsters had gone past Yule Island and moved into the reef systems further to the East. All the results indicated that they had not.

Another possibility was that the lobsters had finished their migration before Yule Island and so, in January 1979, a survey of the reef system situated near the trawling grounds was carried out. The Koilahu reef complex just East of Orokolo Bay was found to have reasonable stocks of lobsters which were shown to be part of a

migratory population, not residents. Therefore it was concluded that at least part of the 1978 migration had moved into this reef system, finishing their migration before reaching Yule Island. During the previous season, when Yule Island had received good stocks of lobsters, the Koilahu reefs had had very few lobsters.

As the trawl fishery was restricted by quotas we do not know how large the 1978 migration actually was. Perhaps the size of the migration was over-estimated so that the trawlers took a greater percentage of available stocks than predicted. This is unlikely however, in view of the ease with which the quotas were taken. The proportion of the migration that ended before Yule Island or reached this area but moved into deep water and remained out of the reach of the local fishermen is also unknown.

*A Daru fisherman with a fine catch of lobsters taken at night from the canoe which was paddled across the reef top at low tide. Using the kerosene lamp, the fisherman was able to see the lobsters walking on the reef and catch them in the long scoop net.*

## CONCLUSIONS

The major problem with this management system is that no matter how many lobsters are allowed to pass through the trawling grounds, there is still no guarantee that they will eventually be available to the Yule Island fishermen. Management, therefore, has to be most concerned with the protection of spawning. If the lobsters move into reefs near the trawling grounds or into the deeper reefs off Yule Island, then the Yule Island catch will be unavoidably

reduced. However, this will not affect the level of spawning. Long term management depends on accurately estimating the size of the migration then setting trawl quotas which will allow enough spawning. Without accurate data from the Queensland fishery this is not possible.

We are faced with a situation where the traditional fishery at Yule Island has had very few lobsters in two out of the last three seasons. In addition, the 1979 migration is expected to be the smallest since the trawl fishery started. The Division of Fisheries has therefore strongly advised that no trawling for lobsters takes place during the 1979 season so that the total migration is allowed to pass across the Gulf of Papua. This would ensure a high level of spawning and provide a chance to study the factors, other than trawling, that affect the movement of lobsters into the Yule Island fishery.

By banning the trawl fishery, the total Papua New Guinea catch of lobsters would be reduced to about 50 t whole weight. In contrast, the Queensland fishery would continue unrestricted with a catch of at least 250 t. Protection of spawning in the Gulf of Papua will therefore be of far more benefit to Australia than it will be to Papua New Guinea. Even considering this, it is still felt that these restrictions are necessary to protect the Daru and Yule Island fisheries. Therefore the Government has introduced a total ban on the trawling of lobsters during 1979. As a good migration is predicted in 1980 however, the trawl fishery can be allowed some access to these stocks.

It is hoped that a joint Papua New Guinea/Australia research programme will start in 1980 so that the necessary data for long term management will be available in the near future. It is only by joint management based on accurate data from all fishing areas that stability can be introduced into these fisheries and maximum use be made of them.