

## CATCH AND SIZE GROUP DISTRIBUTION OF TUNA CAUGHT BY PURSE SEINING SURVEY IN THE INDIAN OCEAN, 1995-1996

Dhammasak, P.<sup>1</sup>

### Introduction

The Department of Fisheries has conducted a tuna resource survey since 1994 with the Fishery Research Vessel "MAHIDOL", based on tuna purse seine operations with a view to develop the oceanic tuna fisheries and increase tuna production to meet the increasing demand from canning industries. From October 1995 to September 1996, R/V "MAHIDOL" carried out a purse seining survey with the use of drifting FADs along the "Carlsberg Ridge" western Indian Ocean, and Ninety East Ridge, eastern Indian Ocean, to collect data on the abundance of tuna, fishing grounds, seasonal variation, size distribution and oceanographic information.

### Fishing areas.

The operations were conducted along the South of the ridge at 2,000 - 4,000 m depth between Lat. 02°N - 04°S, Long. 60° - 67°E. and Lat. 02°N - 09°S, Long. 82° - 95°E (Figure 1). Fifteen to twenty drifting FADs were set at sea on each cruise for luring pelagic fish, with a drifting period of about 3 - 4 weeks. A total of 55 complete sets were made around the FADs with the aid of echo sounder and scanning sonar observations.

### Catch

Tuna purse seining was conducted in October 1995 - September 1996, with a total of 55 complete positive sets made throughout the entire period of the survey. The results of purse seining generally gave a good catch in most cases, with the maximum successful catch of 51.5 tonnes/set and an average catch of 11.8 tonnes/set. The catch consisted mainly of skipjack, yellowfin tuna and bigeye tuna in addition to other pelagic fish (rainbow runner and dolphin fish) as shown in Table 1.

Skipjack predominated in this tropical area of the Indian Ocean and contributed as much as 55 % of the tuna catch (Figure2).

### Size distribution

Data on length frequency distributions of the survey are available for the main tuna catch as follows:- (Figure3-6):

- Skipjack, was the dominant catch during October 1995 - September 1996 (Figure4) when the length of fish ranged from 30 cm to 74 cm. It is clearly visible that there was one size group in the region, with a mode of 42 cm. (Figure3-4);
- Yellowfin tuna occurred in the size range of 29 - 80 cm with a major mode at 40 cm. Another mode was also discernible at 52 cm (Figure3-5);

Purse seine catches of bigeye tuna in the western Indian Ocean were slightly higher than in the eastern Indian Ocean at the same latitude. The size range was 30 - 84 cm with a dominant mode at 56 (Figure3-6).

### Oceanographic observation.

An oceanographic survey was conducted simultaneously with the fishing survey throughout the cruises in order to provide information concerning the possibilities of applying knowledge of the environment (i.e. temperature, dissolved oxygen, current etc.) for describing the variation in the availability and potential of tuna resources.

Water temperature was one of the main parameters observed applying to deep-sea tuna fishing. The vertical temperature distribution showed a maximum at the surface layer of about 29.6 - 30.8°C at the sea surface down to 50-70 m, and then decreased with depth. The thermocline zone which had much effect on fish behaviour occurred at the depth of 50-220 m, with temperatures ranging from 29.5 - 14.0°C (Figure 7).

The salinity at the surface varied from 32.10-33.22 ppt, with an average of 32.88 ppt and had interval changing of 34.09-34.90 ppt with an average of 34.62 ppt at a depth of 200 m.

The dissolved oxygen at the surface occurred at about 5.34 - 5.55 ml/l, with an average of 5.43 ml/l and also had changing value of 1.36 - 2.44 ml/l at a depth of 200 m.

**Table 1:Species composition and sizes**

Species	Composition (%)	Average size ( cm)
<i>Katsuwonus pelamis</i>	54.5	44.1
<i>Thunnus albacares</i>	25.6	49.4
<i>Thunnus obesus</i>	12.2	56.7
Others ( <i>Elegatis</i> sp., <i>Coryphaena</i> sp.)	7.7	-

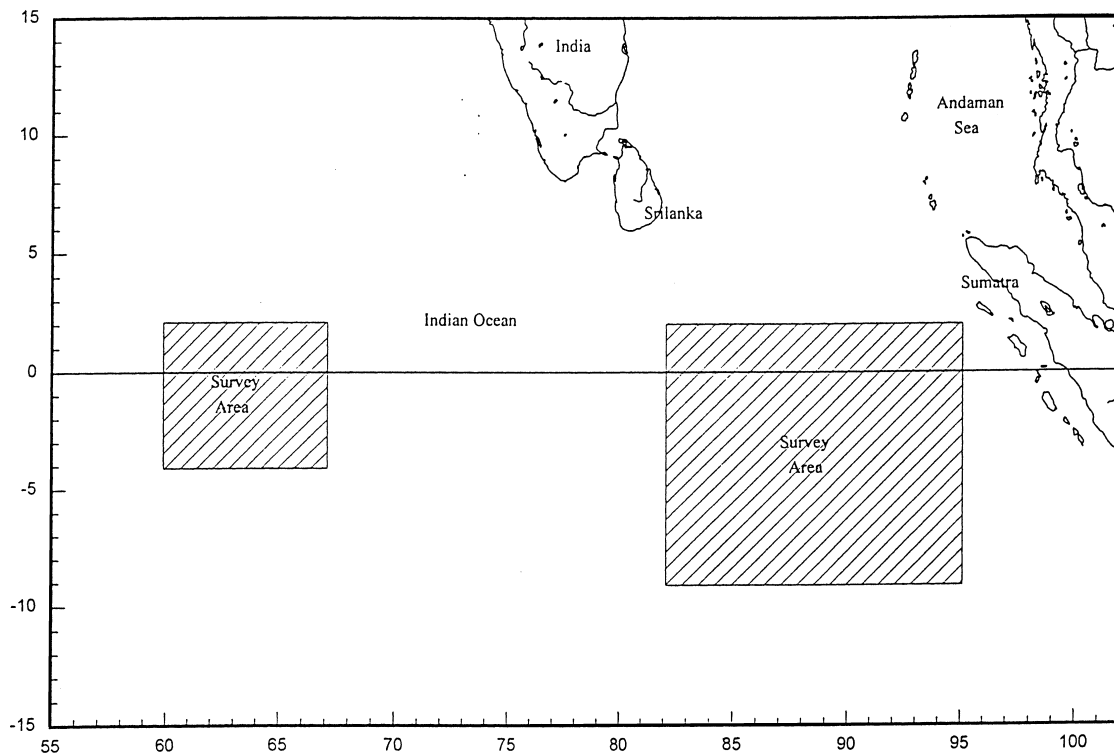


Figure 1 Survey areas for tunas of R/V Mahidol, October 1995 – September 1996

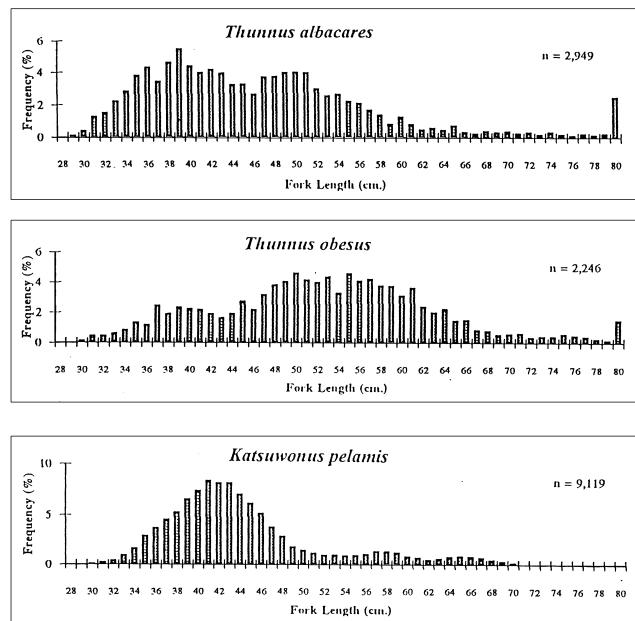
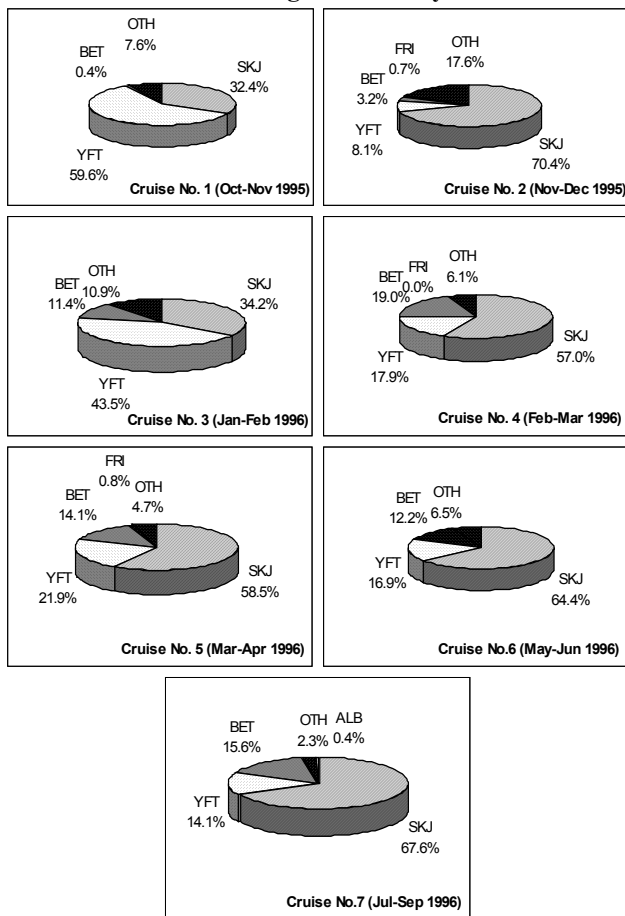


Figure 2 Percentage composition by species of purse seine catches from the Indian Ocean, October 1995 – September 1996

Figure 3 Length-frequency distribution of *Katsuwonus pelamis*, *Thunnus albacares* and *T. obesus* caught by purse seine in the Indian Ocean, 1995-1996

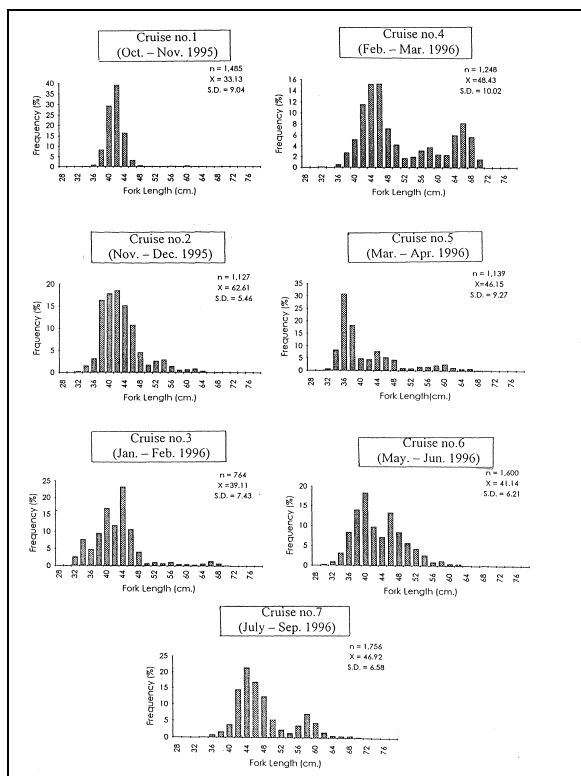


Figure 4 Length-frequency distribution of *Katsuwonus pelamis* caught by purse seine in the Indian Ocean, 1995-1996

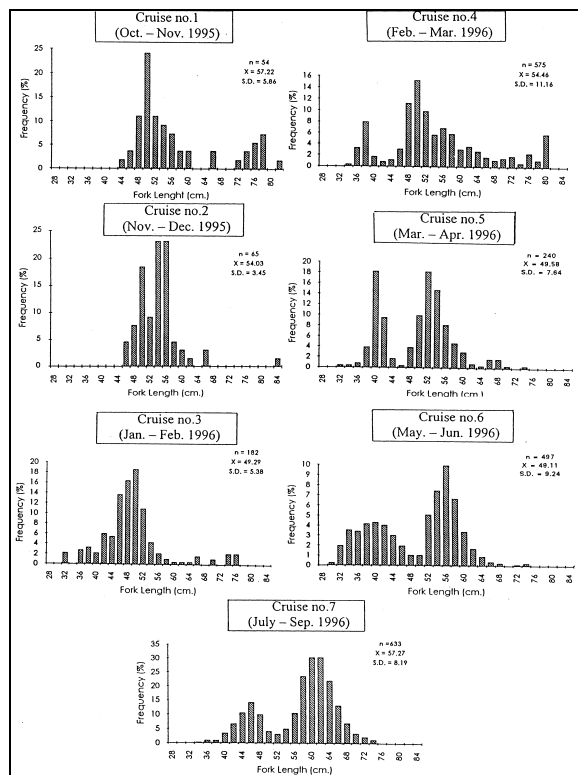


Figure 6 Length-frequency distribution of *Thunnus obesus* caught by purse seine in the Indian Ocean, 1995-1996

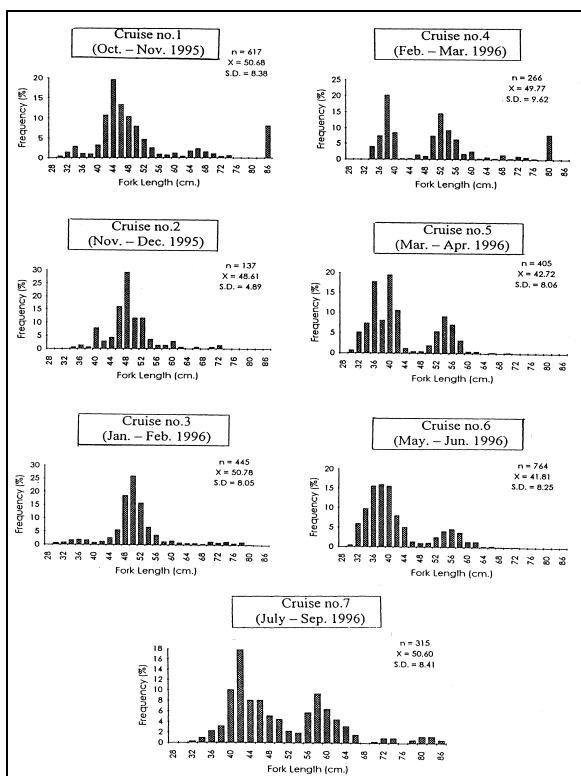


Figure 5 Length-frequency distribution of *Thunnus albacares* caught by purse seine in the Indian Ocean, 1995-1996

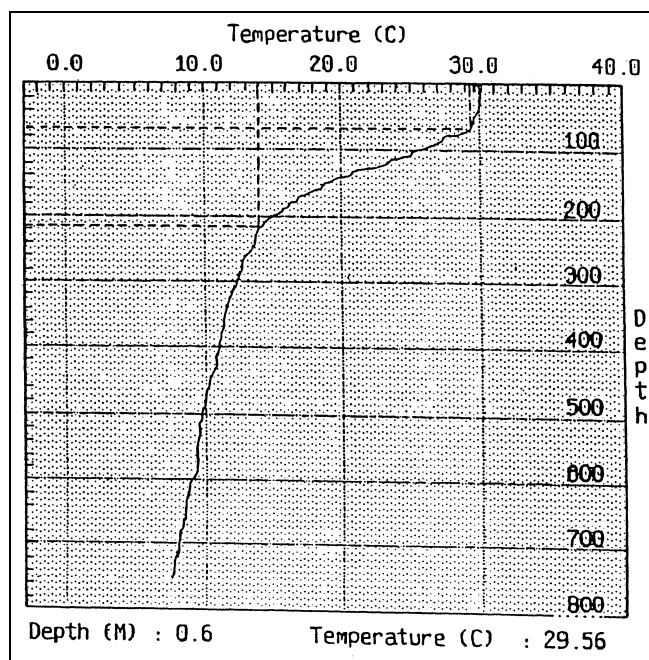


Figure 7 Vertical thermal gradient in the Indian Ocean, 1996 - 1996