A Preliminary Account of the Population Dynamics of *Stolephorus devisi* (Engraulidae) at Munda Baitground, Solomon Islands*

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Abstract

Estimates of growth parameters for *Stolephorus devisi* (Engraulidae) at Munda Baitground, Solomon Islands were obtained using the Compleat ELEFAN software. Also, estimates of natural and fishing mortality are presented, along with recruitment patterns. All results are presented on a per-year basis for 1985-1987.

Introduction

The pole-and-line skipjack tuna fishery of the Solomon Islands is wholly dependent on a sufficient supply of live bait. Stolephorid species contribute approximately 90% to the total bait catch from Munda baitground, Western Solomon Islands.

A collaborative research project on baitfish between the Australian Centre for International Agricultural Research (ACIAR) and Solomon Islands government was conducted from 1987 to 1989 which aimed at describing the biology and population dynamics of the major bait species, thereby providing the Fisheries Division (especially the Management section) with knowledge on how the baitfish stocks may respond to variations in fishing pressure.

This report presents a preliminary account of the population dynamics of *Stolephorus devisi* (Fam. Engraulidae) based on the analysis of length-frequency data, analyzed using the Compleat ELEFAN software package of Gayanilo et al. (1988).

Materials and Methods

Fishing methods

Baitfish samples were collected each month at Munda baitfish ground, Solomon Island (Fig. 1), using the "bouki-ami" technique. In this method, a lamp is suspended underwater during the night for three to five hours. When sufficient amount of baitfish have gathered, a deep net is lowered to catch them. The research team used two 25-foot canoes and a bouki-ami net of a much smaller size than used by the commercial pole-and-line vessels. However, the technique is similar.

Baitfish sampling

The baitfish samples that were collected from Munda baitground were collected randomly from the night catch. The sampled fish were measured to the nearest millimeter, and each species presented in the sample were recorded in order to determine the species composition. The length-frequencies of the major baitfish species were compiled each month. Other major work undertaken by the collaborative research project includes otolith reading, baitfish predators, baitfish food (plankton) and reproductive biology.

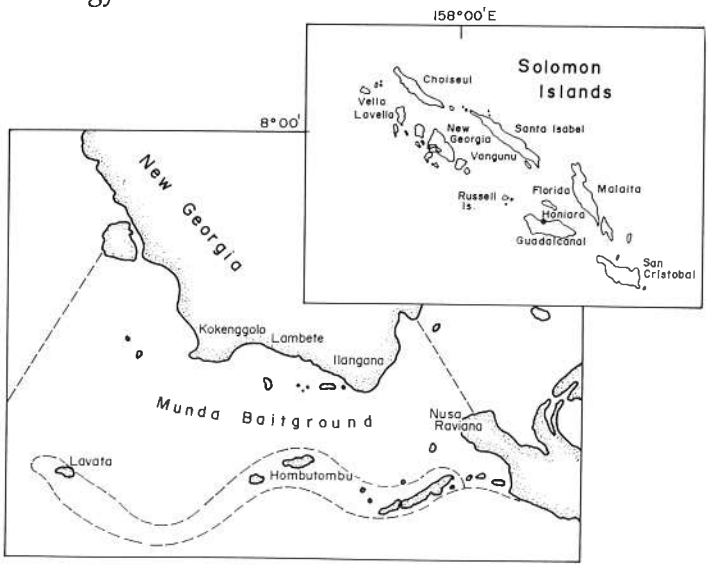

Fig. 1. Location of Munda Baitground, Solomon Islands.

*Preliminary results based on a paper written during a workshop on Length-Based Methods in Fish Analysis, 5-17 December 1988, Honiara, Solomon Islands (see Fishbyte 7(1):11-12).

Catch and effort data

Catch and effort data were made available through the cooperation of the two fishing companies operating in the Solomon Islands. The recorders on each vessel are provided with log sheets provided by the Fisheries Division to record the amount of catch after each fishing night. The data are compiled by month and baitground.

The available length-frequency data from 1985 to 1987 were analyzed using the ELEFAN I program, using preliminary estimates of L_∞ and K presented by Dalzell (1984) for *S. devisi* in Papua New Guinea.

Catch curve estimates of Z, and estimates of M and F were obtained using the ELEFAN II program, as outlined in Gayanilo et al. (1988).

Results and Discussion

Identification of the "best" estimate of L_∞ and K, using the different search routines in ELEFAN I, proved quite difficult, as the R_n (goodness of fit index) values viewed over a wide range of L_∞ and K values, did not generate a sharp peak. However, taking preliminary estimates of L_∞ and K from Papua New Guinea as "seed values", the automatic search routine of ELEFAN I was used to identify a "best" growth curve, shown in Fig. 1 (the corresponding parameter estimates are given in Table 1).

As might be seen from Fig. 1, an insufficient number of smaller fish are included. This is due to the fact that the smaller anchovies are difficult to identify to species, a problem which the research team is currently trying to resolve. Eventually, the length-frequency data should be analyzed using programs other than ELEFAN I, so that growth parameter estimates can be compared.

Table 1. Growth and mortality parameter estimates for *Stolephorus devisi* in Solomon Islands and Papua New Guinea

Location	Year	Growth and mortality parameter estimates							
		L_∞ (mm)	K year^{-1}	C year^{-1}	WP year^{-1}	Z year^{-1}	M year^{-1}	F year^{-1}	E (F/Z)
Munda bait-ground[a]	1985	79.5	2.30	0.2	0.5	6.0	4.6	1.4	0.235
- do -	1986	78.0	2.23	0.2	0.1	13.5	4.5	9.0	0.667
- do -	1987	78.5	2.25	0.2	0.3	14.0	4.6	9.4	0.674
Papua New Guinea[b]	-	78.0	2.00	-	-	-	4.4-	-	

[a]This study
[b]Dalzell (1984)

Table 2. Catch and effort data for Munda baitground, 1984-1988, Solomon Islands

Year	Hauls	Boat nights	Buckets	C/f (buckets/haul)	% of catch[a]
1984	5,451	1,544	193,122	35.4	23.7
1985	6,010	1,711	209,000	34.8	20.6
1986	3,857	1,194	144,945	36.6	13.5
1987	5,815	1,499	200,507	34.5	20.9
1988[b]	729	232	28,889	39.6	2.9

[a]% of total catch from the Solomon Islands
[b]1988 data refer to January-October only

The catch per unit effort data so far obtained are shown in Table 2; monitoring by this division continues, in order to quantify the change in fishing pressure exerted by the pole-and-line vessels.

It is hoped that through the framework of the study on the bait fishery of Solomon Islands, the Fisheries Division will eventually obtain results useful for management. Furthermore, there is a lot of biological information (e.g., plankton, predators and abundances, monsoon periodicity, etc.) that should be monitored as future inputs for fishery management.

References

Dalzell, P. 1984. The population biology and management of baitfish in Papua New Guinea waters. Fisheries Research and Surveys, Dept. of Primary Industry, Port Moresby, Papua New Guinea. 5 2p.

Gayanilo, F.C., Jr., M. Soriano and D. Pauly. 1987. A draft guide to the Compleat ELEFAN. ICLARM Software 2, 65 p.