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Research on Fish Aggregation Devices (FADs) in Papua New Guinea during 1984 and 1985

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RESEARCH ON FISH AGGREGATION DEVICES (FADs) IN PAPUA NEW GUINEA DURING 1984 AND 1985.

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Introduction

The aim of the FAD research project near Wewak in Papua New Guinea was to evaluate the effectiveness of FADs in shallow (<500m) water where they would be accessible to village fishermen using small scale fishing operations. This paper summarizes the results of the research (discussed in full in Frusher, 1986) and outlines potential areas of future research.

Methods

A full description of the design of the FAD is given in Frusher (1986). Construction and deployment were primarily carried out by SPC Masterfisherman L. B. Chapman. FAD's were deployed in 160m and 390m water depth.

Around FADs the main fishing method was trolling of feathered and plastic lures. Longling, jigging and trolling of large pelagic lures was of limited success.

Results

DEPTH : The shallower FAD proved unsuccessful both in the amount of fish caught and the consistency with which fish were aggregated.

The 390m FAD provided consistent troll catches averaging 12 kg/hr/vessel with several catches exceeding 40 kg/hr/vessel. This FAD was considered to have tripled the annual harvest of tunas by artisanal fishermen in Wewak.

SPECIES COMPOSITION : Tuna comprised the majority of the catch with Euthynnus affinis being the dominant species. Thunnus albacares, Auxis thazard, A. rochei and Coryphaena hippurus showed seasonal abundance, while Katsuwonus pelamis, T. obesus and Elagatis bipinnulatus were caught in minor quantities. With the exception of E. affinis and A. thazard, the other species were seldom caught in the artisanal fishery prior to the introduction of FADs. Indeed A. rochei had not previously been recorded from PNG.

No large pelagics (i.e. Scomberomorus commerson, Acanthocybium solandri, Sphyraena spp.and Caranx spp.) were caught around either FAD despite the use of commercial styled trolling lines.

SPECIES SIZE RANGE : The size range of all tuna species caught at the FAD (15 to 35cm caudal fork length) was consistent throughout the year. The size ranges of fish were significantly smaller than of those caught in the artisanal fishery. The FAD aggregated juveniles of both the neritic (E. affinis and A. thazard) and oceanic (T. albacares, K. pelamis, T. obesus and C. hippurus) species.

Discussion

With the placement of FADs closer to shore and in shallower water, it was hoped that they would aggregate both large and medium (eg. Megalaspis cordyla, Grammatorcynus bilineatus and Rachycentron canadus) coastal pelagics. Although these fish are regularly caught in the artisanal fishery, the lack of captures around the FAD could be due to the distance to the nearest reef (>3km).

The deeper water FAD was considered of importance to the artisanal fishermen as it : (a) increased their potential catch of medium pelagics, (b) gave access to species of a resource not previously fished and (c) gave a guaranteed supply of bait for deep bottom fishing, a problem which had previously hindered the development of this fishery.

The exploitation of juvenile fish is always of concern to fisheries managers, although inshore shallow water FADs would presently have a negligible effect. The degree to which larger, offshore, deepwater FADs, which are used by the commercial tuna fisheries, harvest juvenile tunas is unknown. Even if these fish were returned to the sea, their survival would be limited as demonstrated by the short tagging time outlined in the SPC tuna tagging program. A vessel apprehended in north western Papua New Guinean waters, which was deploying and fishing (purse seining) FADs, had small yellowfin tuna on board. It was unknown if any juvenile yellowfin tuna were in the freezer hold as an inspection was not undertaken, however rows of juvenile yellowfin were hanging from the rigging to dry in the sun.

Another concern is the lack of knowledge relating to stock size and differentiation in the coastal species. It is presently unknown whether the stock of E. affinis along the PNG

coastline is continuous or separate discrete stocks. The answer to this question is necessary before the degree to which juvenile exploitation can be assessed.

Future Research

The FADs did offer the opportunity to study growth rates of several of the species of juvenile tunas, and a report analysing modal progression from length frequency plots is presently underway. Whether the growth rate for FAD associated tuna is the same as for non-FAD associated juveniles is presently unknown as the author is unaware of studies on similiar juvenile populations in the eastern Pacific. With increased exploitation of the tuna resource, it is possible that FADs could play an important role as protected nurseries for stock enhancement.

Unfortunately our present knowledge of FADs and juvenile tuna is very limited and research needs to be done on some of the following:

i) DEPTH: Which are the best depths for aggregating juvenile tuna? In PNG 400m proved far more successful than 160m. However depths >500m and <1000m have yet to be tested.

ii) AREA: Are certain areas more likely to aggregate juveniles? E.g. Adjacent to river mouths, Areas of upwellings, Areas of high phytoplankton counts etc.

iii) FOOD: How are the number of juveniles related to the presence and abundance of food?

With the continual use of purse seines around FADs by the commercial tuna fleet, it is important to know if juvenile tunas are being caught, and if so, where and in what numbers?

Where exploitation of juveniles is expanding (i.e. increased use of nearshore FADs) it is essential that stock differentiation be attempted to determine the degree of intermixing (especially reproductive) between regions.

References

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