Status of the population of *Pseudotolithus senegalensis* (Valencienne, 1833) of Cameroon

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ABSTRACT

Analysis of the length frequency distribution of the population of *Pseudotolithus senegalensis* of Cameroon using the Froese and Binohlan (2000) method, indicates that this population is being exploited mostly before the length at first maturity. This situation leads to a loss of 29% of the potential production of that fishery every year. This finding is contrary to previous studies on the same species. This discrepancy might have come either from the model utilised (yield per recruit of Beverton and Holt, 1957), or from the increase of the fishing effort above the sustainable level. Due to the importance of the fishery sector in the country with regard to its contribution to employment generation, export earnings and protein food self-sufficiency, this calls for immediate attention. To that end, the fishery should either increase the mesh size actually in use, avoid fishing in the nursery zones or implement the management strategy of closed seasons during the reproductive periods.

Keys words: Frequency Distribution, Length at First Maturity, Yield per Recruit, Mesh Size, Nursery Zones

RESUME

L'analyse de la fréquence de taille de *Pseudotolithus senegalensis* du Cameroun à l'aide de la méthode de Froese et Binohlan (2000), révèle que cette population est exploitée surtout avant sa taille de première maturité sexuelle. Cette situation entraîne chaque année une perte de 29% du potentiel de production de cette pêcherie. Ce résultat est contraire aux premières études réalisées sur cette espèce. Ce désaccord proviendrait soit du model utilisé (rendement par recru de Beverton et Holt, 1957), ou d'une augmentation de l'effort de pêche au-dessus du rendement durable. Compte tenu de l'importance du secteur de la pêche dans le pays et plus spécialement du point de vu génération d'emplois, de rentrée de devises et de l'auto-suffisance alimentaire, la situation ici décrite, mérite une attention particulière. A cet effet, la pêcherie devrait soit augmenter le maillage en cours d'utilisation, éviter de pêcher dans les zones d'alevinage ou alors utiliser la stratégie d'aménagement qui consiste à interdire la pêche pendant la période de reproduction.

Mots clés: Distribution de Fréquence de Taille, Longueur à Première Maturité Sexuelle, Rendement par Recru, Maillage, Zones d'Alevinage

1. INTRODUCTION

Seventy to eighty percent of the total catch from the landings of the industrial fishery in Cameroon consists of fish from the family of sciaenidae, among which *Pseudotolithus senegalensis* forms a major component (Djama and Pitcher, 1989). In a multispecies and multifleet context, the knowledge of the state of exploitation of a given resource (in this case the population of *Pseudotolithus senegalensis*) is important and necessary for a proper management of that population.

Until recently, nothing on the status of the population of *Pseudotolithus senegalensis* has been published in Cameroon. However, Djama and Pitcher (1989) using the yield per recruit curve of Beverton and Holt (1957), found that the fishing effort was less than the optimum, suggesting that the stock of *Pseudotolithus senegalensis* was still in a safe situation of exploitation. Due to the importance of the fisheries sector in Cameroon, especially in the provision of employment and revenue to the population (Djama, 1992), this paper is intended to update information on the status of the population of *Pseudotolithus senegalensis* for the sustainable exploitation of that stock.

2. MATERIALS AND METHODS

Monthly representative length frequencies of *P. senegalensis* were recorded at the hall of the landing site of the industrial fishing companies in Douala for a period of one year (January to December 1989). A total number of 30 869 fish species of *P. senegalensis* were then measured (total length) to the nearest centimetre. These monthly samples were pooled to calculate annual length frequencies which constitutes the data

Table 1. Summary of the parameters used in the study

Parameter	Definition
$L_?$	Parameter of the VBGF expressing the mean asymptotic length that a fish would reach if it is to grow indefinitely
L_m	Mean length at first maturity
L_{opt}	Mean length at maximum egg production
$W_L = a{*}L^b$	Relationship between the length of the fish and its weight
$W_{Lclass} = N_{class}{*}a{*}L^b{}_{class}$	Weight of each length class
$W_T = \sum W_{Lclass}$	Total weight (landing)
$W_{poss} = a{*}N_{opt}{*}L^b{}_{poss}$	Sustainable yield

NB: $\log L_{opt} = 1.053\log(L_m) - 0.0565$

Table 2. Values of the parameters used in the study

used for this study. It is important to recall at this point that *P. senegalensis* is a coastal marine demersal fish specie living above the thermocline discontinuity (Longhurst, 1964), preferably on sand and/or sand mud bottoms. It is a predator of crustacean, especially shrimps (*Penaeus notialis)* (Longhurst, 1957).

The model

Froese and Binohlan (2000) provided a method of analysing length frequencies in order to estimate the

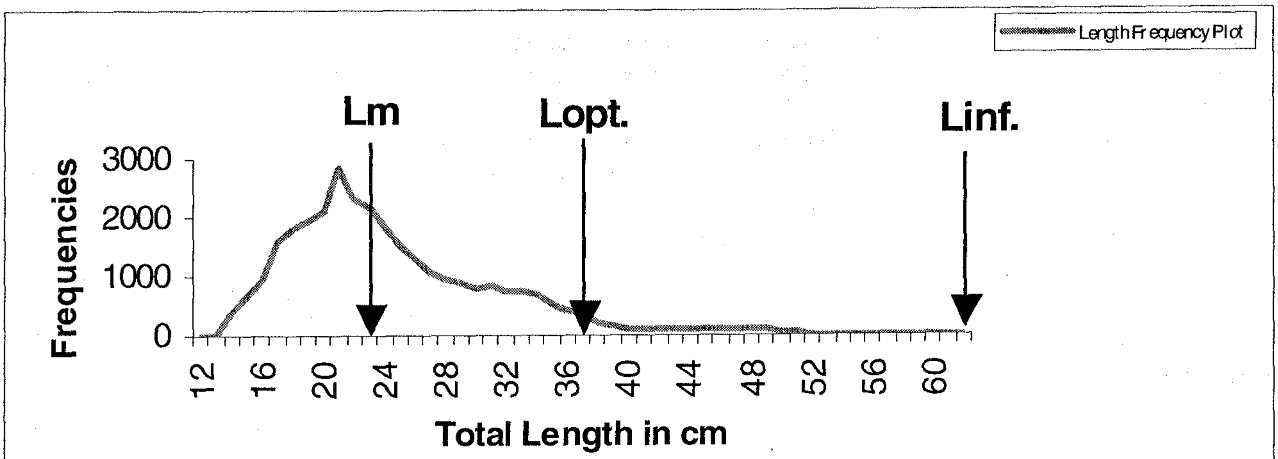

Fig. 1: Length-Frequency Plot

Lm = Mean Length at first maturity ; Lopt = Mean length at maximum egg production; Linf. = Mean asymptotic length

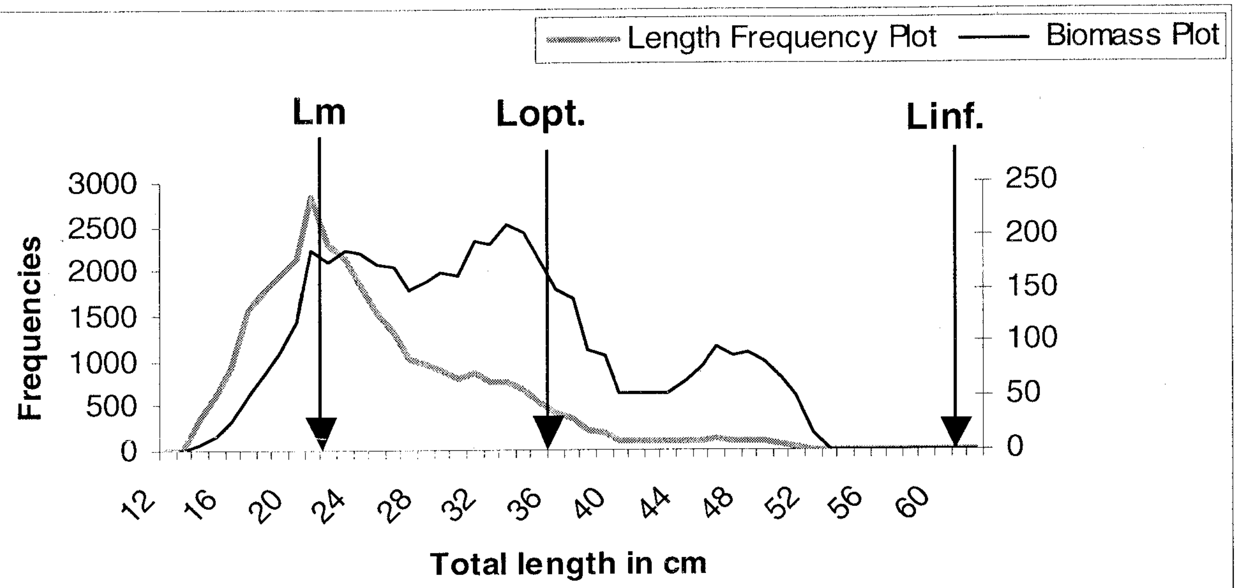

Fig. 2: Length-Frequency Biomass Plot

degree of growth over-fishing (over exploitation of immature fish species). This model requires the knowledge of biological parameters such as mean asymptotic length of the fish (L_8), mean length at fish maturity (L_m), mean length at maximum egg production ($L_{opt.}$), and the length-weight relationship. Table 1 summarises the parameters used for this study.

3. RESULTS AND DISCUSSION

Estimation of the degree of over-fishing of P. senegalensis

The mean length at first maturity (L_m), is a length at which 50% of the fish of that length are mature. For *P. senegalensis* the mean length at first maturity is 23 cm (Djama, 1992). When comparing this value with the

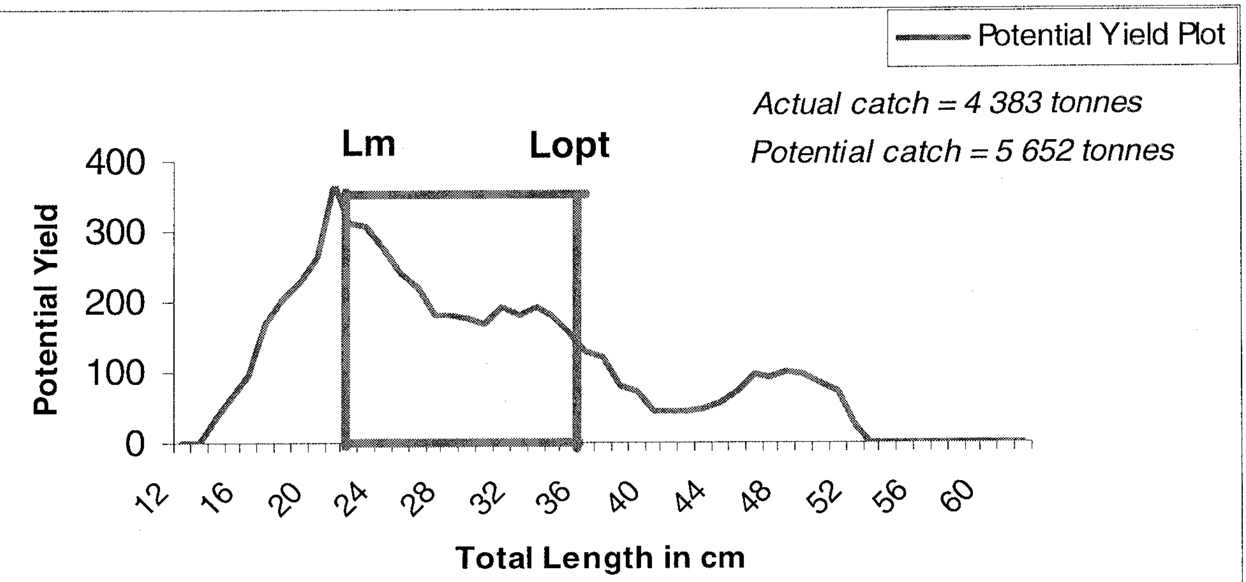

Fig. 3: Length-Frequency Potential Yield Plot

length frequency distribution plotted (Fig. 1), one can observe that the L_m arrow is situated after the peak of the histogramme, implying that most of the fish are captured before this length class. This finding suggests that the fishery is concentrated mostly on juveniles. Due to the fact that this activity of fishing exclusively on juvenile fish is being perpetuated by the fishing industry, this calls for immediate attention as such a situation will certainly lead to growth over-fishing.

Estimation of the biomass of P. senegalensis

In Figure 2, the length frequency distribution has been converted into biomass through the length-weight relationship. The plot of this biomass against length frequency shows that most of the biomass can be obtained when the fishery is capturing fish after the length at first maturity. This finding is not really surprising, but is an additional proof to support the philosophy aiming at protecting fish before spawning maturity.

Estimation of possible yield of P. senegalensis

The potential catch (yield) is the sustainable yield from the fishery. This yield has been estimated from the formula in Table 1, and its value is approximately 5 652 tonnes per year. Comparing this value with the actual catch of 4 383 tonnes from the fishery, the difference falls within a range of 29%. This result suggests that the fishery on *Pseudotolithus senegalensis* is loosing approximately one quarter of its potential of production every year. This finding is contrary to the results of a previous study (Djama and Pitcher, 1989) on the species using the yield per recruit model of Beverton and Holt (1957). This discrepancy can be explained either by the fact that the yield per recruit model is not a good indicator of the status of the fishery, or that fishing effort has increased over the years above the sustainable level. This latter seems to be the case, as the fleet has increased from 31 fishing units in 1989 to more than 50 fishing units in 1999.

Due to the importance of the fishery sector in the country with regard to its contribution to employment generation, export earnings and protein food self-sufficiency, this calls for immediate attention. To that end, the fishing industry should avoid capturing fish of less than 23 cm total length by either increasing the mesh size of the nets presently in use or avoiding fishing in the nursery zones. Closed seasons management policy can also be implemented during the reproductive periods which coincides with the dry seasons (Djama 1992).

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