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A review on oceanic tuna fishery in Sri Lanka and estimation of the length-weight relationships for yellowfin tuna and bigeye tuna

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There are three dominant oceanic tuna species frequently found in Sri Lankan waters namely yellowfin tuna *(Thunnus albacares),* bigeye tuna *(Thunnus obesus)* and skipjack tuna *(Katsuwonus pelamis).* This paper reviews the trends of oceanic tuna landings in Sri Lanka. Also, attempt was made to estimate the length weight relationships of two major species: yellowfin tuna *(Thunnus albacares)* and big eye tuna *(Thunnus obesus).* The annual production of oceanic tuna has increased rapidly over the period 1950-2010 and the highest production was reported in 2004. Skipjack tuna was the major contributor throughout the period followed by yellowfin tuna. Oceanic tuna resources are frequently targeted by offshore fishing crafts of three categories: UN3A (9.8 - 12.2 m in length), UN3B (12.2-15.2m) and UN4 (15.2-18.3m). Gillnet has effectively been contributing for catching oceanic tuna. The estimated length -weight relationships for yellowfin tuna *(Thunnus albacares)* and bigeye tuna *(Thunnus obesus) were* $W= 0.033L^{2.848}$ and $W=0.011L^{3.08}$ respectively.

Introduction

Sri Lanka is an Island located in the Indian Ocean, southeast of India, between 5°55'and 9°51' N latitude, and 79°41' and 81°53' E longitude. Its land area is approximately 65,610 km ^{2}; with a coastline of about 1,620 km (Joseph, 2003). The offshore and high sea fish production is dominated by tuna and tuna like fish (Hasarangi et al., 2012). The tuna resources in Sri Lanka mainly consist of Yellowfin tuna (*Thunnus albacares),* Bigeye tuna (*Thunnus obsesus*), Skipjack tuna (*Katsuwonus pelamis*), Kawakawa (*Enthynnus affinis*), Frigate tuna (*Auxis thazard*) and Bullet tuna (*Auxis rochei*) (Haputhantri and Maldeniya, 2011; Joseph and Dayaratne, 1994). A range of fishing gears is being used in capturing tuna and tuna like fish. Among those, gillnet is still most popular (Haputhantri and Maldeniya, 2011). The present study was undertaken to review the status of Sri Lankan oceanic tuna landings and to estimate the length-weight relationships of two oceanic tuna species.

Sources of data/ information

IOTC (Indian Ocean Tuna Commission) published database was used for reviewing past and current oceanic tuna fish production in the country. Length and weight data of Yellowfin and Bigeye tuna were collected from the export oriented fish landings where lengths of individual fish were measured to the nearest 1cm and weights of fish were measured to the nearest 0.1g.

Multi-day fishing crafts

There are about 3 200 fishing boats engaged in multiday fishing activities. However, oceanic tunas are frequently targeted by three types of multiday fishing crafts (Table 1). These vessels mostly operate in offshore waters within the EEZ of Sri Lanka or in the high seas (Haputhantri, 2012).

Table 1. Classification of multiday fishing vessels in Sri Lanka operated for targeting oceanic tuna

Boat category	Boat description
UN3A	9.8 - 12.2 m (34' - 40'). FRP or wooden. Inboard engine (single) - 60 HP Insulated fish hold and may have gear- hauler/ GPS/sounder/fish finder
UN3B	12.2 m – 15.2 m (40' - 50'). FRP or wooden. Inboard engine (single) - 60 + HP. Insulated fish hold and may have freezer facilities. Gear Hauler/GPS/sounder/fish finder
UN4	15.2 - 18.3 m (50' - 60') Inboard engine, fish storage facility, may have RSW or CSW or freezing facility, gear hauler, GPS, echo-sounder/fish finder, radio communication

Gear types

Due to the multi-species nature of large pelagic fishery in the country, various types of fishing gear are being used to catch tuna and tuna like species. Motorization of crafts and the introduction of synthetic nets resulted in gillnet as the key fishing gear in the tuna fishery in early 1980's and thereafter gillnet has been firmly established as the dominant gear (Figure 1).

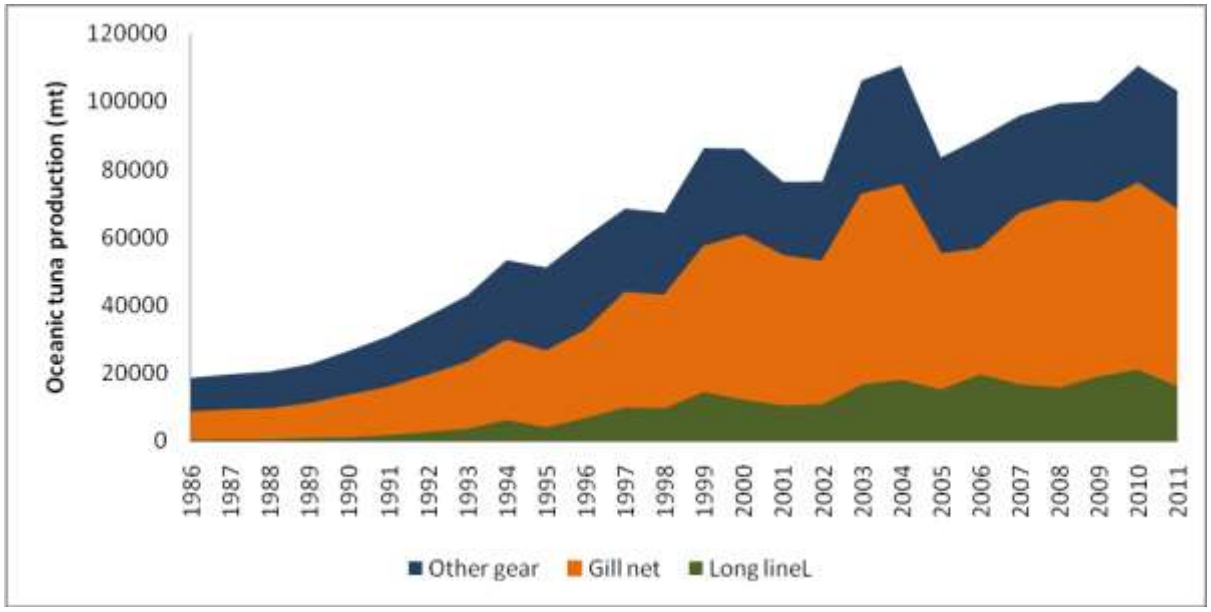

Figure 1: Gear wise contribution in the oceanic tuna production: 1986-2011 (Source: IOTC, 2011)

Production trends

Oceanic tuna production has increased rapidly till 2004 and ever reported highest catch was recorded in 2004 (Figure 2). However, production falls in 2005 and this is mainly due to the tsunami disaster in December 2004. Coastal fishery sector was severely affected by the tsunami and 16,101 coastal fishing crafts were destroyed, 7,105 vessels were damaged and 9,207 engines were destroyed. Fishing gears of all the affected fishing crafts were also destroyed (Bandaranayake and Maldeniya, 2012). After the tsunami, during accelerated rehabilitation phase with massive international donations of fishing nets and crafts, along with existing fishing gear, resulted in the production being increased (Figure 2). Among the three species of oceanic tuna, skipjack tuna was the dominant species for the entire period of 1950-2010 whereas bigeye tuna was the lowest catch (Figure 3).

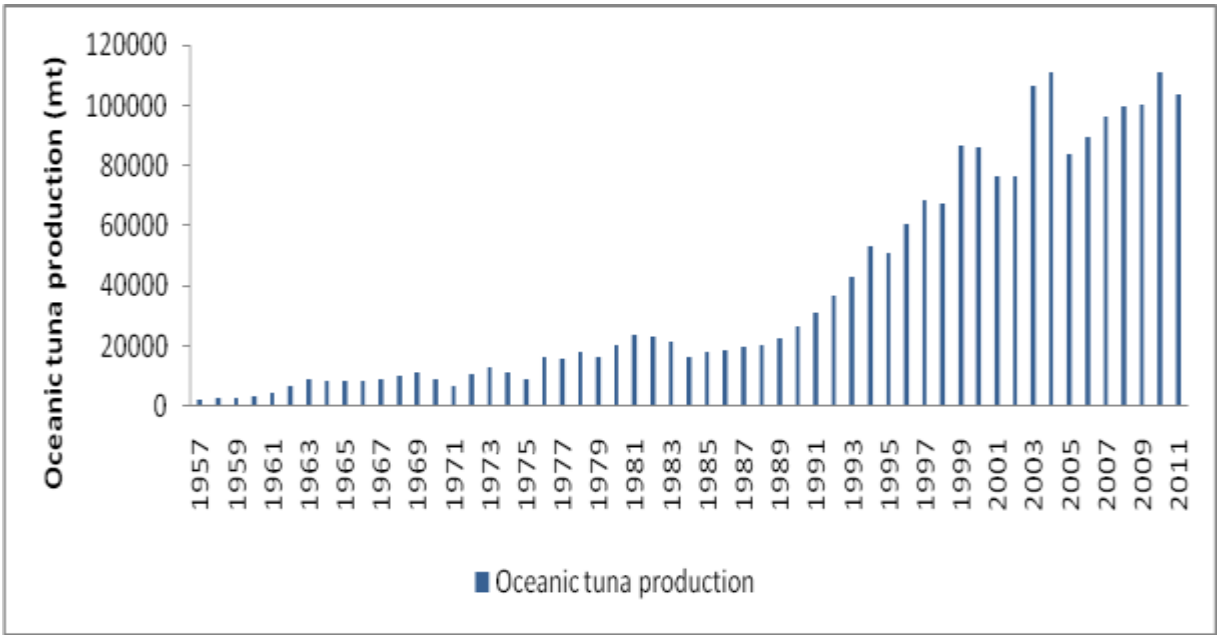

Figure 2: Oceanic tuna production trend: 1957-2011 (Source: IOTC, 2011)

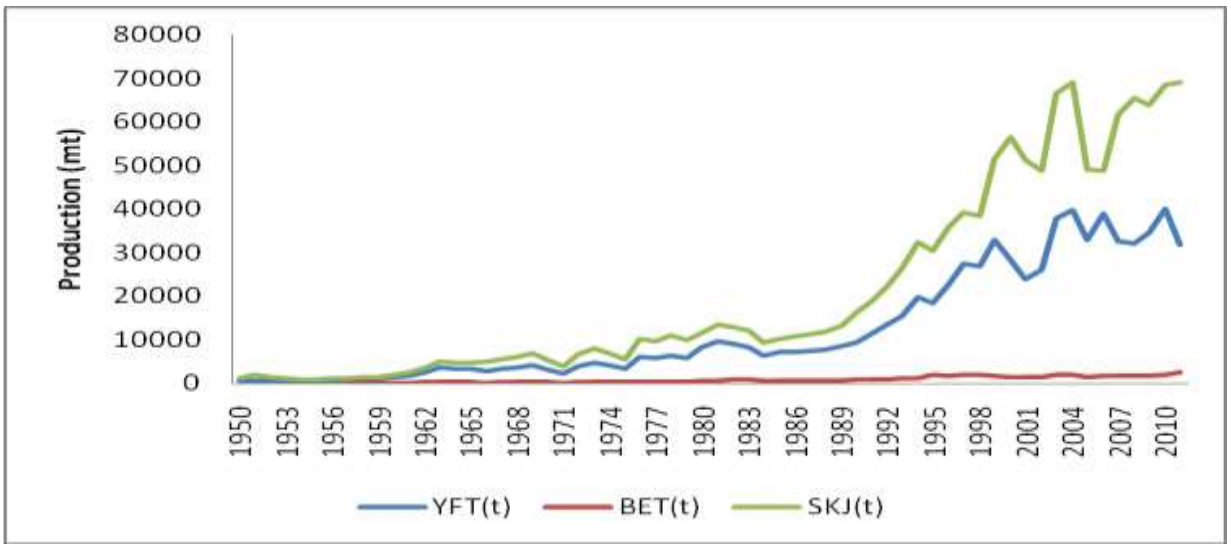

Figure 3: Oceanic tuna production trends by major species: 1950-2010 (IOTC, 2011)

Oceanic tuna represented 83% of the total tuna production for 2006-2011 period where 35% of the oceanic tuna production comprised of yellowfin tuna (Figure 4).

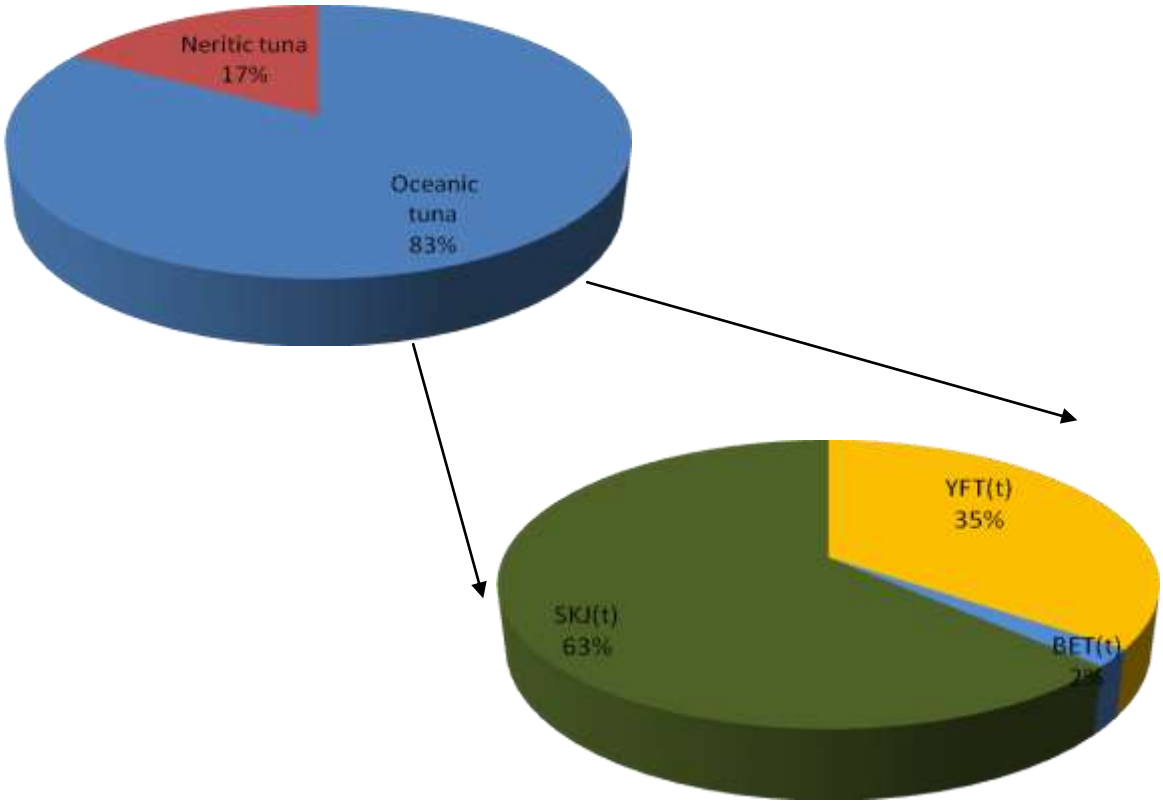

Figure 4. Average Oceanic tuna production by species 2006-2011

Length-weight relationship

The length (total length) and weight measurements of yellow fin tuna and bigeye tuna were measured for estimating the length – weight relationship of the two species. Log transformed weight vs. log transformed length were plotted in order to derive the length – weight relationships (Figures 5 & 6). Results indicate a strong linear correlation between log transformed weight and log transformed length for both species

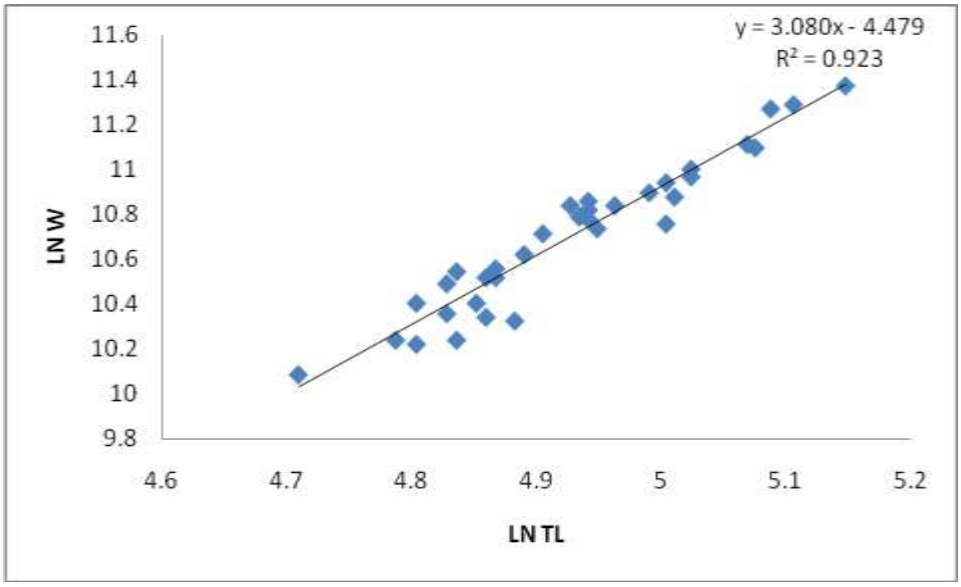

Figure 5. Log transformed weight vs. log transformed length of *Thunnus obesus*

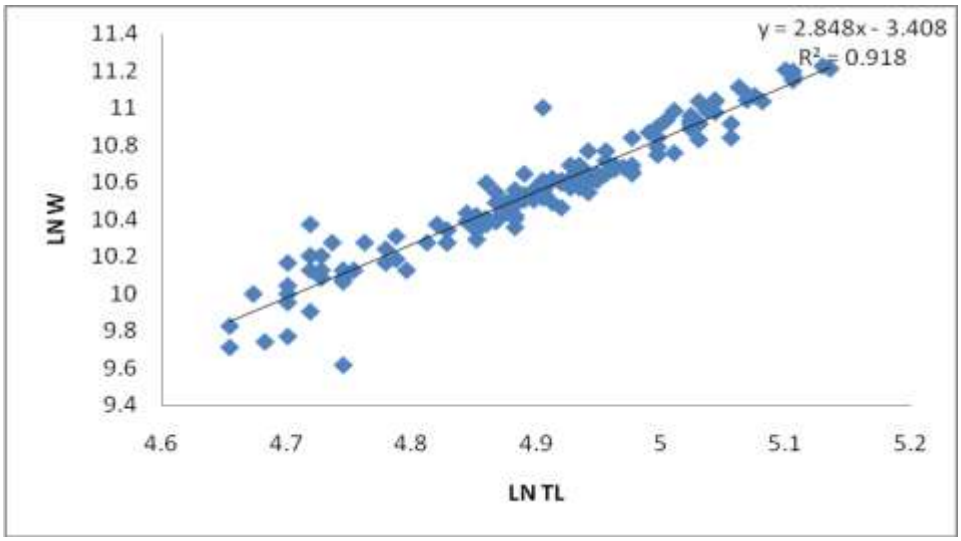

Figure 6 .Log transformed weight vs. log transformed length of *Thunnus albacares*

Following length – weight relationships were obtained for both species

Thunnus obesus $W=0.011L^{3.08}$

Thunnus albacores $W= 0.033L^{2.848}$

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