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Sharks and Rays Fisheries of the Bay of Bengal at the Landing Centers of Chittagong and Cox's Bazar, Bangladesh

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I. Introduction

In Bangladesh shark fisheries (sharks and rays) are largely artisanal fisheries, it is exploited by fishers as targeted species and as a by catch by other fisheries. Sharks are captured by shark net (modified large mesh drift gill net) and sometimes hooks (shark hooks) and line. Rays are mainly harvested by hooks and line but sometimes by the set bag net and trammel net also (Roy, 2008). Large numbers of juvenile's sharks and rays are caught incidentally by shrimp and fish trawls which remain unreported. Sharks and rays are targeted mainly for its high value fins but meat has some demand in the tribal area of the country. The most valuable shark fins and few dried meats are exported to different Asian countries.

The Republic has a 710 km long coastal line on the southern coastal zone of the country. In these areas fleets of small scale fishing craft and gears such as the 52000 numbers of mechanized and non- mechanized boats and totally 223858 numbers of different type's gears are engaged within 40 meters depth. For industrial fishing a total of 172 numbers of different trawlers are harvesting beyond 40 meter depth. Commercially 120-150 numbers of artisanal boats are engaged for sharks and rays fishing in Bay of Bengal. The multi-species coastal fisheries, at both artisanal and commercial levels, comprise of 56 species of sharks and rays by IUCN (2000), Day (1978) mentioned 63 numbers and Roy (2011) recorded 27 species of sharks (11 species) and rays (16 species) in the Bay of Bengal.

As many as, 70 species of sharks are found in Indian waters, through only 18 species are occasionally or frequently caught (Hausfather, 2004). In Myanmar waters, only 36 species have been reported recently (SEAFDEC, 2012). At present, 9 families of sharks (19 species) and 6 families of rays (22 species) have been recorded from Cambodia (SEAFDEC, 2012).

In Sri Lanka the elasmobranches caught as a by catch from other fisheries by using bottom and drift gill nets, despite this, elasmobranches are important nationally, contributing 8.76% of the total catch during 1987-1991(Bonfil, 1994).

Sharks are taken as target and by catch species in artisanal fisheries under the jurisdiction of coastal areas of Bangladesh. Targeted fishing for sharks and rays for fins and/ or for meat. The majority of the catches are processed locally with most of the flesh being salted and dried; fins, skins and shark's jaws with teeth dried and the livers are processed to be shark oil. The most valuable part of the shark body is its fins and they are usually exported to Asian countries.

Fisheries for elasmobranchs have not increased in the same way because of their fisheries worldwide. The low market value of these fishes and relatively low abundance, Compagno (1990) indicates that in terms of commercial catches and according to FAO statistics, cartilaginous fishes are a minor group which contributed and average of 0.8% of the total world fishery landings during 1947-1985. While bony fishes such as clupeids, gadoids and scombroids, accounted for 24.6%, 13.9% and 6.5% respectively.

They are typically slow growing and long lived and mature at a late age. They together with their low fecundity, results in a low reproductive potential for most of the species Recoveries of population numbers from severe depletions (caused either by natural phenomena an human action) should take many years for the

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majority of elasmobranchs (Bonfil, 1994). Elasmobranches fisheries of Pakistan were of prime importance on a global scale until recently when production plummeted. The relative importance of elasmobranches in Pakistan is among the highest in the world. 7.42% of the total national catches during 1987-1991 (Bonfil, 1994).Sharks catches are incidental to other fisheries in India (Appukuttan, 1988) and are mainly taken with long lines, which Very in design by region and are also as by catch of Trawlers using disco nets off Ratnagiri (Maharashtra), with bottom set gill nets in Porto Novo (Tamil Nadu) and by shrimp trawlers of Kerala (Devaraj, 1988). Rays are caught with bottom set gill nets in Gujarat, North west India and Cudalore and are abundant on the outer shelf and slope off Karala and Karuatakta (Devaboss, 1978). There have traditionally been important fisheries for elasmobraches in India with a relatively steady growth up to the mid seventies. Indian production of sharks and rays represent only 1.72% of the total national catch in 1987-1991 (Bonfil, 1994). The large fisheries production of South Korea, elasmobranches are of minor importance representing only 0.66% of the total catch between 1987 and 1991 (Bonfil, 1994).

Traditionally, elasmobranches have not been a highly priced fishery product. Their economic value ranks low among marine commercial fisheries (e.g. in the Taiwanese gill net fisheries of the central waters pacific, shark (trunks) prices attain only 20% and 60% of those of tunas and mackerels respectively (Millington, 1981). The only highly prized elasmobranch product is shark fin for oriental soup, a commodity for which there has recently been a considerable increase in demand (Cook, 1990).

In the year 2010-2011 period total fish production from marine sources was 54,633 MT of which sharks, skates and rays contributes only 0.77% (4,205 MT) and 0.13% of the total fish production (30,61,687 MT) of Bangladesh (DoF, 2010-2011). Since 1972 all sharks and rays used exhaustively for domestic consumption but from few years ago meats, fins, skin, jaws, vertebrae and liver oil export in the Korea, Singapore, China, Hong Kong, Mayan mar, Thailand and other countries. Till now, there is no comprehensive report on the landing of sharks and rays in Bangladesh. Therefore, this study aims to provide an overview of landing trends, species composition and percentage contribution in shark fisheries producing and exporting from an economic and social point of view.

II. Materials and Methods

The main two landing centers of sharks and rays situated at Fishery ghat, Chittagong and BFDC Fish harbour, Cox's Bazar district were selected for sampling in order to cover a wide range of the most sharks and rays landing retail and whole sale marketing, target and incidental catch from the Bay of Bengal of Bangladesh. The field visit was undertaken for a year starting from July, 2011 to June, 2012 at the mentionable two fish landing centers where only 80-100 numbers of boats are engaged for sharks and rays fishing commercially in the southern part of the Bay of Bengal fishing grounds.

Species-wise sharks and rays landing data were recorded at both landing station and on board commercial fishing vessels. In the selected sampling station elasmobranches catch data were collected by 5 Scientific Officers and 10 field stuff alternately. The data were collected in new-moon, full-moon, first quarter, last quarter and other days of the moon month from the landing center. Sampling days were 8 in each month of the year continuously by the Marine Fisheries Survey Management Unit.

Species were identified locally and unidentified species were preserved in 5- 7% formalin solution just after collection from the landing centers, brought laboratory to find out lowest possible taxonomic level by the help of Munro(1982), Bonfil and Mohammad(2003), Quddus(1988) and Raje(2007.

III. Results and Discussion

A total 24 species of sharks and rays were recorded from this study conducted during July, 2011 to June, 2012 at the selected Fishery ghat, Chittagong and BFDC fish harbor, Cox's Bazar.

a) Species composition

In this study of which 10 were shark's species, they are Scoliodon laticaudus, Rhizoprionodon acutus, Rhizoprionodon oligolinx, Sphrna lewini, Chiloscyllicem indicum, Galeocerdo cuvier, Carcharhinus melanopterus, Carcharhinus leucas, Carcharhinus falciformis, and Carcharhinus. sorrah of which the most common and widely distributed two shark species were Scoliodon laticaudus and Sphrna lewini; five species were (Rhizoprionodon acutus, Chiloscyllicem indicum, Galeocerdo cuvier, Carcharhinus melanopterus, and Carcharhinus falciformis and rarely found species were Rhizoprionodon oligolinx, Carcharhinus leucas and Carcharhinus. sorrah.

The 14 species of rays are Himautura uarnak, Himantura walga, Himantura undulata, Himantura gerrardi, Himantura. uarnacoides, Gymnura japanica, Rhinoptera javanica, Aetomylaeus nichofii, Mobula kuhlii, Rhinobatos typus, Rhynchobatus djiddensis (laevies), Rhina ancylostoma, Aetobatus narinari and Urogymnus asperrimus. Among them Himautura uarnak, Himantura. uarnacoides and Rhinobatos typus were the most common species. Moderately abundance fished rays were Gymnura japanica, Aetomylaeus nichofii and Rhynachobatus djiddensis and limited occurrence of species were Aetobatus narinari followed by Rhinoptera javanica, Rhina ancylostoma,

Urogymnus asperrimus, Himantura gerrardi, H. undulata, H. walga and Mobula kuhlii.

b) Total landing

A total 382.67 MT of sharks and rays were landed during the study period (Figure-4). Among them total harvested sharks and rays landing weight was 136.45 MT and 246.22 MT respectively. The month wise composition is given in Fig. 1 & 2.

Species wise landing by weight showed that Scoliodon laticaudus was 84.52 MT followed by Rhizoprionodon acutus, R.oligolinx, Sphyrna lewini, Chiloscyllicem indicum, Galeocerdo cuvier, Carcharhinus melanopterus, C. leucas, C. falciformis and C. sorrah were 5.56MT, 0.02MT, 27.08MT, 4.48MT, 4.48MT, 5.13MT, 4.77MT, 1.15MT, 3.37MT and 0.01MT respectively(Table,1). Total landing weight of ray's species Himautura uarnak was 164.42MT followed by H. walga- 1.18MT, H. undulata- 0.89MT, H. gerrardi- 0.78MT, H. uarnacoides-33.29MT, Gymnura japanica- 10.0MT, Rhinoptera javanica-0.32MT, Aetomylaeus nichofii-3.37MT, Mobula kuhlii-1.72MT, Rhinobatos typus-27.16MT, Rhynachobatus laevis-2.30MT, Rhina ancylostoma-0.09MT, Aetobatus narinari- 0.03MT and Urogymnus asperrimus was 0.67MT of the total catch (Table-1).

The month wise landing weight of shark's in total 4.99 MT of sharks was landed in the month of July,2011 followed by 11.65 MT, 10.37 MT, 30.60 MT, 16.45 MT, 18.79 MT, 11.68 MT, 6.81 MT, 5.29 MT, 7.55 MT, 8.09 MT and 4.00 MT in August,11, September,11, October,11, November,11, December,11, January,12, February,12, March,12, April,12, May,12 and June,12 respectively (Fig-4). And in the month of July,2011 total landed weight of rays was 9.94 MT followed by August,11, September,11, October,11, November,11, December,11, January,12, February,12, March,12, April,12, May,12 and June,12 were 6.25 MT, 2.35 MT, 40.34 MT, 43.88 MT, 42.70 MT, 19.94 MT, 30.42 MT, 27.88 MT, 15.74 MT, 4.74 MT, and 2.05 MT respectively (Table-1).

c) Total number

Total 479,661 numbers of juvenile and adult sharks and rays species were harvested during July, 2011 to June, 2012(Table, 3). Among them total species number of sharks was 449,133. Month wise maximum number of landed sharks was 135,177 in the month of October, 2011 and minimum landed number was 9803 in March, 2012. Total 30,528 number of ray's species was landed during the study period, month wise harvested highest and lowest number of rays were 6,797 and 252 number in the month of October, 2011 and June, 2012 respectively (Table-3).

Shown this in a Table, 3 in the species wise analyzing total landed number of shark species Scoliodon laticaudus was 420365 numbers followed by Rhizoprionodon acutus, R. oligolinx, Sphrna lewini, Chiloscyllicum indicum, Galeocerdo cuvier, Carcharhinus melanopterus, C. leucas, C. falciformis and C. sorrah were 3519, 10, 15924, 4832, 304, 74, 641 and 05 respectively. Species wise total landed number of ray species Himautura uarnak was 16982 numbers followed by 84, 45, 36, 2964, 5182, 36, 1704, 442, 2925, 74, 43, 3 and 8 numbers in H. walga, H. undulata, H. gerrardi, H. uarnacoides, Gymnura japanica, Rhinoptera javanica, Aetomylaeus nichofii, Mobula kuhlii, Rhinobatos typus, Rhynachobatus laevis, Rhina ancylostoma, Aetobatus narinari and Urogymnus asperrimus respectively(Fig, 5 & 6).

d) Percentage contribution

In average percentage contribution of the total sharks constituted 35.66% of the total catch by weight and the rest 64.34% was in rays Species wise average percentage contribution of shark species Scoliodon laticaudus was 22.09% followed by Rhizoprionodon acutus-1.45%, R.oligolinx-0.0%, Sphyrna lewini-7.08%, Chiloscyllicem indicum-1.26%, Galeocerdo cuvier-1.34%, Carcharhinus melanopterus-1.25%, C. leucas-0.30%,, C. falciformis-0.88% and C. sorrah was zero% of the total landing. And among the ray's species Himautura uarnk was 42.97% followed by H. walga, H. undulata, H. gerrardi, H. uarnacoides, Gymnura japanica, Rhinoptera javanica, Aetomylaeus nichofii, Mobula kuhlii, Rhinobatos typus, Rhynachobatus laevis, Rhina ancylostoma, Aetobatus narinari and Urogymnus asperrimus were 0.32% ,0.23%, 0.20% ,8.70% ,2.61%, 0.08% ,0.88% ,0.44%, 7.10% ,0.60% ,0.02%, zero% and 0.18% respectively (Table-2).

Month wise maximum and minimum percentage contributions of total sharks and rays were 18.54% and 1.58% in the month of October, 2011 and January, 2012 respectively. In the month of January,2011 percentage contribution of total sharks was 33.42% followed by 65.08%, 81.53%, 43.13%, 27.29%, 30.56%, 37.30%, 18.28%, 15.94%, 32.42%, 63.06% and 66.19% were in the month of August,2011, September, 2011, October, 2011, November, 2011, December, 2011, January, 2012, February,2012, March,2012, April,2012, May,2012 and June,2012 respectively (Fig-3 & 4). And month wise total percentage contribution of ray's was 66.58% in the month of July, 2011 followed by August,2011, September, 2011, October, 2011, November, 2011, December, 2011, January, 2012, February,2012, March, 2012, April,2012, May,2012 and June,2012 were 34.91%, 18.48%, 56.88%, 72.76%, 69.44%, 62.72%, 81.71%, 83.07%, 67.58%, 36.94% and 33.81% respectively (Table-2).

During 2005 total world fish production was 93253346 MT and the sharks and rays production was contributed 0.83% (FAO, 2005). According to the FAO (2007), total marine fish production was 65709000 MT and the sharks, rays and chimaeras were 771105 MT (1.17%).

In the year 2010-2011 period total marine fish production of Bangladesh was 54,633 MT of which sharks, skates and rays contributed 0.77% (4,205 MT) only in artisanal fishing and 0.13% of the total country fish production (30,61,687 MT) (DOF, 2010-2011). But in the present study period 10 sharks species and 24 rays species were recorded and their total landing volumes was 382.67 MT which contributed only 9.10% of the total shark production of Bangladesh

Shark fining- the practice of catching a shark, slicing off its fins and then discarding the body at sea takes a tremendous toll on shark populations, up to 73 million sharks are killed every year to primarily support the global shark fin industry, valued for the Asian delicacy shark fin soup (Internet, July,2011).

Statistics for the elasmobranches fisheries of Indonesia were not recorded before 1971. Indonesia fisheries represent 10.18% of the world's elasmobranches catch. Despite this, elasmobranches are of only moderate importance in Indonesia, contributing 2.41% to Indonesian landings during 1987-1991(Bonfil, 1994). Artisanal shark and ray fisheries in eastern Indonesia including Java, Bali, Nusa, Tenggara and Papua, a total of 137 species of chondrichthyans consisting of 78 sharks, 56 rays and 3 chimaeras were formally recorded to occur in Indonesian waters; the annual production of sharks was 45832 MT and 61663 MT of rays and sharks and rays productions were contributed 0.94% and 2.26% respectively from the total production during 2009. (Faizah, 2012)

The elasmobranches fisheries currently represent 2.2% of the total catch of Malaysia. Rays are more important than sharks in the catches. SEAFDEC data indicate that from 1976-1991 rays represented, on average, 60% of the elasmobranches catch and sharks the remaining 40%.There are 7 orders of sharks comprising of 62 species (18 families), 6 orders of rays comprising of 79 species (15 families) and 1 species of chimaeras inhabiting Malaysian waters from fresh water to deep sea and total production of sharks was 7253 MT and rays was 15091 MT and their contribution only 1.71% (sharks-0.50% and rays-1.10%) of the total marine fisheries production during 2009 (SEAFDEC, 2012).

Philippine's elasmobranches catch were of minor importance before the late 1970's and although variable, from 1987-1991 they compromised only 0.8% of the total national catches. SEAFDEC data show rays to be slightly more important than sharks in the catches representing an average 53% of the elasmobranches yields during 1977-1991(Bonfil, 1994). Philippine catches account for 2.63% of the world wide elasmobranches catch. In Philippines for large scale fishery purse seines, trawls, hook and line in small scale fisheries other trawl, gill/ drift net, hook/ long line, trap and others used for elasmobtanch fishery. The Philippines sharks and rays resources comprise 163 species of 3 Chimaeras, 94 sharks and 66 betides and the total production of sharks and rays were 2635 MT and 2591 MT respectively during 2009 and total production of sharks and rays contributes only 0.10% (sharks-0.05% and rays-0.05%) of the total marine fisheries landing (SEAFDEC, 2012).

In Thailand for large scale activity used purse seines, trawl, and hook and line but in small scale activity used gill/ drift net and hook/ long line for elasmobranch fishery. Total 60 species of sharks and 60 species of rays have been found in the Thai waters and total production of sharks was 2862 MT and 6219 MT rays and represents of sharks 0.20% and rays 0.50%(average. 0.29%) were of the total marine fisheries landing during 2009 (SEAFDEC, 2012).

This study reveals that total production of elasmobranchs in South Korea, Thailand and Philippines represents only less than 1% of the total marine fish production which is same in our countries shark fisheries production (%) But in Malaysia, Indonesia, Sri Lanka, India and Pakistan total landing of elasmobranch was more than 1% of the total marine fisheries landing. In this study a total 24 species of sharks and rays were recorded during one year study period; harvested 479661 numbers of sharks and rays species and their total landing of weight was 382.67 MT of which sharks and rays contribute 35.66% and 64.34% respectively. Roy (2008) mentioned that, yet exploitation of shark fishing is seasonal but harvested one start from November continue up to May, the peak period of harvest in December to January. But in this study the peak period of exploitation on sharks and rays fishing were found in October to December.

Roy (2007) described that during April, 2006 to March, 2007 total 22 species of sharks, skates and rays were identified and total 162888 numbers of sharks, skates and rays species were harvested and their total landing weight was 398.68 MT, the highest sharks and rays catch were Scoliodon sorrakowah (34.415MT, 8.63%) and Himantura uarnak (163.904MT, 41.11%) respectively. But in the present study a total of July,2011 to June,2012 period total 24 species of sharks and rays were recorded, their total exploited numbers was 479658 and total landed weight was 382.67MT; the highest catch of sharks and rays were Scoliodon laticaudus (sorrakowah) (84.52MT, 22.09%) and Himantura uarnak (164.97MT, 42.97%) respectively of the total landing. According to the Roy (2007), analyzing and this study, total catch numbers of sharks and rays species variety and total landing weight about same but total exploited species numbers about 3 times more remaining the Roy, (2007) study at the same landing stations. Halder, (2010) mentioned that catches of small size juvenile sharks has increased with the decrease of large size shark and some species are rare in the catches So it is clear that small sizes of juveniles' sharks

and rays species are harvested which is an indication of danger for future shark fisheries.

The major problem on shark and ray fisheries are the lack of catch and species composition data, as most fisheries doesn't report shark landings by species and lack of species identification knowledge of shark. No information on biological data or size compositions of species landed, stock assessment for sharks in Bangladesh has never conducted. For proper management and conservation of shark fisheries there is need for a National Action Plan (NAP).

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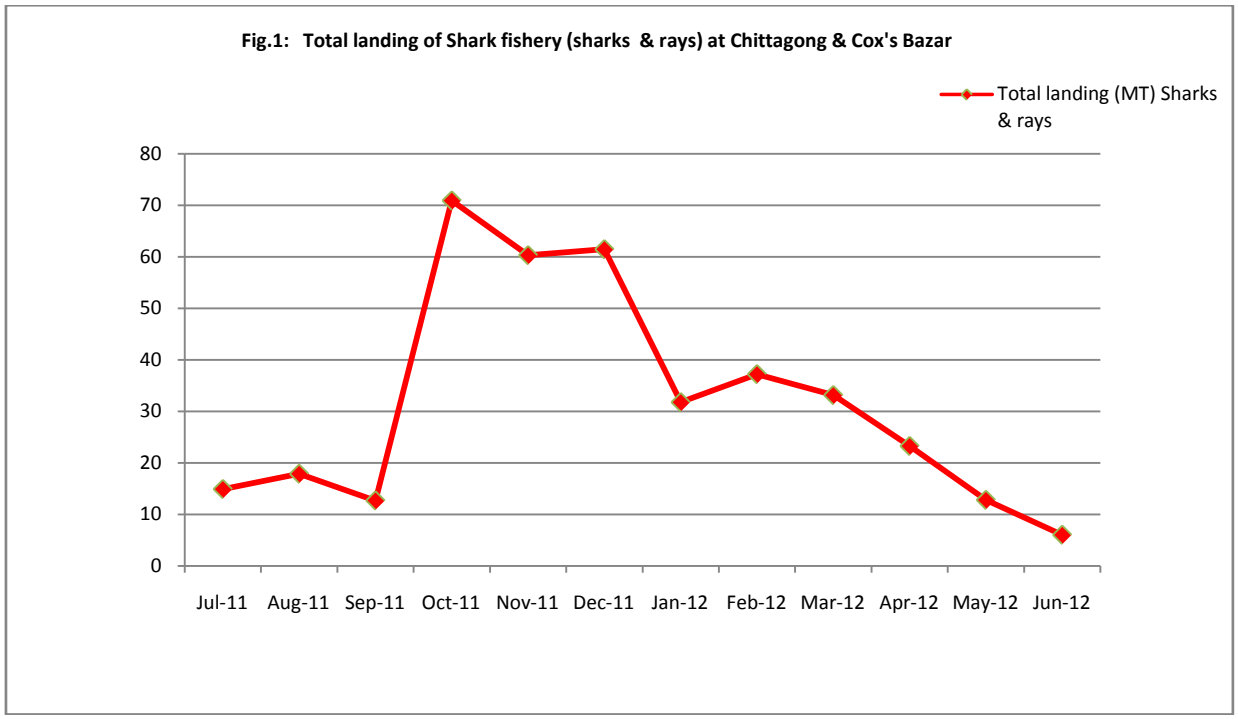

Fig.1 : Total landing of Shark fishery (sharks & rays) at Chittagong & Cox's Bazar

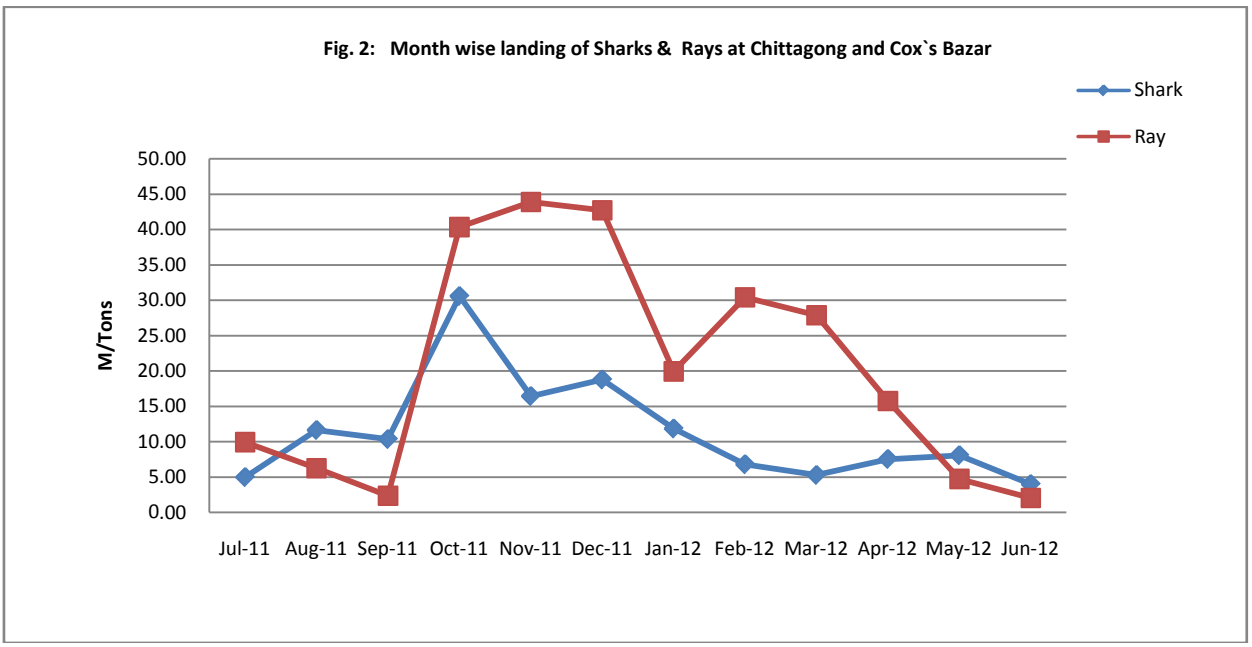

Fig. 2 : Month wise landing of Sharks & Rays at Chittagong and Cox`s Bazar

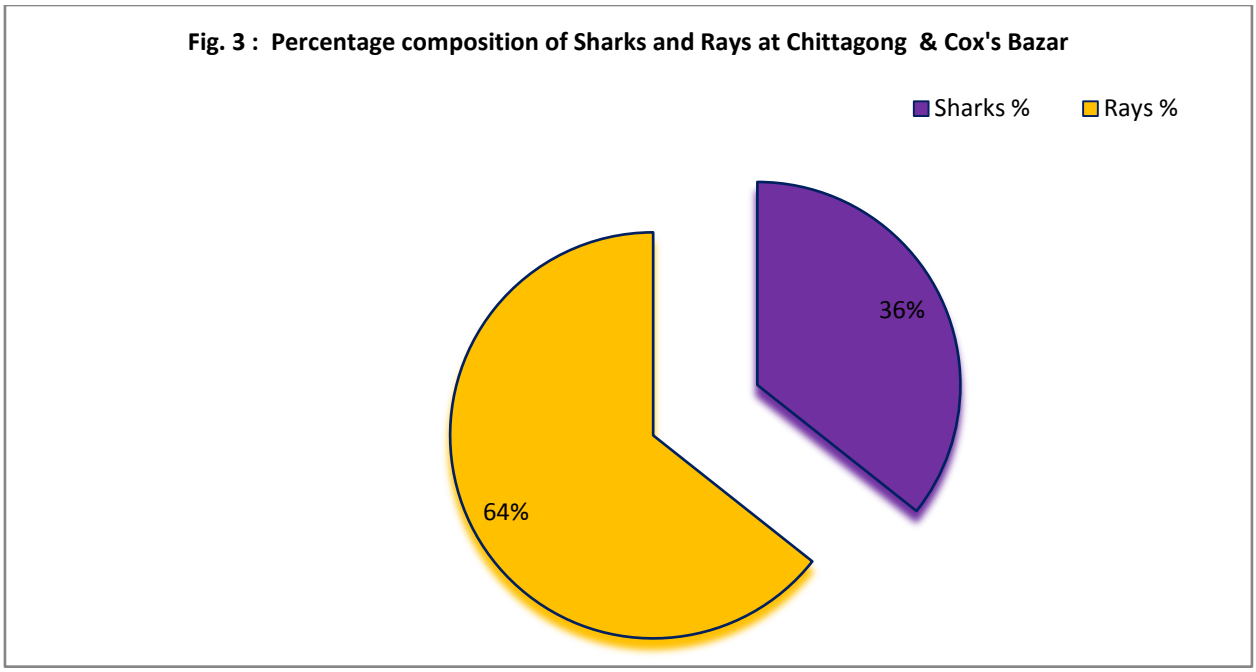

Fig. 3 : Percentage composition of Sharks and Rays at Chittagong & Cox's Bazar

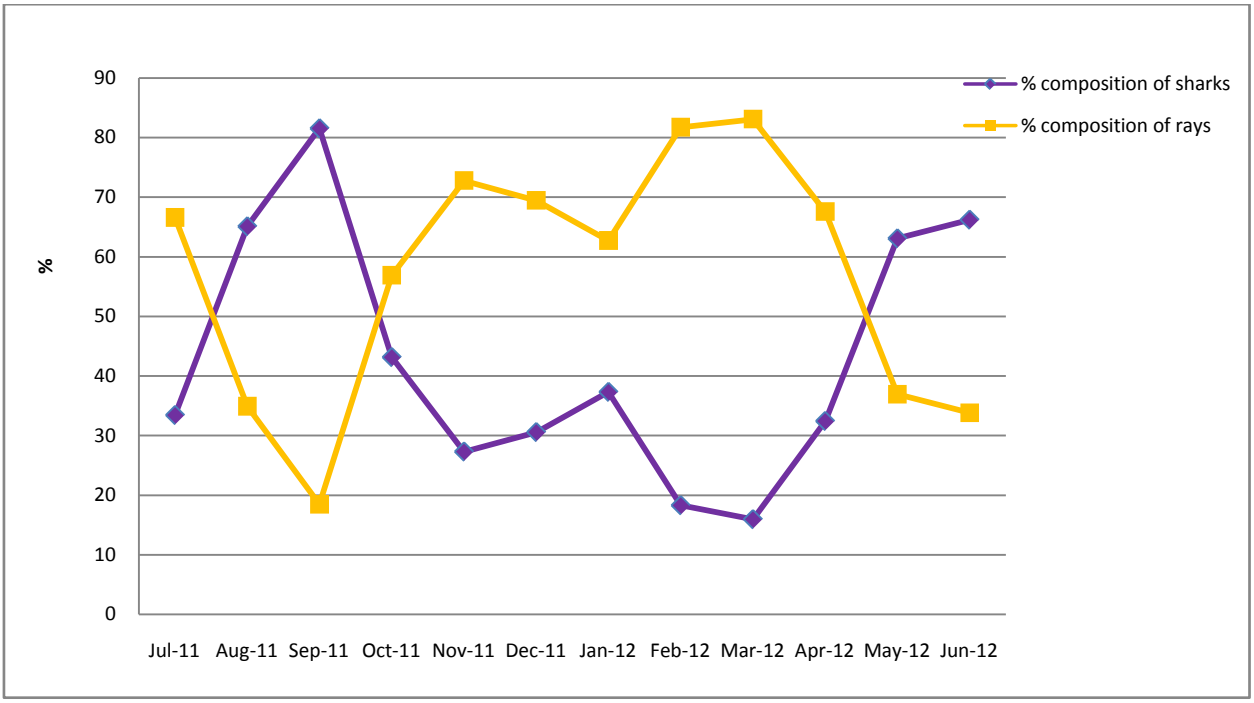

Fig. 4 : Monthwise percentage composition of Sharks and Rays at Chittagong & Cox's Bazar

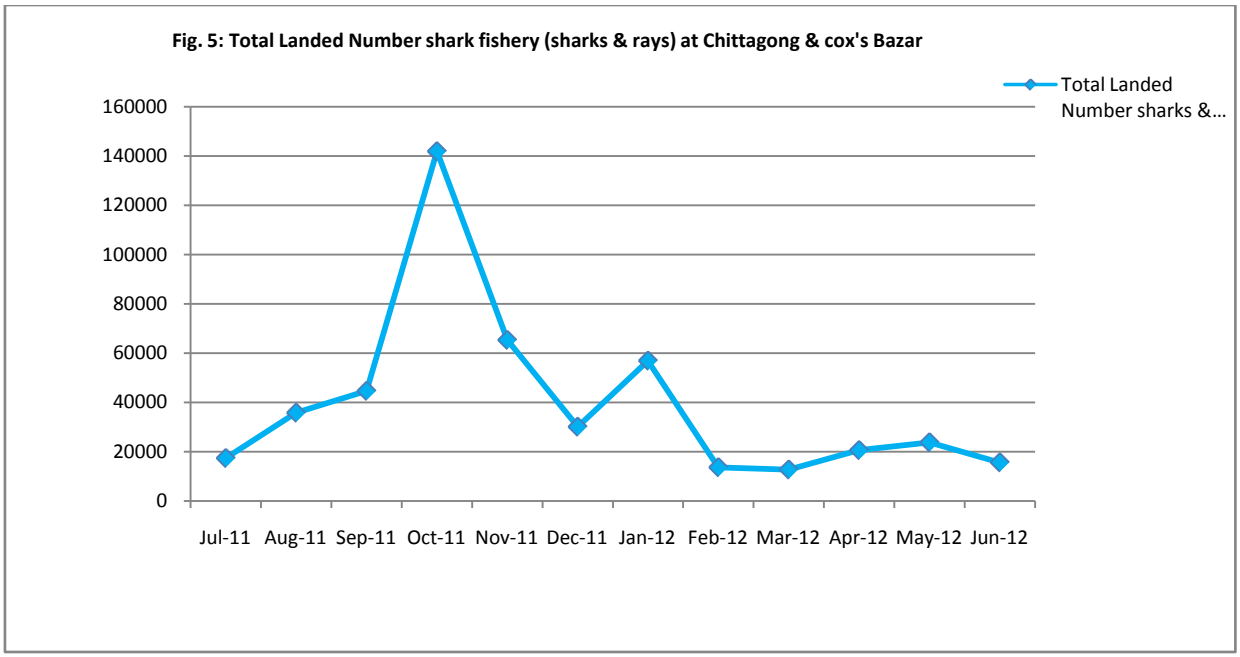

Fig. 5 : Total Landed Number shark fishery (sharks & rays) at Chittagong & cox's Bazar

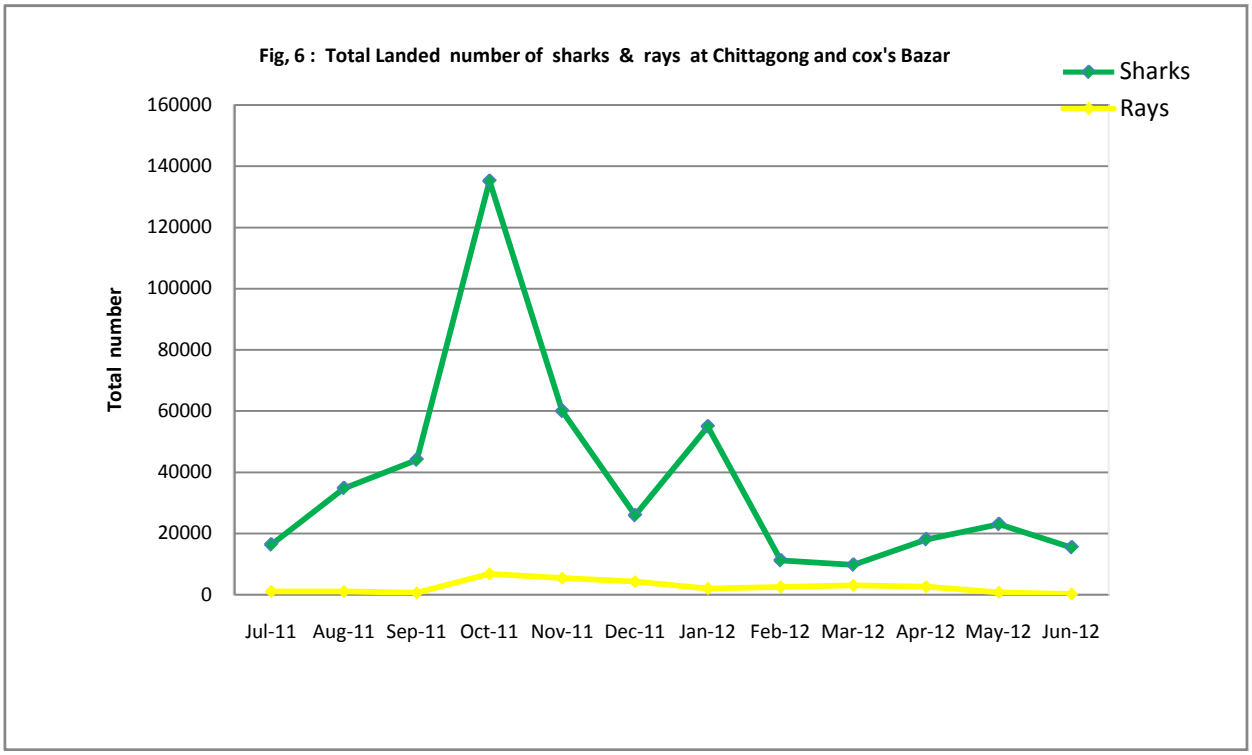

Table 1 : Total production (MT) of sharks and rays at Chittagong and Cox's Bazar landing centers

Scientific Name	July'11 (MT)	Aug'11 (MT)	Sep'11 (MT)	Oct'11 (MT)	Nov'11 (MT)	Dec'11 (MT)	Jan'12 (MT)	Feb'12 (MT)	Mar'12 (MT)	Apr'12 (MT)	May'12 (MT)	Jun'12 (MT)	Total landing (MT)
Scoliodon laticaudus	3.33	7.55	8.17	25.63	10.46	4.49	10.06	2.48	2.23	3.53	4.21	2.38	84.52
Rhizoprionodon acutus	0.07	0.21	0.04	0.49	0.56	0.35	0.32	1.56	0.02	1.20	0.44	0.30	5.56
R. oligolinx	-	-	-	-	-	-	-	-	-	-	0.02	-	0.02
Sphyrna lewini	0.73	1.40	1.02	1.83	3.30	12.34	0.74	0.70	1.24	0.56	2.37	0.85	27.08
Chiloscyllium indicum	0.02	0.79	0.61	0.96	0.88	0.30	0.38	0.18	0.24	0.10	0.37	0.01	4.84
Galeocerdo cuvier	0.01	0.15	0.01	0.25	0.11	0.50	0.09	1.29	0.70	1.82	0.19	0.01	5.13
Carcharhinus melanopterus	0.45	0.56	0.18	1.16	0.23	0.21	0.21	0.13	0.75	0.15	0.35	0.39	4.77
C. leucas	-	-	-	-	0.47	-	-	0.47	0.10	-	0.11	-	1.15
C. falciformis	0.38	0.99	0.34	0.28	0.44	0.60	0.06	-	0.01	0.19	0.02	0.06	3.37
C. sorrah	-	-	-	-	-	-	-	-	-	-	0.01	-	0.01
Sub total	**4.99**	**11.65**	**10.37**	**30.60**	**16.45**	**18.79**	**11.86**	**6.81**	**5.29**	**7.55**	**8.09**	**4.00**	**136.45**
Himantura uarnak	0.10	3.71	-	33.56	33.42	31.74	3.08	22.92	20.68	9.92	3.60	1.70	164.42
H. walga	-	-	-	-	-	-	-	-	1.09	-	-	0.09	1.18
H. undulata	0.35	0.11	-	-	-	-	-	-	-	0.20	0.23	-	0.89
H. gerrardi	-	-	-	-	-	-	-	-	-	0.78	-	-	0.78
H. uarnacoides	9.20	1.13	0.42	0.21	1.09	2.85	10.63	3.67	1.05	2.64	0.40	-	33.29
Gymnaura japonica	0.14	0.82	1.59	2.56	0.71	0.84	0.83	0.68	0.65	0.94	0.20	0.04	10.00
Rhinoptera javanica	-	0.23	0.02	-	-	-	-	-	0.07	-	-	-	0.32
Aetomylaeus nichofii	0.01	0.05	0.01	1.56	0.35	0.34	0.35	0.06	0.38	0.22	0.03	0.01	3.37
Mobula Kuhlii	0.01	-	-	0.43	0.74	0.03	0.13	-	0.19	0.05	-	0.14	1.72
Rhinobatos typus	0.13	0.12	0.08	2.02	7.46	6.79	4.21	3.08	1.95	0.99	0.26	0.07	27.16
Rhynchobatus laevis	-	0.08	0.15	-	0.10	0.11	0.04	0.01	1.81	-	-	-	2.30
Rhina ancylostoma	-	-	0.08	-	0.01	-	-	-	-	-	-	-	0.09
Aetobatus narinari	-	-		-	-	-	-	-	0.01	-	0.02	-	0.03
Urogymnus asperrimus	-	-	-	-	-	-	0.67	-	-		-	-	0.67
Sub total	**9.94**	**6.25**	**2.35**	**40.34**	**43.88**	**42.70**	**19.94**	**30.42**	**27.88**	**15.74**	**4.74**	**2.05**	**246.22**
Total	**14.93**	**17.90**	**12.72**	**70.94**	**60.33**	**61.49**	**31.80**	**37.23**	**33.17**	**23.29**	**12.83**	**6.05**	**382.67**

Table 2 : Percentage composition of sharks and rays at Chittagong and Cox's Bazar landin centers

Scientific Name	July'11 (%)	Aug'11 (%)	Sep'11 (%)	Oct'11 (%)	Nov'11 (%)	Dec'11 (%)	Jan'12 (%)	Feb'12 (%)	Mar'12 (%)	Apr'12 (%)	May'12 (%)	Jun'12 (%)	Average (%)
Scoliodon laticaudus	22.30	42.18	64.23	36.13	17.34	7.30	31.64	6.66	6.72	15.17	32.81	39.34	22.09
Rhizoprionodon acutus	0.47	1.17	0.31	0.69	0.93	0.57	1.01	4.19	0.06	5.15	3.43	4.96	1.45
R. oligolinx	-	-	-	-	-	-	-	-	-	-	0.16	-	-
Sphyrna lewini	4.89	7.82	8.02	2.58	5.47	20.07	2.33	1.88	3.74	2.40	18.47	14.05	7.08
Chiloscyllium indicum	0.03	4.41	4.80	1.35	1.46	0.49	1.19	0.48	0.72	0.43	2.88	0.17	1.26
Galeocerdo cuvier	0.07	0.84	0.08	0.35	0.18	0.81	0.28	3.46	2.11	7.81	1.48	0.22	1.34
Carcharhinus melanopterus	3.01	3.13	1.42	1.64	0.38	0.34	0.66	0.35	2.26	0.64	2.73	6.45	1.25
C. leucas	-	-	-	-	0.80	-	-	1.26	0.30	-	0.86	-	0.30
C. falciformis	2.56	5.53	2.67	0.39	0.73	0.98	0.19	-	0.03	0.82	0.16	0.99	0.88
C. sorrah	-	-	-	-	-	-	-	-	-	-	0.08	-	-
Sub total	**33.42**	**65.08**	**81.53**	**43.13**	**27.29**	**30.56**	**37.30**	**18.28**	**15.94**	**32.42**	**63.06**	**66.19**	**35.66**
Himantura uarnak	0.67	20.73	-	47.31	55.40	51.62	9.69	61.56	62.35	42.59	28.06	28.10	42.97
H. walga	-	-	-	-	-	-	-	-	2.29	-	-	1.49	0.31
H. undulata	2.34	0.61	-	-	-	-	-	-	-	0.86	1.79	-	0.23
H. gerrardi	-	-	-	-	-	-	-	-	-	3.35	-	-	0.20
H. uarnacoides	61.62	6.31	3.30	0.30	1.81	4.63	33.43	9.86	3.17	11.34	3.11		8.70
Gymnaura japonica	0.94	4.58	12.50	3.61	1.18	1.37	2.61	1.83	1.96	4.04	1.56	0.66	2.61
Rhinoptera javanica	-	1.28	0.16	-	-	-	-	-	0.21	-	-	-	0.08
Aetomylaeus nichofii	0.07	0.28	0.08	2.20	0.58	0.55	1.10	0.16	1.15	0.94	0.23	0.17	0.88
Mobula kuhlii	0.07	-	-	0.61	1.23	0.05	0.41	-	0.57	0.21	-	2.31	0.44
Rhinobatos typus	0.87	0.67	0.63	2.85	12.37	11.04	13.24	8.27	5.88	4.25	2.03	1.16	7.10
Rhynchobatus laevis	-	0.45	1.18	-	0.17	0.18	0.13	0.03	5.46	-	-	-	0.60
Rhina ancylostoma	-	-	0.63	-	0.02	-	-	-	-	-	-	-	0.02
Aetobatus narinari	-	-	-	-	-	-	-	-	0.03	-	0.16	-	-
Urogymnus asperrimus	-	-	-	-	-	-	2.11	-	-	-	-	-	0.18
Sub total	**66.58**	**34.91**	**18.48**	**56.88**	**72.76**	**69.44**	**62.72**	**81.71**	**83.07**	**67.58**	**36.94**	**33.81**	**64.34**

Table 3 : Total landing (Nos) of sharks and rays at Chittagong and Cox's Bazar landing centers

Scientific Name	July'11 (Nos)	Aug'11 (Nos)	Sep'11 (Nos)	Oct'11 (Nos)	Nov'11 (Nos)	Dec'11 (Nos)	Jan'12 (Nos)	Feb'12 (Nos)	Mar'12 (Nos)	Apr'12 (Nos)	May'12 (Nos)	Jun'12 (Nos)	Total landing (Nos)
Scoliodon laticaudus	15313	31379	41699	129183	57165	21452	54566	10732	9255	17397	20643	11581	420365
Rhizoprionodon acutus	212	20	45	2406	338	82	54	84	10	124	99	45	3519
R. oligolinx	-	-	-	-	-	-	-	-	-	-	10	-	10
Sphyrna lewini	488	790	519	1256	2273	4215	245	252	290	113	2042	3441	15924
Chiloscyllium indicum	6	2347	1720	120	47	91	35	30	28	388	15	5	4832
Galeocerdo cuvier	2	15	2	14	9	34	7	100	50	37	33	1	304
Carcharhinus melanopterus	264	181	46	2124	53	46	36	26	149	12	167	355	3459
C. leucas	-	-	-	-	-	-	-	3	13	-	56	-	74
C. falciformis	113	92	59	74	126	34	36	-	8	34	15	50	641
C. sorrah	-	-	-	-	-	-	-	-	-	-	5	-	5
Sub total	16398	34824	44090	135177	60013	25954	54979	11227	9803	18105	23085	15478	449133
Himantura uarnak	33	452	-	4044	3955	2670	309	1463	2005	1361	533	157	16982
H. walga	-	-	-	-	-	-	-	-	52	-	-	32	84
H. undulata	10	14	-	-	-	-	-	-	-	12	9	-	45
H. gerrardi	-	-	-	-	-	-	-	-	-	36	-	-	36
H. uarnacoides	908	194	81	8	149	316	828	147	30	242	61	-	2964
Gymnaura japonica	66	358	498	842	583	391	483	580	434	792	134	21	5182
Rhinoptera javanica	-	11	2	-	-	-	-	-	23	-	-	-	36
Aetomylaeus nichofii	1	5	3	1451	47	53	68	17	34	11	8	6	1704
Mobula kuhlii	1	-	-	109	225	10	26	-	45	5	-	21	442
Rhinobatos typus	60	26	23	343	411	802	315	324	398	156	52	15	2925
Rhynchobatus laevis	-	11	6	-	25	11	4	6	11	-	-	-	74
Rhina ancylostoma	-	-	38	-	5	-	-	-	-	-	-	-	43
Aetobatus narinari	-	-	-	-	-	-	-	-	2	-	1	-	3
Urogymnus asperrimus	-	-	-	-	-	-	8	-	-	-	-	-	8
Sub total	1079	1071	651	6797	5400	4253	2041	2537	3034	2615	795	252	30528
Total	17477	35895	44741	141974	65413	30207	57020	13764	12837	20720	23880	15730	479661