

MANAGEMENT OF THE NEW IRELAND

BAIT FISHERY

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WHY MANAGEMENT?

A population of fish is a renewable resource. This means that if the population is managed correctly, good catches can continue to be taken from it regularly.

Many fish populations respond to fishing by increasing their productivity. This means that, up to a certain level, increased fishing results in more fish production.

The fish which are produced in response to fishing are called the surplus production. This surplus production is what a well managed fishery aims to catch.

If too many fish are caught, however, or if they are caught too young, then reproduction and growth may suffer and the size and number of fish in the population may be severely reduced. This may result in the collapse of the fishery.

In order to prevent this from happening, fishery managers must know the number of fish in the population and the effect of fishing on it. From this, they can work out a management plan.

The plan may involve limiting the amount of fish which can be caught, the type of fishing gear used, or the amount of fishing carried out.

Whatever measures are used, the aim of the plan will be to allow the biggest possible catches to be taken regularly throughout the fishing season while making sure that enough fish are left for future seasons.

The tuna fishery is the largest commercial fishery in Papua New Guinea. In 1978, 48,933 tonnes of tuna were caught. The export value of these fish was about K19 million.

The tuna industry produces direct income for the nation and for individual provinces (7.5% of the export value in total). It also provides employment and indirect income (several million kina per year) from the sale of food, fuel and other supplies to the mother ships and catcher boats, and from vessel maintenance and slippage charges. When the proposed tuna processing plant and cannery are built near Kavieng, the export of canned tuna will increase the value of the PNG catch considerably.

Almost all of the tuna catch is taken by the pole-and-line method of fishing (see HARVEST 5 (2): 109-118) which uses large quantities of baitfish. If too few baitfish are caught, then the tuna cannot be fished by this method and the country loses a lot of money.



Catching tuna by the pole-and-line method.

Although other methods of catching tuna can be used, for example purse seining and long-lining (see HARVEST 5(3):140-151 and 5(4):221-231), they are not as suitable as pole-and-line fishing for P.N.G. This is because the tuna schools here are too small to be caught by purse seiners, while long-line fishing is not economical unless the catch is sent to Japan where high prices are paid.

It is therefore likely that pole-and-line fishing and the bait fishery will continue to be important in PNG for a long time to come.

In the mid-1970's, the scientists of D.P.I. Fisheries Research Section realised that proper management of the bait fishery was needed to prevent damage to future supplies of baitfish. A research programme was therefore set up to find

out enough information about the fishery for a management plan to be worked out. This research programme is described in the article called 'Baitfish Research in New Ireland' which is also in this issue of HARVEST.

The results of the research programme became available in 1979 and a management scheme for the New Ireland bait fishery was introduced in 1980.

RESEARCH RESULTS

There are four main baiting areas in New Ireland: North Ysabel Passage, South Ysabel Passage, Silver Sound and Three Islands Harbour. Most of the research work has been done in the Ysabel Passage but information has also been gathered from the other areas. Some of the most relevant research findings are summarised below:-

- 1) Many different species of small fish are caught for bait and the proportion of each in the catch changes from day to day and from place to place in the bait fishing area. The three most common species in the Ysabel Passage are the anchovies *Stolephorus heterolobus* and *S. devisi*, and the sprat *Spratelloides gracilis*.
- 2) In general, baitfish are very fast-growing and short-lived. Between March and December of the same year, up to five generations can be born and come to maturity. This means that, although all the adult fish in an area may be caught, there will usually be plenty of young left which will grow up to replace them in quite a short time.

Despite this, overfishing caused temporary collapse of the fishery both in 1978 and in 1979. In 1979 this collapse

was so severe that fishing had to be abandoned for several weeks. Fishing intensity just before this collapse, was over 1200 hauls per month, while 800 hauls per month appears to be the most that the fish population can cope with.

3) The baitfish move around between the baiting grounds and so catches in one part of the area may affect the fishery in another. Similarly, if some parts of the area are not fished at all, they may provide a safe breeding ground for the fish.

4) Usually, half of the baitfish catch dies soon after capture and the rest die within 24 hours. Since only live fish can be used as bait, this means that many more fish must be caught than would otherwise be necessary. The fish must also be caught fresh every night.

If the baitfish are 'hardened off' in holding pens, however,

and handled very carefully, using special methods developed by fisheries research staff, the number of them which die soon after capture can be reduced and the rest can be kept alive for 7-10 days. This means that bait fishing can be carried out less often and that fewer baitfish need to be caught if these methods are used.

This is also the situation where the baitfish population is made up of especially hardy species. For example, in Silver Sound, sardines and a type of baitfish called fusiliers are common. Even with present handling methods, these fish will stay alive for several days. This means that a relatively small baitfish population in this area can support several tuna catcher boats.

POSSIBLE MANAGEMENT MEASURES

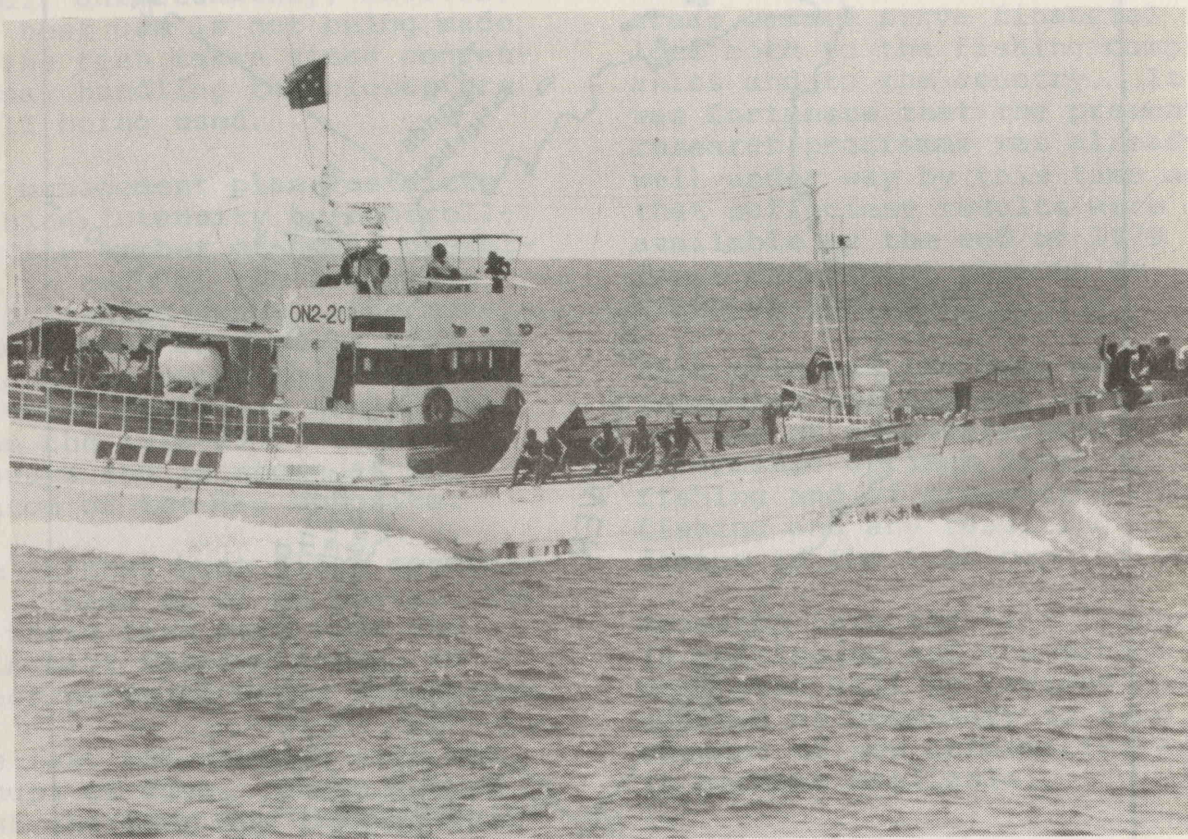
Conventional mathematical methods of working out management plans cannot be used for this fishery because of the large number of species involved and the impossibility of controlling the relative proportions of each that are caught. An empirical (experimental) approach has therefore been used instead. This approach has been used in many other parts of the world and has proved very successful in a number of cases (e.g. the Gulf of Thailand).

The following four management measures could be adopted for this fishery:-

1) Restrict the fishing intensity in the Ysabel Passage throughout the March to December fishing season to a maximum level of about 800 hauls per month. This can be done either by limiting the number of boats allowed to catch bait or by



Hauling in the baitfish



A pole-and-line catcher boat

controlling the number of hauls made by each boat. Silver Sound and Three Islands Harbour would be used as additional baitfishing sites, and would also be strictly controlled.

2) Continue a moderate fishery throughout the year, without the three-month 'off season' from December to February. This would make sure that all generations of baitfish grew up under fishing pressure and that surplus population was produced continually.

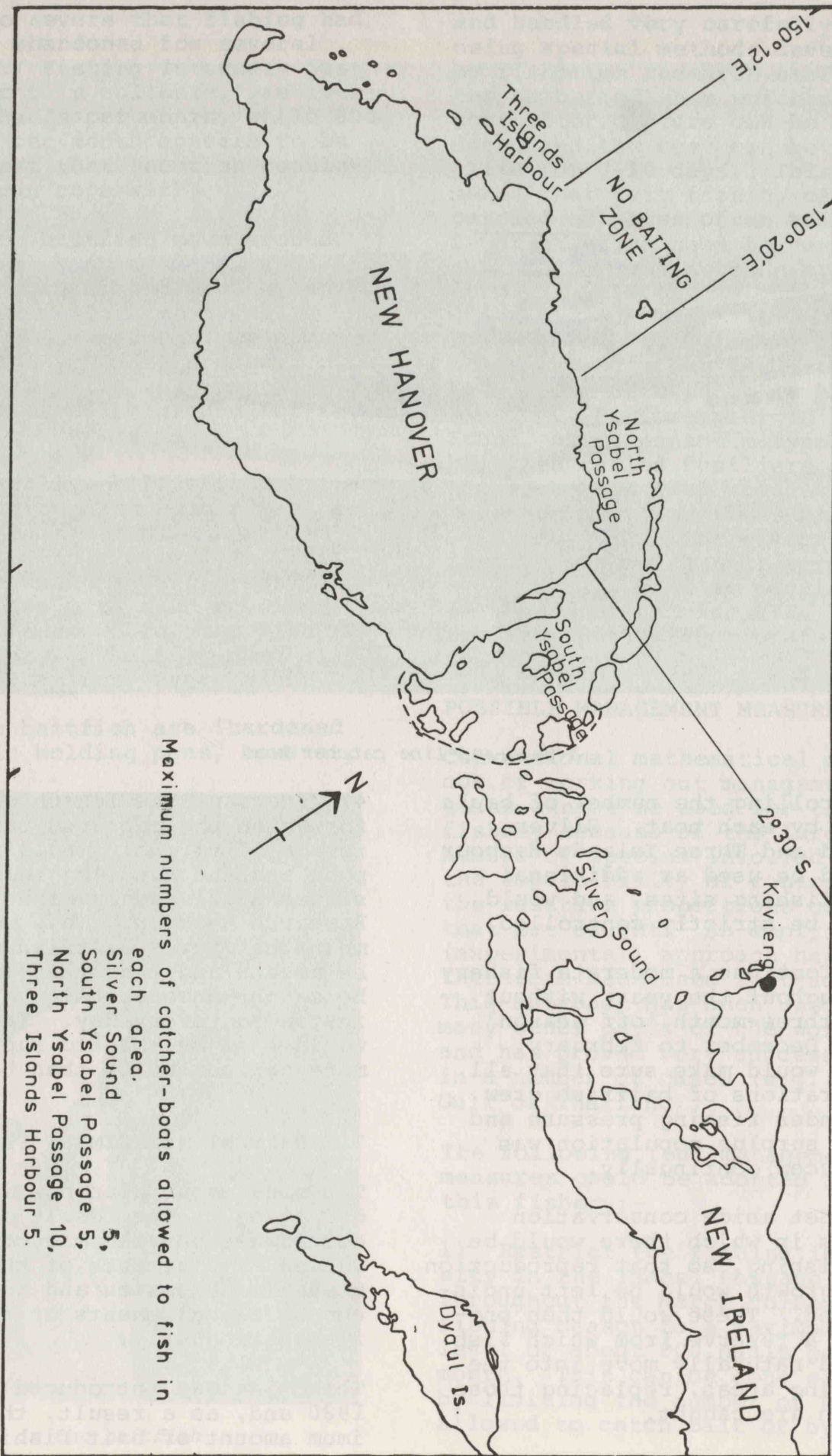
3) Set aside conservation areas in which there would be no fishing, so that reproduction and growth would be left undisturbed. These would then provide a reserve from which fish would naturally move into the fishing areas, replacing those which are caught.

4) Increase the length of time for which the captured baitfish remain alive, using holding pens and the handling techniques developed by Fisheries Research Section. This would mean that fewer baitfish would be needed and that they could be caught once or twice a week instead of every day. The area would then be able to support more catcher boats than before.

THE PRESENT MANAGEMENT PLAN

The management plan now in operation is the result of a compromise between the conservation requirements of the Fisheries Division and the economic requirements of the fishing industry.

This plan was introduced in 1980 and, as a result, the optimum amount of bait fishing is



New Hanover and New Ireland baiting areas

now taking place off New Ireland. Unfortunately, however, the best use is not being made of the fish taken since conventional handling techniques are still being used.

The management plan restricts fishing intensity by controlling the number of boats operating in each of the four main bait fishing areas. The maximum number of vessels that is allowed to catch bait in each of these areas was worked out from the 1976-1979 research results and is shown at the bottom of the Map opposite.

The catcher boat fleet concerned is made up of 32 boats. Two of these fish away from the main bait fishing areas, in other parts of Papua New Guinea.

The rest are divided into six groups of five. These groups fish the four New Ireland baiting areas and a fifth area located elsewhere. At present, the fifth area is at Pondo in East New Britain.

The groups are moved regularly from one baiting ground to another so that each boat gets an equal chance to fish in each area. This is important since some areas yield better catches than others.

A conservation zone was also set up as part of the management plan. This is called the No Baiting Zone. No catcher boats are allowed to bait in this area at all. The No Baiting Zone, therefore acts as a reserve in which reproduction and growth can continue undisturbed.

CONCLUSION

A clear demonstration of the need for careful management of PNG's baitfish resource was

given in 1978 and 1979 when overfishing in the baiting areas caused severe financial loss both to the fishing companies and to the country. It was fortunate that the present research programme was already well under way by this time and that sufficient results were available by the end of 1979 for a management plan to be drawn up for 1980.

This plan has the dual aim of improving the fishery through the use of a scientifically determined optimum level of fishing and of preventing overfishing and any resulting damage to the fish populations.

Research into the bait fishery is continuing and the management plan will be revised and updated as necessary to take account of new information as it becomes available.

FURTHER READING

DALZELL, P.J. (1980). Baitfish research in New Ireland. *Harvest* 6 (3): 109-116.

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NOTE ON SOYABEANS

Some additional information for anyone who became interested in growing soyabeans after reading Rose Kambuou's article on "Soyabean cultivation in the Markham and Ramu Valleys" HARVEST Volume 6 No.1 earlier this year.

Average experimental yield of this crop at Bubia is 2.5 tonnes/hectare.