Notes on the Silverbiddy *Gerres oyena* (Gerreidae) in Tarawa Lagoon, Kiribati[a]

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Abstract

Length-frequency data, collected using beach seines, on the common silverbiddy *Gerres oyena* (Gerreidae) in Tarawa Lagoon, Kiribati (northern Gilberts Group), from September 1976 to October 1977 were analyzed using the Compleat ELEFAN software. This analysis and basic knowledge of the inshore-offshore migration patterns of this fish suggest that the data at hand, because they include only young fish, cannot be used to estimate growth and/or mortality. The seasonal pattern of recruitment could be inferred, however, and this suggests that *G. oyena* is recruited, every six months, in pulses of unequal strength.

Introduction

In September 1976 to October 1977, the Fisheries Division of Kiribati conducted a survey of the Tarawa Lagoon fisheries using beach seines, gillnets of different mesh sizes, handlines and trolling lines. The primary objectives of the survey were to identify the various species present in the lagoon and to collect basic information on the biology and ecology of the fish of Kiribati.

The details of the sampling methods, the sampling areas and the results obtained in the original survey have been compiled into three volumes (Cross 1978).

Over a decade later, it has become feasible to take a good look at these data and to try to extract further information from this dataset, relevant to the management of the Tarawa Lagoon fisheries. The "good look" in question is made possible by the availability of software for the detailed analysis of length-frequency data such as MULTIFAN, MIX or LFSA. Here, the Compleat ELEFAN package of Gayanilo et al. (1988) was used, but emphasis was given to checking whether its basic assumption (representativeness of the analyzed length-frequency data) was met.

Materials and Methods

Sampling Site

All samples utilized stem from Tarawa Atoll, the fifth island from the north in the Gilberts Group, 1°20'N and 170°10'E (Fig. 1).

The climate is similar year-round, but with some more rains in November to March. Food crops are not plentiful, and thus fishing forms a major part of the local people's subsistence.

Tarawa is the most populated island in the whole of Kiribati (with a third of the total country's population) and the seat of government (Anon. 1985). Compared to the other islands in the group, it has the highest number of fishing gears and vessels and the

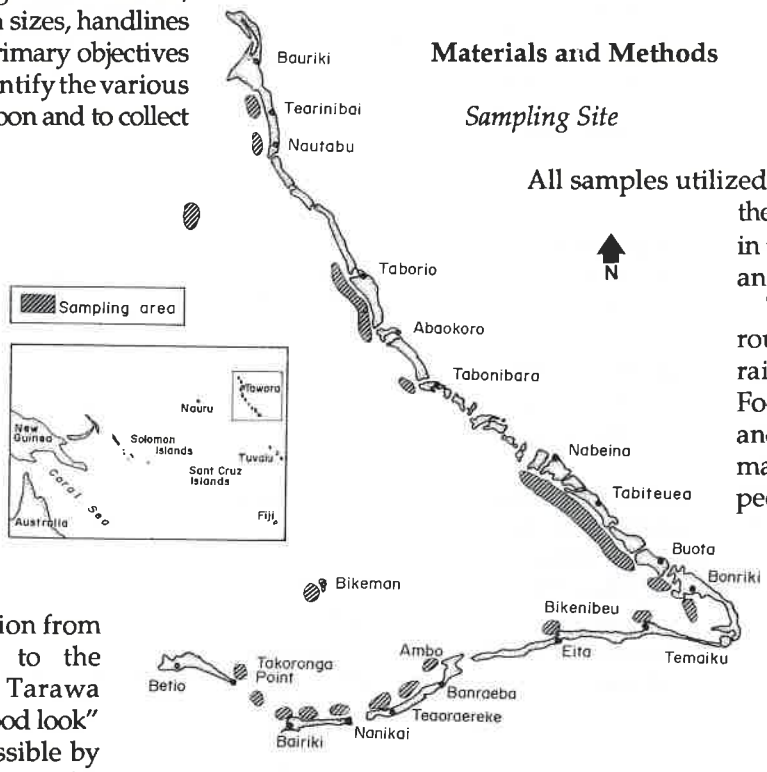

Fig. 1. Map of Tarawa, Kiribati, showing location of beach seine sampling areas. The inset shows the location of Kiribati (northern Gilberts Group) in the South Pacific.

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

highest commercial fishing activity. The fishing areas around the atoll are therefore being quite heavily fished, especially the lagoon which is by far the most favored fishing area due to its accessibility and relative safety during periods of rough weather (Yeeting 1987).

Temporal and Spatial Distribution of Samples

Samples were collected every month with a beach seine from September 1976 to October 1977 as described in detail in Cross (1978). Essentially, this involved enclosing an inshore area with a wall of netting, then slowly pulling up the net onto the beach, thus forcing any fish that had been surrounded into a central bag which was then pulled ashore. Most of the netting was sampled in shallow waters of up to 1.5 m depth (this included the turtle grass beds of the intertidal zone).

A total of 31 different sites distributed along the whole extent of the island were sampled, thus providing a good coverage of the entire shallow water zone of the lagoon (see Fig. 1).

Analysis of Length-Frequency Data

The data compiled by Cross (1978) were presented (as fork lengths) in intervals of 3 mm. These data were entered and regrouped into intervals of 5 mm using the appropriate routine of the Compleat ELEFAN (Table 1). That same software was used for all subsequent analyses.

Results and Discussion

The monthly samples are large and appeared to show clear normal distributions, suggestive of good representation of the population. However, larger fish of up to 40 cm are frequently caught in gillnets in the deeper areas of the lagoon[b]. At this point some knowledge on the biology of the species becomes important.

Gerres oyena (Fig. 2) is known by local fishermen to migrate to the ocean side of the island to spawn. The eggs hatch after a few days into larvae which are

Table 1. Length-frequency distribution of *Gerres oyena* sampled with beach seines in Tarawa Lagoon from September 1976 to September 1977.

FL(cm)	9/76	10/76	11/76	12/76	1/77	2/77	3/77	4/77	5/77	7/77	8/77	9/77
1.5	-	9	4	-	0	-	-	0	-	1	4	3
2.5	4	300	150	84	7	1	135	4	16	15	32	95
3.5	4	203	218	66	24	0	82	17	60	33	38	420
4.5	26	123	399	134	25	2	12	13	31	93	123	435
5.5	6	96	289	247	70	8	37	26	102	283	142	272
6.5	7	43	157	102	96	38	71	26	281	316	137	178
7.5	3	37	113	30	32	46	129	35	548	237	89	109
8.5	1	25	51	10	9	39	76	39	238	234	58	86
9.5	15	30	25	5	6	16	28	14	90	128	14	29
10.5	34	22	10	0	3	6	12	3	44	84	12	11
11.5	10	12	5	2	-	1	7	2	15	43	4	5
Sum	110	900	1,421	680	272	157	589	179	1,425	1,467	653	1,643

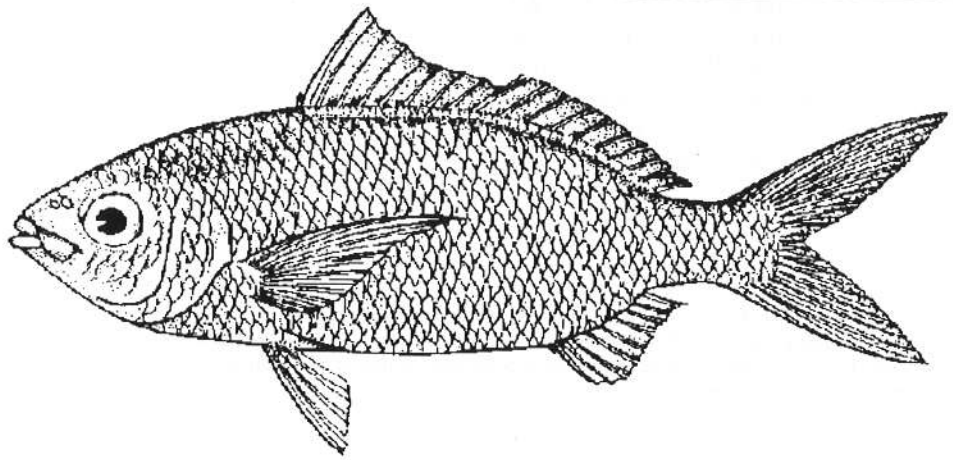

Fig. 2. The common silverbiddy *Gerres oyena* (Gerreidae), known as *ninimai* in Tarawa.

[b]Editor's note: The FAO Fish Identification Sheets for the Western Indian Ocean report this species to reach a maximum of 25 cm, much less than the figure of 40 cm given here.

transported by the tidal currents back, through the passes, into the lagoon, i.e., into their nursery areas in very shallow waters dominated by turtle grasses and mangrove. Here, they remain until they become late juveniles, at which point they return to deeper waters. Cross (1978) stated that his sampling results showed migration into deeper waters at a length of around 11-12 cm and first sexual maturity of females at a length of 22 cm and of males at 19 cm. Considering this suggests that the samples in Table 1 will not provide a true representation of the natural population but only of the juveniles.

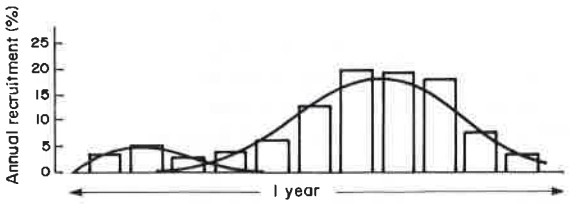

Fig. 3. Recruitment pattern of *Gerres oyena* at Tarawa, Kiribati. Note the separation of two unequal pulses by a period of about 6 months.

Thus, if one were to use these data as if the above-mentioned migrations did not occur, one would (i) underestimate L_∞; (ii) overestimate K and consequently (iii) overestimate Z and M[c].

On the other hand, these data, pertaining exclusively to young fishes, are well-suited to identify the seasonality of recruitment of *G. oyena* in Tarawa Lagoon. Fig. 3 presents the recruitment pattern thus obtained.

As might be seen, this suggests that *G. oyena* recruits in two annual pulses of unequal strength - which is similar to what other tropical species appear to do.

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[c]Editor's note: Since the work reported upon here was conducted, a paper was published which may present reliable growth parameter estimates for the common silverbiddy. Its reference is: El-Agamy, A.E. 1988. Age determination and growth studies of *Gerres oyena* (Forsk.) in the Arabian Gulf waters. Mahasagar 21(1):23-34.

Estimating Natural Mortality of Kuwait's *Penaeus semisulcatus* Using a New Tag-Recapture Data Analysis Method

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Abstract

A novel method was used to estimate natural mortality (M) of Kuwaiti *Penaeus semisulcatus* using tagging data. The new M estimator is based on two tagging experiments with similar products of initial survival after tagging times reporting rate, but with different total mortality (Z) values. The best M-estimate for males was 2.4 year^{-1}; the data on the female were, however, inadequate for use by this method. The new method is likely to produce reasonable estimates of M if accurate Z-values are used.

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