RESEARCH PLAN TO STUDY STOCK STRUCTURE OF SKIPJACK (*KASTUWONUS PELAMIS*) IN THE INDIAN OCEAN BY GENETIC ANALYSES

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INTRODUCTION

Concrete knowledge of fish stock structure is essential for policy makers enable to provide persuasive planning for resource management such as MSY estimation and quota determination. Especially, for highly migratory pelagic species groups like tunas and salmons, detail information on population structure is prerequisite for successful international fishery management.

The Indian Ocean Tuna Commission (IOTC) was establish in 1996, in order to strengthen its management roles, comparing to the previous body, Indo-Pacific Tuna Management and Development Programme (IPTP). Therefore, it is one of the most essential tasks for IOTC to elucidate the stock structure as the basic knowledge of the management. Because skipjack is one of most important tuna and tuna like species in the Indian Ocean, it is essential to initiate studying the stock structure.

In stock structure studies for tuna and tuna-like species in the past, various information were used to investigate heterogeneity within each species, i.e., morphometrics, tag recapture data, parasite and fishery data. Of these, the tagging experiment is the most promising approach because it provides a direct proof of the fish movement, but not necessarily of gene flow, Fishery data is the most abundant but less appealing because the data are not intentionally collected for the racial study, hence certain assumptions need to be set in the analysis. Molecular genetic methods may support or compensate the data from non-molecular methods. If migration between subpopulations is estimated to be very hight based on the molecular data, overfishing in one area may be counterbalanced by the huge influx of individuals. And if migration is very little, overfishing in one area may accelerate depletion of local stock.

REVIEW AND DISCUSSION

The tuna fishery has been the mainstay of our economy for centuries in Maldives. It provides a major source of employment, a major source of food and a major source of export earnings. The Maldivian tuna fishery is based on four main species, namely, skipjack, yellow fin, frigate tuna and kawakawa.

Skipjack tuna is of immense importance to the Maldivian economy. Recorded catches for 1995-1999 were about 75,000 t per year. Skipjack contributed an average of about 67% to the entire national fish catch, and about 78% to the recorded tuna catch during the period 1995-9. Skipjack tuna catch rates are increasing from 1998 and the highest catch rate is recorded for the 1999. Skipjack catches are made almost exclusively by livebait pole and line, with mechanized pole and line vessels (*masdhonis*) now accounting for 99% of landings.

Table 1. Recorded catches of skipjack tuna and the total catch of tunas in the Maldives from 1980-1999.

Year	Skipjack (Metric tones)	Total Catch (Metric tones)	% of Skipjack
1980	23561	30448	77.38
1981	20617	28781	71.63
1982	15881	23834	66.63
1983	19701	31569	62.41
1984	32048	44367	72.23
1985	42602	53851	79.11
1986	45445	53751	84.55
1987	42111	52037	80.93
1988	58546	68051	86.03
1989	58145	67803	85.76
1990	59899	70363	85.13
1991	58898	71102	82.84
1992	58577	73451	79.75
1993	58740	78503	74.83
1994	69411	89599	77.47
1995	70372	89947	78.24
1996	66502	89840	74.02
1997	69015	87110	79.23
1998	78409	103886	75.48
1999	92888	113487	81.85

The two main species caught in the Maldives (skipjack and yellowfin tuna) are highly migratory. There is concern that the Maldivian tuna catches will be adversely affected by the great increase in tuna fishing effort elsewhere in the Indian Ocean. The average sizes of skipjack caught had declined in the northwest side of the Maldives and the catches had stagnated It is not clear whether it is high levels of fishing elsewhere in the Indian Ocean or oceanographic conditions which has led to the consequences.

A collapse of the tuna fishery would be disastrous for the Maldives. Therefore there is a clear need for a better understanding of the dynamics of tuna populations around the Maldives. Stock assessment studies are required in order to provide information to manage the sustainable utilization of the fish stocks. For meaningful stock assessment, a prerequisite is a robust understanding of the stock structure. Since DNA analysis can give some powerful insights to the stock structure, this study is very timely.

RESEARCH PLAN

Schedule

October 2000 – December 2001 : Collection of tissue samples (NRIFSF & MRC)

January 2002 – August 2002 : Genetic analyses (NRIFSF)

September 2002 : Report results to the IOTC (WPTT)

Genetic analysis

Collection and processing of tissue sample for genetic study have been recognized as easy (in terms of sampling) , efficient and accurate method in recent years (e.g., Ward *et al*, 1998; Chow and Ushiama, 1995; Alvarado-Bremer *et al*, 1995 and 1998; and many others). Thus, we plan to use this molecular genetic approach to study the stock structure of skipjack in the Indian Ocean as the primary method.

In conducting this study, we need to collect muscle samples from different locations as indicated. Basically, we will cover wide geographical areas, i.e., east, central and western region and within each region, we cover north, central and southern region. Thus, nine basic regions are concerned (see the same Map for yellowfin tuna case, Chow et al, 2000).

We plan to send the small containers (80 pieces) for each place and need to get cooperation to collect samples from the local fisheries research officers. The method how to collect sample is provided in Fig. 1. Samples from juvenile fish (Age 0-1) are preferable, but those from larger fish (age 2 or older) are also acceptable as long as the minimum sample number (80) is satisfied.

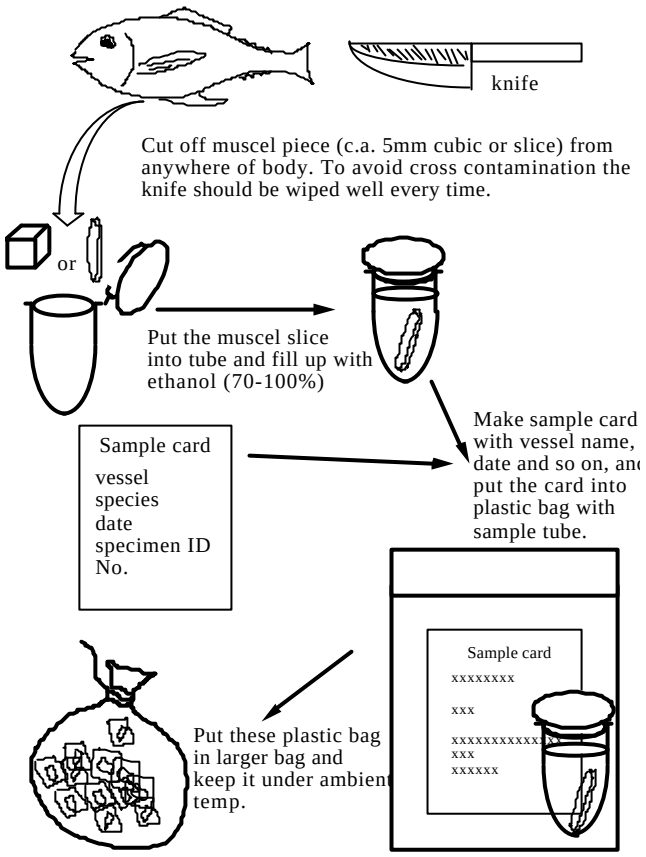

Fig. 1 Sampling methods

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