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A PRELIMINARY SURVEY ON THE SPAWNING OF *LETHRINUS OBSOLETUS* FORSSKÅL - "OKAOKA" FROM TARAWA LAGOON

by

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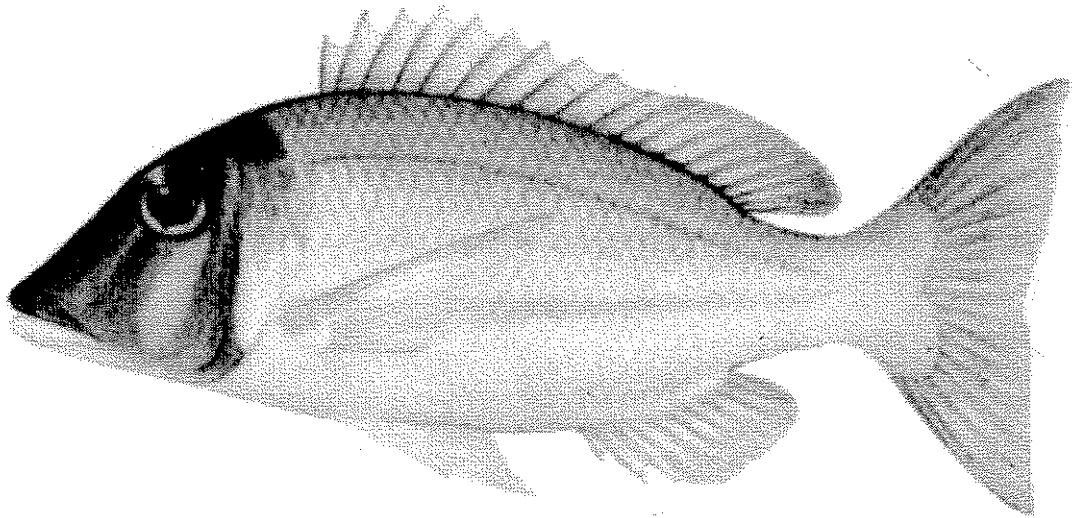
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LETHRINUS OBSOLETUS FORSSKÅL- "OKAOKA" (LETHRINIDAE)
FROM TARAWA LAGOON**



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ABSTRACT

The Lethrinidae or emperor fish, *Lethrinus obsoletus* Forsskål, also locally known as *okaoka*, spawns between the first and last quarter moons. More specifically, trickle spawning occurs around the first and last quarters while peak spawning occurs around fullmoon. This species sexually matures and spawns at fork length of 23.2 cm. The sex ratio of 1:2 in favour of males suggests it may undergo sex reversal from female to male (protogynous hermaphroditism) sometime during its life cycle. The smallest and biggest specimens caught during sampling excursions measured 21.3 and 47.2 cm, respectively.

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2. INTRODUCTION.

Finfish is the major source of protein for Pacific Island people (Tebano, 2000), especially those who got stranded on these atolls with limited land mass for the production of land-based protein sources. The importance of sustaining and managing valuable marine resource is critical for the continuing well being and livelihood of islanders. Over the past centuries atoll dwellers have managed to harvest from their reefs without any significant biological and ecological changes which might have led to the degradation and impoverishment of island systems and their various ecosystems. This practice has drastically changed over the past years. Changes caused by the introduction of foreign (European especially) fishing gears, powered outboard motor boats, very effective fishing techniques and other fish related innovations that are supposed to yield maximum catch from minimum fishing effort. These have led to greater harvests with surplus that has to be sold. The more cash oriented lifestyle in the islands fits in the sale of finfish for fast money. These have a drastic effect on the coastal resources of the island states. Over a short period more resources have been harvested and the impact has begun to emerge. If this trend continues at the same intensity over a long period, the resources will soon be depleted, in some cases resources have diminished significantly and some are on the verge of irreversible recovery.

Indeed, such scenarios have been observed with the fisheries of Tarawa. A classic example is a bonefish, *Albula vulpes*, as described in a report by the BioSystems Analysis Incorporated (1994). The population of this fish had drastically declined on the islands of Abemama and Tarawa. The gillnetting of a bonefish on the former coincides with the spawning run. This has been practised before the 1960s and continued into the late 1980s when it was declared the stock has reached a crash point. The same method was also used in Tarawa lagoon at about the same period. The nets got longer and longer and the splashing technique (orooro) soon modified gillnetting making it more efficient. The splashing technique was banned and the cling-cling or banging of a crow bar under water (katangitang) replaced it.

Thus the reduction in mean size and depletion in certain fish species is attributed to a series of changes in the fishing techniques used. What is needed most is proper and sound management

from government agencies and the public at large who are solely the principal users of the resources. But management cannot be effective without concrete data on the biology and ecology of a resource. It is in this regard that this report provides a preliminary observation on the spawning season and other aspects of a Lethrinidae species, *Lethrinus obsoletus* or *okaoka* as is locally known. This is one of the sought after species by restaurants. It is hoped that this report is useful in the drafting of a management strategy for such a resource. Other reef fish and lagoon fishes will also be looked into. This report presents:

- i) A spawning season of *Lethrinus obsoletus* based on lunar cycle.
- ii) Size at which the fish is sexually mature.
- iii) Sex proportion in the specimens sampled.

3. METHODS AND MATERIALS

Samples were collected from Tarawa reef and lagoon between February and August, 1998 using hand lines with breaking strengths between 20 - 30 kg and hooks between No.12 and 9 (10-30 mm). At least one trip per week was made if weather permitted. A 20 foot skiff powered by a 40 horsepower Yamaha outboard was used for the fishing excursions. Each fishing excursion began early evening and finished at day break the following day. Catches were kept in eskies with ice. At the research station the catch was sorted according to species. Selected species were dissected for gonad examination, measured for wet weight and fork length. A Salter suspender MODEL 235 was used to weigh samples less than 2 kg. A large spring balance calibrated up to 25 kg was used for larger fishes. A measuring board was used to estimate fork length in cm. Raw data was recorded and stored on Microsoft Excel for analysis. Gonad staging was carried out using a visual technique with the assistance of an expert. The categories are as follows:

- Stage 1: Developing - gonad is recognised as either a testis or ovary, occupies a very tiny portion of body cavity.
- Stage 2: Developed - gonad occupies less than a third of body cavity.
- Stage 3: Ripe - gonad occupies more than half of body cavity.

Stage 4: Spawn: gonad exudes from body cavity on slightest touch or runs out freely on its own.

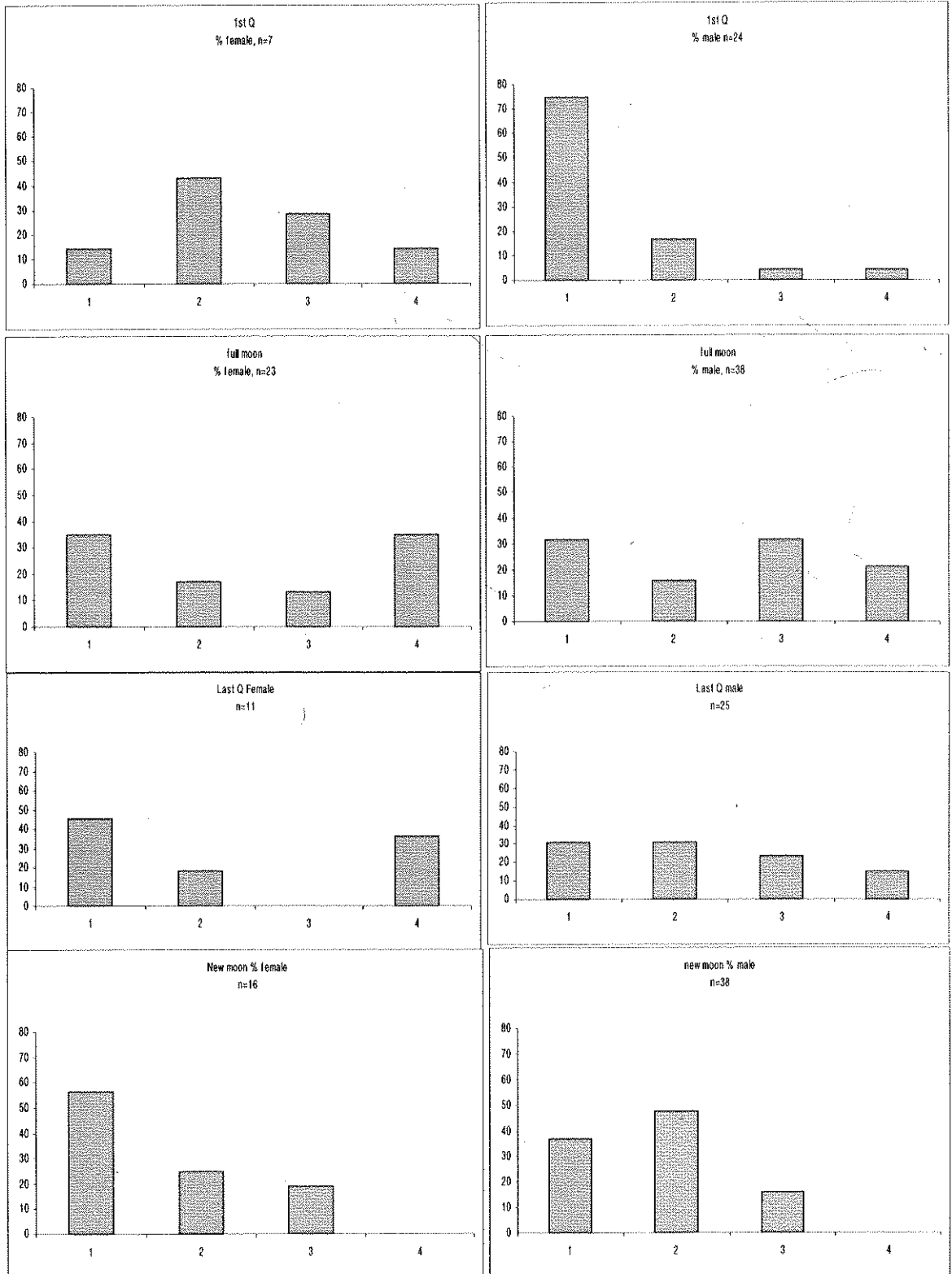
The stages above are matched against lunar periods (first quarter, full moon, last quarter and new moon) on which the excursions were carried out. Samples caught 3 days before or after each lunar phase were pooled into that particular phase.

4. RESULTS AND DISCUSSION

Table 1: Name of fish and other measurements.

<u>Local Name</u>	<u>Common English name</u>	<u>Latin</u>
Okaoka	Orange striped emperor	<i>Lethrinus obsoletus</i>
	Total number of samples	126
	Sex proportion (F/M)	1:2.2
	Mean fork length of male	28.9 cm
	Maximum length	47.1 cm
	Minimum length	21.3 cm
	Mean fork length of female	28.7 cm
	Maximum length	47.2 cm
	Minimum length	21.6 cm

Figure 1: Percentage of individuals with gonad stage (1-4) at each moon phase.



It appears that spawning in *Lethrinus obsoletus* occurs around the first quarter and continues into the last quarter (Figure 1). However, a higher proportion of the animals reaching Stage 4 (spawning stage) is more notable around fullmoon. So it is more likely that trickle spawning occurs before and after fullmoon while peak spawning occurs around fullmoon. Spawning coinciding with fullmoon is not a new phenomenon as there are many finfishes and shellfishes that also spawn around the same period. For example, a bone fish (*Albula vulpes*), a mullet fish (*Chanos chanos*), and a clam, *Anadara uropigmelana* (Biosystems Analysis Inc., 1994; Tebano, 2000). A link between spawning and a fullmoon in many marine organisms is not yet well understood. However, Tebano (1990, 2000) suggested that slight changes in water temperature during spring tide trigger spawning, in addition to the abundance of plankton and other nutrients. The latter is largely made up of larvae of both land and marine organisms. The exact biology and physiology that determine this event need to be looked into.

This species of Lethrinidae sexually matures at fork length of 23.2 cm. This is the minimum length at which ripe gonads have been observed in the specimens. The largest individuals caught in Tarawa, Kiribati, using vertical handlining method with hooks 10 - 30 mm long (No. 9 - 12) measured 47.2 cm. The smallest individuals caught measured 21.3 cm.

The sex proportion of the 126 individuals that were sampled over a six-month period is 1:2 in favour of males. This implies that there is a potential of sex change (from female to male) in the fish sometime during its lifecycle. Protogynous hermaphroditism has been demonstrated in several species of *Lethrinus* (Myers, 1991). This emperor species is probably one of them. More information is required to confirm the claim.

Lethrinus obsoletus is common in seagrass beds and sandy or rubble areas of shallow lagoon and seaward reefs to a depth of over 25 m (Myers, 1991). It is an Indo-Pacific species and inhabits waters around the Red Sea to Samoa, the Ryukyus (Japan), New Caledonia, Tonga and all of Micronesia (Myers, 1991). Emperors to which *L. obsoletus* belongs are closely related to snappers but differ primarily by possessing a maxillary completely hidden by a naked or near-naked preopercle and conical molariform teeth on the sides of the jaws. They also have fairly thick lips, canine teeth in the front of the jaws, a continuous dorsal fin with X spines and 9 to 10 rays, and an

anal fin with III spines and 8 to 10 rays. Most species of the emperor family feed during the day or may rest at night. *L. obsoletus* is fished during the day but sometimes is caught at night. The fish has never been implicated in ciguatoxic poisoning that is common in the carnivorous species. Its mode of feeding and feed preference in the waters of Kiribati are yet to be determined.

Lethrinus obsoletus is an important commercial fish species beside *Lethrinus nebulosus - morikoi* in local markets and is one of the emperor fishes sought after by restaurants and hotels. There are signs that large individuals are rarely caught in Tarawa lagoon. Management of this important resource needs to be put in place before its population crashes.

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