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COMMUNICATION II

Preliminary Estimates of Growth and Mortality in *Nemipterus bathybus* Snyder (Pisces: Nemipteridae) from the Coast off Sarawak, South China Sea

ABSTRAK

Sampel kekerapan panjang Nemipterus bathybus Snyder (Pisces: Nemipteridae) yang diperolehi dari kajiselidik di luar pantai Sarawak, Malaysia Timur (Laut China Selatan) telah diasingkan ke dalam komponen dengan kaedah Bhattacharya. Panjang min komponen berdekatan yang dianggap mewakili kelas tahun telah digunakan untuk menganggarkan parameter L_∞ dan K dalam persamaan Bertalanffy, manakala bilangan ikan dalam komponen ini digunakan untuk menganggarkan jumlah kematian. Keputusan adalah: TL_∞ = 31.2, K = 0.36 −1 tahun dan Z = 1.4 tahun $^{-1}$. Keputusan telah dibincang berdasarkan anggaran lain bagi N. bathybus *dan spesis ikan kerisi lain.*

ABSTRACT

Length–frequency samples of Nemipterus bathybus *Snyder (Pisces: Nemipteridae) obtained in a trawl survey off the coast of Sarawak, East Malaysia (South China Sea) were separated into components using the Bhattacharya method. The mean length of adjacent components, assumed to represent year classes, were used to estimate the parameters Loo and K of the von Bertalanffy equation, while the numbers of fisah in these components were used to estimate total mortality. Results were: TL_∞ = 31.2, K = 0.36 year^{-1} and Z = 1.4 year $^{-1}$. The results are discussed in relation to other estimates of* N. bathybus *and other species of threadfin breams.*

INTRODUCTION

A brief survey was conducted from 17 to 21 June 1987 on board R/V Kagoshima Maru in the waters off Sarawak, South China Sea. A total of 12 trawl hauls were made out of which 7 were successful and positive for *Nemipterus bathybus* Snyder (Pisces: Nemipteridae). Length measurements were taken for the purpose of growth and mortality estimation, as needed for future assessment of the stock.

MATERIAL AND METHODS

The length–frequency data used here are summarized in Table 1. They were used in their original form (sample i (a)) and after smoothing over 3 classes as recommended in Pauly and Morgan (1987) for irregular data (samples i (b)).

The method of Bhattacharya (1967) as implemented in the Compleat ELEFAN software package (Pauly and Morgan 1987) was used to separate samples i (a) and i (b) into their normally distributed component distributions *(Fig. 1).*

Assuming, along with Weber and Jothy (1977) and Pauly and Martosubroto (1980) that the major components identified represent year classes (i.e. $\Delta t = 1$, the mean length between adjacent groups (ΔL) was computed, and related to the mean length of all components involved in the computation of ΔL (L).

A rough estimate of asymptotic length (L_∞) was obtained from Lmax/0.95 = L_∞ where Lmax is the maximum size in Table 1 (30.5 cm, TL). A preliminary estimate of the parameter K of the von Bertalanffy equation was then obtained using a "forced Gulland and Holt Plot" (Pauly 1984, see also Gulland and Holt 1959) i.e. from

$$K = (\Delta L/\Delta t)\ (L_\infty - \bar{L}) \qquad \ldots.1)$$

while a preliminary estimate of t_0 was obtained from the empirical equation

$$10g_{10}\ (-t_0) = -0.3922 - 0.2752 \times \log_{10}$$

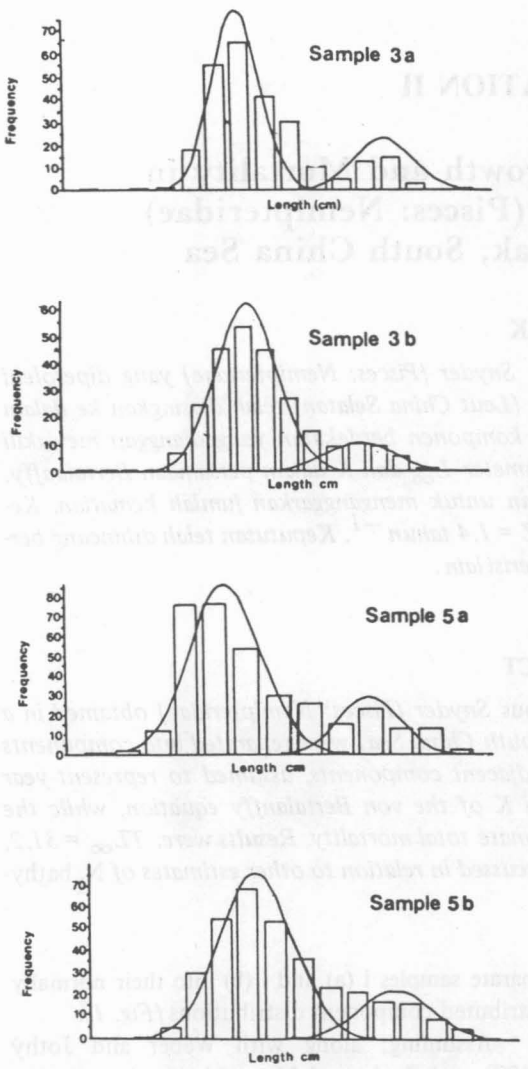

Fig. 1: Sample outputs of Bhattarcharya's method for separation of composite length-frequency samples into their component distributions, as inplemented on the Compleat ELEFAN program (a: data of Tables 1;b: smoothed data; see Table 2).

$L_\infty - 1.003 \times \log_{10} K$ ....2)

(from Pauly and Martosubroto 1980, with a correction for the sign of the intercept from Pauly, pers. comm.). Total mortality (Z) was estimated, assuming representativeness of the samples in Table 1, and constancy of recruitment from

$$Z = -\log_e \left(\frac{Nt + 1}{N_t}\right) \quad \ldots .3)$$

where Nt, Nt + 1 represent the sum of number of fish in adjacent groups (Table 1).

RESULTS AND DISCUSSION

Table 2 summarizes the results of the Bhattacharya analyses and identifies the components used to estimate K and Z.

With L_∞ estimated as 32.2 cm, K is computed, following (1), as K = 5.1/(32.2–17.9) = 0.36 ....4)

while t_o = –0.45 based on equation (2). Thus the von Bertalanffy equation, based on our data for the stock of Sarawak is;

$$L_t = 32.2\ [1 - e^{-0.36(t+0.45)}] \quad \ldots .5)$$

Our estimate of total mortality, based on the N values in Table 2, is Z = 1.37 $year^{-1}$, corresponding to a survival rate of 2.5% $year^{-1}$.

This latter result is compatible to those of Weber and Jothy (1977) who estimated values of Z = M ranging from 0.4 to 2.2 off Sarawak and Sabah. Similarly, the (mean = 1.31) for nemipterids growth parameter estimates are comparable to these reported for *N. bathybus* by Pauly (1978), based on Eggleston 1972 i.e. L_∞ = 30.2 cm, K = 0.324 and to = –0.80.

This correspondence is encouraging, although due to the nature of our data, our results must be considered as preliminary.

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TABLE 1
Length-frequency distribution of Nemipterus bathybus
collected off the coast of Sarawak from 17th–12st June, 1987

ML/Sample	1	2	3	4	5	6	7
8.5							2
9.5						1	3
10.5			1			2	18
11.5			0		1	4	16
12.5			1		2	8	8
13.5	2		1		12	13	5
14.5	7		18	1	76	18	0
15.5	17	9	55	7	77	22	3
16.5	20	7	65	36	54	8	1
17.5	22	10	41	78	30	4	3
18.5	21	4	30	63	26	2	2
19.5	15	1	10	37	15	2	0
20.5	7	0	5	23	23	0	1
21.5	1	0	12	13	13	0	
22.5	0	0	14	10	13	1	
23.5	1	0	3	1	2	0	
24.5		0	0	0		1	
25.5		1	1	1			
26.5		0					
27.5		0					
28.5		0					
29.5		0					
30.5		1					
Sum	113	33	257	270	344	86	62

TABLE 2
Summary of results of Bhattacharva analysis of length–frequency data of *Nimepterus bathybus.*

Sample[a)]	Mean length (cm)		S.D. of Groups		N in Group	
	T_t	T_{t+1}	t	t + 1	Nt	Nt + 1
1a	17.3	–	1.61	–	105	–
1b	17.5	–	1.85	–	100	–
2a	17.3	–	10.7	–	31	–
2b	16.9	–	1.41	–	31	–
3a	16.3	21.9	0.95	0.91	189	67
3b	16.6	21.7	1.36	0.91	214	43
4a	17.8	21.9	1.04	0.70	208	61
4b	18.1	22.2	1.39	(0.70)	236	33
5a	15.8	20.5	1.14	0.99	258	74
5b	15.8	21.0	1.39	0.99	265	77
6a	14.5	–	1.74	–	81	–
6b	14.3	–	2.12	–	83	–
7a	11.7	17.7	1.17	0.82	52	9
7b	11.4	17.3	1.35	0.82	50	11
				Sum[b)]	1472	375

a) a refers to estimates based in the original length frequency data, b to data smooted over 3 length classes.

b) refers to N–values for which both N_t of N_{t+1} were available, as used in equation (3).

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