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A REVIEW ON NERITIC TUNA RESOURCES IN SRI LANKA

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Abstract

This paper reviews the trend of neritic tuna fishery in Sri Lanka with an update of the status of resources. Among the neritic tuna, *Auxis thazard* (frigate tuna), *Auxis rochei* (bullet tuna) and *Euthynnis affinis* (kawakawa) are the major components while *Scomberomorus commerson* (narrow- barred spanish mackerel) is dominating the species associated with neritic tuna. In the 1990's neritic tuna accounted for more than 8 percent of the total tuna production but declined up to 4 percent during the 2000's. The reduction in the relative contribution was greatly influenced by the growing concern towards oceanic tuna. Annual neritic tuna production of 1258Mt in 1982 followed an increasing trend until 1997 with a maximum of 9117Mt and thereafter production declined. Until the mid 2000's catches were mainly dominated by *Auxis thazard* followed by *Euthynnis affinis* and *Auxis rochei* where gillnet has been the main gear. After the tsunami in 2004, an increase tendency of practicing new fishing methods along with gillnets was observed and resulted in the production being increased with a higher contribution of *Euthynnis affinis* for few years. In 2011, neritic tuna represented 13 percent of the tuna production where *Auxis thazard* contributed more than half of the production. A higher production was observed from the southeast and southern coastal waters in the country. Analysis of size data during the past three years (2009-2011) revealed that most of the catches of neritic tuna species comprised of mature fish. Since there is a limited fishing effort exerted towards neritic tuna as a target fishery in Sri Lanka, there would be a potential to further increase the production.

Introduction

Sri Lanka is one of the oldest and most important tuna fish producing island nations in the Indian Ocean since the Medieval Era and has gone through numerous developmental changes, over many decades (Disanayake et al, 2008). Inclusion of new multiday boats resulted the tuna production being increased since early 1980's: 24,115 Mt in 1982, 85 220 Mt in 1998 and 138,698 Mt in 2010 (IOTC, 2011). This increase is mainly due to the increase of the production of oceanic tuna dominated by skipjack (*Katsuwonus pelamis*) followed by yellowfin (*Thunnus albacares*). On the other hand, the production of small tuna or neritic tunas comprising of Kawakawa (*Euthynnis affinis*), frigate tuna (*Auxis thazard*) and bullet tuna (*Auxis rochei*) shows a slight increase for the same period. The present study reviews the trends in the neritic tuna fisheries in Sri Lanka with some concern on the status of the resources.

Sources of Information

Two databases were used for this review: IOTC (Indian Ocean Tuna Commission) published database and *PELAGOS* database of the National Aquatic Resources Research and Development Agency (NARA) of Sri Lanka. As a responsible party, NARA, the research arm of Ministry of Fisheries and Aquatic Resources Development in Sri Lanka has been directly involved in offshore fishery data collection and has a well established large pelagic fishery data collection programme (including the PELAGOS database) since 1994. The monitoring programme has been upgraded and modified in several occasions with the assistance of, initially IPTP (Indo-Pacific Tuna Development and Management Program), thereafter IOTC and IOTC/OFCF (Overseas Fishery Cooperation Foundation of Japan). The current monitoring and reporting system and the PELAGOS database is the outcome of IOTC/OFCF assistance programme of 2006 (Dissanayake, 2005).

Neritic tuna fisheries trends

Estimated neritic tuna contribution was 6 and 9 percent in the 1980s and 1990's respectively and has dropped to 4 percent in the 2000's. Sivasubramanium (1973) estimated that *Auxis sp*. contributed 15 percent by weight to the total annual landings in the country with *Auxis thazard* and *Auxis rochei* contributing 92 and 8 percent of the total *Auxis spp.* respectively. Maldeniya et al, 1988 cited the contribution of neritic tuna species to the total tuna production

as 12.3, 15.8 and 6.1 percent respectively in 1984, 1985 and 1986. Production trends over the past three decades are summarized in Figure 1.

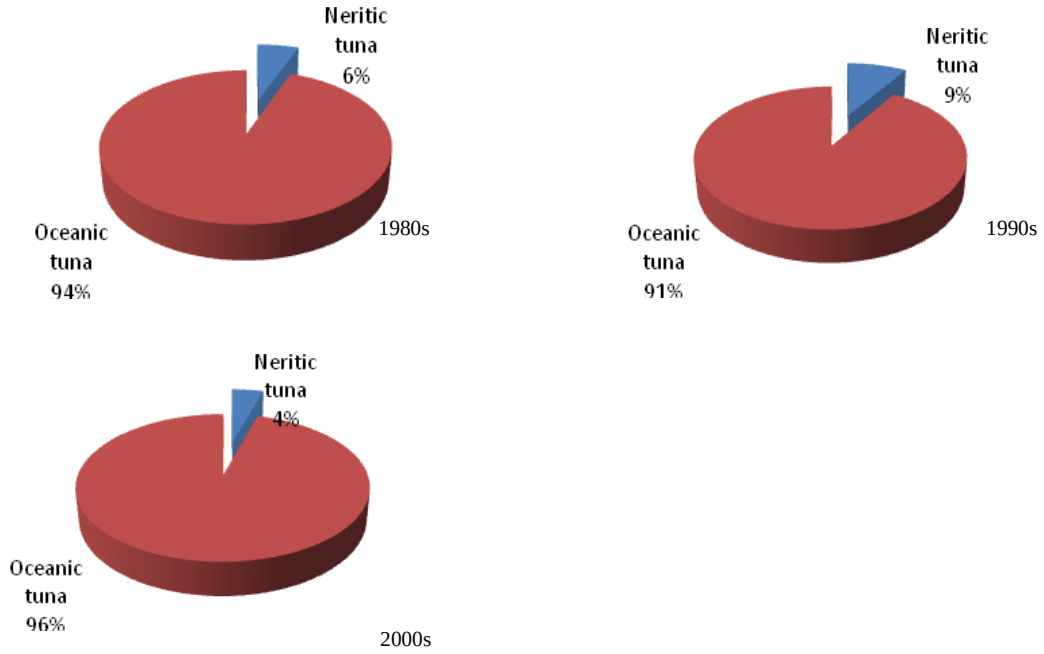

Figure 1: Average composition of neritic tuna during three decades: 1980s, 1990s and 2000s (IOTC, 2011)

Fishing crafts and gear

Neritic tuna resources are mainly targeted by coastal fishing crafts in the country. Out of 42,330 fishing crafts operating in Sri Lanka, more than 90 percent of crafts are operated in the coastal fishery (MFARD, 2009). Normally all the coastal fishing vessels are day boats and can be categorized as traditional motorized and traditional non-motorized crafts, outboard engine Fiberglass Reinforced Plastic boats (FRP) and inboard single day boats (1DAY). FRP and IDAY boats represent about 48 percent of the total vessels (MFARD, 2009). However, only a small percentage of FRP and IDAY boats target neritic tuna. Also, the fishery is highly seasonal.

Due to the multispecies nature of large pelagic fishery in the country, various types of gears including traditional fishing methods such as trolling, pole and line are being utilized to catch neritic tuna. But, operation of gears of Pole and line, hand line and trolling are highly seasonal. Motorization of crafts and the introduction of synthetic nets resulted in gillnet as a key fishing gear in the tuna fishery in early 1980's and thereafter gillnet has been firmly established as the dominant gear (Figure 2), while the other gears have become seasonally

important in certain areas (Joseph and Moyiadeen, 1985/86). Pole and line fishery declined partly due to problems associated with the supply of live bait while trolline declined due to fuel crisis (Joseph and Moyiadeen, 1985). Popularity of ring nets immerged as a seasonal activity from 1990s in certain localized areas. Ring nets are operated in coastal waters in day time targeting small, localized free mixed schools of carangids and small tuna varieties. Even though production increases were recorded with the introduction of ring nets, at present their operations have been greatly discouraged by the government due to social unrest. As a result, operation of this gear is considerably declining in the country.

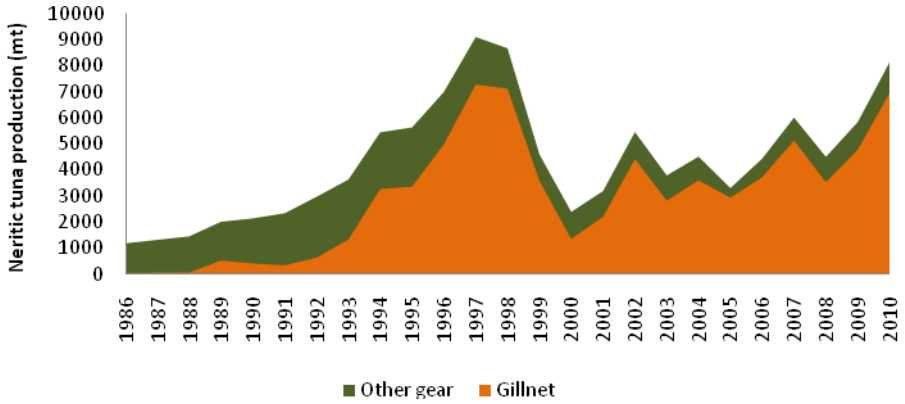

Figure 2: Gillnet and other gear contribution in the neritic tuna production: 1986-2010 (Source: IOTC, 2011)

Earlier, gillnet and pole & line were effective for frigate tuna catches while handline and trolline were important for kawakawa production (Maldeniya et al., 1988). However, the present data, revealed that more than 50 percent of catches of neritic tuna have been taken from the crafts operated with gillnets (Figure 3).

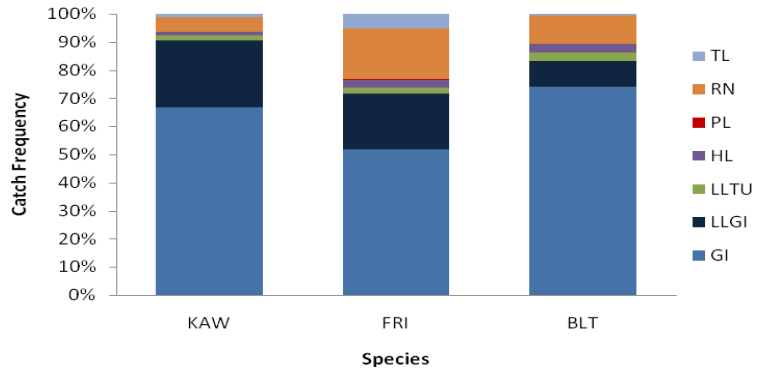

Figure 3: Neritic tuna production by gear: (TL-Trolline, RN-Ringnet, PL- Pole and Line, HL- Handline, LLTU- Tuna Longline, LLGI- Longline/ Gillnet combination, GI- Gillnet) (Source: PELAGOS, 2011)

Production trends

Neritic tuna production of all three species has increased rapidly until 1997/1998 with the motorization of traditional crafts, establishment of gillnets and introduction of new types of crafts/gear to the industry (Figure 4). The increasing trend of neritic tuna production by all major species has changed after 1997 . A drastic drop in 2000 was observed and this may be due to the massive El nino in 1998 (Haputhantri et al., 2008). Production falls in 2005 was mainly due to the tsunami disaster on 26th 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 (MFARD, 2005). After the tsunami, during accelerated rehabilitation and rebuilding period with the massive international donations of fishing nets and crafts, along with existing fishing gear, resulted in the production being increased (Figure 4).

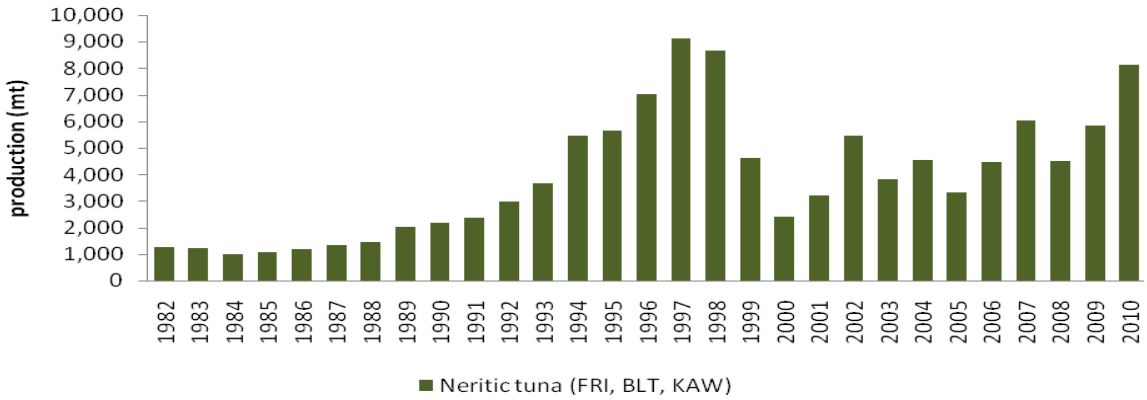

Figure 4: Neritic tuna production trend 1982-2010 (Source: IOTC, 2011)

Annual Production of neritic tuna species ranged between 1,258 Mt in 1982 and 8,144 Mt in 2010. During 1982 - 2004 period, neritic tuna production was dominated by the Frigate tuna followed by Kawakawa and Bullet tuna respectively (Figure 5). However a considerable change was noted in the production for the period of 2005-2009 where Kawakawa became dominant (Figure 5).This may be due to multiple reasons: expansion of the fishing zone and new fishing practices etc. However, in 2010, Frigate tuna became major contributor after five years.

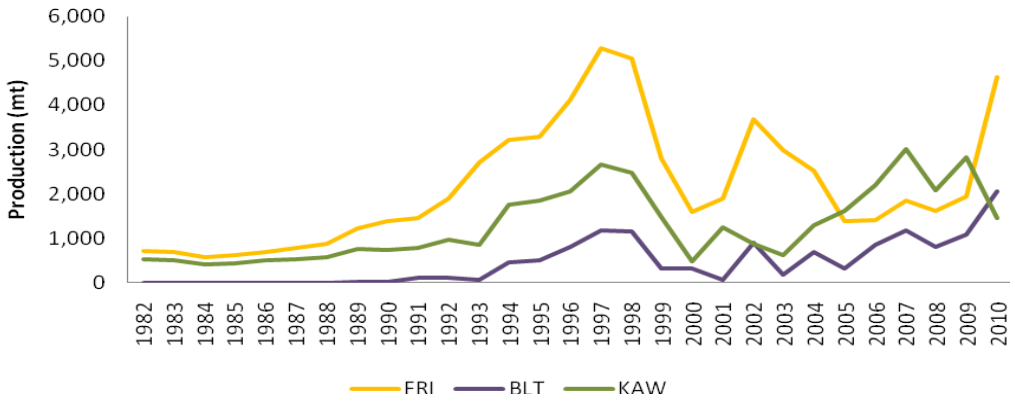

Figure 5: Neritic tuna production trend by major species: 1982-2010 (IOTC, 2011)

In 2011, neritic tuna represented 13% of the tuna production where more than 50% of the production comprised of Frigate tuna (Figure 6).

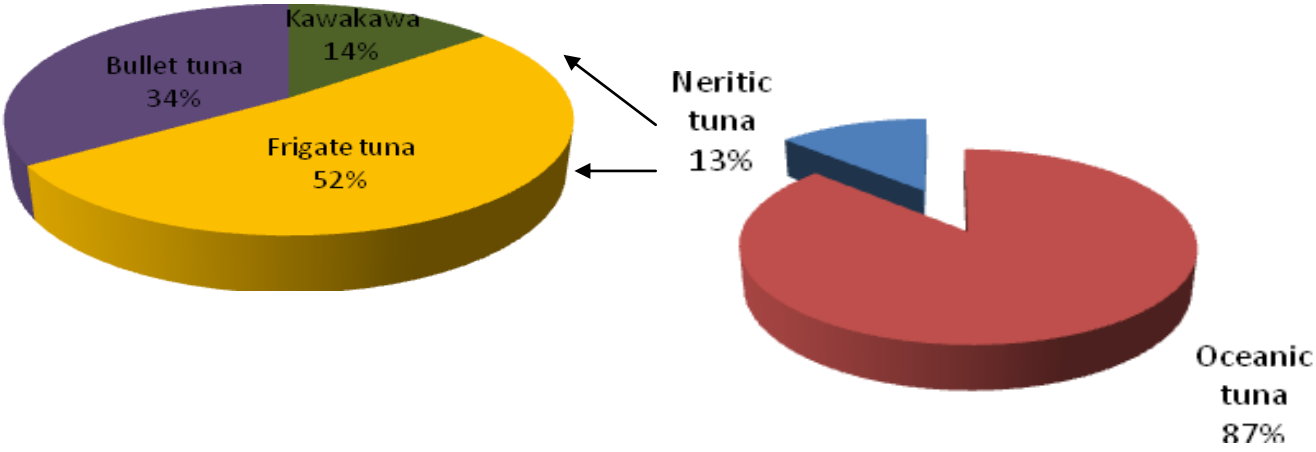

Figure 6: Neritic tuna production by species in 2011 (Source: PELAGOS, 2011)

Production by fishing zones

For the management purposes, the coastline around Sri Lanka has been divided into seven statistical zones: West (Negombo), Southwest (Beruwala, Galle, Dodanduwa), South (Matara, eligama, Mirissa, Dondra, Gandara, Kottegoda), Southeast (Hambantota, Kalametiya, Kirinda, Tangalle, Kudawella), East (Baticaloa, Kalmunai, Malaikadu) and Northeast (Codbay, Trincomalee) (Figure 7). However, the sampling programme of NARA has not yet been implemented for the North due to the civil war that prevailed in Sri Lanka for more than 30 years.

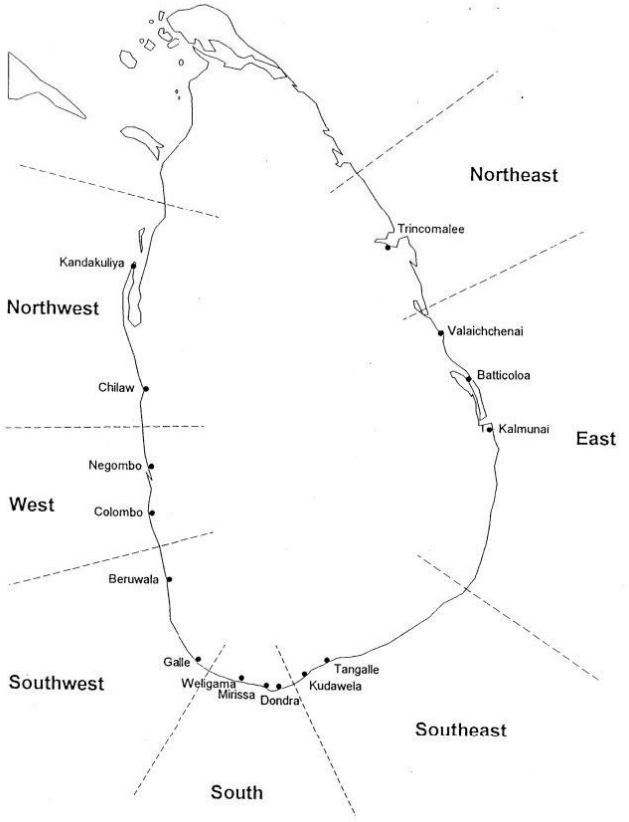

Figure 7, Principal statistical zones and major landing centers used in estimating offshore fish production in Sri Lanka.

At present, a larger contribution of neritic tuna production in the country comes from the Southeast and South Coasts, where tuna fishery has traditionally played an important role in the marine fishery (Figure 8).

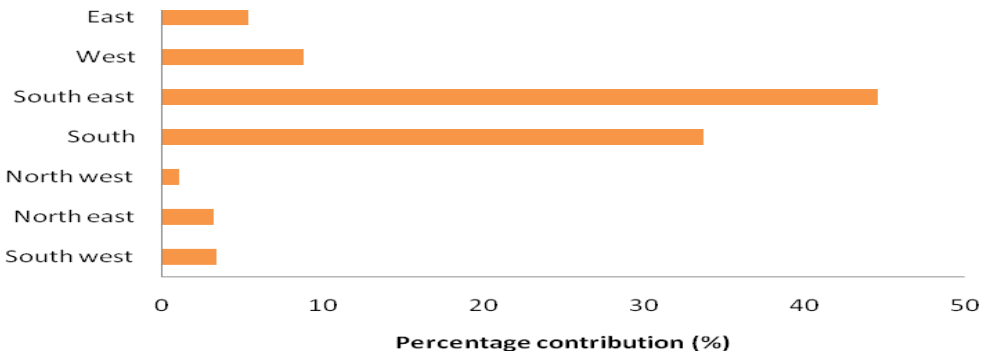

Figure 8: Contribution by fishing zones for neritic tuna production in Sri Lanka in 2011 (Source: PELAGOS, 2011)

Seasonal variations in neritic tuna production by fishing zones

The fishing seasons and fishing activities are generally associated with the two monsoons: the southwest monsoon from May to September and the northeast monsoon from November to March (Joseph 1999, Dissanayake, 2005). A considerable proportion of neritic tuna catch has been mostly reported from the Southeast and South Coasts of Sri Lanka for many months of the year (Figure 9). In general, the catches reporting from other zones are not so high, but a considerably higher fluctuation was observed for different months.

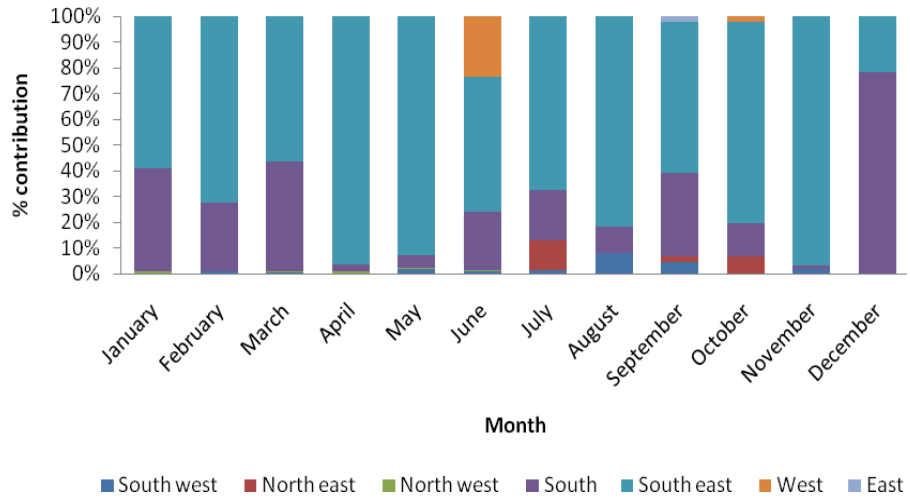

Figure 9. A comparison of monthly variation of neritic tuna production by fishing zones

Size composition

The size range of recorded frigate tuna varies from 20 cm to 66 cm TL but most of the catch is between 34 - 39 cm. Bullet tuna ranged from 17 cm to 40 cm TL where most of the catches lie in the range of 27-30cm. Kawakawa fishery was supported by 23-70 cm length range where most of the catches are in the range of 40-52 cm (Figure 10).

Various authors have used the maturity-stage method based on the general appearance of the gonads to determine the maturity of frigate tuna. Chiampreecha (1978) determined maturity of 79 frigate tuna from the east coast of Peninsular Malaysia with a 5-stage scale and found more than 50% of the fish around 37 cm to be mature. Muthiah (1985) determined maturity stages 292 males and 354 females of *Auxis rochei* from off Mangalore, India, and found the sizes at 50% maturity for these respective sexes were 24.0 cm and 23.8 cm. Sivasubramanium in 1965 stated that *E. affinis* reaches maturity when about 45cm long. Rohit et al, (2012) have also reported minimum size at maturity of *Euthynnis affinis* was at 37.7 cm.

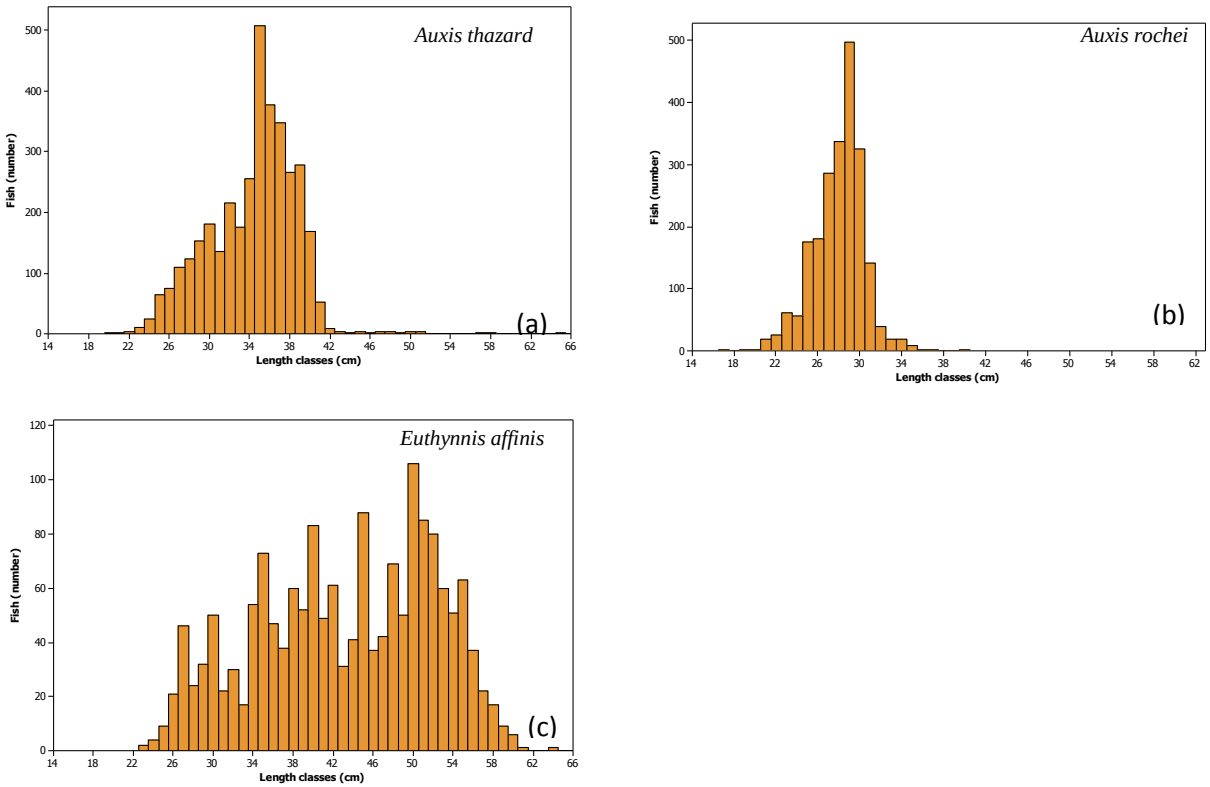

Figure 10: Length frequency distribution of neritic tuna fish landings- 2009-2011 (a) *Auxis thazard* (b) *Auxis rochei* (c) *Euthynnis affinis*

Conclusions and Recommendations

- Limited effort exerted towards neritic tuna as a target fishery in Sri Lanka with its lower exploitation depicts that there would be a potential to further increase the production.

- Recently there is a clear increase in the production of neritic tuna in the country. This can be further increased with the provision to develop fisheries activities in the Northern areas of the country. However, it is recommended to expand the existing NARA data collection programme into the Northern part. Presently NARA is in the process of strengthening existing data collection and reporting system on both coastal and off-shore large pelagic fisheries with the assistance of IOTC/OFCF.

- Further improvements with more collaborative research activities on the life history parameters of major neritic tuna species are also recommended.

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