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**Title: An overview on large pelagic species and Estimation of By-catch by Iranian fishing vessels (Gillnets) In IOTC competence of area in 2021**

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**Abstract:**

Iran fishing grounds in southern waters of country are of the oldest and most important resources of large pelagic species. There are 4 coastal provinces in those areas and more than 11 thousand vessels consist of fishing boat, dhows and vessels which are engaged in fishing in the coastal and offshore waters. There are three fishing methods targeting tuna and tuna-like species in the IOTC area which include gillnet and purse seine and also some of small boats use trolling in coastal fisheries.

In order to assess the level of Iranian tuna fishing vessels By-catch in the IOTC area of competence in 2021 tuna fisheries data which are collected through the Iran Fishery Organization Data Collection system are used. Base on the information, around 30 different species of Tuna, Tuna-like and some others are caught by Iranian fishermen through the Tuna fishing activities. Base on the information in total, 308231 tons of different species including, 248806 tons Tuna and Tuna-like species, 26077 tons Billfish, 4085 tons of Sharks and 29263 tons the other species, are caught by Iranian fishing vessels in the IOTC area of competence. According to IOTC target species list (16 species covered by IOTC agreement) 89% of Iran catch belong to target species and 11% of catch belong to non-target species, in the 2021.

Group of Fish		Species	Weight/ T	Total / T	%
Target Species 89%	Tuna & Tuna like	Frigate Tuna	7027	248806	80.72
		Kawakawa	39566		
		Longtail Tuna	51668		
		Skipjack	68108		
		Yellowfin	44848		

		Bigeye	620		
		Narrow-barred Spanish mackerel	26813		
		Indo-pacific king mackerel	10156		
	BillFish	Indo Pacific Sailfish	16287	26077	8.46
		Black Marlin	6527		
		Other	3263		
None Target Species 11%	Sharks	Silky Shark	239	4085	1.325
		Grey reef shark	379		
		Hammerhead Sharks	9		
		Mako Shark	15		
		Milk Shark	2271		
		Other Sharks	1172		
	Other Species	Carangidae Species	26109	29263	9.493
		Mujilidae Species	846		
		Rachycentridae	2248		
		Common Dolphin Fish	60		
Total Catch		Target & none Target	308231	100	

According to 2021 information, non-target species which are caught as by-catch (11%) included 1.32% different species of sharks and some other species with 9.49%, in compare with total catch. The vessels CPUEs were calculated, based on different gears catch per day (Vessel Catch/Day). According to our estimation, Purse Seiners CPUE is calculated 15.9 Kg/D, Trolling (Boats) 70.8 Kg/D, gillnetters 399.3 Kg/D and long line 91.3 kg per a day. Also, the amount of Sharks CPUE was calculated 5.6 Kg/D for gill nets.

## **I- Introduction:**

In order to better Tuna fisheries management and integrate ecosystem considerations, based on IOTC data collection requirements and scientific advices by the Scientific Committee and IOTC Resolutions, Iran Fisheries Organization (IFO) has been following the purposes through its fisheries monitoring system by different methods. Although the level of monitoring and control of Iranian fishing fleets need more improvement, in quality but compliance to regulations and resolutions of IOTC has had a progressively trend and IFO intent to continue this trend, up to complete implementation of all related resolutions. This evidence indicates a big progress on implementation of compliancy of Iran with IOTC regulation during recent years. Also prepared identification cards by IOTC translated in Persian and are available for observers and fishermen physically and they are available in IOTC web site now, which help us in better data collection and implementation of observer scheme in fishing harbors. Current paper is going to review on Iran tuna fisheries by-catch in IOTC competence of area in 2021. The information extracted from IFO statistics system and concentrate on catch composition of the vessels in 2021.

## **II- Materials and methods:**

In order to estimate different types of Iranian fishing vessels by-catch in 2021, the data are collected through IFO data collection system in fishing harbors, landing places, through the Logbooks and offline VMS information and analysis of them. Base on collected information through the Iran data collection system, a day of catch are supposed as a unit effort and the CPUE was calculated based on amount of catch for a day. According to recorded information majority of Iran fishing vessels gears are gill net and normally the nets investigated during 24 hours (Setting net at the Sea 4 hours, waiting time 10 hours, separation of fish from the net mesh 6 hours and maintenance and preparing for next setting takes 4 hours time). So, an active day was accepted as a unit effort for a gill-net vessel. Because of sailing from ports to fishing areas, weather condition and finding fish concentration area, normally there is no catches during some days of sailing, so only active fishing days calculated as efforts days. In fact, one active day for gill netters accepted as an effort.

Some other information collected from offline vessel monitoring system, logbooks also by interview with some crews. The vessels fishing areas mostly were Iranian coastal waters and EEZ and western part of Indian Ocean especially eastern part of Africa continent. In order to identification of species

and survey on catch composition, port state observers carried out in fishing harbors and landing places.

### **III- Results and Discussion:**

Base on IFO statistics system around 30 different species of Tuna, Tuna like, billfish, Sharks and some other species were caught, by Iranian fishermen in 2021. According to the information around 308231 tons of different species including 248806 tons of Tuna and Tuna like species (80.72%), 26077 tons Billfish (8.46%), 4085 tons different species of SharBks (1.32%) and 29263 tons some other species (9.49%) are caught by Iranian fishing vessels in the IOTC competence of area in 2021. Also in 2021 about 80% catch belong to IOTC target species included Tuna, Tuna like and Bill-fish and 20% of the catch belong to none target species which are caught as by-catch. Base on IFO statistic system, more than 95% of Iran catch comes from Gillnet gear, while around 0.17% of catch belongs to Purse seiner, 2.91% Trolling and 1.83% are caught by artisanal long-line vessels. During 2021, Tuna and Tuna-like species which are caught by Iranian fishermen are included, longtail tuna with 51668 tone, Yellow-fin Tuna with 44848, Skipjack with 68108, kawakawa with 39566, Narrow-barred Spanish mackerel with 26813, Frigate tuna with 7027, Indo Pacific King Mackerel with 10156 tone and big-eye with 620 tone in compare with total catch (248806 T).

During the year, Billfish with 26077 tons which assigned 8.46% of total catch included Indo-pacific Sailfish with 5.3%, Black Marlin with 2.1% and other billfish 1%, in compare with total catch.

Base on collected data, the other by-catch species which are identify in catch composition mainly belonged to Carangidae family with 7991 tons (2.8%), Common Dolphin fish with 7391 tons (2.5%), Rachycentridae family with 2167 tons (0.7%) and Mugilidae family with 310 tons (0.1%). In total this species catch's quantities have been 6% in compare with total catch.

Also base on 2021 data, in total 4085 tons (1.325%) of different species of Sharks are caught in Iran Tuna fishing activities as a by-catch. These species are included Silky sharks with 239 tons (0.07%), Grey reef sharks with 379 tons (0.1%), Mako Shark with 15 tons (0.004), Hammerhead Shark with 9 tons (0.002), Milk Shark with 2271 tons (0.7) and other Sharks with 1172 tons (0.38%).

### **IV- Conclusion:**

As mentioned above, CPUE (Vessel Catch/Day) was calculated, base on total amount of catch for each vessels (C) and their navigation days (Unit Efforts). Also the fleet has had different type of vessels with varied GT that gives them different ability to catch. In order to calculate CPUE for Gill net by vessel class, we have faced with lack of information because the amounts of catch are not recorded for each trip. So, we normally use sampling methods or receive self-declaration of

fishermen and the system needs some improvement and corrective measures. Also, the amount of Sharks CPUE was calculated only for gill nets, while there are no reports for other gear types. In conclusion the condition of catch base on gear types are as a below.

During 2021 two purse seiners were active in Iran tuna fisheries, while their total active fishing days have been 376. Base on available information in total Iran purse seiners are caught 531 tons different species of fish in 2021. So, the amount of CPUE for Iran purse seiners are calculated 15.9 Kg fish per a day. Also, around 0.2% of Iran tuna and tuna like species come from purse seine fisheries. These vessels are mechanized industrial ships and normally are operated in open sea and out of Iran coastal waters.

Second type of Iran tuna fisheries are gillnet which assigned majority of catch for itself. The length and power engine of the vessels are varied from small boated with less than 3 GT up to more than 100 GT and 30 m lengths. While there are about 4138 different type of gillnet vessels but it is difficult to talk about their CPUE because there is limited information about amount of catch for each group. In total Iran gillnet active vessels have caught 293053 tons of different fish by 818425 days' efforts. So the amount of CPUE for all types of gillnets is 399.3 kg per a day. But this CPUE does not show a clear evaluation about catch quantity and need to calculate separately for each group of vessels. Based on current information around 94% of tuna and tuna like fisheries catch comes from gillnet fisheries while the 77% of total efforts belong to these vessels.

Trolling gear is third type of tuna fisheries where majority of small boats are active by use of this method. Around 2,694 small boats with less than 3 GT engine power were caught 8987 tons of different species of tuna through the 541,066 days efforts by use trolling gears have been active in 2021. So, the amount of CPUE for Iran tuna trolling gear is calculated 70.8 Kg fish per day. Also, around 3% of Iran tuna catch comes from the trolling gears fisheries while the amount of these vessels efforts have been 21% of total efforts of Iran tuna fisheries. Around 1771 vessels (31.7%) are active in tuna fisheries by use of trolling gear. That means, in spite of high level of efforts of these boats their catch have been very low. They are none mechanized small boats and normally are operated by 1-2 fishermen as small scale fisheries in Iran coastal waters.

Also only some longline vessel has been active in 2021, which the total catches of them have been 5660 ton while the vessels efforts have been 61800 days. So longline vessel CPUE is calculated 91.3 kg per a day. According to 2021 information the amount of Sharks CPUE for all types of gillnet vessels was calculated 5.6 Kg/D in total.

**V- References:**

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