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**STATUS OF FISHERIES OF NERITIC TUNA IN PAKISTAN**

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**Introduction:**

Tuna fishing is one of the oldest economic activity along the coast of Pakistan. There used to be large fisheries for salted-dried products that was exported mainly to Sri Lanka. Among the dry seafood, tuna species used to fetch highest prices, therefore, fishermen prefer to involve in catching of various tuna species along the coast of Pakistan. Main centers for tuna fisheries were Karachi, Gaddani, Ormara, Pasni, Sur, Gwader, Phushukan, Ganz and Jiwani. All these population centers are located along the open coastline, therefore, have easy access to neritic waters. Since long the only gear used for catching of tuna is gillnet. Fishermen used to carry salt which was used for preservation on board fishing vessels. There used to be many curing yards at each of these landing centers which we-salted fish from the fishing boats are further processed before export to Sri Lanka.

The processing trend started to change since early part of last decade when tuna was traded with fuel with Iran both at high seas and along the Iran-Pakistan border. Construction of coastal along the Balochistan coast (Mekran Coastal Road) has opened a new avenue and fish from even the distant places like Karachi could be easily transported to Iran with a few hours. This brought changes in fish handling on board fishing vessels and now all the catch is landed in chilled form.

There are two type of tuna gillnet fisheries in Pakistan i.e. neritic tuna fisheries and offshore tuna fisheries. Present paper reviews the neritic tuna fisheries of Pakistan.

**Fishing Boats**

Pakistani tuna fleet consists entirely of locally made wooden boats (Fig. 1). A census of the fishing boats carried out in December 2011 reveals that most of the boats involved in neritic tuna fishing range between 10 to 15 m (Fig. 2). Almost all tuna fishing boats operating from Karachi have a transom at the stern whereas tuna boats of Balochistan are mostly double keeled. Tuna boats including both operating from Karachi or from Balochistan coast have inboard engine with 50 hp to 500 hp (Fig.3). Almost all of these boats have a hydraulically operated net hauler whereas on some smaller boats nets are hauled manually. Previously no navigational and communication gadgets were used on these boats but now most tuna boats carry fish finders, GPS, GPS plotters and satellite phones. Some boats also have VHF and short-wave radios for communication purposes.

Most of the tuna boats targeting neritic tuna have fish hold consisting of 8 compartments each having capacity to hold about 1 ton of fish. Ice is carried on fishing trips and prime catch is placed with ice. Because of smaller size, fishing boats of Balochistan have fewer fish holds.



Fig. 1. Tuna fishing boats (a) Smaller Tuna Gillnetter ('hora'/'rachin') (b) Large Tuna Gillnetter

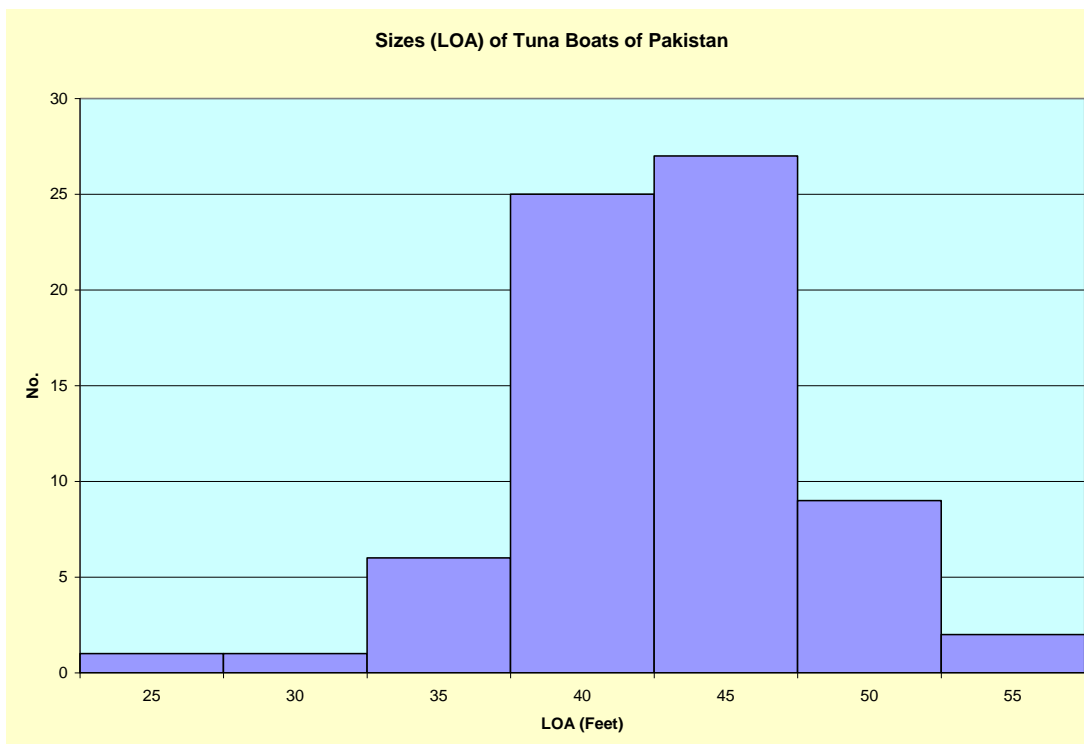


Fig. 2. Length (LOA) of local tuna boats

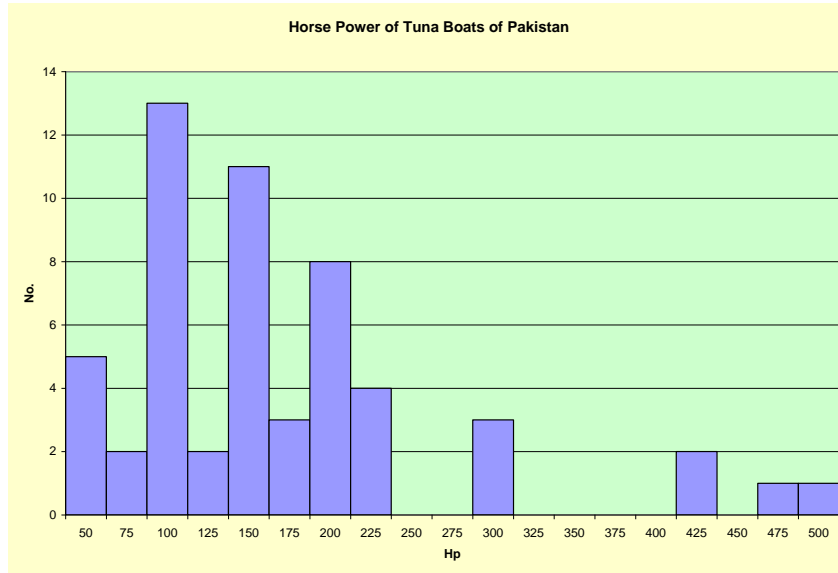


Fig. 3. Engine power (hp) of local tuna boats.

**Fishing Gears**

Surface gillnetting using polyamide nets are used for catching tuna in Pakistan. It has stretched mesh size ranging between 13 cm to 17 cm (average 15 cm) with a hanging ratio of 0.5. The length of the net varies from 5 to 10 km. in comparison, those operating in offshore waters may have gillnets which range between 10 and 25 km. A survey of fishing gear carried out in 2005 revealed that nets used in neretic waters had a length ranging between 2.4 and 12.0 km whereas in the those boats operating in the offshore waters had gillnets with length ranging from 2.4 16.8 km (Fig. 4).

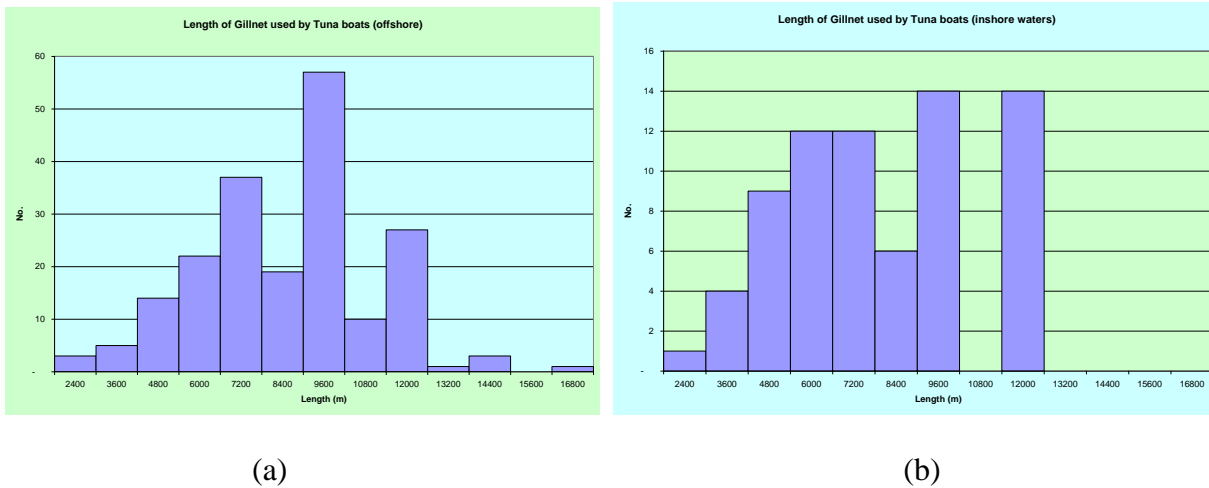


Fig.4. Length of net used by (a) offshore boats (b) neretic tuna boats

In a recent study carried out in December 2011, it was noticed that the length of gillnet varies between 4.83 km and 11.27 km (Fig. 5). The breath of the net was reported to be 14 m. It was informed by the fishermen that there are a number of larger fishing boats being operated from Karachi and Gwadar which may have a length of 20 km or even more.

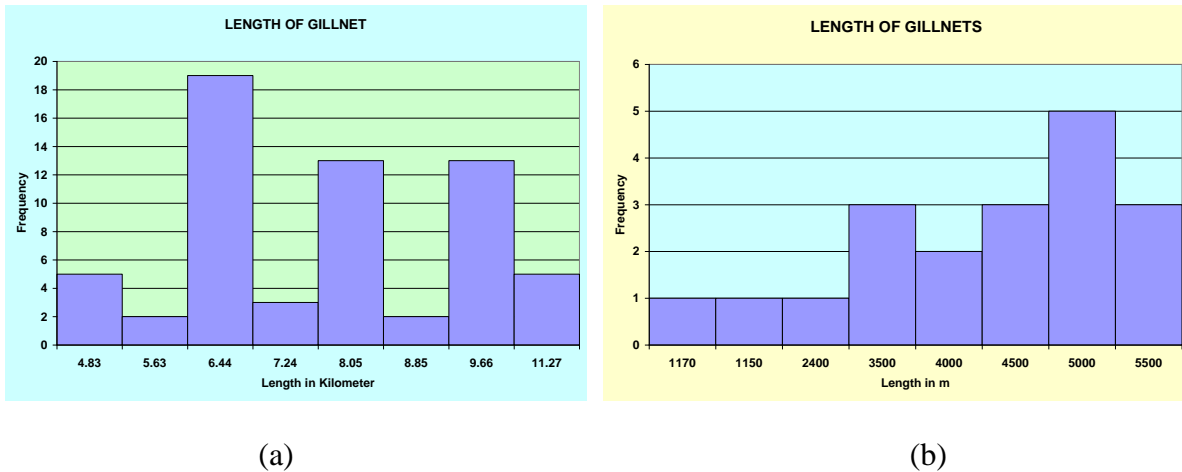


Fig.5. Length of tuna gillnet in boats based in (a) Karachi (b) Balochistan (data collected in December 2011)

Mesh size of the net is predominantly 15 mm (stretched), A study carried out in December 2011 revealed that the mesh sizes may vary between 8.0 mm and 18.0 mm (Fig. 6). Both stone and lead weights are used as sinkers whereas various types of floats are used in the head rope.

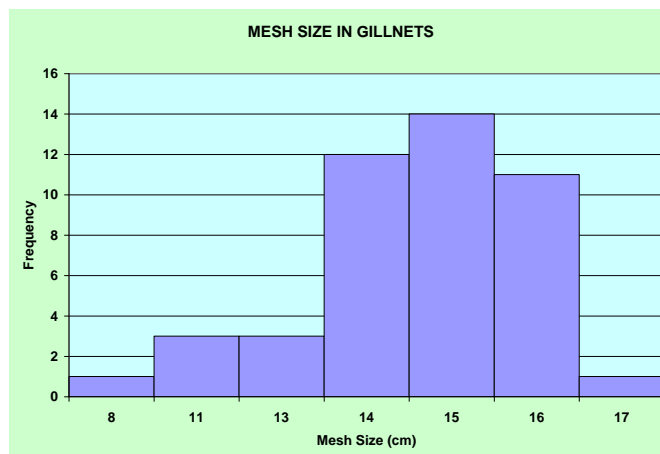


Fig.6. Mesh size of tuna gillnet (data collected in December 2011)

## Fishing Grounds

Fishing boats engaged in tuna fisheries are mainly based in Karachi and Gwadar. There are fewer tuna fishing boats which are based in Pasni, Sur and Pushukan. Only a few tuna boats are operating from Pasni because of closure of the Fish Harbour due to excessive siltation. These boats now offload their catch at a creek near Ras Juddi. There used to be substantially a large tuna fleet which was in Ormara and Jiwani but because of the diversion of this fishing fleet to Indian mackerel, tuna gillnet operation from these towns has practically stopped.

The fishing boats engaged in neritic tuna fishing operates within a radius of 40 to 50 km from their base stations, however, boats based in Karachi have wider area of operation; some of the operating as far as 500 km from the base station. The information gathered during a study in December 2011, revealed that there are 10 major fishing ground along Pakistan coast. Of these, off Ghorabari seems to be most preferred location for boats based in Karachi whereas off Churna Island, off Gaddani and off Malan are also important fishing ground (Fig.7a). For the boats based in Balochistan off Shumal Bundar seems to be preferred location (Fig. 7b).

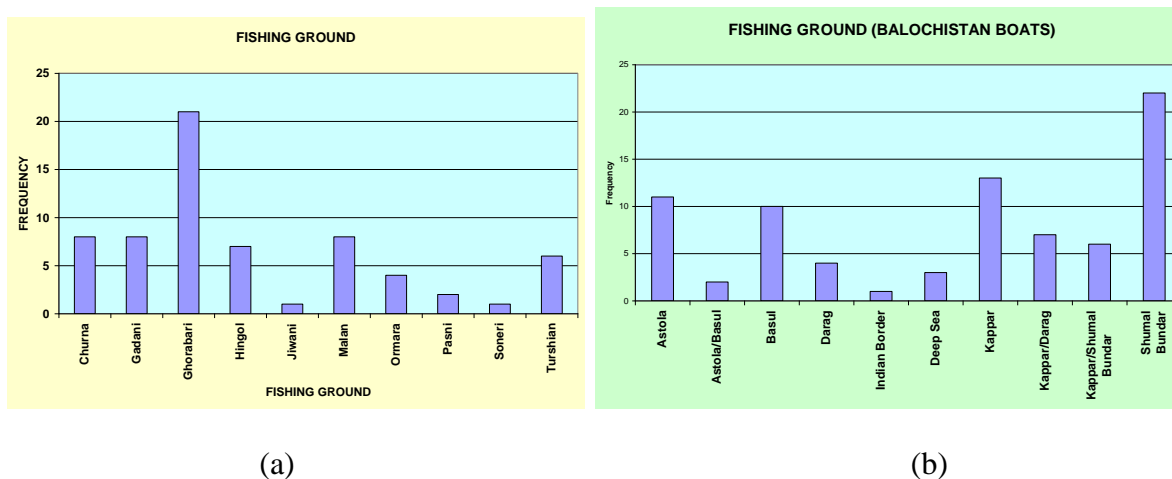


Fig.7. Major fishing grounds for tuna for boats based in (a) Karachi (b) Balochistan

## Fishing Operations

Neritic tuna fishing boats undertake voyage of about 30 to 20 days. In comparison those operating in waters offshore waters undertake fishing voyage of about 60 to 90 days. Crew size varies from 9 to 13 depending on the size of the fishing vessel (Fig. 8). In case of smaller fishing boats ('horas' and 'rachins') upto 15 fishermen are employed whereas in larger fishing boats especially those operating in offshore waters the crew size varies between 16 to 23. Prior to installation of hydraulic winches, the nets used to heaved manually due to which larger crew used to be engaged for such boats.

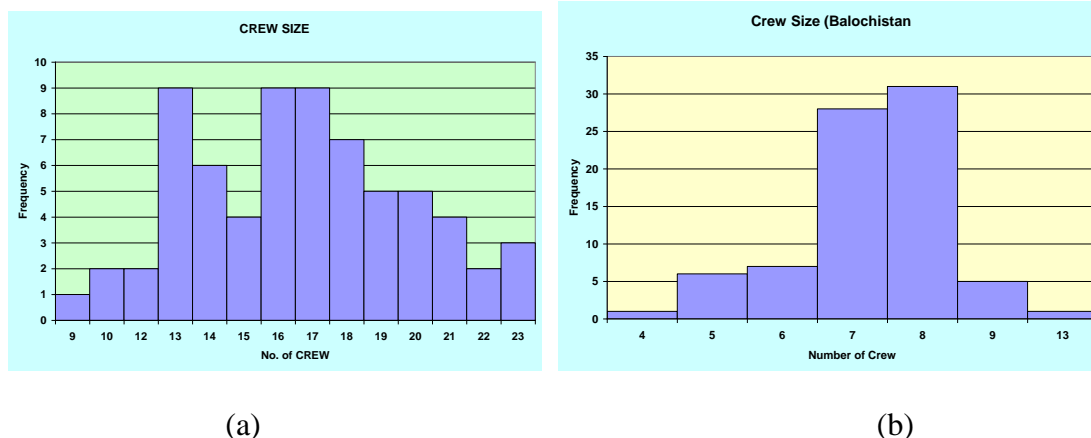


Fig.8. Crew size on tuna gillnet vessels (a) Karachi (b) Balochistan (data collected in December 2011)

In almost all cases nets are laid in the afternoon and retrieved in early morning. Fish is removed from the net after entire net is retrieved. However, in case of high catch density net is retrieved and simultaneous a few crew members are assigned to remove the fish from the net. After every operation nets are inspected and mended before recasting.

### Fishing Seasons

Neritic tuna is harvested throughout the year, however, because of rough seas during southwest monsoon (June to September) tuna fishing activities decreases. There is strong seasonality in catch quantity and catch composition. Summer is the peak season for tuna whereas December and January are months of poor catch.

### Catch Composition

Out of eight species known from Pakistan, only five species i.e. yellowfin, longtail, skipjack, kawakawa and frigate tunas are represented in the commercial catches. Stripped bonito sometimes also appear in small quantities. Analysis of data of landings (1982-2000) indicates that the catch composition of fishing boats targeting neritic tuna along Pakistan differs substantially from those operating in offshore waters of Pakistan. Those operating in inshore waters have longtail (33 %) and skipjack (32 %) to be dominating whereas kawakawa (19%), yellowfin (14 %) and frigate tuna (2 %) are also caught (Fig. 9a). In contrast, in offshore operations skipjack alone contribute 83 % followed by yellowfin (12 %) whereas contribution of all other species is about 5 % (Fig. 9b) Seasonal variation in this overall composition was, however, noticed.

During a study carried out in December 2011, it was observed that longtail tuna is most dominating in the catch (about 59 %) followed by kawakawa (29 %), frigate tuna (8) and

yellowfin and skipjack contributing 2 % as reported from boats operating from Karachi (Fig. 10a). In case of Balochistan kawakawa seems to be dominating species (Fig. 10b). Since most of the longtail and yellowfin are procured from tuna boats operating from Balochistan, therefore, kawakawa appears to be most dominating in the landings made at Gwader (Fig. 11a), Pasni (11b) and Sur Bundar (Fig. 12).

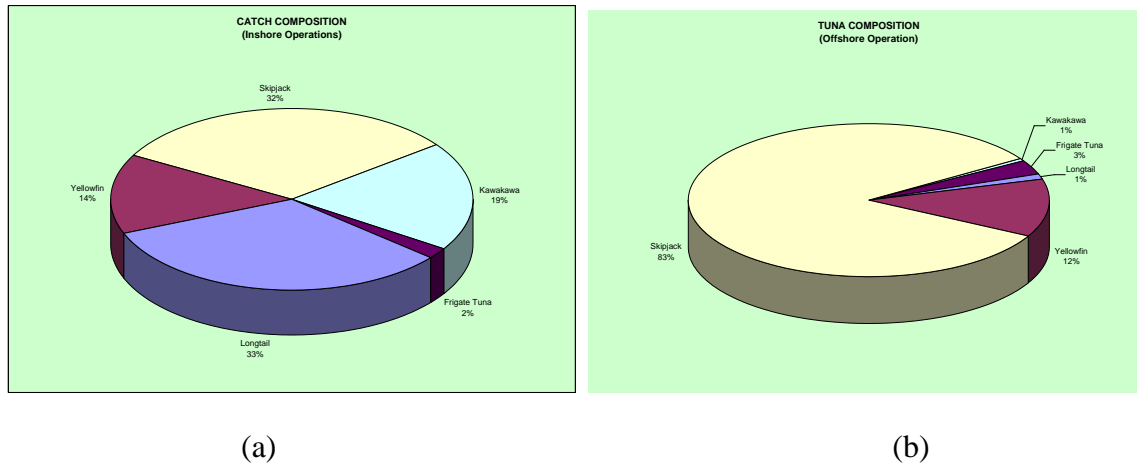


Fig. 9. Pie diagram showing catch composition of boats operating in (a) inshore and (b) offshore waters of Pakistan

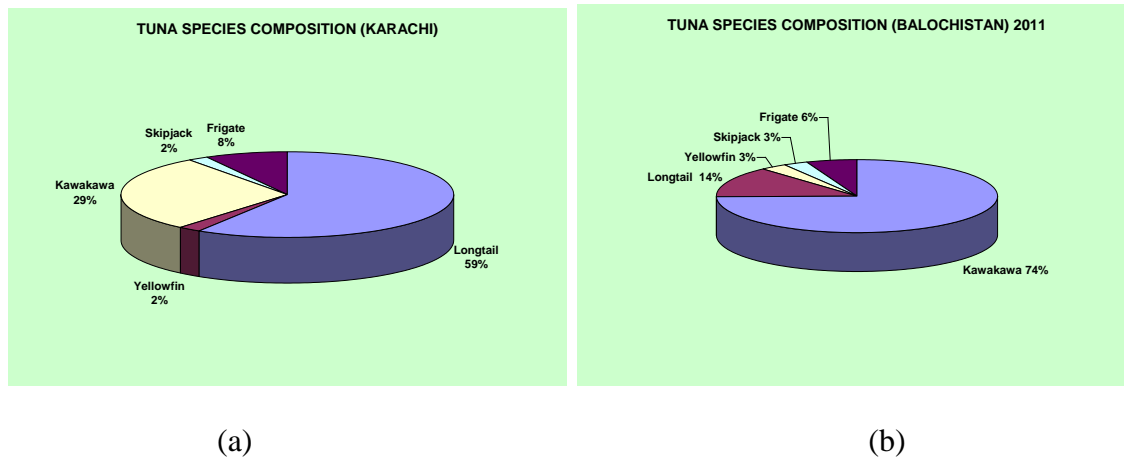


Fig. 10. Pie diagram showing tuna catch composition in (a) Karachi (b) Balochistan coast (December, 2011)



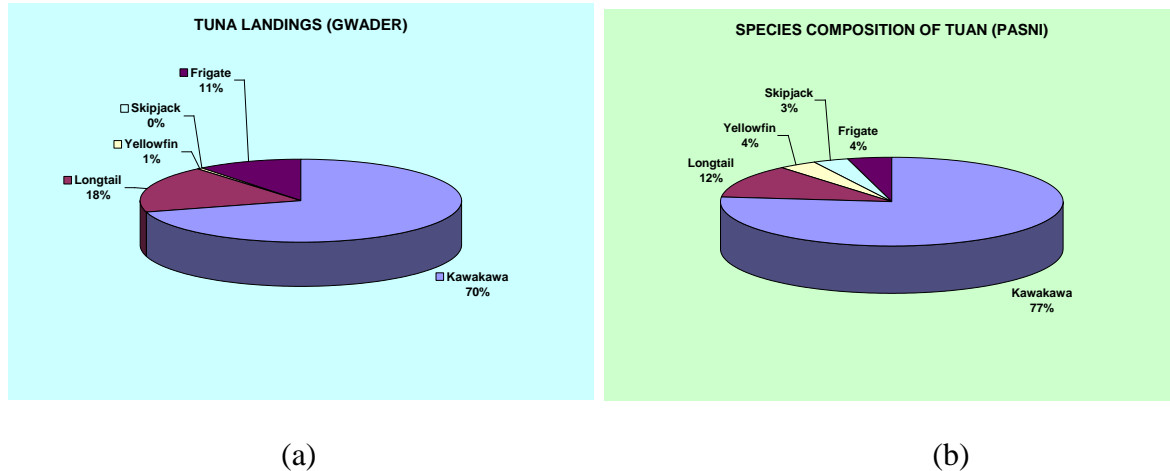


Fig. 11. Pie diagram showing tuna catch composition observed during Rapid Assessment Survey in (a) Gwader (b) Pasni (December, 2011)

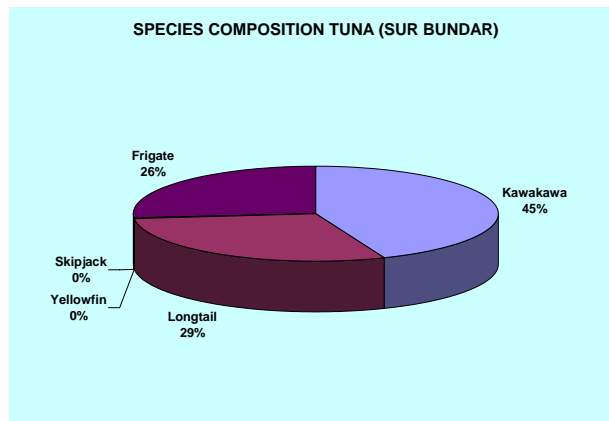


Fig. 12. Pie diagram showing tuna catch composition in Sur Bandar area (December, 2011)

### Size Frequency

Lengths of fishes including tuna may be represented by size frequency distributions which in turn approximate the size structure of the populations. Understanding the size structure of fish populations is important as size is considered fundamental for determining growth, reproduction, and recruitment with changes in size an early indicator of disturbance. It also provide snapshots of the combination of fish species present and the sizes of individuals at particular locations and times. Thus groups of such distributions can suggest processes occurring across spatial (area-wise) and temporal (time or seasonal) gradients. Size frequency of major tuna species was collected in a study carried out in December 2011 (Fig. 13 to Fig.16).

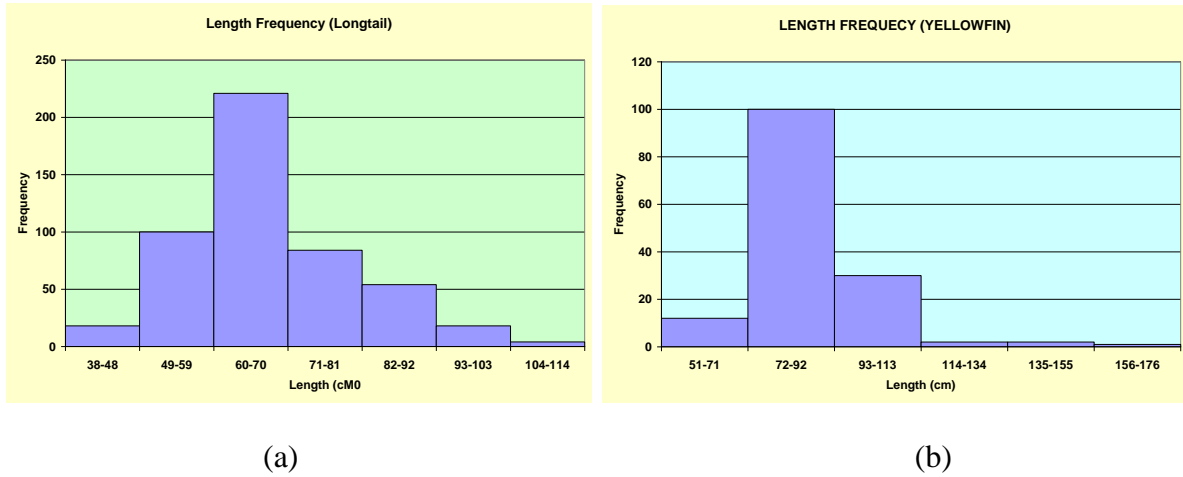


Fig. 13. Histogram showing size frequency of (a) Longtail and (b) yellowfin tuna

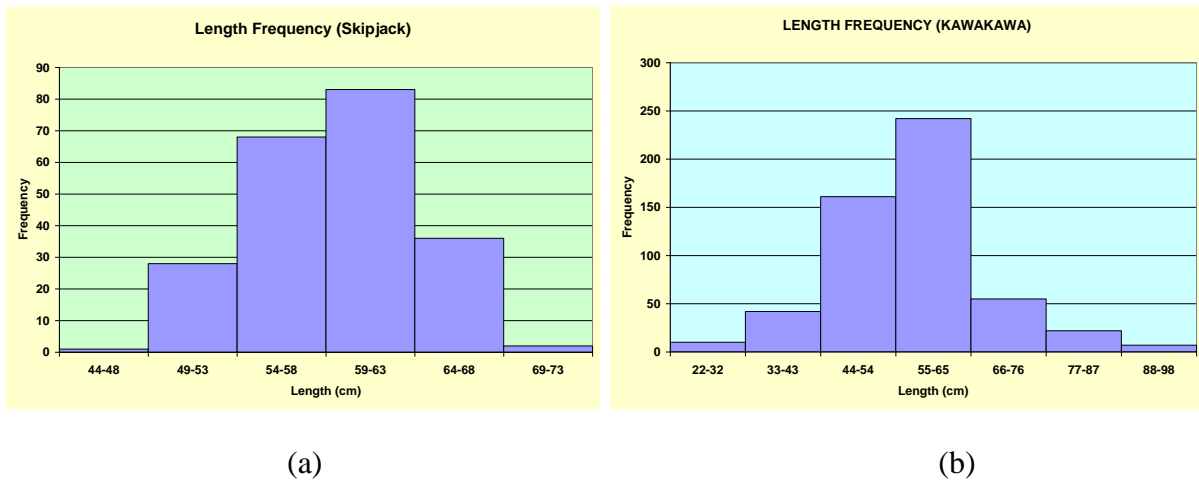


Fig. 14. Histogram showing size frequency of (a) Skipjack and (b) Kawakawa

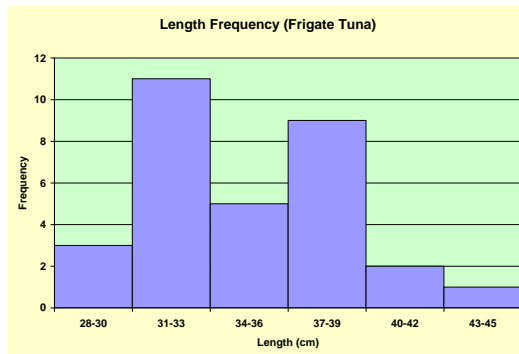


Fig. 15. Histogram showing size frequency of Frigate Tuna

**Major Issues related to Neritic Tuna Fisheries of Pakistan**

- Tuna fisheries is economically viable fisheries in Pakistan, therefore, a large number of fishing boats which were targeting other fishes such as shrimp have modified and operating in neritic waters. This has increased pressure on the stocks of neritic tuna in Pakistan. There is, therefore, a need to development a management plan for tuna fisheries so that uncontrolled entry into tuna fisheries especially in neritic tuna fisheries may be controlled.
- Neritic tuna gillnet fisheries is marred with high bycatch especially of sharks, turtles and cetaceans. The study carried out in December 2011 revealed that turtle entanglement was found to be high in neritic tuna operations as compared to offshore operations whereas cetaceans engulfment was found to be comparatively less in neritic tuna operations than offshore tuna gillnetting.
- Post harvest losses on board tuna fishing boats is high because of poor handling practices, therefore, there is a need to develop a programme for improvement of fish handling so that high quality tuna is produced which may be exported to better markets than present disposal channels.
- Gillnet operations are non compliant to UNGA Regulation because in most cases the length of gillnet was observed to be longer than 2.5 km. There is a need to immediate corrective measures.
- The data of landings and other biological information is not systematically and regularly collected, therefore, there is a need to develop a system of statistical data collection systems at all major landing centers.