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National report and selected papers presented at the fourth meeting of the

WECAFC AD HOC SHRIMP AND GROUNDFISH WORKING GROUP OF THE GUIANAS-BRAZIL CONTINENTAL SHELF AND CFRAMP SHRIMP AND GROUNDFISH SUBPROJECT SPECIFICATION WORKSHOP

Port of Spain, Trinidad and Tobago, 8-12 January 1996

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Preliminary Results on the Studies of Recruitment of Penaeus subtilis in the Shrimp Fishery of French Guiana (1994-1995)[1]

A. Charuau[2]

RECRUITMENT VARIABILITY

The general mechanism of the recruitment of the juveniles to the fishery is known but it is always impossible to quantify its intensity. Recent cruise observations confirm also the migration of the juveniles from the coast to the open sea up to 40 meters depth. Moreover, the gradient of the distribution of recruits seems more obvious during the wet season than during the dry season. These recent observations confirm also a non-monotonous distribution of the recruits on the continental shelf with very strong concentrations in front of the main rivers (Oyapock, Maroni, and Sinnamary). These first results based on a very short sampling period cannot show the seasonal or cyclic mechanisms if they exist. If the results of various cruises are compared, the same events are not observed at the same period of the year. From these cruises, three things can be deduced, that could be important in designing future studies:

- Nothing is known of the catchability of the shrimps, juveniles and adults, i.e. the shrimp trawl seems to be a poor sampling tool;
- The currents are important in the migratory behaviour of shrimps but there is no data on the coastal hydrology;
- The rainfall, with its correlate, salinity, seems to be an important factor in the distribution of the juveniles.

In the past, the 30 m isobath has been considered as the limit of the distribution of the juveniles. The only indices used on the shrimp fishery is the commercial index of the smallest category (category IV). As there is no consistent sorting between various companies, it was in all cases an approximation.

The fishery was divided into four areas, but as fishing is not random, it is very difficult to get consistent sampling of the smallest categories. Another problem, common in all fisheries, it is the progressive decrease of the mean length in each commercial category. These methods were used to give a general description of the recruitment with two maximum periods of abundance in the first part of the year and only one in the second part. That periodicity suggests that there are climatic effects on the level of recruits. Methods that have been used for the assessment of the stock include: global modeling and analytical assessment on age and length, although it seems contradictory to carry out length analysis of the stocks with the assumption of a constant recruitment which was known to be considered as highly variable.

It is likely, but not obvious, that there is an important correlation between the level of the recruitment and the production of the stock. Although no catastrophic variations of the landings are known in last years, there is no evidence that the recruitment was at the same level during the same period.

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1 This preliminary study is extracted from unpublished works of P. Moguedet and Ch. Bene.

2 IFREMER, French Guiana.

It is obvious that the CPUE of the smallest categories is also in relation with the dynamics of the fleet. If the strategy of the shrimp-trawlers is oriented towards small categories, in the shallow waters, the recruit indices will go up and vice versa. For classical studies, it seems important to get reliable indices of recruitment but the indices from the fishery are very difficult to understand and very often the variability of the recruitment seems to reflect the variability of the habits of the boats.

Another fact is that there is no real problem in the fishery. The CPUE is increasing in recent years except in 1993, and the series are too short to show any trends.

Climatic factors may be important but no relationships can be shown. Preliminary work has been carried out in Monterey to relate climatic effects to intensity of recruitment. Modeling is in progress but no relevant data are ready to verify the modeling.

RELATIONSHIP BETWEEN RECRUITMENT AND PRODUCTION

The observations on the level of recruitment have important consequences in terms of help for the management of the fishery. It seems to be logical to predict the stocks in next months as a consequence of the present recruitment.

The biological argument seems to be logical, but for that fishery, it is also obvious that the estimations of the CPUE of the small shrimps is biased by the strategy of the boats and it is difficult to get reliable prediction of the production. As an illustration of the problem we examined the relationship between the index of abundance of the stock (all commercial categories, except the smallest category IV) and the recruitment index (category IV only), for the whole period (35 years) when data were suitable (Figure 1).

If there was a relationship between the recruitment index and the production of the stock four or five months later, we should observe a relationship between the two series. For example, after a high period of recruitment a high period of abundance would be observed. Short-term variability was eliminated by smoothing the series.

The recruitment index shows two important increases: from 10 to 30, and 30 to 50; neither of which are accompanied by any increase of the value of the index of stock abundance. Similarly, increases and decreases of the general level of the stock are not reflected in the variations of the recruitment index. It seems that the variations of the two series are completely independent.

It seems difficult, at the moment, to use these indices directly, without a correction from the dynamics of the fleet and/or from the catchability of the various age-groups of the stock.

The evaluation of reliable recruitment indices is always difficult. But the purpose of that work is to get good indices of the level of the stock to give advice for the management of the fishery. Many others ways can be used for these assessments but it is very important to get a good relation between the quality and the price of the information. At the moment, the climatic factors can be studied and a relation between these factors and the abundance of the stock can be found.

The real problem is to define the exact purpose of the work: to get very precise value to establish a regulation by TAC, as recommended by the European Union or to get a knowledge of the biodiversity of the ecosystem including finfishes.

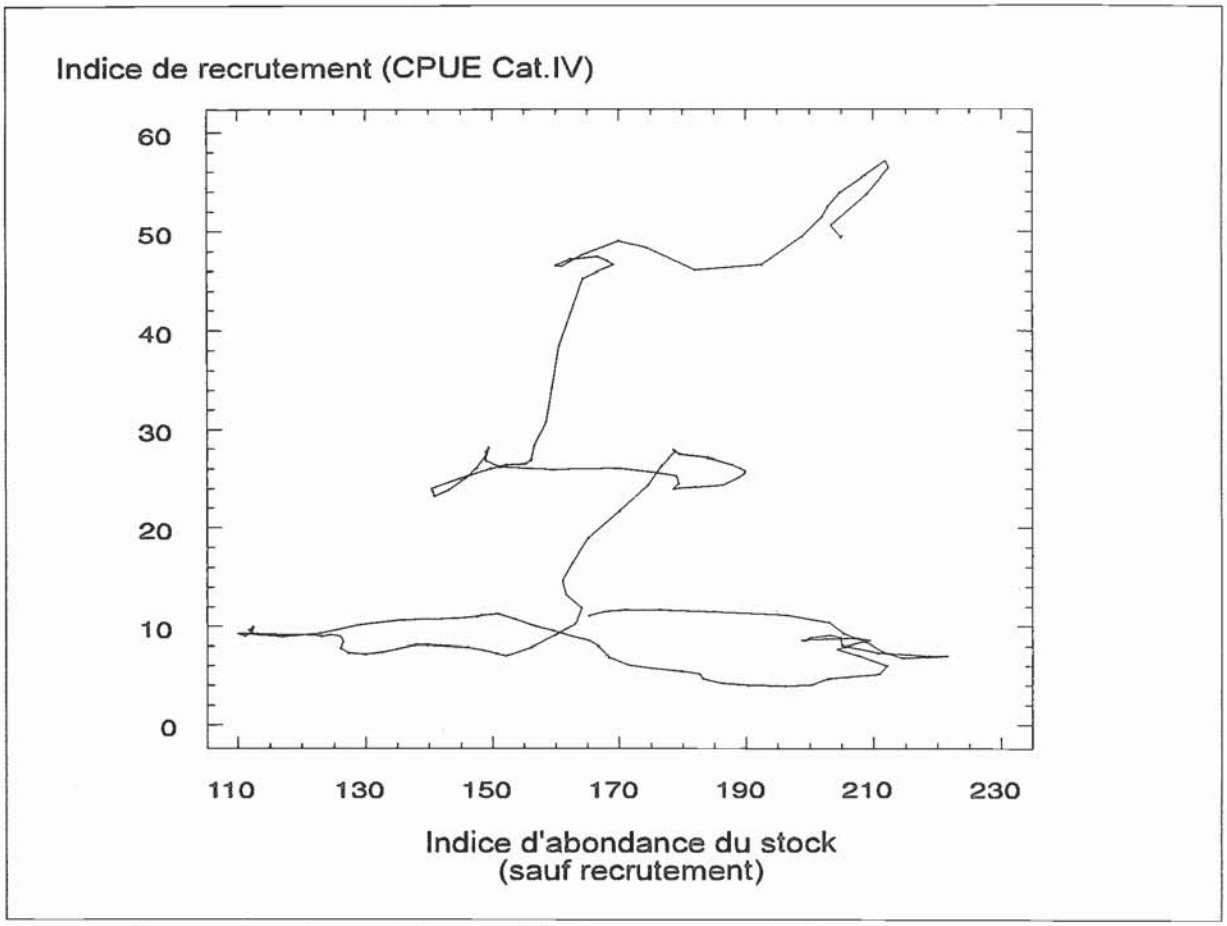

Figure 1: Simultaneous change of the recruit indices on the Y axis (CPUE of the category IV) and of the abundance of the total stock indices (all categories except category IV) on the X axis.