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# Status of Neritic Tuna Fisheries in India

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**Abstract**

India is having 8118 km long coast line with a continental shelf area of 0.53 million sq.km. Small scale fishing for tuna and tuna like fishes is carried out by operating drift gill nets, troll line, hook and line, pole and line, purse seining, ring seining etc. Tuna catch is mainly constituted by ten species. The average neritic tuna landing during 2007-2011 was 41271 t which is 12.03 % of the total neritic tuna landings of Indian Ocean countries. India's highest contribution in neritic tuna was 27.7% during 1972-1981.Tuna production from Indian seas have fluctuated between 92079 t in 2008 and 53009 t in 2010. Average tuna landing during 2008-2011 was of 73265 t. Kawakawa dominated the tuna catch with 38% followed by skipjack (17%), yellowfin (16%) and longtail (11%). Since neritic tuna are mainly caught by multi-gear and multiday fishing operation, the availability of gear-wise data on the resources are limited. Hence, for regular monitoring of the resources, detailed data, specific to craft and gear is required for adopting sustainable tuna fishery management based on scientific methods.

**Key words**: Neritic tuna, multi-gear, *masmin*, iced fish

## Introduction

India is having 8118 km length of coast with nine maritime states and four Union Territories including Andaman & Nicobar Islands and Lakshadweep Islands. The country has a continental shelf of 0.53 million sq.km. Small-scale fishing for tuna and tuna like fishes is carried out by operating drift gill nets, troll line, hook and line, pole and line, purse seining, ring seining etc. Tuna and tuna like fishes are one of the major components of pelagic fishes. Ten species of coastal/neritic and oceanic species are encountered in the fishery. Neritic tunas are represented by little tuna (*Euthynnus affinis*), frigate tuna (*Auxis thazard)*, bullet tunas (*Auxis rochei*), longtail tuna (*Thunnus tonggol*) and bonito (*Sarda orientalis*). Oceanic species are represented by yellowfin (*Thunnus albacares*), skipjack tuna (*Katsuwonus pelamis*), dogtooth tuna (*Gymnosarda unicolor*), albacore (*Thunnus alalunga*) and bigeye (*Thunnus obesus*).

The status of exploitation tuna by the coastal fishery in the Indian EEZ has been reviewed and assessment of tuna stock has been made by some earlier workers (Kasim and Mohan,2009; James and Pillai, 1993; Modayil *et al*., 2005; Abdussamad *et al* .,2012; Ghosh *et al.*, 2012, Sivadas *et al*., 2012; Joshi *et al*., 2012; James *et al*.,1993; John and Pillai, 2009; Vijayakumaran and Varghese 2010, 2011, 2012). Studies have also been done on the fishery and biology of tuna resources from the Indian coast (Ghosh *et al., 2012*; Silas and Pillai, 1982; Rohit *et al.*, 2012; Koya *et al*., 2012).

**Database**

The data on fish landings collected through multi-stage random sampling procedure by the CMFRI and submitted by the Government of India during 2008 – 2011 to the Indian Ocean Tuna Commission (IOTC) as National report has been utilized in this paper for analyses. In addition the Nominal catch data of tuna from Indian Ocean were retrieved from the website of Indian Ocean Tuna Commission (http://www.iotc.org/English/data.php) for trend analyses.

**Production Trend**

Neritic tunas remained the mainstay of traditional tuna fishery throughout the period of analyses. The little tuna (*E. affinis*), frigate tuna (*A. thazard*), longtail tuna (*T. tonggol*) and bullet tuna (*A. rochei*) are the major species contributed to the neritic tuna fishery in Indian seas. Neritic tuna production registered a steady increase from 770 t in 1951 to 53358 t in 1996 and thereafter fluctuated (Fig 1). The average neritic tuna landings during 2007-2011 was 41271 t. This formed 12.03 % of the total neritic tuna landings of Indian Ocean Countries. The neritic tuna landing from the Indian ocean region registered a steady increase from 7225t in 1951 to 4,01,800 t in 2011 (Fig 2). The coastal countries surrounded by the Indian Ocean have taken an average annual catch of 11300 t during 1952-61 and 288913 t during 2002-2011. However, during the same period India's contribution averaged 2889 t (25.6%) and 288913 t (13.9%) respectively. India's highest contribution in neritic tuna was 27.7% during 1972-1981 (Table 1).

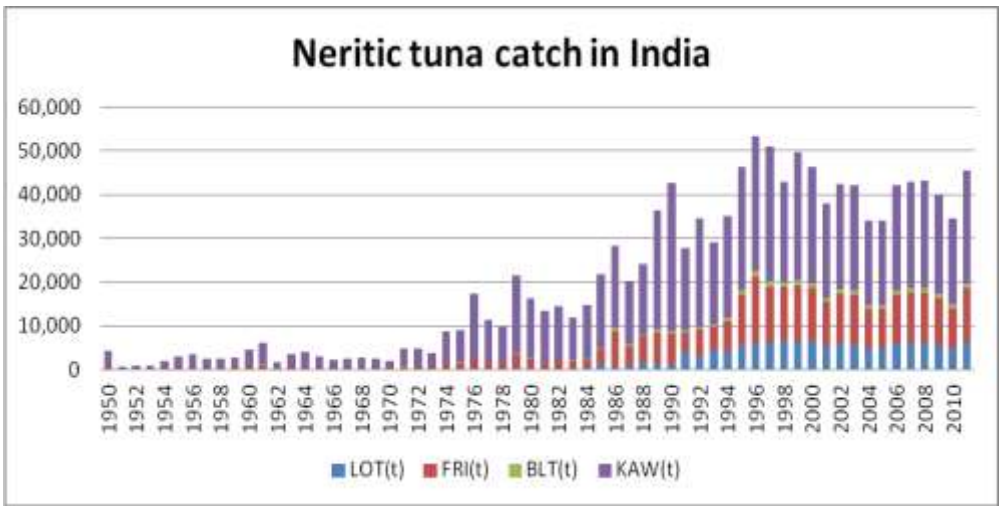
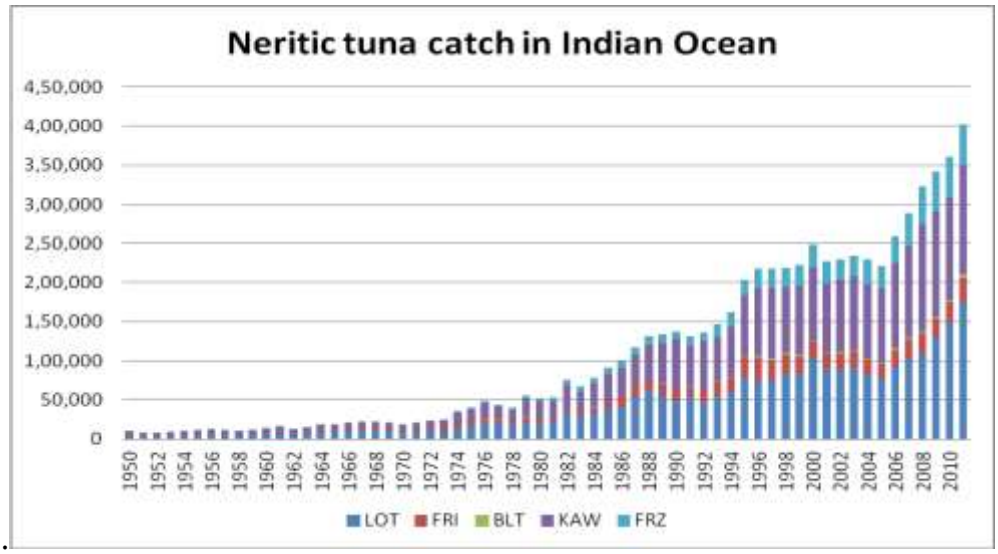



Fig.1. Trends in neritic tuna catch in India from 1950-2011 (Source: IOTC data bank)




(LOT-Longtail tuna;FRI-Frigate tuna;BLT-Bullet tuna;KAW-Kawakawa;FRZ-Frigate and bullet tuna)

Fig.2. Trends in neritic tuna catch in Indian Ocean from 1950-2011 (Source: IOTC data bank)

Table1. Average neritic tuna catch during 1952-2011 (Source: IOTC data bank)

| Period | Average neritic tuna landings (t) in Indian Ocean | Average neritic tuna landings (t) in India | India's Percentage contribution |
|---|---|---|---|
| 1952-1961 | 11300 | 2889 | 25.6 |
| 1962-1971 | 19121 | 2869 | 15.0 |
| 1972-1981 | 41900 | 11616 | 27.7 |
| 1982-1991 | 106396 | 24262 | 22.8 |
| 1992-2001 | 200163 | 42665 | 21.3 |
| 2002-2011 | 288913 | 40125 | 13.9 |

**Coastal Tuna fishery in India**

Tuna production from Indian seas have fluctuated between 92079 t in 2008 and 53009 t in 2010. Average tuna landing during 2008-2011 was of 73265 t. Kawakawa dominated the tuna catch with 38% followed by Skipjack tuna 17%, yellowfin 16% and longtail tuna 11% (Fig 3).

Neritic tuna contributed to 69.89% of total tuna landings with kawakawa (57.75%), frigate tuna (11.97%), Bullet tuna (9.5%), longtail tuna (16.31%) and bonito (2.69%) accounting for the bulk. Oceanic species contributed to 30.11% of the average tuna landings during 2008-2011.

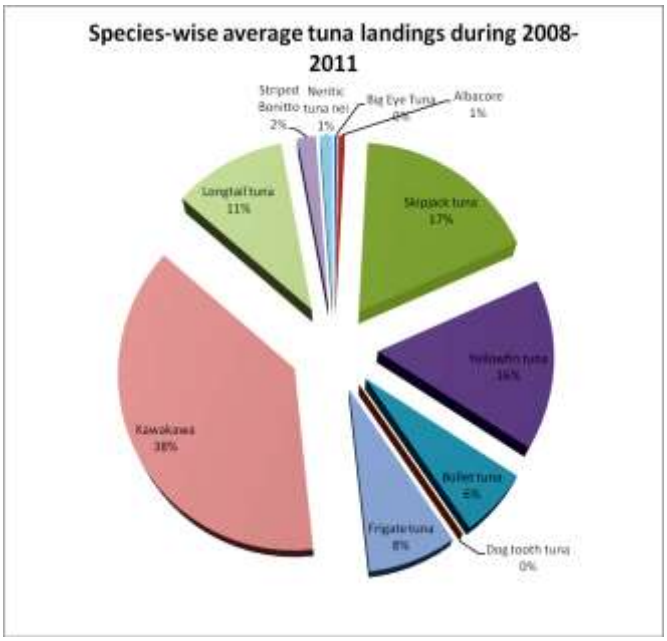



Fig.3. Species wise tuna catch (%) during 2008-2011

**Production by area**

Area-wise contribution to total tuna landings during the period from Western Indian Ocean (FAO area 51) and Eastern Indian Ocean (FAO area 57) was 60.5% and 39.5% respectively. Coastal tuna production during 2008-2011 shows that in both the areas, kawakawa is the dominant species contributing 45% and 34% respectively. Longtail tuna is caught mostly in the area 51(18%), whereas frigate tuna is caught equally (8%) in both the areas (Fig.4, 5 and Table 2)

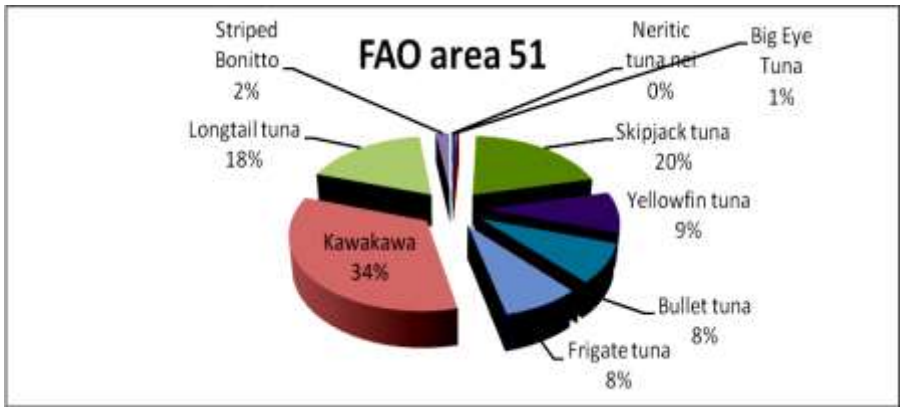



Fig.4. Species wise coastal tuna catch (in %) in the area 51

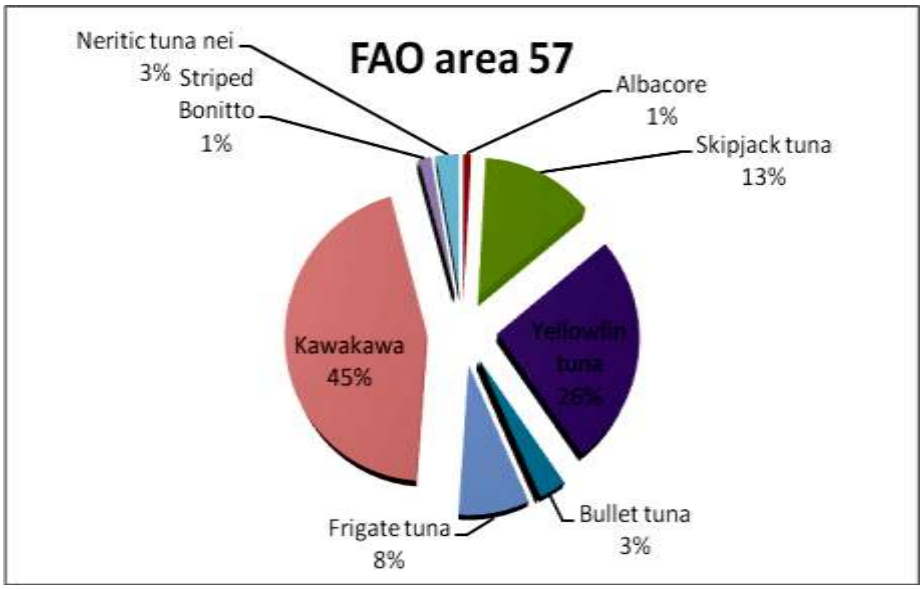



Fig.5. Species-wise coastal tuna catch (in %) in the area 57

Table. 2. Species-wise tuna catch in India during 2008-2011

| | FAO 51 | | | | FAO 57 | | | | India Total | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 2008 | 2009 | 2010 | 2011 | 2008 | 2009 | 2010 | 2011 | 2008 | 2009 | 2010 | 2011 | Average |
| Big Eye Tuna | 6 | 829 | 1 | -- | 11 | -- | 37 | -- | 17 | 829 | 38 | -- | 221 |
| Albacore | 430 | 199 | 42 | 50 | 621 | 44 | | 330 | 1051 | 243 | 42 | 380 | 429 |
| Skipjack tuna | 19590 | 13174 | 1373 | 1872 | 2470 | 2417 | 3520 | 6887 | 22060 | 15591 | 4893 | 8759 | 12826 |
| Yellowfin tuna | 4628 | 6679 | 3106 | 1404 | 8879 | 6549 | 6183 | 8567 | 13507 | 13228 | 9289 | 9971 | 11499 |
| Bullet tuna | 2839 | 2548 | 3301 | 6178 | 24 | 945 | 1609 | 928 | 2863 | 3493 | 4910 | 7106 | 4593 |
| Dog tooth tuna | 14 | 45 | 12 | 37 | -- | - | -- | -- | 14 | 45 | 12 | 37 | 27 |
| Frigate tuna | 3979 | 3372 | 3944 | 2736 | 2207 | 1868 | 2339 | 2673 | 6186 | 5240 | 6283 | 5409 | 5780 |
| Kawakawa | 16116 | 12502 | 11642 | 19691 | 16285 | 12429 | 9629 | 13247 | 32401 | 24931 | 21271 | 32938 | 27885 |
| Longtail tuna | 7486 | 6111 | 6077 | 11777 | 28 | -- | 15 | | 7514 | 6111 | 6092 | 11777 | 7874 |
| Striped Bonitto | 2470 | 519 | 172 | 323 | 1416 | 281 | 7 | 16 | 3886 | 800 | 179 | 339 | 1301 |
| Neritic tuna nei | -- | 207 | -- | -- | 2640 | -- | -- | 539 | 2640 | 207 | -- | 539 | 847 |
| Total | 57558 | 46185 | 29670 | 44068 | 34581 | 24533 | 23339 | 33187 | 92139 | 70718 | 53009 | 77255 | 73280 |

**Production by Gear**

Coastal tunas were caught as incidental catch in many gears during 2008-2011 (Fig. 6, Table 3). Major share of the catch was realised in gillnets (45.59%) and hooks and line (17%). Other gears landing tunas are pole & line, purse seines, ring seines, trawls and bagnets. Considerable variation has been observed in the catch composition of different gears.

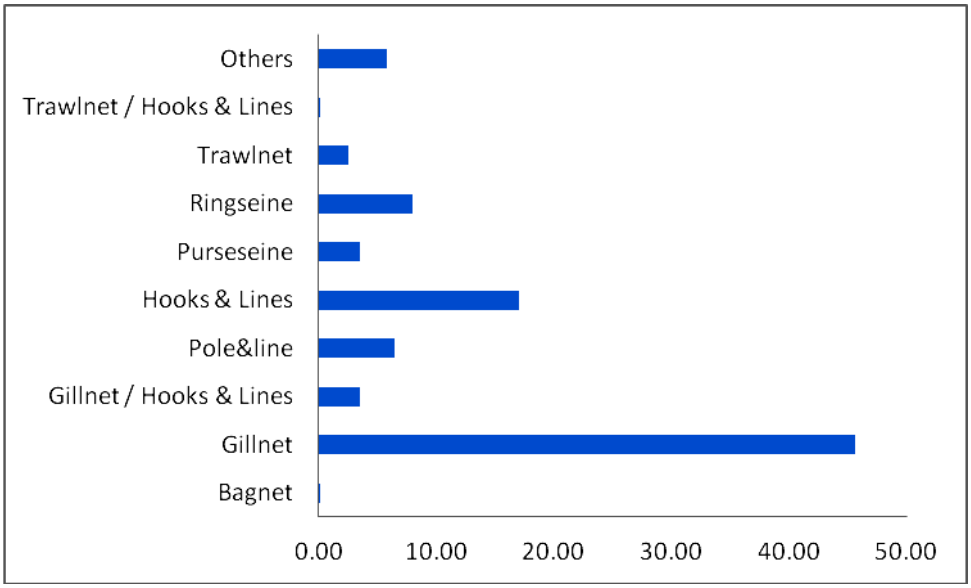



Fig.6. Contribution (%) by different gears to total tuna production during 2008-2011

**Table 3: Species-wise, gear-wise average coastal tuna catch during 2008-2011**

| Gear | Kawakawa (Little Tuna) | Longtail Tuna | Bullet Tuna | Frigate Tuna | Skipjack Tuna | Striped Bonito | Albacore | Yellowfin Tuna | Neritic tunas nei | Dogtooth Tuna | Big eye tuna | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bag net | 12 | 19 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 35 |
| Gillnet | 12474 | 5708 | 888 | 1969 | 6442 | 651 | 217 | 4850 | 0 | 4 | 204 | 33406 |
| Gillnet / Hooks & Lines | 469 | 31 | 43 | 107 | 619 | 43 | 0 | 1166 | 64 | 22 | 6 | 2569 |
| Pole & line | 0 | 0 | 0 | 0 | 4126 | 0 | 0 | 611 | 0 | 0 | 0 | 4737 |
| Hooks & Lines | 3587 | 70 | 3416 | 349 | 955 | 253 | 34 | 3006 | 783 | 1 | 3 | 12455 |
| Purse seine | 3737 | 1530 | 160 | 2378 | 17 | 0 | 4 | 282 | 0 | 0 | 0 | 8107 |
| Ring seine | 5115 | 6 | 36 | 481 | 88 | 145 | 0 | 0 | 0 | 0 | 0 | 5869 |
| Trawl net | 1230 | 139 | 38 | 2 | 208 | 0 | 19 | 174 | 0 | 0 | 9 | 1818 |
| Trawl net / Hooks & Lines | 30 | 3 | 0 | 6 | 4 | 1 | 0 | 14 | 0 | 0 | 0 | 57 |
| Others | 1232 | 369 | 14 | 490 | 368 | 209 | 155 | 1393 | 0 | 0 | 0 | 4229 |
| Total | 27885 | 7874 | 4593 | 5780 | 12826 | 1301 | 429 | 11499 | 847 | 27 | 221 | 73280 |

**Species wise landings**

*Euthynnus affinis* is the most abundant species available all along the coast with average landings of 27,885 t during 2008-2011 (Table 4). Several gears landed the species, with the major share by gillnet (44%), ring seines (18%), hooks and line (13.0%), and purse seines (12%) (Fig 7).

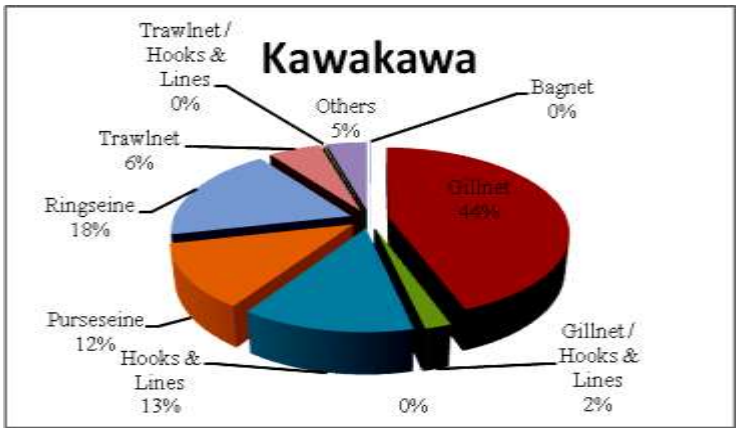



Fig.7. Gear-wise landing of kawakawa during 2008-2011 (in %)

*Thunnus tonggol* is distributed mainly along the west coast and Andaman waters as well as in Maharashtra and Gujarat coast. Gillnet (74%) and purse seine (20%) are the important gears catching the species (Fig 8). Fishery during 2008-2011 registered an increasing trend and the annual landings varied between 6,111 t and 11,777 t with an average of 7,874 t.

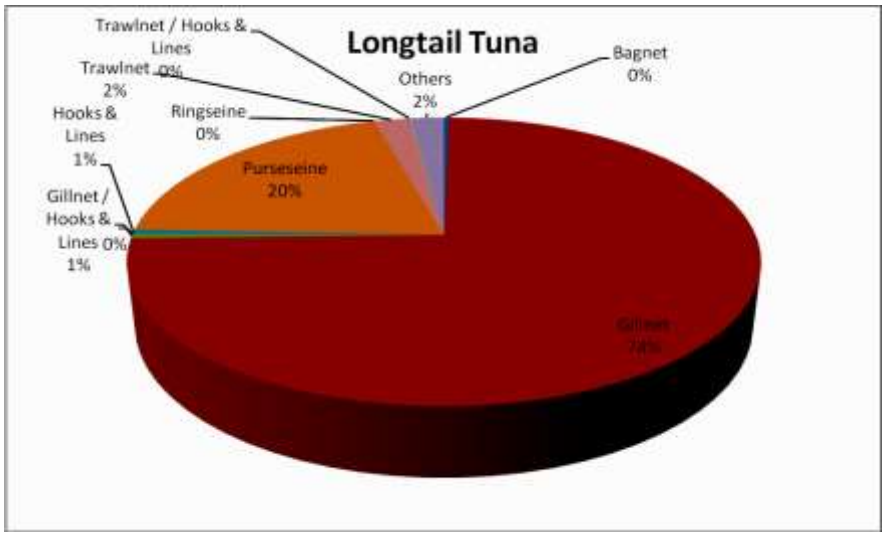


Fig.8. Gear-wise landing of longtail tuna during 2008-2011 (in %)

*Auxis thazard* is the second dominant coastal species, distributed along the west and east coast of India with abundance towards southern coasts. Large abundance was observed along the Indian side of Chagos Laccadive ridge. The species exhibit strong shoaling behavior and support fishery round the year. Major share of the landings is by purse seine (38%) followed by gillnet (33%), and ring seine (10%) (Fig 9). The average annual landing during 2008-2011 was 5780 t.

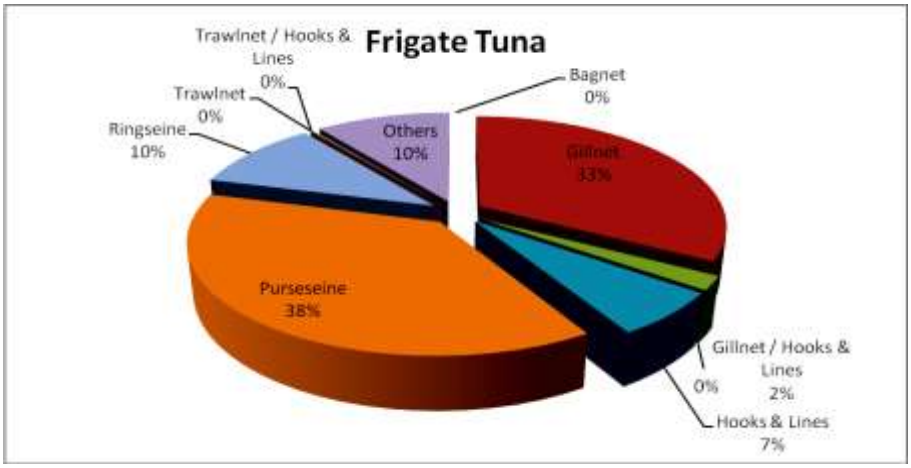



Fig.9. Gear-wise landing of frigate tuna during 2008-2011 (in %)

The fishery for the *Auxis rochei* is restricted to the southernmost part of Indian waters with nearly 75% of the landings coming from Kerala and 21% from Tamil Nadu (Fig. 8). Several gears catch the species with major share by hooks and line (72%) and gillnets (22%) (Fig 10). Landings during 2008-2011 varied between 2,863 t and 7,106 t with an average of 4,593 t.

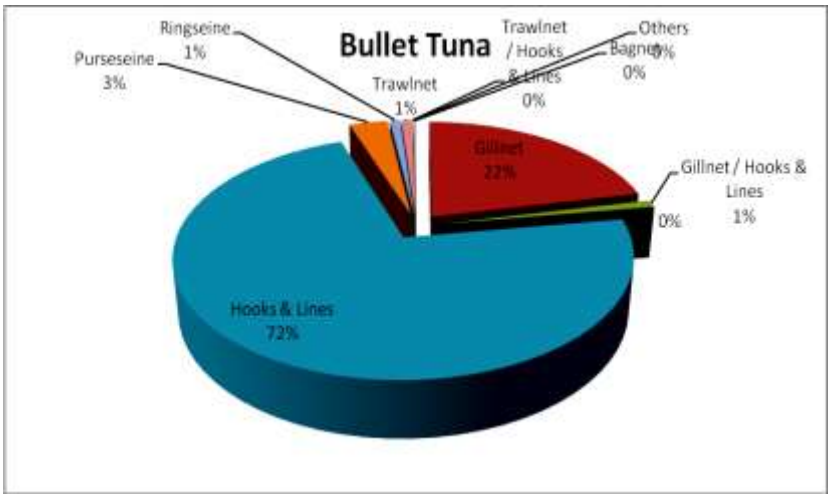



Fig. 10. Gear-wise landing (%) of bullet tuna during 2008-2011

*Sarda orientalis* is distributed along the coasts of mainland and island territories. This species shows close association with coral reefs and knolls and exhibit schooling behavior, often appear along with other small tunas. Major areas of abundance are coasts of Kerala, Andaman & Nicobar and Gujarat. Landings are mainly by gillnets (54%), hooks & lines (20%) and ring seine (7%) (Fig11). Landings showed a downward trend, varied between 179 t and 3886 t with an average of 1301 t during 2008-2011.

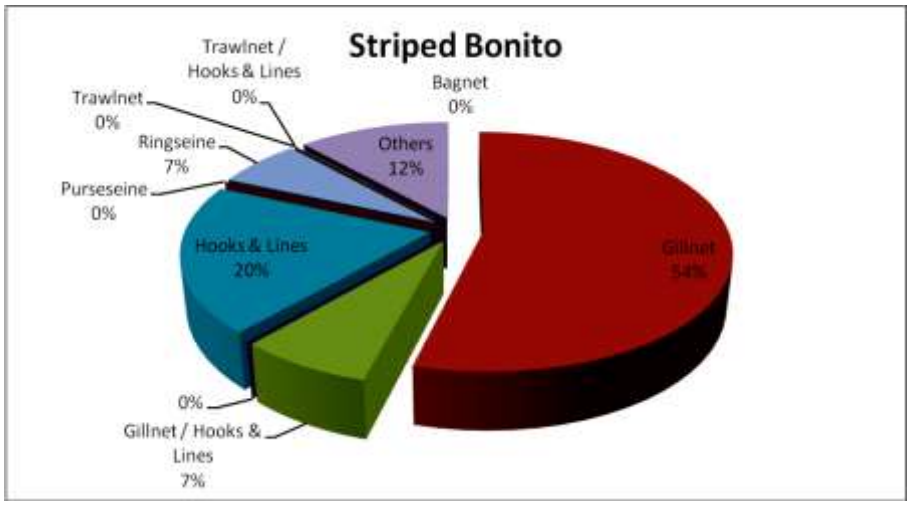



Fig. 11. Gear-wise landing (%) of striped bonito during 2008-2011

**Discussion**

Neritic tuna is being caught in Indian waters since time-immemorial as incidental catch along with other targeted species and landed fresh or in iced condition. However, the tuna is not having good domestic market demand. In the South-west Coast of India small scale fishing

using purse seines and ring seines, target coastal pelagic including neritic tuna. In the Lakshadweep waters targeted fishing is conducted in an organised manner only for the skipjack tuna by pole and line fishing and the catch is mostly used for *masmin* production. In the Andaman & Nicobar group of island tuna is caught only by gillnet and troll line.

Coastal tuna production in the Eastern Indian Ocean and Western Indian Ocean shows that kawakawa is the dominant species in both the areas. Longtail tuna is found to be predominantly distributed in the West Coast of India (99.8%). Frigate tuna is caught in equal percentage in both the areas indicates that it is uniformly distributed all along the Indian coast. Area-wise share of tuna landings during the period in Western Indian Ocean (FAO area 51) and Eastern Indian Ocean (FAO area 57) were 60.5% and 39.5% respectively. This indicates that West Coast is more productive for coastal tuna than the East Coast.

Though the neritic tuna has been caught by multi-gear and multiday fishing operated in the coastal states, the availability of the gear wise data on the resources are limited. Coastal tuna is part of a multispecies fishery and their management needs thorough understanding of the resources. Hence mechanisms to collect detailed data specific to craft and gear is required for planning sustainable fishery management programmes for neritic tuna.

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