EXPERIMENTAL TRAP FISHING IN VANUATU

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Being used traditionally and successfully in other parts of the world (Philippines, Caribbeans, (MUNRO 1974, PAULY et al in KULBICKI et MOU-THAM, 1987)), fish traps were tried in Vanuatu as an alternative for deep bottom fishing. This method was considered a potential development towards more intensive fishery, after the common bottom line fishing techniques.

This research programme was carried out at the Vanuatu Fisheries Department, funded by the French Ambassy in Port-Vila, with the assistance of three successive French Volunteers (VSNA): Michel BLANC, Didier TOURREL and Jean-Michel GUERIN). This paper gives an analysis of the results of all the campaigns.

I - METHODS

The traps used were of the type presented at Figure 1. This Z-trap was designed by FAO. It is made of a metal frame (bars 10 mm diam.) and of metal galvanized mesh (150 x 25 mm) with two symetric entrances. Those traps were weighted and the rig is made of a polypropylene rope (12 mm diam.) and 3 buoys. Two differents boats were used to set the traps, the only requirement for the boat being to have some hydraulic powered line-hauler to lift the traps from the water.

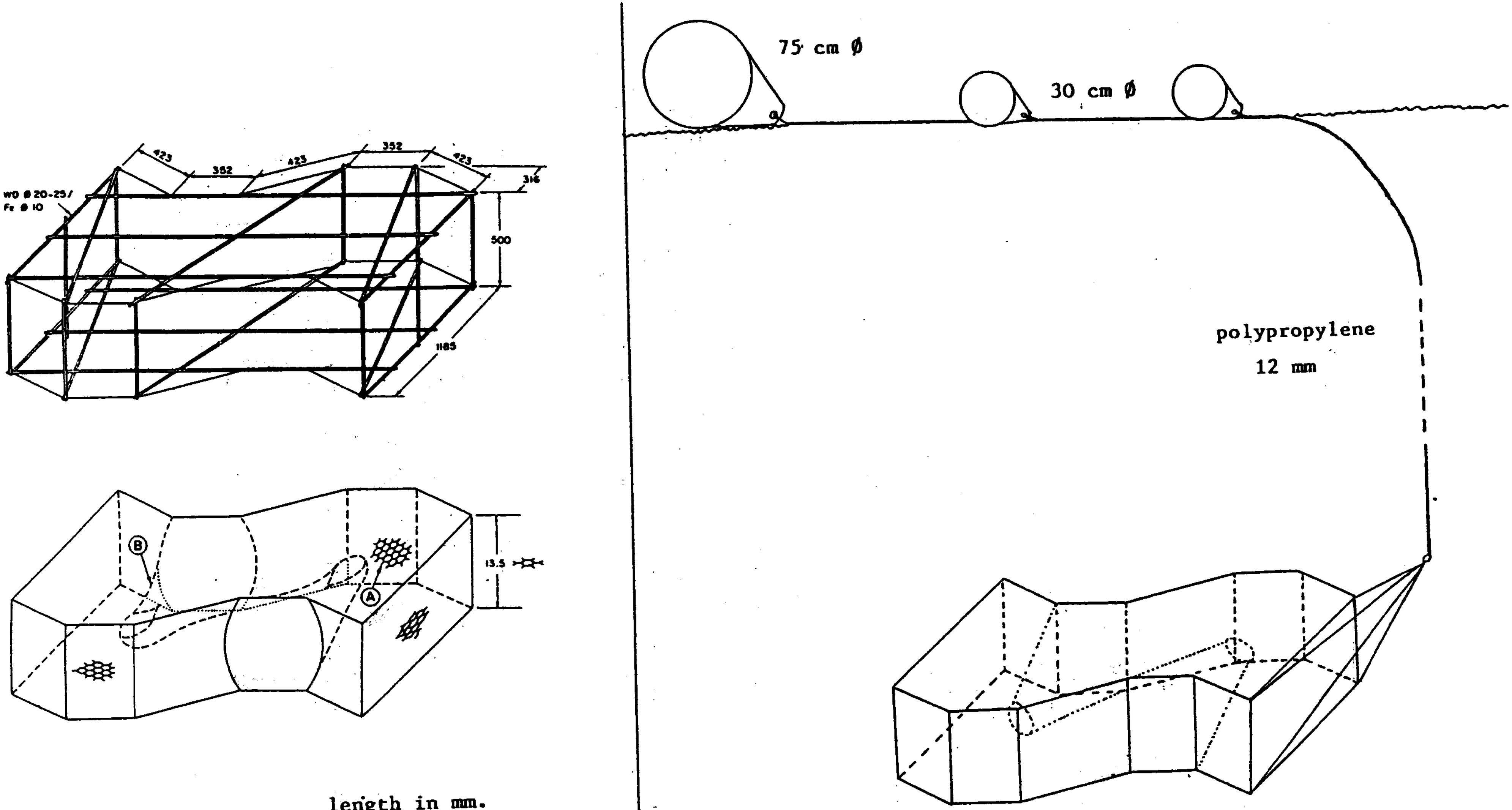
The experiment started in April 1987 and lasted until October 1988. A total of 169 traps sets were made in various spots around Efate island (reef fishing zones on figure 2). The traps were baited at the best with fresh skipjack (Katsuwonus pelamis) or sardines (Herklotsichtys punctatus) which proved to be in preliminary studies (BLANC, 1987), the most efficient bait for that kind of fishing. When those baits were not available, other types of fresh or frozen fish were used. The traps were left in the water for different soaking times (from 4 to 240 hours) at depth varying between 17 and 430 m. The traps were then taken back on board, the fish and nautilus collected and some new bait put in, prior to another soak.

For each trap set, the data collected were: soaking time, depth, type of bait used, number of nauti lus caught, total weight of fish caught, number of fish of commercial species caught. From the 169 sets, two traps were lost, so a total of 167sets were analysed.

II-RESULTS

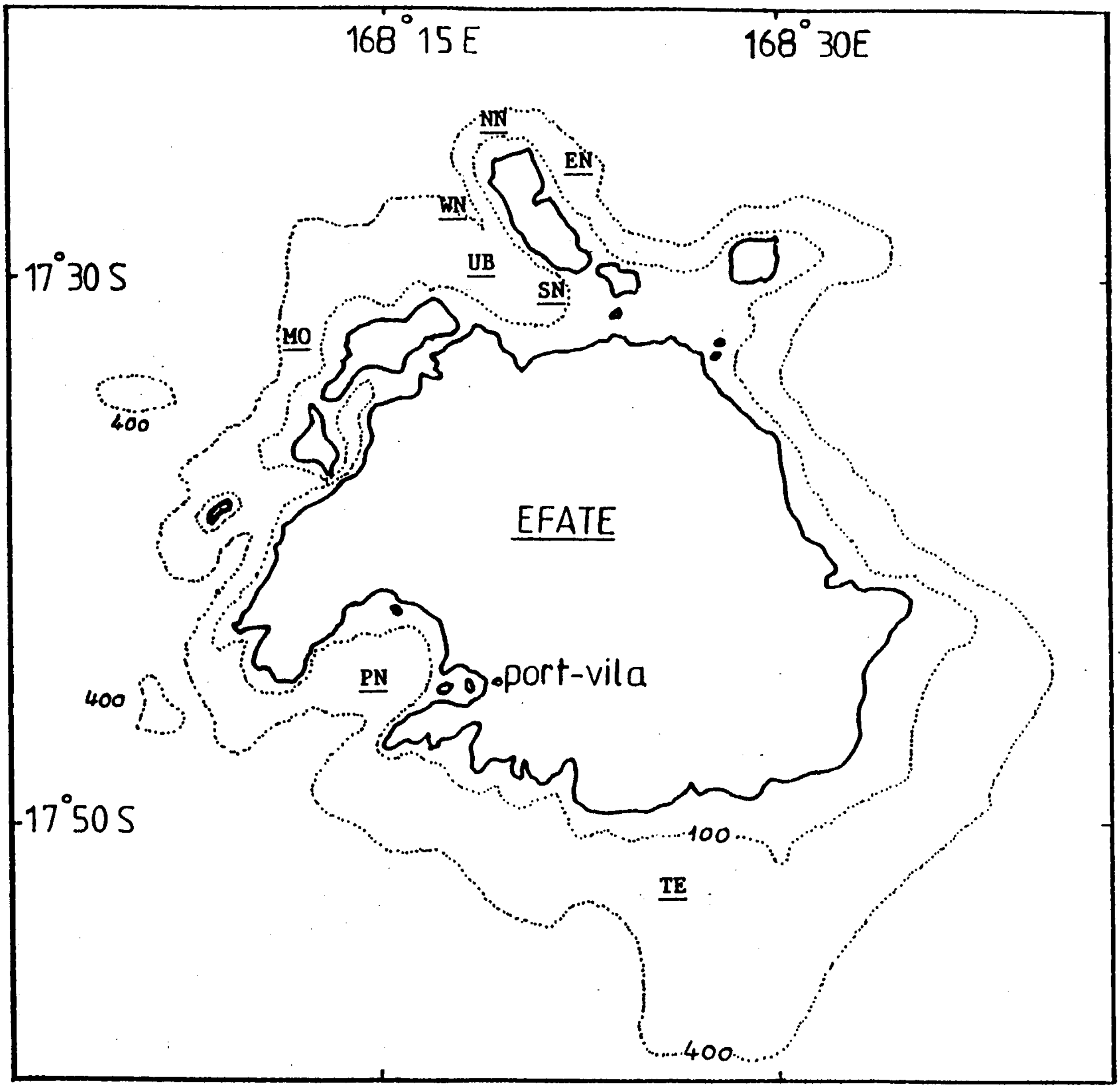
A total of 526 kg of fish and 252 nautilus were caught for a total soaking time of 4,988 hours. The average catch per set was 3.15 kg of fish and 1.51 nautilus.

This being for an average soaking time of 29 hours per set. Taking a closer look to the data, the important heterogeneity has to be emphasized. As shown on figure 3, very little traps made good catches (over 10 kg) but the majority of them made very poor catches (between 0 and 2 kg). Due to this very high level of dispersion in the catches observed in similar conditions, some of the results turned to be not statistically significant (example: total fish catch vs depth). In the following sections, only the statistically significant results are presented.



Source: FAO small fishing gears catalog.

FIGURE 1: TRAP DESIGN AND OPERATIONS



NN:North Nguna

EN: East Nguna

WN: West Nguna

SN: South Nguna

UB: Undine Bay

MO: Mosso

PN: Pango North

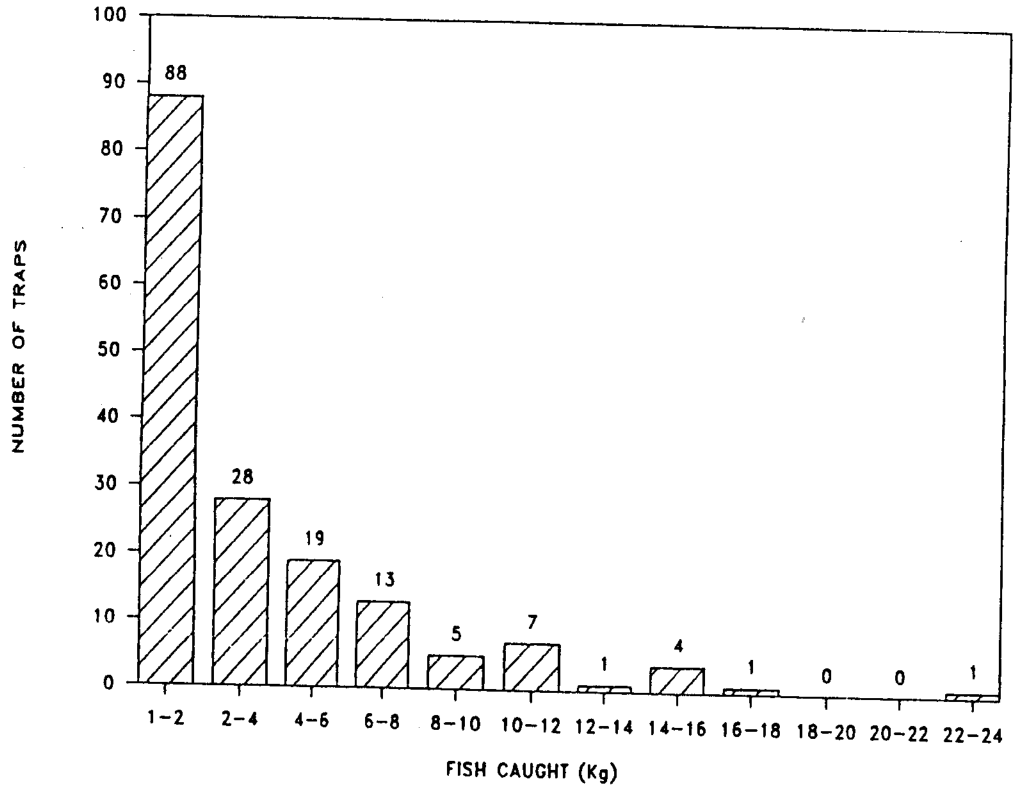
TE: Teouma

FIGURE 2: FISHING ZONES.

TABLE 1: TOTAL FISH CATCH vs SOAKING TIME.

soaking time from	hours to	average catch Kg/trap	trap sets
0	12	1.62	13
12	24	3.30	111
24	48	3.15	31
48	78	0.26	7
78	+	7.76	5

FISH CATCH DISTRIBUTION



NAUTILUS CATCH DISTRIBUTION

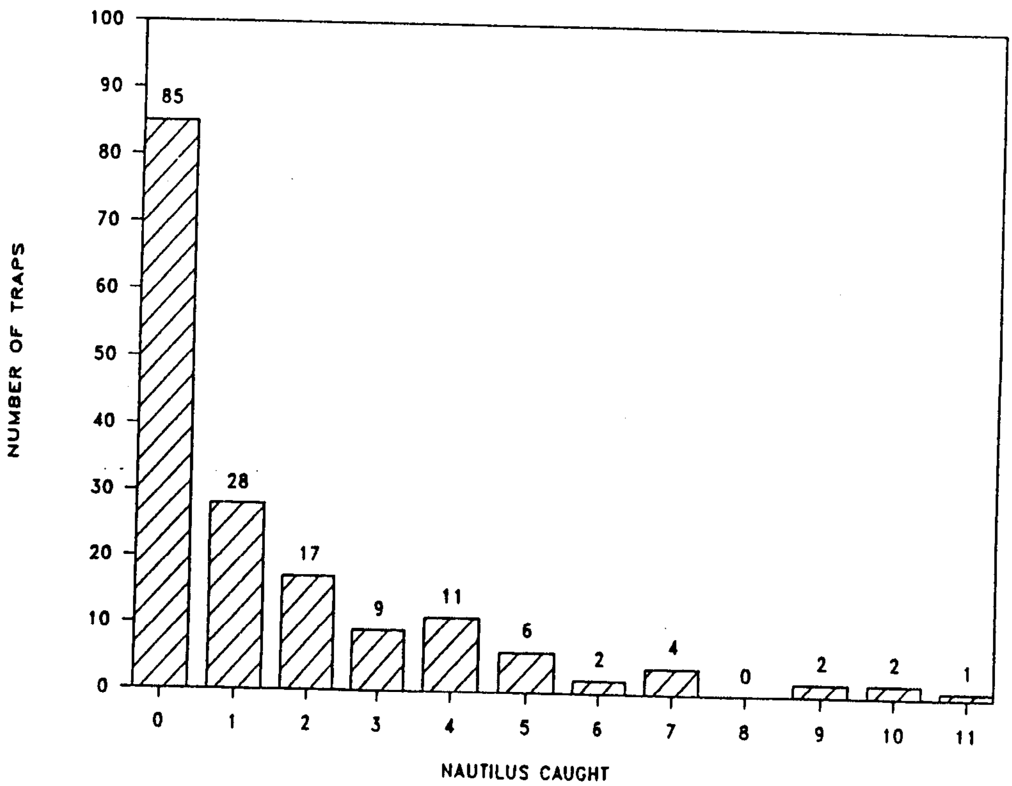


FIGURE 3: CATCHES DISTRIBUTIONS

II-1 : Influence of soaking depth

Only two types of results were significant, the depth showed an influence on the species composition of the catches and on the catch of nautilus.

I-1-a: Nautilus catch.

The nautilus catch was analysed by comparing the catch per unit effort (CPUE, here being the number of nautilus caught per hour of soaking time) at different soaking depth. The total depth range was divided in eight 50 m ranges and the average CPUE for each range is plotted at figure 4. Those results being statistically significant; it seems that the distribution of the nautilus is bi-modal. This could be related to the behaviour of the nautilus that moves to different depths during night and day. This is only an hypothesis and it would be necessary to re-design an experiment to find out the reasons for such a bi-modal distribution.

II-1-b: Species composition in trap catches.

The species recorded in the catch were:

*Pristipomoides filamentosus:	11.8%
*Pristipomoides flavipinnis:	21.0%
*Pristipomoides multidens:	3.3%
*Lutjanus malabaricus:	6.0%
*Lutjanus rufolinatus:	32.8%
*Epinephelus sp.:	6.2%
*Gymnocranius sp.:	7.7%
*Seriola sp.:	3.3%

With the percentage in total number of fish caught; these were the most important catches of commercial fish species.

96% of the fish were caught between 100 and 300 meters. The statistical analysis of these data was made comparing the distribution of CPUE for each species at four different depth ranges. These CPUE (in kg of fish caught per hour of soak) are all very low, ranging from 0 to 0.747 These results are shown at figure 5 where the importance of Lutjanus rufolinatus has to be noticed. The four distributions were found being significantly different. .

Comparing these results with the droplines fishery, the absence of Etelis sp. is noticeable. Lutjianus rufolinatus is usually not caught with droplines (BROUARD et GRANDPERRIN, 1984), but it turned to be quite abundant in the traps. The other important results are the importance of Lutjianus rufolinatus between 100 and 200 meters and the abundance of Pristipomoides flavipinnis between 200 and 250 meters.

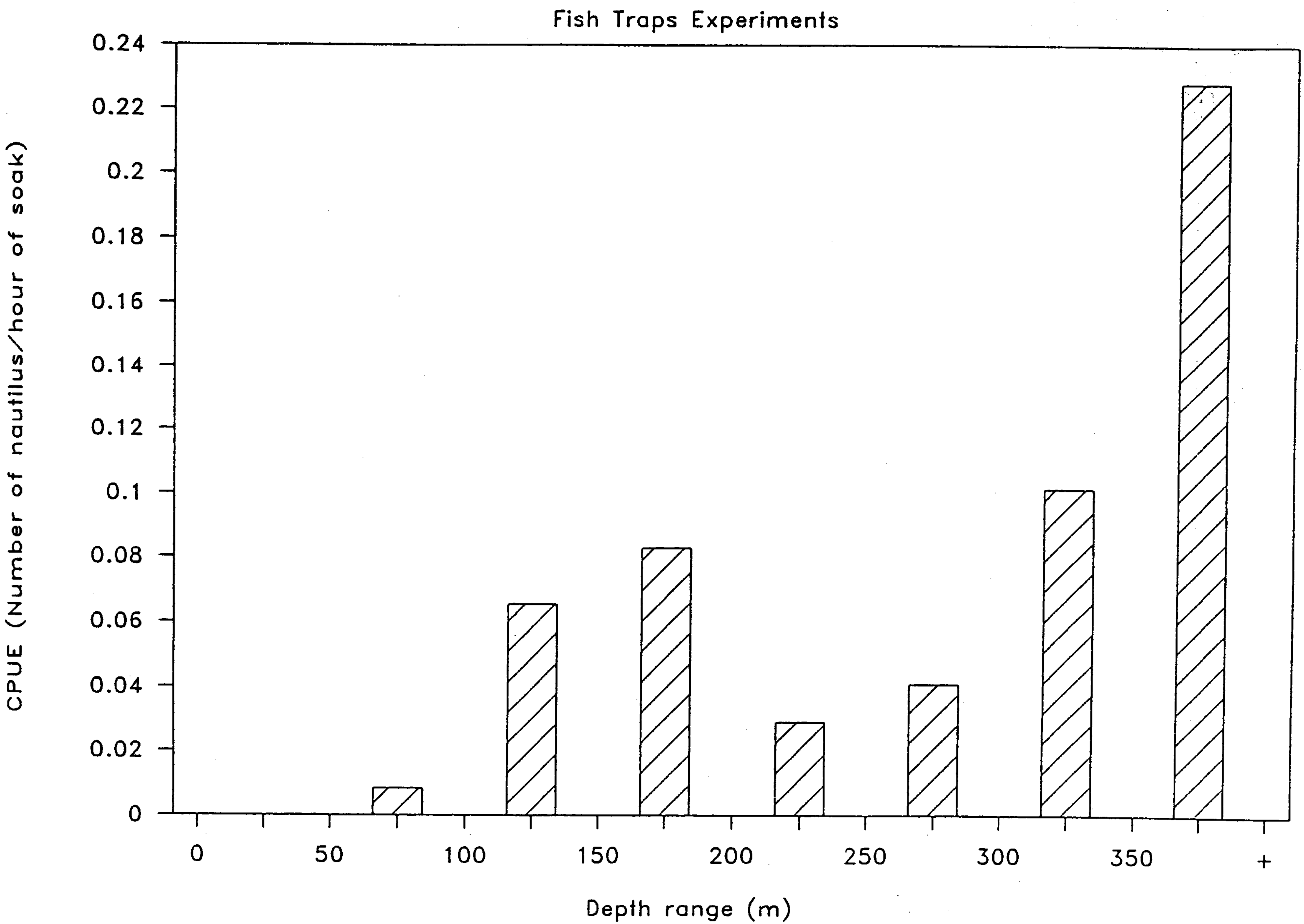


FIGURE 4 : NAUTILUS CATCH vs DEPTH.

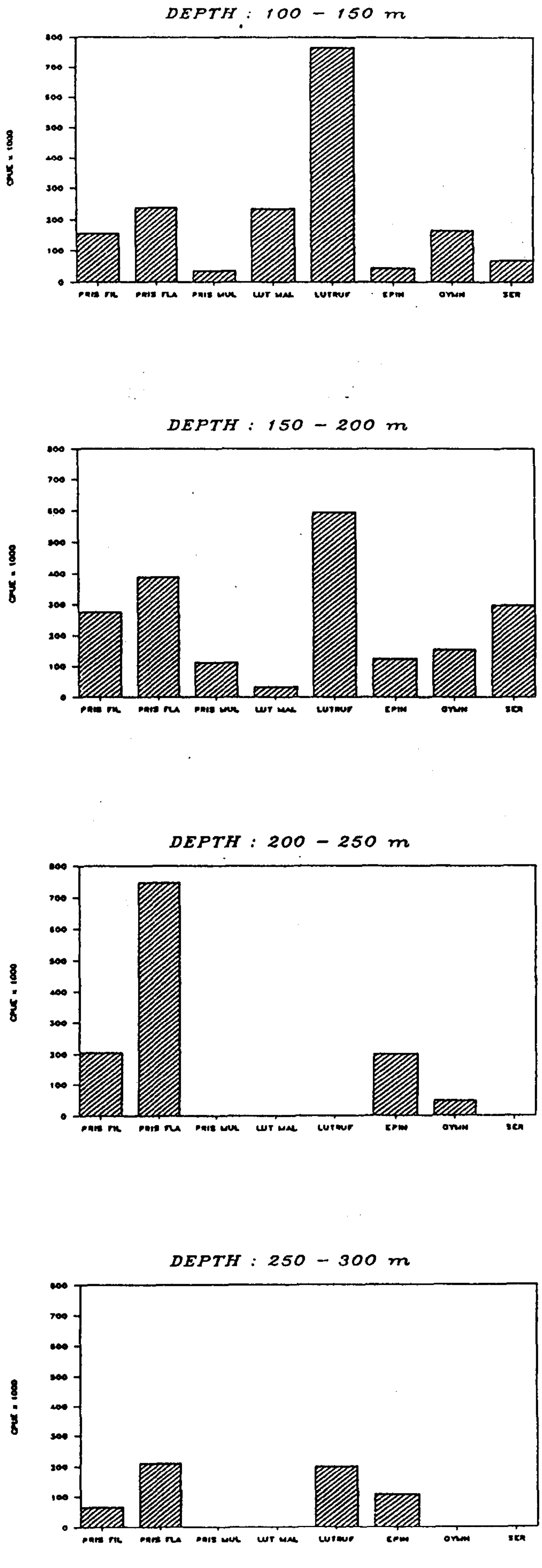


FIGURE 5: SPECIES DISTRIBUTION AT DIFFERENT DEPTH RANGES.

II-2: Influence of soaking time.

The soaking time showed to have a significant influence on the total fish catch for each trap set. The results are indicated in the table 1. There is an increase in fish catch between the two last ranges (48-78 hrs and over 78 hrs). Only 5 trap sets were made for more than 78 hours, and in the same place that might as well have been a very productive one. It could be necessary to redesign an experiment so that with more homogenous data, it would be possible to say if the soaking time is or not significant.

III- DISCUSSION

A private fisherman experience in New Caledonia consisted of traps set at depth between 90 and 140 m., the average catch was 8.9 kg/set (SPC, 1985). This is well above the results obtained in Vanuatu which were of 3.15 kg/set of fish. This difference was also observed with the nautilus catch.
The Vanuatu fish trapping results are still comparable to the expectations for fish-trap fishing in the reef zone in the Caribbeans (4 kg/trap.day - MUNRO, 1980). The fish traps in Vanuatu were set in much deeper waters. This resulted in long and costly operations that makes it difficult to appear of a commercial interest. The same catch, if it is made in reef zones (< 30 m) or in deeper zones (100-200 m.) cannot make the same profit. A major difference, from the economical point of view is that in the case of shallow waters fish-trapping, there is a lobster by-catch that is very important as far as profit is concerned, no crustaceans being caught in our experiment.

Comparing with the longline fishing, where the same boat and crew were used, the catch was 18 kg of fish caught per hour of bottom longline fishing (FYRIAM A. pers. comm.).This would suggest the longlines being much more productive especially considering the lower investment cost of longlines compared to fish trapping were each trap built and fully rigged costed ca 50 000 vt.

There was a strong variability in the results of the trap fishing, 53 % of the trap set have been catching between 0 and 2 kg of fish and some few others caught up to 15 or 22 kg (Figure 3). This variability had already been emphasized by other authors (DALZELL and AINI, 1987). In order to give more useable data for the next fish trapping experiments, wherever this might happen, a special attention should be paid to the experimental plan, evenly setting the traps in different places, at different depths and for different soaking times. This would allow the use of multi-factor variance analysis that would, for the same experimental cost, provide much more accurate informations.

REFERENCES

ANONYME - 1985 - Pêche aux casiers profonds : Premiers résultats de l'expérience d'un pêcheur en Nouvelle-Calédonie. 17ème Conférence Technique Régionale des Pêches - Commission du Pacifique Sud.SPC/Fisheries 17/WP.17.

BLANC M. - 1987 - Premiers résultats d'une expèrience de pêche aux casiers profonds à Vanuatu.Fisheries Department Internal Report.Port-Vila.

BROUARD F. et R. GRANDPERRIN - 1984 - Les poissons profonds de la pente récifale externe à Vanuatu.Notes et Documents d'Océanographie No11.ORSTOM Port-Vila

DALZELL P. et AINI J.W. - 1987 - Preliminary results of fishing trials with arrowhead fish traps in PNG.SPC Fisheries Newsletter No41:34-40.

KULBICKI M. et MOU- THAM - 1987 - Essais de pêche au casier à poissin dans le lagon de Nouvelle-Calédonie.Rapports Scientifiques et Techniques ORSTOM.Sciences de la Mer-Biologie marine No47.ORSTOM Nouméa.

MUNRO J.L. - 1974 - The mode of operation of Antillean fish traps and the relationship between ingress,escapment,catch and soak. Journ. Cons. Int. Explo.Mer 35:337-350.

MUNRO J.L. - 1980 - The composition and magnitude of trap catches in Jamaican waters. ?

Guérin J.M. (1989).

Experimental trap fishing in Vanuatu.

In : Cillaurren Espérance, David Gilbert, Guérin J.M. Contribution of the ORSTOM fisheries department research unit to the South Pacific Commission 21st regional technical meeting on fisheries. Port Vila : ORSTOM, (22), 20-29.

(Notes et Documents d'Océanographie ; 22). Regional Technical Meeting on Fisheries, 21., Nouméa (NCL), 1989/08/7-11.