# Barramundi Research in

# Papua New Guinea

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*There has been a progressive increase in the importance of fisheries in Papua New Guinea's development over the years. Prawns and barramundi have become the top seafood export earners representing $600,000 and $80,000 respectively. Tuna will shortly replace these and will become the major export earner with the proliferation of the Japanese poling fleets around the New Guinea Islands.*

Commercial fishing for barramundi is carried out in the inshore waters and estuaries around Daru, and to a lesser extent in the Bensbach River (near the West Irian border) and Lake Murray. *Figure* 1 shows the distribution of barramundi in Papua New Guinea and the major fishing grounds and processing plants. There were 334,600 lb headed and gutted fish and 6,670 lb fillet exported from Daru in 1969 (equivalent to 445,600 lb of whole fish). In 1970 there were 142,019 lb headed and gutted and 73,178 lb fillet (equivalent to 295,640 lb of whole fish). At an average export price of 28c per lb headed and gutted and 50c fillet, this represents a total of $77,800 the export industry is worth. Most (90 per cent) of the fish are caught in salt water, these being the most desirable, and over 70 per cent are bought by expatriate freezer owners from local fishermen (usually at 40c per lb fillet).

This industry is important to the Western District of Papua as the majority of the Fly River basin is swamp and swamp forest, as yet undeveloped for agriculture. Fish and fish processing then represents the major cash income for the village people in these areas.

To determine the extent of the stocks, the biology and the maximum sustainable yield of barramundi, a research programme commenced in March, 1970. This programme involved a team of two biologists and 10 to 12 local research assistants. To date, effort has been concentrated on both a tagging programme and surveys of areas having at present non-commercial production of fish.

The tagging programme commenced in August, 1970 and since then some 5,000 fish have been tagged. Fish were tagged at Daru (4,000), Lake Murray (500), Fly River area (350) and Port Moresby (150). Most fish were tagged with opercular clip tags (Monel metal, individually numbered) although some 500 fish have been tagged with plastic dart tags. The *Plate* shows an opercular clip tag in position on a fish, although most of the small fish in this size range are given dart tags.

There has been an extensive publicity programme about the tagging, particularly in the Western District. This involved press and radio coverage, individual posters and a 50c reward for the return of tags. As a result of this, tag returns have been good, particularly from local fishermen, there being over 200 returns (4 per cent) from private and commercial fishermen. Recaptures during tagging amount to over 10 per cent (500), these being recorded and released again. Of the 500 recaptures, most are recaptured only once, although 1 fish has been recaptured five times.

Fish were collected for tagging using beach seine nets, and less extensively, 7 in gill nets. The size range for beach netted fish was 17 cm to 90 cm total length, although the majority of the fish fall into the 25 to 60 cm range. Gill nets are extremely selective and collect only fish in the range 60 cm to 100 cm. So far no fish under 17 cm have been found although a variety of techniques are being used. There is a distinct bimodality in length frequency data from gill nets, the females being the larger (mean 85 cm compared with 75 cm for males). Gill nets result in a high-mortality rate—at least 30 per cent of the fish are unsuitable for tagging, compared to less than 1 per cent for the beach net.
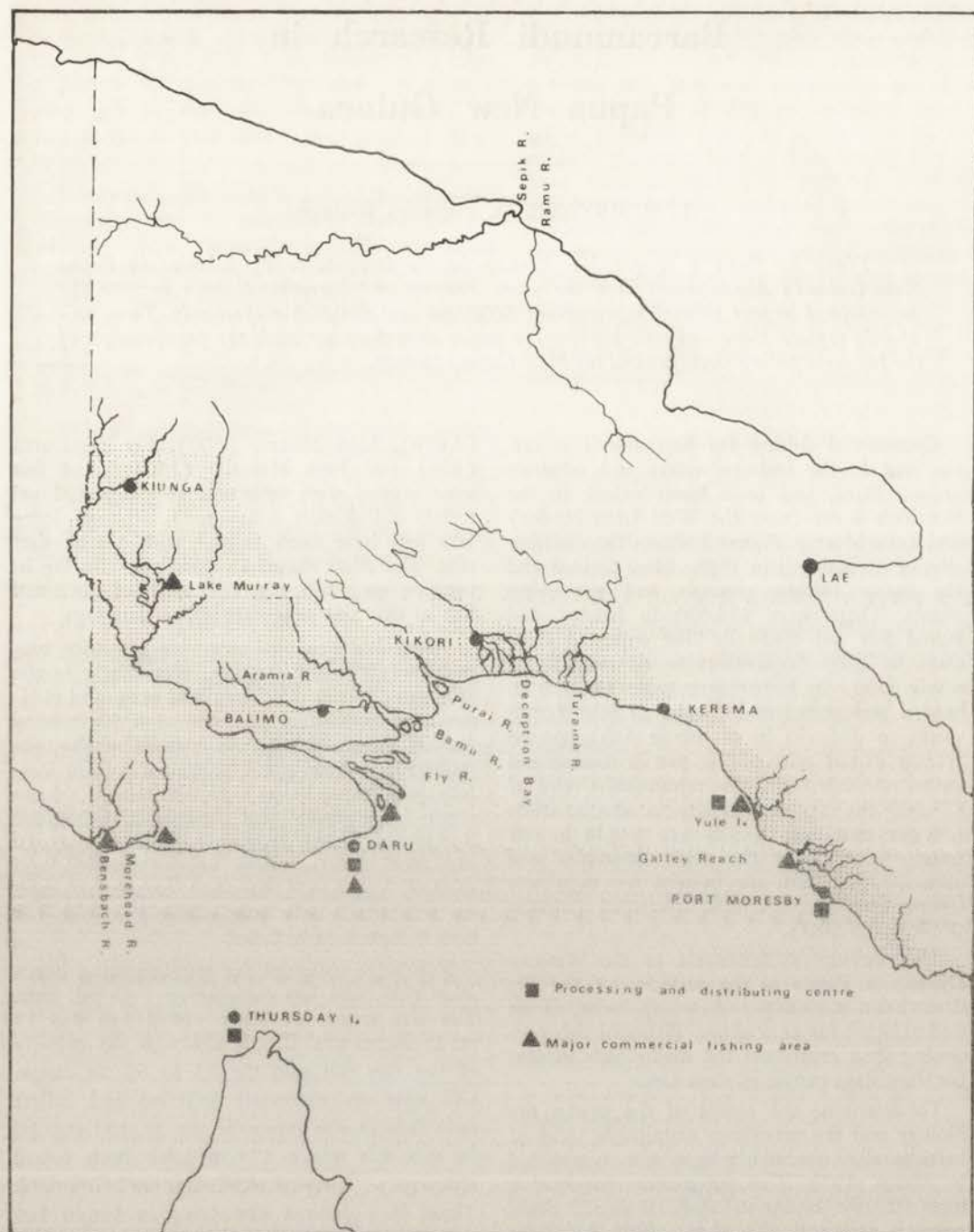
*Figure* 1.—Distribution of barramundi in Papua New Guinea

*Plate* 1.—Fish showing clip tag in position

Preliminary tag returns show a general pattern of movement (*Figure* 2). Prior to February, 1971 there were no long-range movements recorded, only short coastal movements around Daru. Since then tag recoveries have shown many upstream movements (*Table*). One fish was recorded as moving to Kikori, half-way across the Gulf of Papua. The return movement for breeding purposes has to date only been demonstrated by No. 4107 moving from the Upper Fly River (above Lake Bosset) to the Kiwai Islands in the Fly River estuary.

Further research is to be carried out over the next 3 years. A new 35 ft boat, suitable for river and estuarine work, is to be purchased

as soon as possible. Surveys are to be extended, particularly to the underdeveloped Gulf District, and intensive tagging in this area will take place. One important facet of the work to be carried out in the future is the establishment of pond culture techniques for these fish, particularly in conjunction with the introduced rapid growing fish, *Talapia mossambica*, which can be used as a food source for the barramundi. A further extension of this will be an attempt to establish artificial breeding of fish in ponds to offer a source of eggs and fry for experimentation and limited distribution to fish ponds. With a source of supply of fingerlings, it should be possible to provide sport fish for closed waters (such as hydroelectric dams) which would normally not have barramundi because access to the salt water for breeding purposes is denied.
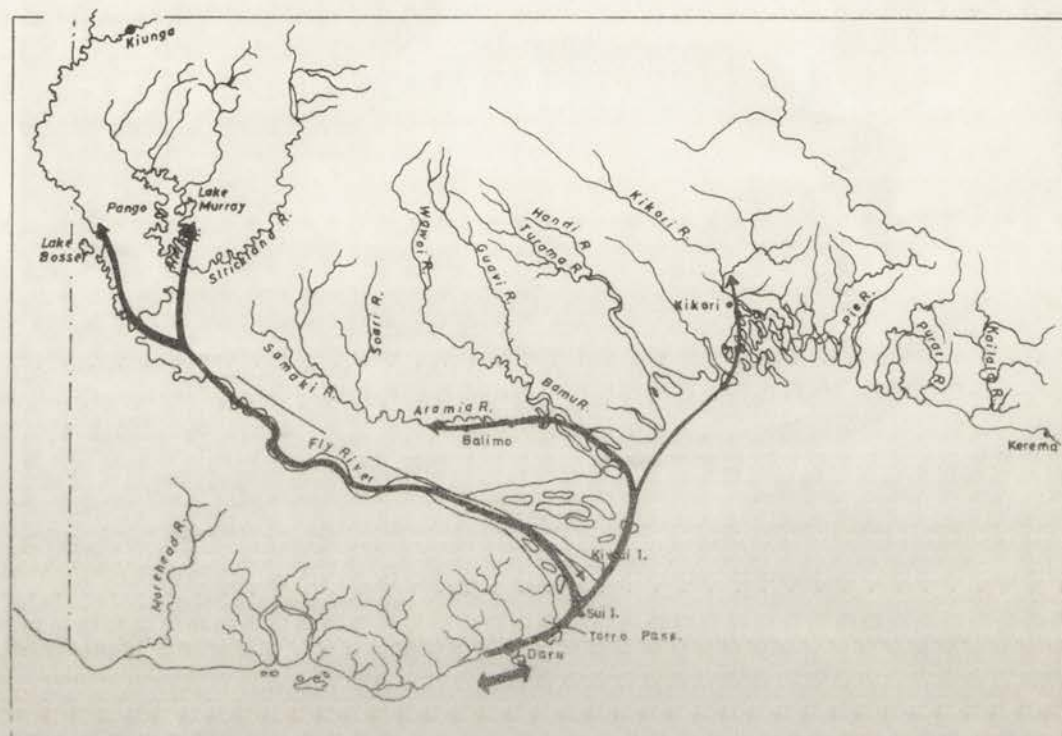


*Figure 2.*—Map showing general fish movements

*Table.*—Tag recaptures showing significant movements

| Tag No. | Date Released | Place Released | Place Recaptured | Time at Liberty (Days) | Distance Moved (Miles) |
|---------|---------------|----------------|------------------|------------------------|------------------------|
| 557 | 6.10.1970 | 12 miles west of Daru | Lake Murray | 358 | 370 |
| 852 | 11.11.1970 | Sui village .... .... | Lake Murry | 104 | 330 |
| 1247 | 8.12.1970 | 12 miles west of Daru | Junction of Bamu and Aramia River | 120 | 160 |
| 2484 | 18.3.1971 | 12 miles west of Daru | Kiwai I. | 90 | 49 |
| 15 | 18.3.1971 | 12 miles west of Daru | Kiwai I. | 50 | 49 |
| 2682 | 29.3.1971 | 7 miles west of Daru | Kikori | 51 | 270 |
| 2836 | 27.4.1971 | 12 miles west of Daru | Kiwai I. | 50 | 49 |
| 2959 | 30.4.1971 | Sui Village .... .... | Fly River-Strickland River Junction | 51 | 270 |
| 4107 | 19.9.1971 | Lake Kongan (Upper Fly) | Kiwai I. | 33 | 285 |