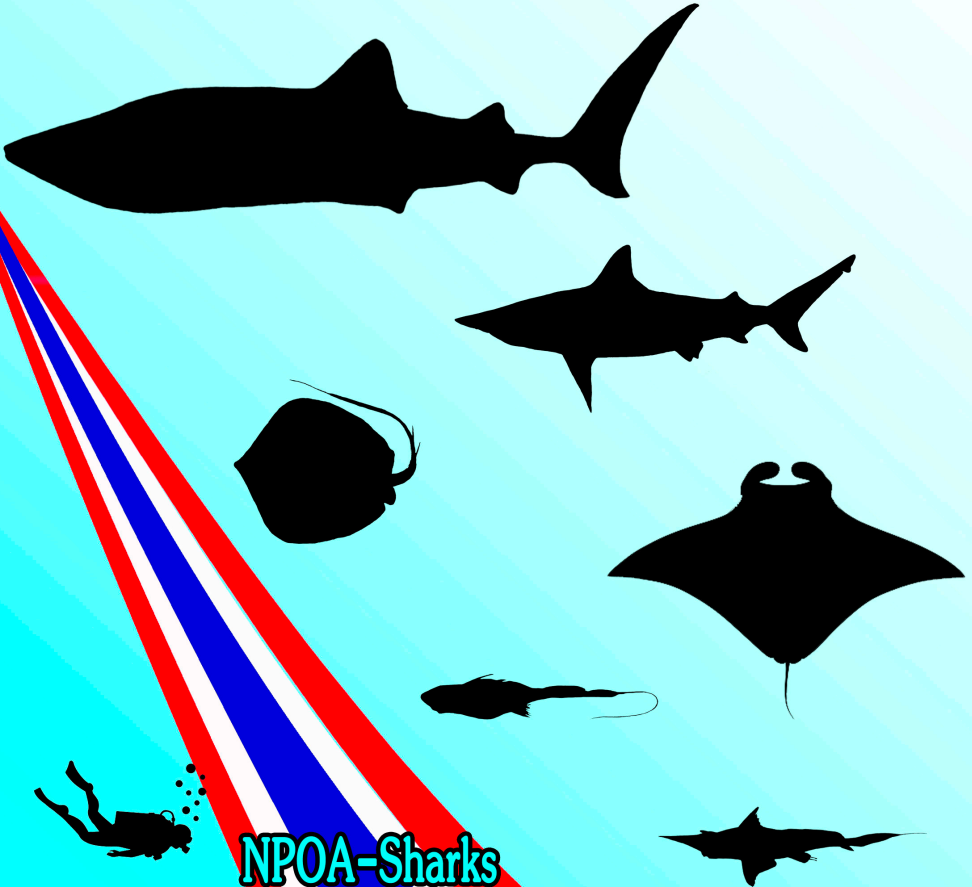




**Thailand National Plan of Action
for the Conservation and Management of Sharks
(NPOA-Sharks, Thailand : Plan 1, 2020-2024)**



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Department of Fisheries

Ministry of Agriculture and Cooperatives

Thailand

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**Thailand National Plan of Action
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Foreword

Shark resources around the world have been in crisis and some species of sharks tend to be endangered or even extinct due to fishing pressure as well as their own biological characteristics which are the low birth rate owing to longtime embryonic development with a small amount of juvenile delivered and the late maturity. According to survey data from national and international organizations, it indicates that shark resources are risking to extinction, meanwhile the stakeholders have been concerned about the shark population status in the future. In this regard, the action plan for conserving and managing of sharks is urgently needed.

As one of the member countries of the United Nations Food and Agriculture Organization (FAO), Thailand ratified the Code of Conduct for Responsible Fisheries and manages fisheries under the Royal Ordinance on Fisheries, B.E. 2558 (2015) and its additional edition (No. 2), B.E. 2560 (2017), we recognize the significance of sustainable management of shark resources and stipulates that the Department of Fisheries (DoF) develops and implements the National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks) under framework of the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks). The objectives of this plan are to strengthen data collection and capacity building, as well as to rectify the negative perception towards shark catching in Thailand through enhancement of public awareness and education programs.

I wish to express my sincere gratitude to Thai NPOA-Sharks team for completing this plan which embodies stakeholders' opinions and interests in conserving and managing by-catch of sharks and rays. My appreciation is extended to whom devoted their times and effort to develop this plan. Finally, I thank all the staff of DoF, relevant agencies and private sectors for their supports and assistance.



(Mr. Amnuay Kongprom)

Director of Marine Fisheries Research and
Development Division

Executive Summary

The marine fisheries in Thailand are continuously growing as fishing gears and fishing methods evolve, and various types of fishing gears are allowed to operate on the same fishing ground. The results from Department of Fisheries of Thailand (DoF) landing survey and assessment of marine capture production in Thai waters revealed that overfishing is occurring in some marine species. In addition, new technologies have been used to improve catch efficiency of many fishing gears including trawls, purse seines, gill nets, long lines, etc., resulting in high catches of sharks. Although sharks are not the main fishery target for Thai fisherman, the survey data of DoF during 2002-2014 indicated that the number of sharks caught has continuously decreased in both the Gulf of Thailand and the Andaman Sea. Meanwhile, the current market demand for sharks and sharks products in many countries is increasing and leading to high numbers of sharks being caught.

Thailand, as a member of the United Nations Food and Agriculture Organization (FAO), supports the Code of Conduct for Responsible Fisheries (CCRF). The Royal Ordinance on Fisheries, B.E. 2558 emphasizes the sustainable management of fishery resources in Thailand, thereby ensuring both conservation and management of sharks. Understanding the status of sharks stocks in Thailand are difficult due to discontinuous or missing data sets.

The status of sharks resources around the world are in crisis and some sharks species are vulnerable to extinction due to (non) targeted fishing activities using a variety of fishing gears. Biologically, sharks are more susceptible to overharvesting because they have low birth rates, small litter sizes, and late sexual maturity. According to survey data from domestic and international organizations such as FAO, IUCN (International Union for Conservation of Nature), CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) and CMS (Convention on the Conservation of Migratory Species of Wild Animals), the status of sharks resources are at risk of extinction and stakeholders are concerned about the status of sharks populations in the future. In Thailand, there is no fisheries targeting to catch sharks directly. It was reported that sharks as by-catch in Thailand accounted only 0.72% of total catches. However, ray longline as a traditional fishing gear targeting rays had no longer used recently because declining of ray stocks when compared to the past.

DoF as the main organization managing sharks stocks in Thailand established Thailand National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks, Thailand) under framework of the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks), which its plan of actions will be implemented for five years (2020-2024). The outline of five key actions necessary to improve the management and conservation of sharks resources in Thai waters, are as follows:

Objective 1 Study and develop a database for information on biology, ecology, fisheries, and utilization of sharks in Thai waters

Objective 2 Systematically and regularly assess status and threats on sharks caused by fisheries and environment

Objective 3 Develop knowledge and enhance capability related to sharks management for relevant officers

Objective 4 Define conservation and management measures to regulate fishing activities and trade on sharks in consistent with international rules, regulations, and obligations

Objective 5 Establish and strengthen a network of stakeholders' engagement for management and conservation of sharks resources

With that objectives, DoF issued NPOA-Sharks of Thailand for conservation and management of sharks. Time series data of sharks resources in Thailand and guidelines for sharks resources management through national stakeholder consultation process to ensure sustainability conservation and management of sharks resources.

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Thailand National Plan of Action for the Conservation and Management of Sharks

1. Introduction

1.1 Background

Although sharks are not the main target of Thai fisheries, the improvement of catch efficiency and fishing gear practices has caused increasing in sharks catches by various types of fishing gears, including trawl, purse seine, gillnet, longline, etc. This group of fishes is classified as by-catch. However, they have been fully utilized for consumption and processing to be various products since there are market demands in many countries, leading to a continuous decline in sharks landings. The Fisheries Statistics of Thailand reported that 80% decline in landings from the highest catch of sharks and rays in 2003 (14,409 and 18,131 metric tons, respectively) to the lowest levels in 2011 (only 1,424 and 3,376 metric tons, respectively), in accordance with sharks landing trends around the world.

Many sharks species are migratory species or are reliant on multiple habitats and are often captured for their fins to make dried shark fins. Furthermore, sharks are more susceptible to overfishing because they have low birth rates due to longtime embryonic development, with a small litter sizes, and late maturity. Therefore, these species are highly at risk of extinction. Many countries concern about the continuous decline in sharks populations due to overfishing, which lead to insufficient numbers for recruitment. Stakeholders are worried that it may affect the sharks population in the future, ultimately leading to their extinction. Thus, FAO agreed to establish IPOA-Sharks in 1998, which was launched in 1999, and encouraged member States to establish their respective NPOA-Sharks to effectively conserve and manage sharks in their waters (FAO, 1999).

For Thailand, this involves not only compliance with the national law on the conservation of aquatic resources, but also complying with the international laws, various legal binding and non-legal binding international rules and regulations ratified and accessed, such as the United Nations Convention on the Law of the Sea, 1982, the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea dated December 10th, 1982 relating to the conservation and management of straddling and highly migratory fish stocks, the Port State Measures Agreement (PSMA), the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, CCRF, the Convention on Biological Diversity (CBD), CMS (1979) and CITES. Furthermore, Thailand is also a member of number of the regional fishery management organizations (RFMOs) supporting implementation of guidelines for sharks

management and encourage conservation and management measures for by-catch in their responsible area including the Indian Ocean Tuna Commission (IOTC), the Southern Indian Ocean Fisheries Agreement (SIOFA) and collaborating with the Western and Central Pacific Fisheries Commission (WCPFC) as a co-operating non-member country. At the same time, Thailand is concerned about this issue and prescribes the regulation to prohibition of fisheries or harming to some marine species such as the Ministry of Agriculture and Cooperatives notified “definitions for marine mammals and endangered or nearly extinction species that are prohibited to fish or bring up onboard fishing vessels” dated 7 April 2016 under the Royal Ordinance on Fisheries, B.E. 2558 (Fisheries Act, B.E. 2558), Whale shark (*Rhincodon typus*) was listed under appendix that was ranked at 4th under the list and declared as a preserved wildlife species in fish group under the Wildlife Preservation and Protection Act, B.E. 2562. Studies and monitoring of sharks resource status have continuously conducted on concordance with international practice for sharks conservation and management. In this connection, Thailand has established this NPOA-Sharks with objectives to effectively conserve and manage sharks resources and comply with the IPOA-Sharks.

1.2 Definition (as appeared in this document)

Sharks refer to all cartilaginous fishes (Class Chondrichthyes) including shark, ray and chimaera.

- Shark refer to cartilaginous fish with 5-7 pairs of gill openings on the lateral side of head.
- Ray refer to cartilaginous fish with 5-7 pairs of gill openings at the ventral side of head.
- Chimera refer to cartilaginous fish with a pair of gill opening on the lateral side of head.

1.3 Problems and limitations regarding sharks conservation and management in Thailand

Thailand have non specific shark fishing. Sharks are categorized as by-catch in from the Thai fishery sector, with very low levels, only 0.72 % of total marine catches. Nowadays, there is no specifically designed fishing gear to catch sharks, while in the past, only traditional fishing gear called “Rawai hook” or ray longline was used; the latter are not currently used because rays are no longer as abundant as in the past (Marine Fisheries Division, 1997). Current problems and limitations regarding sharks conservation and management in Thailand are as follows:

1.3.1 Problems and limitations of data

- Biological data such as species identification, size at first maturity, growth rate, abundance and distribution
- Fishery biological data such as fishing mortality, natural mortality, fishing effort and recruitment rate

- Status of sharks resources in Thai waters is unclear due to the lack of time series data collection.

- Fishery statistics data do not classify catch at species level of sharks. Therefore, it is not possible to assess clearly actual status of sharks resources.

- Quantity and value of domestic consumption, import and export of sharks products and related industries such as shark fins, leather goods, jewelry, souvenirs in various type, group and quality of imported and exported sharks products.

1.3.2 Problems and limitations of personnel

- Lack of fish taxonomists

- A limited number of government staff who is expert in sharks identification at the family or species level, and lack of staff gathering data for proper sharks resource management.

- Low level of involved stakeholders awareness and lack of cooperation among relevant government agencies due to lack of data integration and management of sharks resources of relevant government agencies and private sectors

1.3.3 Problems and limitations of budget

- Insufficient budget for sharks research and their monitoring

- Insufficient budget for sharks management schemes

1.3.4 Problems and limitations related to trade issues

- The global demand for sharks consumption and trade have induced marketing pressures (an important cause of sharks consumption), which increased until it affected sharks resources in Thailand.

1.3.5 Problems and limitations due to the obligations of the international fisheries management organizations

- Ineffective coordination and reporting of sharks landing data information in Thailand and that of highly migration or in the high seas

- National regulations and measures for fishery resources management are likely irrelevant with international obligations.

- Rules, regulations, or measures issued by RFMOs, responsible for fishery resource management in various regions in order to conserve sharks resources or reduce sharks catches by the fisheries, such as IOTC, WCPCF, etc., unenforceable fishing vessels of their respective non-member States, as well as discontinuous distribution of update information are cause of non compliance with vessels operation.

1.4 Goal

To ensure that Thailand has sharks conservation and management measures for sustainable utilization and the long-term socioeconomic development of sharks.

2. Objectives

2.1 Study and develop a database for information on biology, ecology, fisheries, and utilization of sharks in Thai waters

2.2 Systematically and regularly assess status and threats on sharks caused by fisheries and environment

2.3 Develop knowledge and enhance capability related to sharks management for relevant officers

2.4 Define conservation and management measures to regulate fishing activities and trade on sharks in consistent with international rules, regulations, and obligations

2.5 Establish and strengthen a network of stakeholders' engagement for management and conservation of sharks resources

3. Sharks resource status and fishery in Thai waters

3.1 Sharks found in Thai waters and adjacent waters

The survey and species list preparation of sharks in Thai waters was initiated in 1977 by Professor Supap Monkolprasit of the Faculty of Fisheries, Kasetsart University. As a result, publication in English version named “The Cartilaginous Fishes (Class Elasmobranchii) Found in Thai Waters and Adjacent Areas” was issued in 1984. As reported in this publication, there were 29 shark species of 7 families and 38 ray species of 6 families (Monkolprasit, 1984). Subsequently, new list of species was updated by the Department of Marine and Coastal Resources (DMCR) reported 50 shark species of 14 families and 56 ray species of 10 families (Natheewatthana and Chuenphan, 2002). Moreover, Krajangdara *et al.* (2006) revised the list of sharks to 59 species of 18 families, and Krajangdara (2014a, 2014b) revised the list of rays to 71 species of 11 families. These studies found the new record of 7 shark and 15 ray species in Thai waters during 2004-2014, and most of them were found in the Andaman Sea, Thailand.

DoF carried out sharks resource survey in Thai waters by a sampling method during 2011-2014, and reported 14 species out of 39 shark species belonging to 12 families were found in the Gulf of Thailand and 37 species were found in the Andaman Sea. They were mainly found in Ranong (33 species) and Phuket (16 species) whereas the smallest

number of species were found in Samutprakan Province (3 species). There were 3 shark species commonly found in all areas, i.e. two bamboo sharks (*Chiloscyllium punctatum* and *C. griseum*) and a Spottail shark (*Carcharhinus sorrah*). In addition, three new sharks were recorded the first time, i.e. Indonesian wobbegong (*Orectolobus leptolineatus*), Finback catshark (*Proscyllium magnificum*) and Ganges shark (*Glyphis* sp.) (Marine Fisheries Research and Development Bureau, 2014). For rays, a total of 16 species out of 41 species of 10 families were found in the Gulf of Thailand and 40 species in the Andaman Sea (Krajangdara *et al.*, 2014). Rays were found mainly in Ranong and Phuket, and the smallest number in Chumphon Province (35, 16 and 5 species, respectively). Rays under Family Dasyatidae were recorded in all areas, i.e. Sharpnose ray (*Dasyatis zugei*), Whitespotted whipray (*Himantura gerrardi*), Scaly whipray (*H. imbricata*), Dwarf whipray (*H. walga*) and Bluespotted maskray (*Neotrygon kuhlii*). In addition, nine newly recorded ray species were found, i.e. Broadnose wedgefish (*Rhynchobatus springeri*), Thailand pointed guitarfish (*Glaucostegus* cf. *granulatus*), Widenose guitarfish (*Rhinobatos obtusus*), Spotted guitarfish (*R. punctifer*), Pink whipray (*Himantura fai*), Black-spotted whipray (*H. toshi*), Round whip ray (*H. pastinacoides*), Speckled maskray (*Neotrygon* cf. *picta*) and Broad cowtail ray (*Pastinachus atrus*) (Krajangdara, 2014b). Under the list of sharks of Thailand and adjacent waters in 2017, There were a total of 160 including 76 shark species belonging to 21 families, 82 ray species of 16 families and 2 rat fish or chimera species of 1 family (Krajangdara, 2017). Scientific names of rays had been modified according to Last *et al.* (2016). Moreover, Krajangdara *et al.* (2019) updated new list of sharks in 2019, including a total of 183 species (86 shark species of 23 families, 92 ray species of 19 families and 5 chimera species of 2 families, see Figure 1, 2 and Appendix 1). This survey, it indicated that sharks are more abundant along the coastal area of Ranong Province than the other areas.

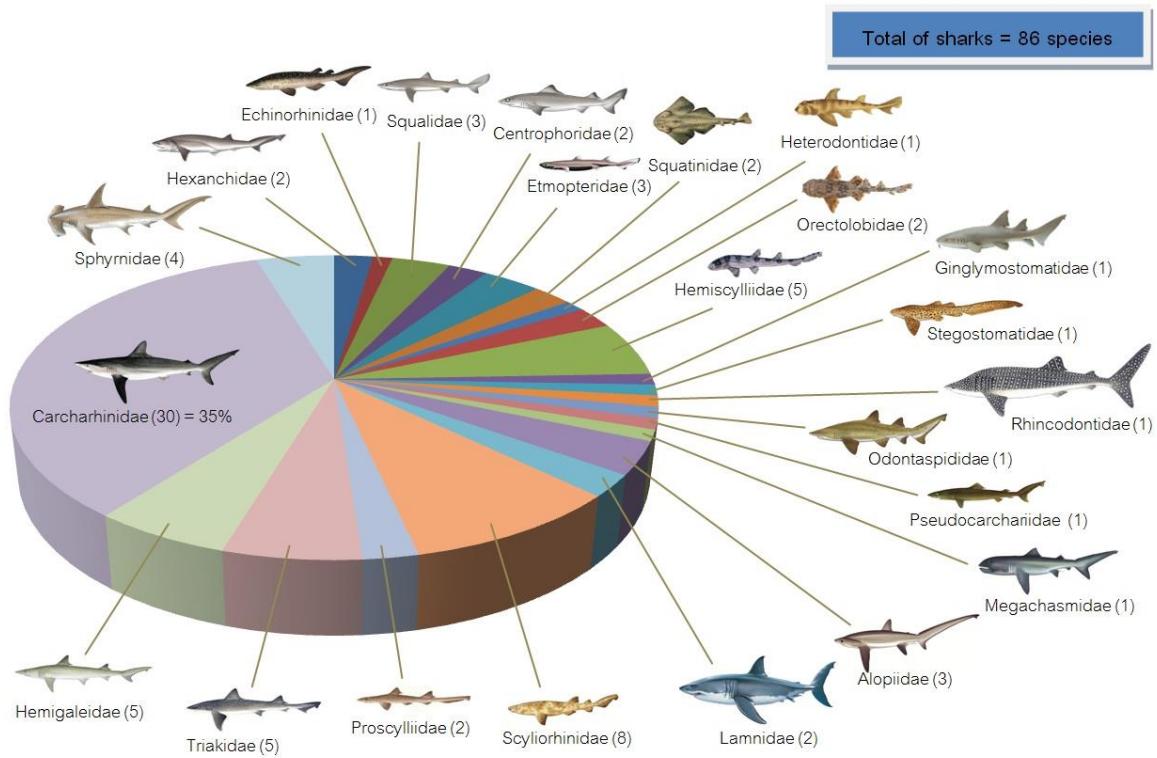


Figure 1 Sharks of Thailand and adjacent waters (Krajangdara *et al.* 2019)

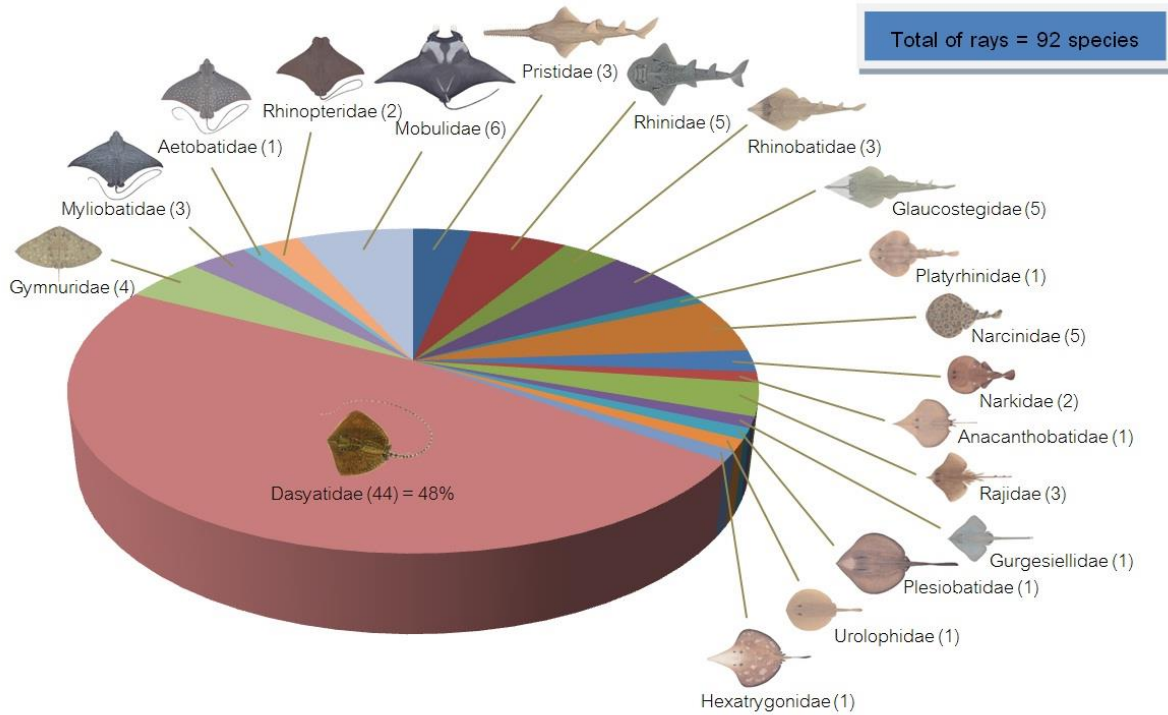


Figure 2 Rays of Thailand and adjacent waters (Krajangdara *et al.* 2019)

3.2 Fishing gears affect to sharks resources

DoF is the main agency responsible for fishery resource management. The Royal Ordinance on Fisheries, B.E. 2558 and its amendment in B.E. 2560 have been enforced by

prescribing all commercial fishing vessels who engage in commercial fishing shall obtain a commercial fishing license, that determine their respective coastal sea areas. The number of licensed commercial fishing vessels during 2016-2017 was 10,990 that were classified by fishing gear types as shown in Table 1.

Table 1 Number of commercial fishing vessels with fishing license issued during 2016-2017 classified by fishing gear types and fishing areas

Fishing gears	Gulf of Thailand	Andaman Sea	Total
Trawls	3,053	687	3,740
Otter board trawl (Fishes)	969	436	1,405
Otter board trawl (Shrimps)	691	38	729
Pair trawl	946	192	1,138
Beam trawl	447	21	468
Surrounding nets	895	316	1,211
Thai purse seine	629	266	895
Anchovy surrounding net	192	46	238
Neritic tuna purse seine	74	4	78
Encircling gill net	22	-	22
Encircling gill net	22	-	22
Gill and Entangling nets	782	10	792
Crab/Shrimp/Cuttlefish	213	-	213
Entangling nets			
Fish gill net	569	10	579
Lift nets	40	-	40
Anchovy lift net	16	-	16
Pomfret lift net	24	-	24
Cast/Falling nets	1,752	218	1,970
Anchovy cast/falling net	478	134	612
Squid cast/falling net	1,274	84	1,358
Push Net	140	-	140
Acetes push net	140	-	140
Traps	782	104	886
Fish trap	122	16	138
Crab trap	360	24	384
Octopus trap	208	-	208
Cuttlefish trap	92	64	156

Dredges	102	31	133
Baby clam dredge	68	-	68
Cockle dredge	14	-	14
Other dredges	20	-	20
Red frog crab dredge	-	31	31
Lines	79	17	96
Long line ≥ 100 m.	57	15	72
Hand line	22	2	24
Light luring vessels	1,316	644	1,960
Light luring vessels	1,316	664	1,960
Total vessels	8,963	2,027	10,990

Source: Fleet Control and Marine Fisheries Control Group, Fishing and Fleets Management Division (2016)

Remark: Commercial fishing vessel is fishing vessel ≥ 10 gross tonnage

According to national fisheries statistics of Thailand during 2002-2014, sharks catch from Thai waters was approximately 0.72% of the total catches, indicating very small proportion as compared to the total fish catches. Over 85% of sharks were caught by otter board trawl, which was the highest percentage of sharks caught in Thai marine fisheries, followed 11.33% from pair trawl and 3.50% from other fishing gears, such as longline, purse seine, Indo-Pacific mackerel gillnet, mackerel gillnet, etc. (Figure 3)

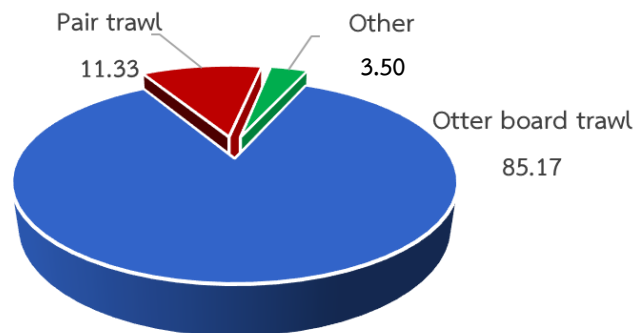


Figure 3 Percentage of sharks catch in Thai waters classified by fishing gears during 2002-2014

The analysis of sharks (shark and ray) catches from the Gulf of Thailand revealed that 83.65% of sharks were caught by otter board trawl, 12.63% from pair trawl and 3.72% from other fishing gears (Figure 4A). After classifying into groups, it was found that 83.75% of shark group was caught by otter board trawl, 12.75% from pair trawl and 3.50% from other fishing gears. For ray group, 83.59% was caught by otter board trawl, 12.54% from pair trawl and 3.87% from other fishing gears (Figure 4B).

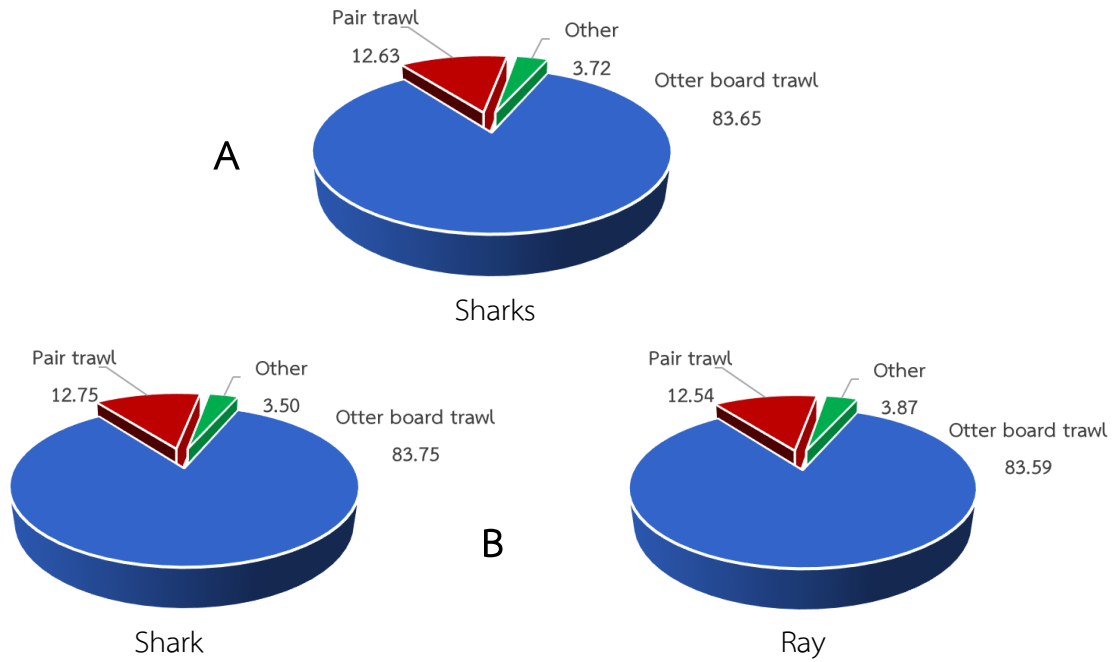


Figure 4 Percentage of sharks catch in the Gulf of Thailand by fishing gears during 2002-2014

The analysis of sharks catches from the Andaman Sea revealed that 87.61% of sharks were caught by otter board trawl, 9.26% from pair trawl and 3.13% from other fishing gears (Figure 5A). After classifying into groups, it was found that 88.94% of shark group was caught by otter board trawl, 9.63% from pair trawl and 1.43% from other fishing gears. For ray group, 86.75% was caught by otter board trawl, 9.02% from pair trawl and 4.23% from other fishing gears (Figure 5B).

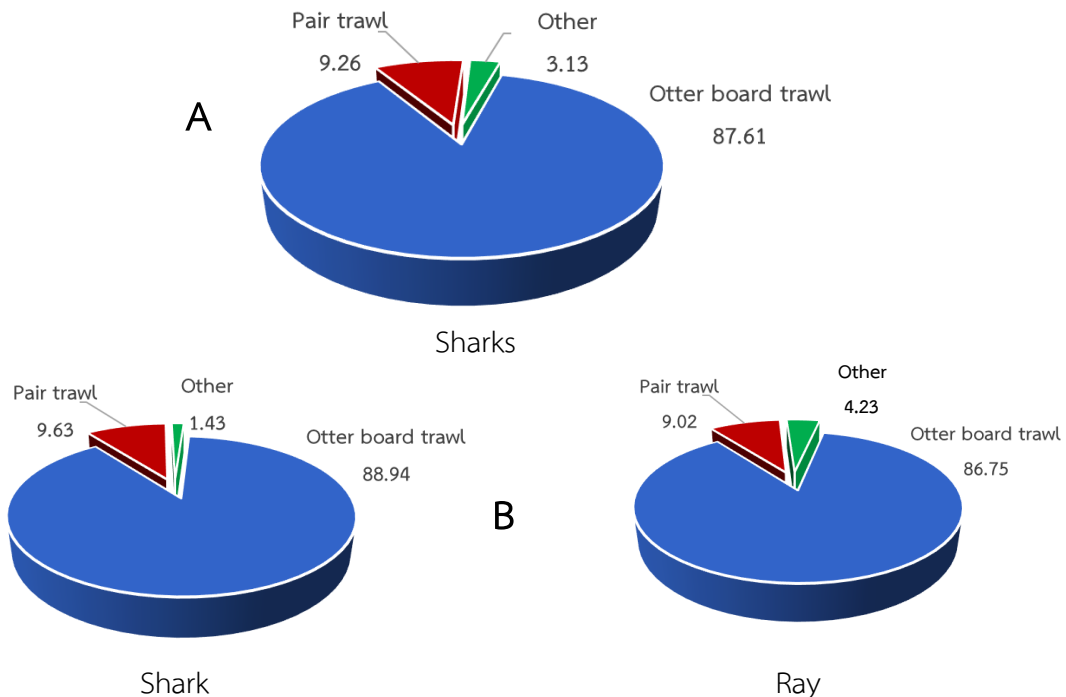


Figure 5 Percentage of sharks catch in the Andaman Sea by fishing gears during 2002-2014

Fishing grounds of otter board trawlers in the Gulf of Thailand are located from 10 to 45 meters along to the coastal line. Fishing ground in the eastern Gulf of Thailand are from Trat Province to Chonburi Province, and around Cha-am district of Phetchaburi Province in the upper Gulf of Thailand. In the central Gulf of Thailand, fishing grounds of otter board trawlers are located from Hua Hin district in Prachuap Khiri Khan Province to Lang Suan district in Chumphon Province, and expanding to Samui island and Phangan island in Surat Thani Province. In the lower Gulf of Thailand, fishing grounds of otter board trawlers are located from Khanom District in Nakhon Si Thammarat Province to Thepha District in Songkhla Province, and expanding to Pattani and Narathiwat Provinces. Intensive fishing activities are close to Thailand-Malaysia boundary for all year round. While fishing ground of otter board trawlers in the Andaman Sea scatter along the Andaman Sea coast line at water depth of 15-40 meters from Phayam island in Ranong Province, Phra Thong Island and Similan Island in Phang-Nga Province, south of Phuket Island, west of Lanta Yai island in Krabi Province, Tarutao and Adang islands in Satun Province. Generally, pair trawlers can fish all year round similar to that of otter board trawlers, its fishing ground is scatter throughout the Gulf of Thailand at water depth of 20-60 meters from islands in Trat Province to Chonburi Province, and expanding to Phetchaburi Province and Prachuap Khiri Khan Province, Mueang District to Lang Suan District in Chumphon Province, Samui island and Pha-ngan island in Surat Thani Province, expanding to Nakhon Si Thammarat, Songkhla and Pattani Provinces to border areas of Thailand-Malaysia. Fishing grounds of pair trawlers in the Andaman Sea are located along coastal line at water depth of 20-90 meters (Figure 6) (Marine Fisheries Research and Development Bureau, 2014).

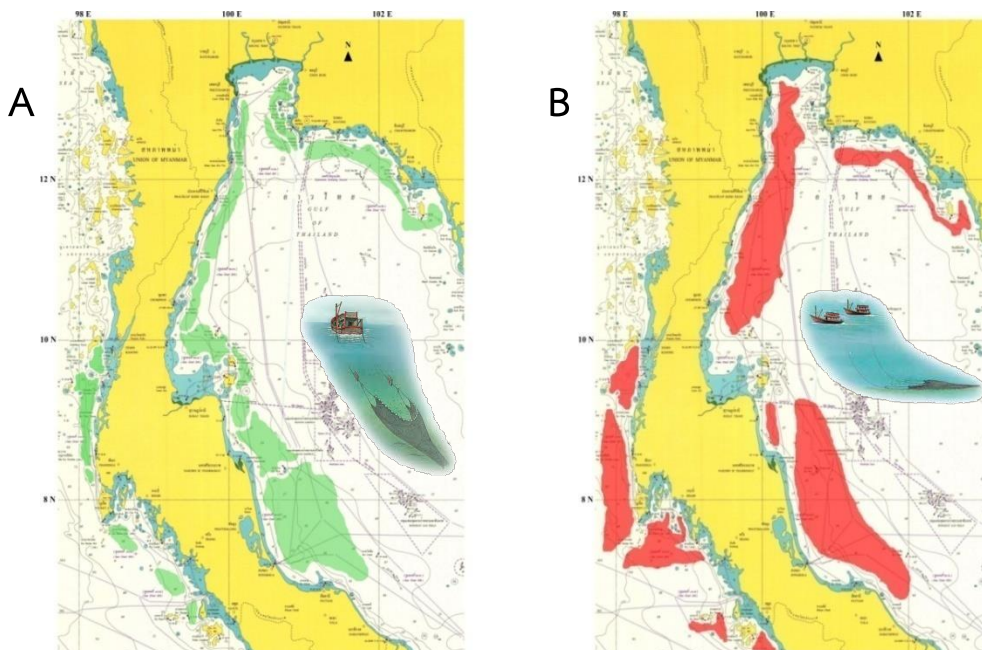


Figure 6 Fishing grounds of otter board trawlers (A) and pair trawlers (B) in Thai waters during 2011-2012

3.3 Sharks catch in Thai waters

3.3.1 Fishery statistics by sampling method survey

According to the data of sharks catches by fishing gear types during 2002-2014 (Department of Fisheries, 2004, 2005, 2006, 2008, 2009a, 2009b, 2010, 2012a, 2012b, 2013, 2014, 2015b, 2016b), which including otter board trawl, pair trawl, beam trawl, purse seine, Anchovy surrounding net, Mackerel gill net, Indo-Pacific mackerel gill net, push net, and bamboo strake trap, revealed that total catches of marine species from the Gulf of Thailand ranged between 861,143-1,719,415 metric tons/year, which included shark catches of 842-10,492 metric tons/year. The maximum shark catches were 10,492 metric tons in 2003 and continuously declined to the lowest catches of 842 metric tons in 2011 and then slightly increased from 2012-2014. Ray catches followed a similar trend. Ray catches ranged between 1,939-12,669 metric tons/year, with a maximum of 12,669 metric tons in 2003 and continuously declined to 1,939 metric tons in 2011 with slightly increased from 2012-2014 (Figure 7).

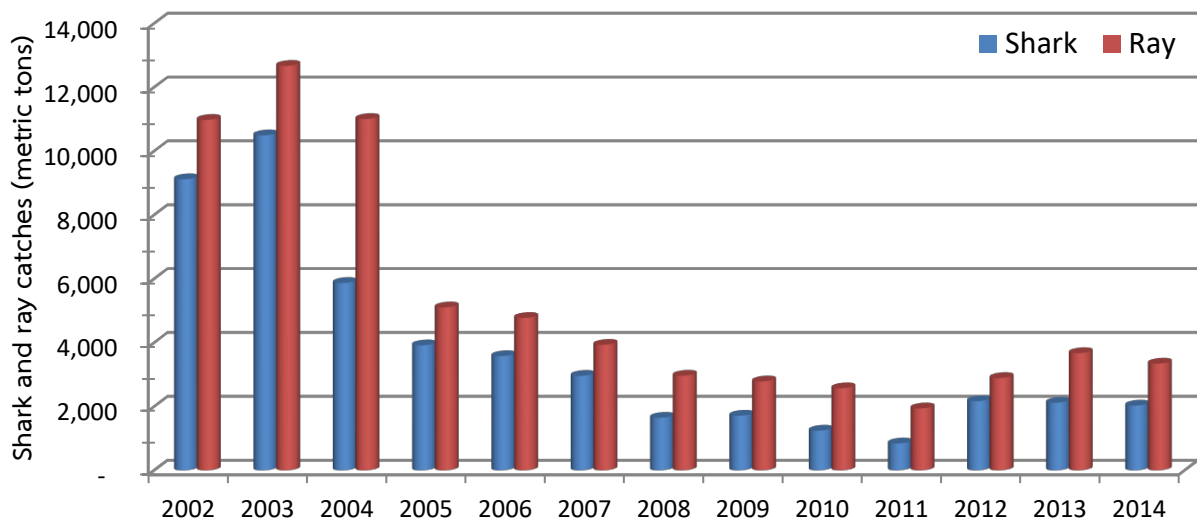


Figure 7 Production of sharks and rays from the Gulf of Thailand during 2002-2014

Source: Marine Fisheries statistics by random sampling

Regarding total catches of marine species from the Andaman Sea, it ranged from 301,884 to 801,695 metric tons/year, which included 156-4,779 metric tons/year of shark catches, while ray catches ranged from 400 to 7,748 metric tons/year. The highest shark catch was 4,779 metric tons in 2002 and it gradually decreased to 156 metric tons in 2014, while the highest ray catch was 7,748 metric tons in 2005 and it decreased the lowest of 400 metric tons in 2013. Shark and ray catches have continuously decreased in both the Andaman Sea and the Gulf of Thailand. Furthermore, this group represented relatively little of the total marine fisheries production from the Andaman Sea, in accordance with its from the Gulf of Thailand (Figure 8).

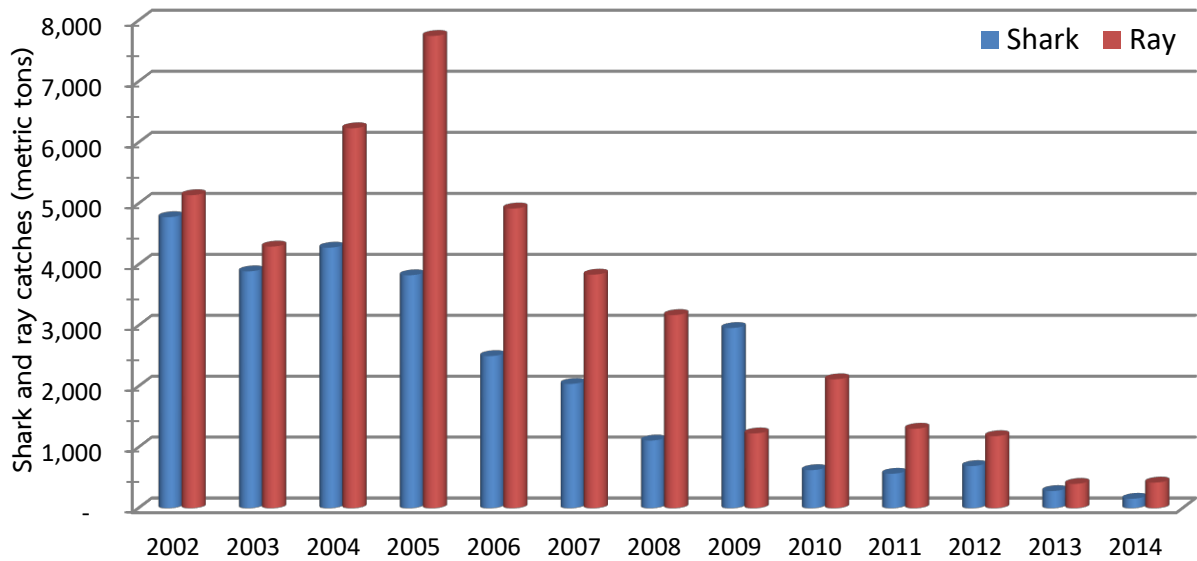


Figure 8 Production of sharks and rays from the Andaman Sea during 2002-2014

Source: Marine Fisheries statistics by random sampling

3.3.2 Resource survey by DoF

1) Fishery Research Vessel “Pramong” survey

The DoF joined a cooperative project with the Southeast Asian Fisheries Development Center (SEAFDEC) in 2004 with its objective to compile biological and fisheries data set of shark prior to the establishment of Thailand NPOA-Sharks. Since then, the biological and fisheries data were recollected in 2011 in order to identify stock status of shark in Thai waters. In the second survey, the data collection was also carried out in fishing ports and piers along sea coast of Thailand (Marine Fisheries Research and Development Bureau, 2014). The data collection on ray resources was done in 2013 under a collaboration project between DoF and FAO/BOBLME.

Marine Fisheries Research and Development Bureau (2014) reported results of the survey of sharks in Thai waters carried out by Fishery Research Vessels “Pramong” by using otter board trawl net during 2011-2012. Shark catch in the Gulf of Thailand and the Andaman Sea were 67.14 and 9.50 kg. with CPUE as 0.14 and 0.12 kg./hr, respectively. While ray catch of both areas were 33.95 and 71.63 kg. with CPUE as 0.07 and 0.87 kg./hr, respectively. In this survey, Brownbanded bambooshark (*Chiloscyllium punctatum*) was found in the Gulf of Thailand and the Andaman Sea, whereas the Zebra shark (*Stegostoma fasciatum*) was found in the Andaman Sea (Figure 9).

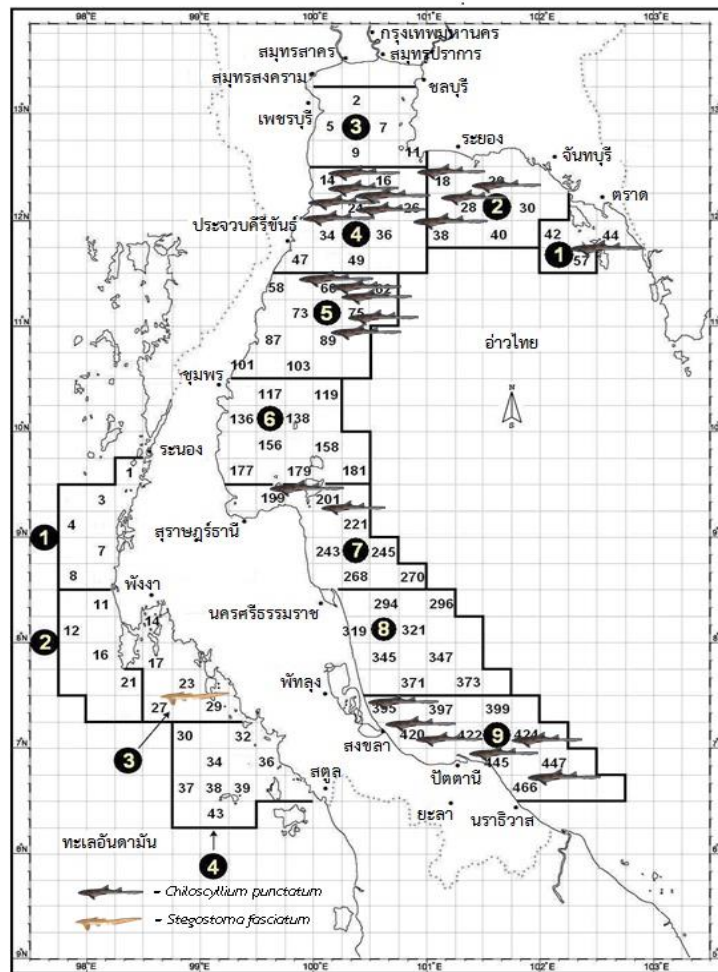


Figure 9 Survey stations during 2011-2012 illustrates shark distributions

2) Survey at fishing ports

The Marine Fisheries Research and Development Bureau (2014) reported the survey at fishing ports during 2011-2012, using catch data from otter board trawl and pair trawl in the Gulf of Thailand areas, and otter board trawl, pair trawl, purse seine and long line in the Andaman Sea areas. As a result of the Gulf of Thailand, proportions of sharks and rays catches as compared with its overall catch by otter board trawl and pair trawl were 0.07% and 0.13%, respectively (Table 2). This considers a small amount when compared to the total catch during that time period. The catch composition of economic fishes and trash fishes on average were 59.24% and 40.50%, respectively. Results also showed that productions of sharks and rays in early of 2012 were higher proportion than that of its productions in late of 2011. The highest proportion of shark catches were found in May 2012 (0.10%), followed by the production in March 2012 (0.08%). Regarding ray productions, its peak was found in March 2012 (0.23%), followed by May 2012 (0.22%). From this survey, it could be assumed that seasonality and fishing grounds influenced abundance and distribution of sharks in the Gulf of Thailand.

Table 2 Percentage of monthly catches in the Gulf of Thailand

Group	2011							2012					Average
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Economic fishes	47.98	47.81	46.31	55.46	55.46	54.74	54.72	50.22	65.07	61.38	51.61	58.38	59.24
Trash fishes	51.92	52.05	53.57	44.40	44.57	45.13	45.10	49.57	34.72	38.31	48.17	41.30	40.56
Sharks	0.02	0.05	0.03	0.05	0.04	0.05	0.04	0.06	0.06	0.08	0.07	0.10	0.07
Rays	0.08	0.09	0.10	0.08	0.12	0.09	0.15	0.15	0.15	0.23	0.15	0.22	0.13
Total (metric tons)	3,929.2	4,485.7	6,495.0	5,579.7	6,272.8	7,140.0	4,334.7	4,083.2	4,361.3	3,208.5	2,937.4	2,848.8	3,387.7

In the Andaman Sea, sharks and rays were caught by four type of fishing gears i.e. otter board trawl, pair trawl, purse seine and long line. In that time, an average catch of sharks and rays were in 0.41% and 0.13% of the total catch, respectively (Table 3). This considers a small amount when compared to the total catch. Average catch composition of economic fishes and trash fishes were 61.28% and 38.19%, respectively. Results showed the proportions of shark catches in 2011 were higher than that of the catches in 2012. Highest proportion of shark catching were found in September 2011 (0.82%), followed by October 2011 (0.69%). It was clearly seen that highest catches of ray were found in both of April and May 2012 (0.24%), followed by January 2012 (0.17%). Monthly catches of ray in 2011 were ranged between 0.07-0.14%.

Table 3 Percentage of monthly catches in the Andaman Sea

Group	2011							2012					Average
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Economic fishes	56.68	60.69	58.22	62.97	64.09	65.48	65.78	36.31	62.16	64.07	58.16	60.48	61.28
Trash fishes	43.00	38.90	41.22	36.14	35.15	34.01	33.72	63.08	37.47	35.68	41.32	39.02	38.19
Sharks	0.19	0.30	0.45	0.82	0.69	0.41	0.37	0.44	0.25	0.18	0.29	0.26	0.41
Rays	0.12	0.12	0.11	0.08	0.07	0.11	0.14	0.17	0.11	0.07	0.24	0.24	0.13
Total (metric tons)	2,486.0	3,724.5	3,120.2	3,886.0	4,856.9	4,120.3	3,667.8	1,162.9	2,993.1	3,084.5	3,246.2	3,530.2	39,878.6

4. Production of sharks from Thai-flags vessels overseas

Thailand is an operating long-distance fishing nation, and has offshore fisheries operating in many areas. During 2006-2007, however there were 15 out of 17 authorized fishing vessels actively operated in overseas.

According to the international procedure in high sea fisheries and the Thai Royal Ordinance in Fisheries, B.E. 2558, DoF has provided licensed observers on board fishing vessels for oversea fisheries (Department of fisheries, 2015a). Result from 15 fishing vessels operated in the Indian Ocean from July 2016 to June 2017 (11 otter board trawlers, 2 pair trawlers, 1 purse seiner with trap and 1 gill netter), sharks were found as by-catch with a total of 109.05 metric tons. Only gill netter that could not catch any sharks. By-catch of sharks by weight in otter board trawlers, pair trawlers and purse seiner averaged at 0.62, 1.09 and 0.06 metric tons/vessel or 1.17%, 1.01% and 0.86%, respectively. These catches were small proportion

when compared to their respective total catch (Table4). All of those fishing vessels have already returned to Thai waters.

Table 4 Catches of sharks by Thai fishing vessels operated in the Indian Ocean during 2016-2017

Quarter	species	Fishing Gear				Total
		otter board trawler	pair trawler	purse seiner with trap	gill netter	
		11 vessel	2 pair	1 vessel	1 vessel	
Round 1	Shark	3.55	1.73	-	-	5.29
	Angle shark (<i>Squatina</i> sp.)	0.57	-	-	-	0.57
	Ray	2.37	1.07	-	-	3.43
	Guitarfishes	0.89	0.34	-	-	1.23
	<i>Rhina ancylostoma</i>	-	0.18	-	-	0.18
Round 2 (1)	<i>Carcharhinus limbatus</i>		0.17	-	-	1.59
	<i>Carcharhinus melanopterus</i>	2.81	-	-	-	1.39
	<i>Sphyrna lewini</i>		-	-	-	-
	Shark	0.10	-	-	-	0.10
	Angle shark (<i>Squatina</i> sp.)	1.46	-	-	-	1.46
	Ray	0.35	0.30	-	-	0.65
	Guitarfishes	0.10	0.13	-	-	0.23
<i>Rhina ancylostoma</i>	0.04	-	-	-	0.04	
Round 2 (2)	<i>Carcharhinus limbatus</i>		-	-	-	10.73
	<i>Carcharhinus melanopterus</i>	10.73	5.02	-	-	5.02
	<i>Sphyrna lewini</i>		-	-	-	-
	Shark	0.30	-	-	-	0.30
	Angle shark (<i>Squatina</i> sp.)	3.44	0.70	-	-	4.15
	Ray	1.91	0.30	-	-	2.21
	Guitarfishes	0.15	0.28	-	-	0.43
<i>Rhina ancylostoma</i>	0.07	-	-	-	0.07	
Round 3	Shark	14.18	4.42	-	-	18.61
	Angle shark (<i>Squatina</i> sp.)	2.88	-	-	-	2.88
	Ray	5.26	0.36	-	-	5.62
	Guitarfishes	1.64	0.33	-	-	1.97
	<i>Rhina ancylostoma</i>	0.41	-	-	-	0.41
Round 4	Shark	22.04	10.32	0.75	-	33.12
	Angle shark (<i>Squatina</i> sp.)	0.85	-	-	-	0.85
	<i>Loxodon macrorhinus</i>	1.79	-	-	-	1.79
	Ray	3.22	0.36	0.02	-	3.60
	Guitarfishes	1.08	-	-	-	1.08
	Total of sharks (metric tons)	82.21	26.07	0.78		109.05
Total Catch (metric tons)		7,006.62	2,593.26	90.08	141.60	9,831.56
Average catch/months/vessel (metric tons)		53.08	108.05	7.51		
Average sharks/months/vessel		0.62	1.09	0.06		
Percentage of sharks/months/vessel		1.17	1.01	0.86		

Source: Oversea Fisheries and Transhipment Control Division, Department of fisheries, 2017

5. Stock assessment of shark resources in Thai waters

The assessment of shark resources in Thai waters was conducted by surplus production model method using CPUE (catch per unit effort) of sharks from otter board trawl, pair trawl, mackerel-gill net and purse seine during 2004-2014 from fisheries statistics by random sampling. Data was adjusted using the ICES method (Supongpan and Nitithamyong, 2001). Then CPUE was transformed to relative fishing effort for MSY (Maximum Sustainable Yield) calculation. Finally, the optimum catching level was calculated according to the Fox model (1970). As there is a high variation in catching data of rays in Thai waters, therefore assessment had been done only in shark groups with the following results.

5.1 Gulf of Thailand

The MSY of shark catches was 1,516 metric tons and their optimum fishing effort was $1,290 \times 10^3$ hours (Figure 10). Based on the data analysis that shark resources in the Gulf of Thailand, affected by catches and fishing effort, resulted in continuous reduction in catches to the minimum point at 468×10^3 hours in 2010. Although the fishing effort was higher in the following year, shark catch was the lowest level at 780 metric tons. This indicated that fisheries in the Gulf of Thailand has affected to shark resources, the direction trend of which was opposite to fishing effort.

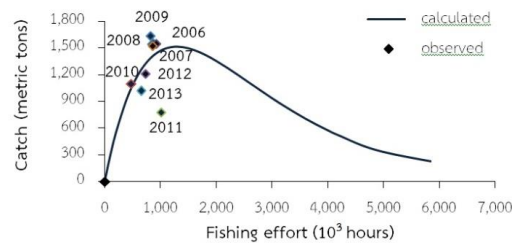


Figure 10 A shark catch curve from the Gulf of Thailand calculated by Fox model (1970)

5.2 Andaman Sea

The MSY for sharks was 347 metric tons and their optimum fishing effort was 336×10^3 hours (Figure 11). According to data analysis during 2004-2007, catch in 2004 was 970 metric tons, which was three times higher than MSY. It was observed that fishing effort decreased during 2004-2007, and shark catches declined to 110 metric tons in 2014. While fishing efforts were higher than their MSY in the following three years. As far as the catches of shark still decreased, these results could indicate that levels of shark catches in the Andaman Sea were over MSY.

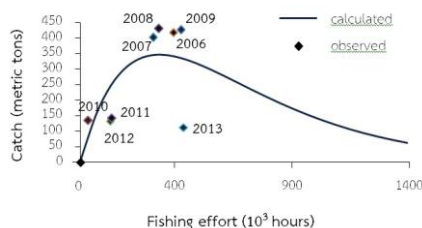


Figure 11 A shark catch curve from the Andaman Sea calculated by Fox model (1970)

6. Sharks utilization

There has been a long-time of believing that sharks meats are low quality and smell badly. Therefore, dishes from sharks were not commonly consumed whereas the consumptions were only among fishers' groups. At present where the total fish productions have been decreased, varieties of post-harvest have been developed resulting in the increased consumption of the sharks.

Shark species in Family Hemiscyllidae (bamboo sharks) and Carcharhinidae (blacktip sharks) are commonly found in local market. It was found that more than 95% of the shark was in a small size. The market price of these species at fishing ports are approximately 20-50 and 50-80 baht/kg, respectively. The price depends on freshness, size and species of sharks, that would be different in each area. The prices of smallest size (under 5 kg), small size (5-10 kg), medium size (over 10 kg) and big size shark (60-120 kg) are approximately 10-30, 30-50, 50-80 and 80-120 baht/kg, respectively. Prices of sharks (over 150 kg) will be determined through auction process by the wholesaler. However, prices of sharks in seafood markets could be 1.5-2.0 times higher than at of the prices at fishing ports (Marine Fisheries Research and Development Bureau, 2014).

Shark utilizations have normally the same pattern in many countries. There are mainly used for fresh consumption in families or restaurants. The rest of it will be processed for dried-shark fins (cutting the fins and drying under the sun), which will be used as materials for shark fins soup. The price of shark fins depends on its size of the shark, categorizing into 4 sizes, including over 80 kg, 50-80 kg, 20-50 kg and under 20 kg (150 baht/kg, 70-120 baht/kg, 50-70 baht/kg and 30-50 baht/kg, respectively). Shark meats are utilized in salty fish, sweetened fish and fish ball. Sharks' liver are extracted for fish liver-oil and cosmetic compound. Other parts are utilized as raw material for animal feeds. The middle size shark (1-10 kg.) may be stuffed and sold at the price of 150-2,000 baht each. Their teeth and jaws are also sold as souvenirs in seaside tourist areas, e.g. Phuket, Ranong and Chonburi Province, at the price of 20-1,000 baht for teeth and 150-3,000 baht for jaws (Marine Fisheries Research and Development Bureau, 2014).

Ray species in Family Dasyatidae and Myliobatidae are also commonly found in local market. Utilizations of rays (Krajangdara, *et al.*, 2014) are as follows:

1. Consumption in dried and salted fish. Most of these rays are small size, such as *Himantura imbricata*, *H. walga*, *Dasyatis zugei*, *D. akajei*, *Neotrygon kuhlii* and *Gymnura* spp., prices at the fishing port ranged from 15-65 baht/kg. Eventually, medium to large size rays were also found, such as *Dasyatis microps*, *Pastinachus* spp., *Aetobatus ocellatus* and

Rhinoptera spp., prices ranged from 20-100 baht/kg depending on the size and freshness. Especially, *Aetobatus ocellatus* and *Rhinoptera* spp. are usually grilled.

2. Processed shark fins of Whitespotted wedgefish (*Rhynchobatus australiae*) and guitarfishes (*Rhynchobatus*, *Rhinobatos* and *Glaucostegus* spp.). Rest of the bodies are salted or sent to fish meal factories at price of 10-70 baht/kg. The snout of guitarfishes are used for cooking and Chinese medicine compound as found in Ranong Province.

3. Jewelry and accessories are especially made from the thorny ridge on head of Bowmouth guitarfish or Shark ray (*Rhina ancylostoma*). Rest of the bodies are salted and sent to fish meal factories with the price of 45-110 baht/kg for body size over 25 kg and ranged from 10-40 baht/kg for size under 25 kg.

Remark: Bowmouth guitarfish and sawfishes are listed as a protected wildlife species in fish group under the Wildlife Preservation and Protection Act, B.E. 2562, therefore they can not be traded as in the past.

4. Ray leathers with thorny ridge or tubercles on the body disc, i.e. *Himantura gerradi*, *H. jenkinsii*, *Pastinachus* spp. and *H. uarnacoides*. Meats are sent to fish meal factories with price ranged from 15-100 baht/kg depending on body size. Auction is commonly used rather than selling it by weight. Rays of the bigger sizes, selling of rays such as *H. granulata* and *Taeniurops meyeri* are used in similar method but its price of whole body for these species are normally lower price.

5. Raw materials for fish meal from very small size and/or not fresh. These includes some species uncommon for consumption and utilization. Their factory prices are ranged from 5-10 baht/kg.

Sharks over 2 kg each in weight landed at the fishing ports around the Gulf of Thailand will be bought by middleman and sent to Mahachai fishing port in Samut Sakorn Province or to Mae Klong fishing port in Samut Songkhram Province. Sharks catches from the Andaman Sea landed in Phuket and Ranong Provinces will be sent to factories in Ranong Province, and subsequently sent to Mahachai market.

7. Type and volume of Trade (Export and Import) of sharks commodities

Fish Quarantine and Inspection Division of DoF has been assigned by Fish Quarantine and Inspection Centres to be responsible for setting up plans to monitor and control imports and exports of aquatic animals, particularly for sharks which have been imported and exported in various types. During 2008-2014, sharks commodities were exported and imported in forms of fresh, refrigerated, frozen, dried shark fins, smoked shark fins, shark fins in brine and ready-to-eat shark fins, etc. (Customs Department, 2014). During 2012-2014, Custom tariff requires export and import of sharks commodities including alive

and carcass of shark body in order to verify the species of sharks for the export/import. Details of the shark export/import are as follows:

7.1 Exports

7.1.1 Ground sharks (cha-lam-nu) and other sharks in fresh or chilled forms were exported to Australia, Iran, Greece, Algeria, Italy, Portugal, Spain, Singapore and Malaysia. Amounts of export ranged from 0.20-118.94 metric tons/year with value of 0.02-7.39 million baht/year. Most of these products were exported to Iran at the volume of 50.73 metric tons in 2010.

7.1.2 Dried or in brine and smoked shark fins were exported to 15 countries during 2008-2014 at the amount of 4.91-73.19 metric tons with the lowest export of 4.91 metric tons occurring in 2013. However, the export amount in 2014 increased to 73.19 metric tons. Hong Kong was the highest importer with average volume of 11.50 metric tons/year (10.56 million baht/year).

7.1.3 Canned shark fins (shark fins in vacuum container) were exported to 34 countries around the world during 2008-2014. Trend of this product was increasing continuously from 271.38 metric tons with value of 32.16 million baht in 2008 to 1,350.06 metric tons with value of 117.91 million baht in 2012. Myanmar was the highest importer, followed by South Africa, USA, Cambodia and Japan. Export amount of this product was the highest as compared with other products from all sharks products.

7.1.4 Ready-to-eat shark fins were exported to 49 countries around the world with an increasing trend during 2008-2011. Export amount increased from 4,444.98 metric tons in 2008 to 6,361.72 metric tons with value of 1,086.33 million baht in 2011. In following years later, this product was decreasing continuously until 2014 to 3,269.59 metric tons (509.89 million baht). Japan was the highest importer, followed by USSR, Austria and Taiwan.

7.1.5 Ground sharks and other sharks in frozen forms had amount of export from 172.86 metric tons (9.68 million baht) in 2008 increasing to 1,014.27 metric tons (50.49 million baht) in 2009. This type of products was exported to 16 countries. China was the highest importer during 2008-2014 with average amount of 503.81 metric tons/year (25.75 million baht/year), followed by Vietnam, Italy, South Korea, Singapore and Malaysia.

7.1.6 Alive ground sharks and other sharks (Aquarium fishes, unit: individual) as reported by the Customs Department for exporting to many countries, were exported to six countries in 2012. Total amount of the export was 36,934 individuals (to China 99.68 %). In the following year, the amount of export was 109,709 individuals exporting to 29 countries

with the most highest amount to Pakistan (54,000 individuals), followed by United Arab Emirates, USA and China (24,070, 12,132, and 1,698 individuals, respectively). In 2014, the exportation of this products increased to 35 countries, totally 978,240 individuals valuing at 11.90 million baht. The highest importing country was Taiwan (373,662 individuals), followed by Pakistan, China and United Arab Emirates (240,012, 180,345, and 180,310 individuals, respectively).

7.1.7 Tan leather of ground sharks and other sharks were exported to many countries as defined by the Customs Department. Export amount to three countries in 2013 was 12,894 individuals with value of 7.21 million baht, and later decreased to 9,262 individuals in 2014 but the value was high at 8.27 million baht.

7.2 Imports

7.2.1 Ground sharks and other sharks in fresh or chilled forms were imported at 0.18 metric tons only from Argentina in 2008. Import amounts occurred again from two countries in 2012 (0.30 metric tons), and three countries in 2013 (0.05 metric tons), and five countries in 2014 (16.07 metric tons, 0.37 million baht).

7.2.2 Dried or in brine and smoked shark fins were imported from 16 countries around the world during 2008-2010 at the amount of 33.06-66.07 metric tons. And its increasing trend was found from 65.54 metric tons in 2011 to 498.46 metric tons in 2014. The highest amount was imported from Malaysia, followed with Indonesia and Hong Kong. Import amount of this product was 8.3 times higher than export products during 2008-2014, but value of the import was only 1.3 times higher than the export. This showed that Thailand exported processed sharks as value added products.

7.2.3 Canned shark fins, Thailand had a few import amounts of this product from one to three countries each year. It was mainly imported from China in 2008, amounting 1.20 metric tons (019 million baht), and totally 2.58 metric tons in 2009 (1.68 and 0.90 metric tons from China and Japan, respectively). This increased more than two times. In the following year, the import amount was slightly lower. The import was higher in 2011, amounting 2.88 metric tons, from China and Canada. In 2014, the import was increased to 5.02 metric tons which all were only from China.

7.2.4 Ready-to-eat shark fins were imported from 11 countries in 2008, amounting 24.44 metric tons, and a high amount of 20.32 metric tons from South Korea. In 2010, importation was only from Japan with a decreasing amount to 2.06 metric tons. Import amounts increased slightly in 2011 and 2012 (24.40 and 26.52 metric tons, respectively). The countries that continually export these products to Thailand are South Korea and Japan.

7.2.5 Ground sharks and other sharks in frozen forms were imported from 20 countries around the world. Its trend of importation was fluctuated. Import amounts in 2008 2010, 2011, 2012, 2013, and 2014 were 217.64, 614.49, 889.42, 69.50, 345.11 and 400.98 metric tons, respectively. These products were mainly imported from Indonesia, China and Taiwan.

7.2.6 Alive ground sharks and other sharks (Aquarium fishes) were imported from Singapore (16 individuals) and Brazil (4 individuals) in 2012. There increased to 779 individuals importing from four countries and 3,991 individuals importing from nine countries in 2013 and 2014, respectively. Major exporting countries to Thailand included Brazil, Myanmar and Malaysia (1,826, 1,000 and 605 individuals, respectively). All of these sharks were imported only for aquarium purpose.

8. Law and measures related to sharks management

Although sharks are not targeted by fisheries of Thailand, by-catch of sharks occurred due to multi-type of fishing gears and methods. According to fisheries statistics, the catch amount of sharks has been continuously declining, and sharks extinction is therefore a concern. DoF and relevant agencies have established several measures to control fisheries and utilization of sharks resources by putting laws (and other relevant laws) and enforcement by competent authorities. Furthermore, international organizations have given priority to safeguard and establish several measures to conserve sharks resources for their sustainable use.

8.1 Law and measures related to sharks management in Thailand

Thailand has enforced a number of laws, which either directly or indirectly affect fisheries resource management and conservation with the objective of sustainable utilization of aquatic animal resources, including sharks resources. These concerned laws (Appendix 2) are as follows:

8.1.1 The Royal Ordinance on Fisheries, B.E. 2558 (Fisheries Act, B.E. 2558) and its amendment in B.E. 2560: DoF applied this Act from a principle law for all fisheries resources management (Fisheries Act B.E. 2490) until 2015, that was amended and revised to be Fisheries Act B.E. 2558. It complies with principles of international fisheries resources management and changing of fisheries situation in order to monitor, control and surveillance of Thai flagged fishing vessel activities in Thai waters and overseas. This aims to prevent IUU fishing and manage fisheries resources in accordance with maximum sustainable yield (Department of Fisheries, 2015a) by establishing guidelines for the conservation and management of fishery and aquatic animal resources in Thai waters for its sustainably utilization. With regard to conservation

of sharks, Ministry of Agriculture and Cooperatives notified “definitions for marine mammals and endangered or nearly extinction species that are prohibited to fish or bring up onboard fishing vessels” dated 7 April 2016. Under Article 66 of this Act, only Whale shark (*Rhincodon typus*) was listed as number 4 in the Annex of this notification. In addition, DoF, as a competent authority to sustain marine resources, developed Marine Fisheries Management Plan of Thailand 2009–2018, National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (NPOA-IUU), 2015–2019, and the Fisheries Management Plan (FMP) 2015-2019.

8.1.2 The Wildlife Preservation and Protection Act, B.E. 2562: Whale shark, declared as preserved wildlife species in the fish group, and 12 ray species including 6 devilrays (Mobulidae; *Manta* and *Mobula* spp.), 4 sawfishes (Pristidae: *Anoxypristis cuspidata* and *Pristis* spp.), Bowmouth guitarfish (*Rhina ancylostoma*) and Giant freshwater stingray (*Urogymnus chaophraya* or original name is *Himantura chaophraya*) declared as protected wildlife species in the fish group.

8.1.3 National Park Act, B.E. 2504

8.1.4 Act on Ancient Monuments, Antiques, Objects of Art and National Museums, B.E. 2504

8.1.5 The Enhancement and Conservation of National Environmental Quality Act, B.E. 2535

8.1.6 Act on the Promotion of Marine and Coastal Resources Management, B.E. 2558

8.2 International obligations regarding conservation and management of sharks

Legal international fisheries obligations and instruments on conservation and management of sharks resources that Thailand shall comply or amend national legislation to be relevant (Appendix 3), are as follows:

8.2.1 The United Nations Convention on the Law of the Sea, 1982

8.2.2 Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea dated 10 December 1982

8.2.3 Port State Measures Agreement (PSMA)

8.2.4 Agreement to Promote Compliance with International Conservation and Management Measures for Fishing Vessels Operating in High Seas and Agreement on Definition of Flag State Responsibility on Fishing Vessels Operating in High Seas

8.2.5 Regional Fisheries Management Organization (RFMOs)

Thailand has been a party of several RFMOs, including IOTC and SIOFA, as well as a cooperating non-member of WCPFC. Additionally, Thailand has adopted other relevant non-legal international instruments, which require Thailand to apply accordingly. Such instruments are as follows:

1. The Code of Conduct for Responsible Fisheries (CCRF)
2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
3. The Convention on Biological Diversity (CBD)
4. The Convention on the Conservation of Migratory Species of Wild Animals (CMS)
5. International Union for Conservation of Nature and Natural Resources (IUCN): this international organization has a mission to conserve biodiversity
6. Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat
7. Man and Biosphere Programme of United Nations Educational, Scientific and Cultural Organization (UNESCO) that certifies Ranong Biosphere Reserve covering 303 square kilometers (Mangrove Forest Research Center (Ranong), 2012)
8. ASEAN Declaration on Heritage Parks

9. Status of sharks

Many species of sharks worldwide are in crisis and tend to become extinct or endangered since they have been threatened by multi fishing gears, both unwanted or by-catch species, and being targeted species of some fisher groups.

9.1 Status of sharks according to IUCN Red List

IUCN defines status of animals called IUCN Red List, categorization of species that have still not extinct into seven status, namely critically endangered (CR), endangered (EN), vulnerable (VU), near threatened (NT), least concern (LC), data deficient (DD), and not evaluated (NE). Among all, the first three groups (CR, EN and VU) are called as threatened species considering most significant in terms of risk of extinction. IUCN (2017) conduct survey and assessment on status of sharks in waters worldwide. It was found that there are 11 shark and 14 ray species are CR species, 15 shark and 28 ray species are EN species, and 48 shark and 65 ray species are VU species (Table 5).

Table 5 Status of sharks according to IUCN Red List in 2017

Status	Shark	Ray	Chimaera
CR	11	14	0
EN	15	28	0
VU	48	65	0
NT	67	62	3
LC	115	114	12
DD	209	256	22
Total	465	539	37

Source: IUCN (2017). <https://cmsdata.iucn.org/downloads/factsheetspdf>, 1 June 2017

9.2 Sharks species listed under CITES Appendices

Presently, marine resources, including sharks, have been diversely utilized, both in terms of methods and species utilization. Demand for such resources has been increasing due to the growing global population. Therefore, protection of aquatic animals from extinction, maintaining biodiversity, and sustainably using aquatic animals from nature, have been given as a priority by a number of countries worldwide. Listing aquatic animals under CITES Appendices is used as a way to conserve aquatic animal resources. According to the result of the 17th meeting of the Conference of the Parties to the CITES (CITES CoP17) held in South Africa in September 2016, there was a number of shark and ray species proposed to be listed under CITES Appendix II, including Silky shark (*Carcharhinus falciformis*), three species of thresher sharks (*Alopias* spp.) and devilrays (*Mobula* spp.). These species are rare and only recorded as oceanic species with very little amount of catch in Thailand. All sharks species listed under CITES Appendices from 2000 -2017 are presented in Table 6 (CITES, 2017).

Regarding to CITES-CoP18 at Geneva, Switzerland in August 2019, proposals to list mako sharks (*Isurus* spp.), Bowmouth guitarfish (*Rhina ancylostoma*), wedgefishes (*Rhynchobatus* spp.) and guitarfishes (*Rhinobatos* and *Glaucostegus* spp.) was made for consideration. As a result, the approval was made for listing these species under CITES Appendix II (Krajangdara *et al.*2019)

Table 6 Sharks species listed under CITES Appendices from 2000-2017

CLASS ELASMOBRANCHII (SHARKS)	Appendices I	Appendices II	Appendices III
CARCHARHINIFORMES			
Carcharhinidae : Requiem sharks		<i>Carcharhinus falciformis</i> (entry into effect delayed by 12 months, i.e. until 4 October 2017)	
		<i>Carcharhinus longimanus</i>	
Sphyrnidae : Hammerhead sharks		<i>Sphyrna lewini</i>	
		<i>Sphyrna mokarran</i>	
		<i>Sphyrna zygaena</i>	
LAMNIFORMES			
Alopiidae : Thresher sharks		<i>Alopias</i> spp. (entry into effect delayed by 12 months, i.e. until 4 October 2017)	
Cetorhinidae : Basking sharks		<i>Cetorhinus maximus</i>	
Lamnidae : Mackerel sharks		<i>Carcharodon carcharias</i>	
		<i>Lamna nasus</i>	
MYLIOBATIFORMES			
Myliobatidae : Eagle and mobulid rays		<i>Manta</i> spp.	
		<i>Mobula</i> spp.	
Potamotrygonidae : Freshwater stingrays			<i>Paratrygon aiereba</i> (Colombia)
			<i>Potamotrygon</i> spp. (population of Brazil) (Brazil)
			<i>Potamotrygon constellata</i> (Colombia)
			<i>Potamotrygon magdalenae</i> (Colombia)
			<i>Potamotrygon motoro</i> (Colombia)
			<i>Potamotrygon orbignyi</i> (Colombia)
			<i>Potamotrygon schroederi</i> (Colombia)
			<i>Potamotrygon scobina</i> (Colombia)
<i>Potamotrygon yepzei</i> (Colombia)			
ORECTOLOBIFORMES			
Rhincodontidae : Whale sharks		<i>Rhincodon typus</i>	
PRISTIFORMES			
Pristidae : Sawfishes	<i>Pristidae</i> spp.		

Source: CITES (2017). <https://www.cites.org/eng/app/appendices.php>, 15 June 2017

9.3 Status of sharks in Thai waters

9.3.1 Status of sharks in Thai waters according to IUCN Red List

According to the IUCN Red List of threatened species in 2019 (Krajangdara *et al.*, 2019), many species of sharks in Thai waters are categorized in this groups (i.e., CR, EN, VU), including 25 shark and 41 ray species in Thai waters. Among them, 11 ray species are considered as CR, i.e. 2 sawfishes (*Pristis* spp.). which have not been found in Thai waters for a long time, 8 guitarfishes and Java stingaree (*Urolophus javanicus*), its appearance was reported once only in 1982 in the Andaman Sea. Under the groups of EN, there are totally 17 species, namely Whale shark (*Rhincodon typus*), Zebra shark (*Stegostoma fasciatum*), 2 mako sharks (*Isurus* spp.), Whitecheek shark (*Carcharhinus dussumieri*), Winghead shark (*Eusphyra blochii*), 2 hammerhead sharks (*Sphyrna lewini* and *S. mokarran*), Narrow sawfish

(*Anoxypristis cuspidata*), 6 species in Dasyatidae, namely Roughback whipray (*Fluvitrygon kittipongi*), Marbled whipray (*F. oxyrhynchus*), White-edge whipray (*F. signifer*), Mekong stingray (*Hemistrygon laosensis*), Roughnose cowtail ray (*Pastinachus solocirostris*), Giant freshwater stingray (*Urogymnus chaophraya* or *Himantura chaophraya*) and 2 eagle rays (*Aetomylaeus maculatus* and *A. vesperilio*). Regarding the groups of VU, there are totally 17 and 21 species of sharks and rays, respectively (Table 7).

Table 7 Vulnerable species of sharks in Thai waters based on IUCN Red List in 2019

Sharks			Rays		
Thai name	English name	Scientific name	Thai name	English name	Scientific name
chalam nang fa	Ocellated angelsharks	<i>Squatina turgocellatoides</i> Chen, 1963	kraben fai fa chut nam tan	Shorttip numbfish	<i>Narcine brevirostris</i> Bessednov, 1966
chalam sai	Sandtiger shark	<i>Carcharias taurus</i> Rafinesque, 1810	kraben fai fa lang riap	Finless sleeper ray	<i>Temera hardwickii</i> Grey, 1831
chalam hang yao	Pelagic thresher	<i>Alpias pelagicus</i> Nakamura, 1935	kraben phisuea hang lai	Zonetail butterfly ray	<i>Gymnura zonura</i> (Bleeker, 1852)
chalam hang yao na nu	Bigeye thresher	<i>A. superciliosus</i> (Lowe, 1841)	kraben pak mae nam	Estuary stingray	<i>Hemistrygon fluviorum</i> (Ogilby, 1908)
chalam hang yao	Thresher shark	<i>A. vulpinus</i> (Bonnaterre, 1788)	kraben lai suea dao	Leopard whipray	<i>Himantura leoparda</i> Manjaji - Matsumoto & Last, 2008
chalam khi sao	Tawny nurse shark	<i>Nebrius ferrugineus</i> (Lesson, 1831)	kraben lai suea lek	Coach whipray	<i>H. uarnak</i> (Gmelin, 1789)
chalam nu	Hooktooth shark	<i>Chaenogaleus macrostoma</i> (Bleeker, 1852)	kraben lai suea yai	Honeycomb whipray	<i>H. undulata</i> (Bleeker, 1852)
chalam nu	Sicklefin weasel shark	<i>Hemigaleus microstoma</i> Bleeker, 1852	kraben malaeng wan	Whitespotted whipray	<i>Maculabatis gerrardi</i> (Gray, 1851)
chalam nu	Snaggletooth shark	<i>Hemipristis elongata</i> (Klunzinger, 1871)	kraben bua	Round whipray	<i>M. pastinacoides</i> (Bleeker, 1852)
chalam hu khao	Silvertip shark	<i>Carcharhinus albimarginatus</i> (Rüppell, 1837)	kraben lai dok mai	Pink whipray	<i>Pateobatis fai</i> (Jordan & Seale, 1906)
chalam thao	Silky shark	<i>C. falcoformis</i> (Müller & Henle, 1839)	kraben thong hang nam	Jenkin's whipray	<i>P. jenkinsii</i> (Annandale, 1909)
chalam khrip yao	Oceanic whitetip shark	<i>C. longimatus</i> (Poey, 1861)	kraben chamuk khao	Whitenose whipray	<i>P. uarnacoides</i> (Bleeker, 1852)
chalam thao	Dusky shark	<i>C. obscurus</i> (LeSueur, 1818)	kraben tok kra	Blotched stingray	<i>Taeniuraps meyeri</i> (Müller & Henle, 1841)
chalam kradong sung	Sandbar shark	<i>C. plumbeus</i> (Nardo, 1827)	kraben bai khanun	Porcupine whipray	<i>Urogymnus asperrimus</i> (Bloch & Schneider, 1801)
chalam nu	Indonesian whaler shark	<i>C. tjutjot</i> (Bleeker, 1852)	kraben chut khao	Mangrove whipray	<i>U. granulatus</i> (Macleay, 1883)
chalam khrip khong	Sharptooth lemon shark	<i>Negaprion acutidens</i> (Rüppell, 1837)	kraben nok bang	Banded eagle ray	<i>Aetomylaeus nichofii</i> (Bloch & Schneider, 1801)
chalam hua khon san	Smooth hammerhead	<i>Sphyrna zygaena</i> (Linnaeus, 1758)	kraben nok	Spotted eagle ray	<i>Aetobatus ocellatus</i> (Kuhl, 1823)
			kraben chamuk wua	Javan cownose ray	<i>Rhinoptera javanica</i> Müller & Henle, 1841
			kraben rahu naeo pakaram	Reef manta ray	<i>Mobula alfredi</i> (Kieff, 1868)
			kraben rahu yak	Giant manta ray	<i>M. birostris</i> (Walbaum, 1792)
			kraben rahu khrip laem	Chilean devilray	<i>M. tarapacana</i> (Philippi, 1892)

9.3.2 Status of sharks species listed under CITES Appendices in Thailand

According to the meeting results of CITES CoP18 (Krajangdara *et al.*, 2019), 33 species of sharks found in Thai waters are listed under CITES Appendices, including 11 shark species namely Whale shark, Silky shark, Oceanic whitetip shark, 3 hammerhead sharks (*Sphyrna* spp.), 3 thresher sharks, 2 mako sharks (Figure 12), and 19 ray species namely 6 devilrays (Mobulidae), 13 guitarfishes (Rhinidae, Rhinobatidae and Glaucostegidae) under CITES Appendix II, while 3 sawfishes (Pristidae) under CITES Appendix I (Figure 13).

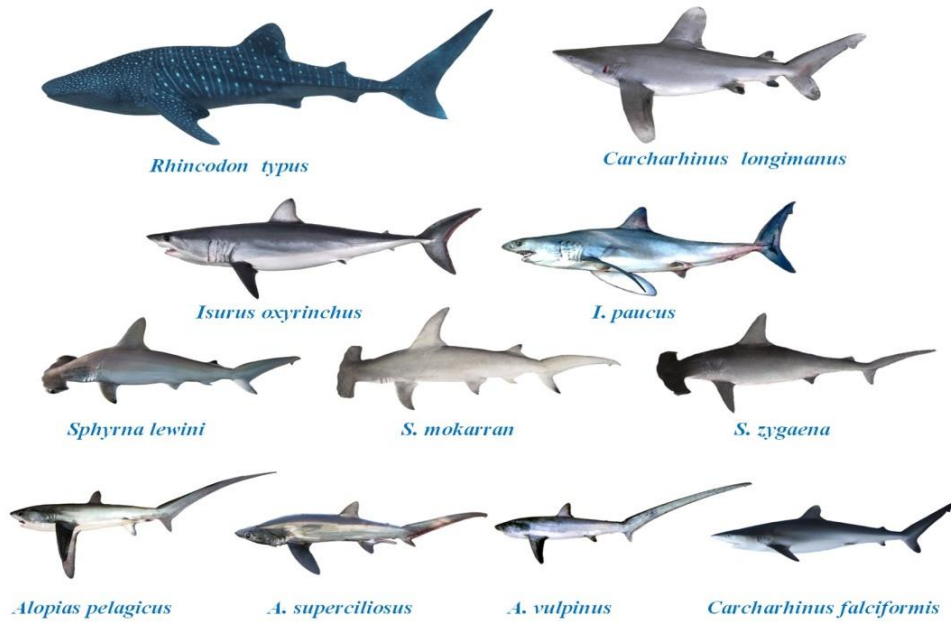


Figure 12 Sharks of Thailand listed under CITES Appendix II



Figure 13 Rays of Thailand listed under CITES Appendix I and II

9.3.3 Status of sharks in Thailand with Legal Implications

Currently, only Whale shark is legally protected by the Notification of the Ministry of Agriculture and Cooperatives on definitions of marine mammals and endangered species prohibited for fishing or taking onboard fishing vessels issued on 7 April 2016 and as preserved wildlife species in fish group under the Wildlife Preservation and Protection Act, B.E. 2562. It includes 12 ray species listed as protected wildlife species in the fish group, i.e. 6 devilrays (Mobulidae), 4 sawfishes (Pristidae), Bowmouth guitarfish and giant freshwater stingray (Krajangdara *et al.*, 2019).

DMCR categorizes endangered marine species into three groups, namely 1) marine endangered species defined under a framework of DMCR, 2) marine threatened species listed under Office of Natural Resources and Environmental Policy and Planning (ONEP) and international organizations, 3) marine endemic species as the first record of the world. Objectives of these actions with regard to sharks are as follows:

1) Preserved and protected wildlife species in fish group under the Wildlife Preservation and Protection Act, B.E. 2562, i.e. Whale shark, sawfishes, Bowmouth guitarfish, Giant freshwater stingray and devilrays.

2) Species to be proposed as protected wildlife species in fish group under the Wildlife Preservation and Protection Act, B.E. 2562, i.e. hammerhead sharks, Zebra shark, and other sharks.

3) Species with the first record of the world, i.e. Magnificent catshark

10. Management and conservation of sharks in Thailand

Thai marine fisheries have continuously developed, particularly fishing gears and methods have developed over time. Various fishing gears have been used in the same areas. According to marine stock assessment in Thai waters, it was found that several species have been already overcapacity (overfishing). Moreover, problem also included illegal fishing in prohibited areas. These issues cause complexity and difficulties in managing marine resources of Thailand whereby the concern is not only the sustainable use but also the compliance with international laws and regulations, such as the Charter of the United Nations, CCRF, CBD, the United Nations Agreement Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, international trades related to CITES, sea turtle conservation and sharks resources management. Therefore, Thailand shall carry out the following activities:

10.1 Scientific research

10.1.1 Taxonomy study and establishment of gene bank of sharks because DoF is responsible for issuing an export certificate for aquatic animals. However, most of exported sharks are mainly in processed products in forms of meat, fins, skin or others. These products are difficult to identify at species level of the raw materials. Thus, it is necessary to have a direction for implementation, for example, species identification method using DNA barcoding and establishment of sharks gene bank which will be used as a database for verifying and comparing the genetic code.

10.1.2 Study on biology and stock assessment of sharks for sustainable utilization

10.1.3 Sharks aquaculture for conservation or aquarium promotion

10.1.4 Explore of population and distribution areas of sharks from coastal areas and beyond

10.2 Management of information on sharks

10.2.1 Monitor and verify information on sharks from private fishing ports and fishery research vessels of DoF annually or every 3 years

10.2.2 Record and collect information for stock assessment as follows:

1) Fish Marketing Organization to record data of sharks landed into family or species levels (if it is applicable, as a more accurate stock assessment can be conducted by using time series catch data of concerned species).

2) Develop a website with users friendly environment where divers or ordinary people who spot sharks while diving, travelling or shopping at local markets can notify/send information to information center for comprehensive data compilation.

11. Work Plan of activities under NPOA-Sharks of Thailand

Based on the context of the Fisheries Act, B.E. 2558 and its amendment in B.E. 2560 with regard to conservation of aquatic animal resources, particularly endangered species, DoF as the leading authority for drafting NPOA-Sharks in order to obtain views from stakeholders prior to submission of the result to the National Fisheries Committee.

As far as the NPOA-Sharks is still not enforced by laws, clarity on sharks resources management has therefore no concrete results. Nevertheless, DoF has carried out a number of relevant activities to support the NPOA-Sharks implementation as follows:

11.1 Compilation of scientific data of sharks from capture during 2004-2016

11.2 Monitoring and determination of status of fisheries resources on annual basis by fishery research vessels four trips per year

11.3 Organization of trainings on sharks species identification for officers of Marine Fisheries Research and Development Division who conducted field surveys in 2011, 2013 and 2015.

11.4 Development of public awareness materials related to sharks resources conservation, including posters and plastic sheets of pictures of sharks found in Thai waters which were disseminated in 2004, plastic sheet of pictures of rays found in Thai waters and adjacent waters disseminated in 2013, posters on knowledge of sharks of Thai waters listed under CITES Appendix disseminated in 2014, and a publication of Cartilaginous Fishes (Sharks,

Rays, and Chimaeras) found in Thai Waters and the Adjacent Areas disseminated in 2017, and Guidebook to Cartilaginous Fishes of Thailand and Adjacent Waters disseminated in 2019.

11.5 Organization of activities to promote shark conservation, such as nursing and releasing bamboo sharks and blacktip reef shark to nature, in cooperation with other government sectors and private agencies.

11.6 Cooperation with international organizations, i.e. FAO, CITES, IOTC, BOBLME Project, and SEAFDEC, by regularly sending officers to attend meetings on consultations and specifying guidelines of sharks conservation at the regional level

As the Fisheries Act B.E. 2558 has come into force since December 2015 and under its Articles 64, 65 and 66, DoF has carry out several activities to support the responsibilities in accordance with the laws, as well as to manage and conserve sharks resources in Thailand. In this connection, DoF has established a working group to finalize the first and final draft of the NPOA-Sharks of Thailand to comply with the IPOA-Sharks. Study on advantages and disadvantages from NPOA-Sharks of other countries will also be considered in preparatory process of the draft. Key elements of the NPOA-Sharks of Thailand preparation are as follows:

- 1) Study and develop a database for information on biology, ecology, fisheries, and utilization of sharks in Thai waters
- 2) Systematically and regularly assess status and threats on sharks caused by fisheries and environment
- 3) Develop knowledge and enhance capability related to sharks management for relevant officers
- 4) Define conservation and management measures to regulate fishing activities and trade on sharks in consistent with international rules, regulations, and obligations
- 5) Establish and strengthen a network of stakeholders' engagement for management and conservation of sharks resources

Details of activities under the five key elements of the plan of actions presented in Table 8 are as follows:

- 1) Study and develop a database of information on biology, ecology, fisheries, and utilization of sharks in Thai waters
 - Collect sharks data by recording name at family or species level, by fishery research vessels and fishing vessels who landed their catches at fishing ports
 - Explore sharks living in marine national parks, conservation areas of aquatic animals, rivers, areas of connected ecosystem and inactive concession areas of offshore drilling rig

- Study on sharks biology, ecosystem, and fisheries
 - Collect sharks samples for museums
 - Collect information of export and import sharks by recording names at family or species level
 - Study and collect DNA samples of sharks species found in Thai waters, and from their products
 - Study on sharks utilization
 - Develop a database system of sharks
- 2) Systematically and regularly assess status and threats on sharks caused by fisheries and environment
- Assess sharks stock status in Thai waters
 - Assess threats caused by fisheries and tourism
 - Study on impacts of threats from environment on sharks
- 3) Develop knowledge and enhance capability related to sharks management for relevant officers
- Train officers and staff of relevant government agencies and private sectors on sharks species identification at fishing ports
 - Train on knowledge of species identification of sharks parts or their products
 - Prepare a field guide on sharks identification
 - Organize a scientific conference on sharks
- 4) Define conservation and management measures to regulate fishing activities and trade on sharks in consistent with international rules, regulations, and obligations
- Define sharks species that will be prohibited for catching/occupancy in accordance with international obligations as ratified by Thailand
 - Define conservation measures for sharks resources, as well as conduct study on impacts from such measures
 - Develop traceability system for sharks and their products
 - Define marketing measures for sharks utilization
- 5) Establish and strengthen a network of stakeholders' engagement for management and conservation of sharks resources
- Establish a network between government agencies by using online social media
 - Establish a network between government and private sectors by using online social media

- Attend international meetings relating to sharks
- Review and update NPOA-Sharks of Thailand
- Conduct study and research on sharks breeding
- Restock sharks from breeding programs to nature
- 9 7 8 Publicize activities of sharks restocking in cooperation with relevant

agencies

- Develop public awareness materials related to sharks conservation
- Organize exhibitions on sharks conservation

Table 8 NPOA-Sharks of Thailand, a 5-year plan (2020-2024)**Objective 1:** Study and develop a database for information on biology, ecology, fisheries, and utilization of sharks in Thai waters

Activities	Time frame					Responsible agencies	Budget	Target	Index
	Phase 1			Phase 2			(million		
	2020	2021	2022	2023	2024		baht)		
1. Collect sharks data by recording name at family or species level, by fishery research vessels and fishing vessels who landed their catches at fishing ports	←				→	Leading agencies: DoF Supportive agencies: FMO, SEAFDEC, Univ, NFAT, and SSFO	22.6	For sharks resources assessment	Sharks information into family or species level
2. Explore sharks living in marine national parks, conservation areas of aquatic animals, rivers, areas of connected ecosystem and inactive concession areas of offshore drilling rig	←				→	Leading agencies: DNP, DoF, DMCR Supportive agencies: PTT and Univ	15.0	To promote marine ecotourism	Sharks species information in study areas
3. Study on sharks biology, ecosystem and fisheries	←				→	Leading agencies: DoF Supportive agencies: DMCR, DNP and Univ	5.0	To define measures and assess the status of sharks resources	Technical paper on sharks
4. Collect sharks samples for museums	←				→	Leading agencies: NSM, DoF Supportive agencies: DMCR, DNP and Univ	5.0	To be references for sharks specimens	Sharks specimens collection in museums
5. Collect information of export and import sharks by recording names at family or species level	←				→	Leading agencies: DoF Supportive agencies: TCD	1.0	To assess the situation of sharks trade	Import and export sharks data into family or species level
6. Study and collect DNA samples of sharks species found in Thai waters, and from their products	←				→	Leading agencies: DoF, NSTDA Supportive agencies: DNP, DMCR, Univ and TMT	5.0	Gene bank for references of sharks species	Collection of sharks DNA barcoding samples
7. Study on sharks utilization	↔				↔	Leading agencies: DoF Supportive agencies: NFAT	0.4	To fully utilize of sharks	Report on sharks utilization
8. Develop a database system of sharks					↔	Leading agencies: DoF Supportive agencies: Univ, DMCR, DNP and NFAT	20.0	Database system on sharks	Sharks database

Objective 2: Systematically and regularly assess status and threats on sharks caused by fisheries and environment

Activities	Time frame					Responsible agencies	Budget	Target	Index
	2020	2021	2022	2023	2024		(million baht)		
1. Assess sharks stock status in Thai waters					↔	Leading agencies: SEAFDEC, DoF Supportive agencies: FMO, DMCR, Univ and ONEP	2.0	To define threatened or endangered species	Report on sharks status assessment
2. Assess threats caused by fisheries and tourism				↔		Leading agencies: DoF Supportive agencies: DMCR, DNP, TAT, ONEP, PRD, Univ and PAO	4.0	To define the causes of reduction in sharks numbers	Report of threat assessment of sharks
3. Study on impacts of threats from environment on sharks	↔					Leading agencies: DoF, DMCR Supportive agencies: PCD, DIW, ONEP, TAT, PAO, Univ and TMT	10.0	Guidelines for protection of sharks from environment impacts	Information of environmental quality in areas of sharks

Objective 3: Develop knowledge and enhance capability related to sharks management for relevant officers

Activities	Time frame					Responsible agencies	Budget (million baht)	Target	Index
	2020	2021	2022	2023	2024				
1. Train officers and staff of relevant government agencies and private sectors on sharks species identification at fishing ports		↔		↔		Leading agencies: DoF Supportive agencies: DMCR, FMO, NSM, DNP, Univ and NFAT	1.0	Training relevant offices on sharks identification	100 trained officers
2. Train on knowledge of species identification of sharks parts or their products		↔		↔		Leading agencies: DoF Supportive agencies: DMCR, FMO, NSM, DNP, Univ and NFAT	1.0	Training relevant offices on sharks part identification	100 trained officers
3. Prepare a field guide on sharks identification	↔					Leading agencies: DoF Supportive agencies: Univ	2.0	To publish field guide on sharks identification	3,000 copies of a field guide on sharks identification
4. Organize a scientific conference on sharks		←————→				Leading agencies: DoF and Univ Supportive agencies: DMCR, DNP, NSTDA and ONEP	4.0	To exchange related scientific knowledge on sharks	Organize scientific conference once a year

Objective 4: Define conservation and management measures to regulate fishing activities and trade on sharks in consistent with international rules, regulations, and obligations

Activities	Time frame					Responsible agencies	Budget	Target	Index
	2020	2021	2022	2023	2024		(million baht)		
1. Define sharks species that will be prohibited for catching/occupancy in accordance with international obligations as ratified by Thailand						Leading agencies: DoF, DMCR Supportive agencies: DNP, ONEP, FMO, PAO, NFAT and SSFO	1.0	To protect sharks species based on international obligations committed by Thailand	A number of protected sharks species
2. Define conservation measures for sharks resources, as well as conduct study on impacts from such measures						Leading agencies: DoF, DMCR Supportive agencies: DNP, ONEP and NFAT	1.0	Existence of sharks in Thai waters	Measures for sharks conservation
3. Develop traceability system for sharks and their products						Leading agencies: DoF Supportive agencies: NFAT and Univ	10.0	To be able to trace the source of sharks	Traceability system for sharks
4. Define marketing measures for sharks utilization						Leading agencies: DoF, DMCR Supportive agencies: NFAT	1.0	To reduce the use of sharks	Marketing measures

Objective 5: Establish and strengthen a network of stakeholders' engagement for management and conservation of sharks resources

Activities	Time frame					Responsible agencies	Budget (million baht)	Target	Index
	2020	2021	2022	2023	2024				
1.Establish a network between government agencies by using online social media	←	→				Leading agencies: DoF, DMCR Supportive agencies: DNP, PAO and Univ	1.0	To integrate the information access between government agencies	100 members
2.Establish a network between government and private sectors by using online social media		←	→			Leading agencies: DoF, DMCR Supportive agencies: NFAT and SSFO	2.0	To integrate the information access between government and private sectors	100 members
3.Attend international meetings relating to sharks	←	→				Leading agencies: DoF Supportive agencies: DMCR, DNP	1.0	To exchange sharks information at international level	Attend a meeting once a year
4.Review and update NPOA-Sharks of Thailand				↔		Leading agencies: DoF Supportive agencies: DMCR, DNP, SEAFDEC, NFAT and Univ	2.0	To review and update NPOA-Sharks of Thailand, Plan 1	A draft of NPOA-Sharks, Plan 2
5.Conduct study and research on sharks breeding	←	→				Leading agencies: DoF, DMCR Supportive agencies: DNP, RTN and Univ	5.0	Sharks species that can be bred in captivity	Technical paper on sharks breeding
6.Restock sharks from breeding programs to nature	←	→				Leading agencies: DoF, DMCR Supportive agencies: DNP, RTN and Univ	2.0	To increase sharks in nature	At least 50 sharks released to the nature per year

Objective 5: (Cont)

7.Publicize activities of sharks restocking in cooperation with relevant agencies						Leading agencies: DoF, DMCR Supportive agencies: DNP, PRD, RTN and Univ	2.0	To build awareness on sharks conservation	One event of releasing sharks to the nature per year	
8.Develop public awareness materials related to sharks conservation						Leading agencies: DoF, DMCR Supportive agencies: DNP and Univ	2.0	To build awareness on sharks conservation	At least three channels of public relations (Line, Facebook, Website)	
9.Organize exhibitions on sharks conservation						Leading agencies: DoF, DMCR Supportive agencies: DNP, PRD, RTN and Univ	2.0	To build awareness on sharks conservation	At least one exhibition	
							Total budget for 5 objectives 130 million baht			

List of responsible agencies:

DIW = Department of Industrial Works

DoF = Department of Fisheries

DMCR = Department of Marine and Coastal Resources

DNP = Department of National Parks, Wildlife and Plant Conservation

FMO = Fish Marketing Organization

NFAT = National Fisheries Association of Thailand

NSM = National Science Museum

NSTDA = National Science and Technology Development Agency

ONEP = Office of Natural Resources and Environmental Policy and Planning

PAO = Provincial Administrative Organization

PCD = Pollution Control Department

PRD = Government Public Relations Department

PTT = Petroleum Authority of Thailand

RTN = Royal Thai Navy

SEAFDEC = Southeast Asian Fisheries Development Center

SSFO = Small scale fisheries organization

TAT = Tourism Authority of Thailand

TCD = Thai Customs Department

TMT = Manta Trust (Thailand)

Univ = University

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Appendix

Appendix 1

Appendix table 1 Species list of cartilaginous fishes found in Thai waters and the adjacent areas in 2019

1) Subclass Elasmobranchii : sharks and rays

Order	Family	No.	Thai name	English name	Scientific name	Status	Source	IUCN Redlist
Shark 8 order , Organize the list according to Last et al., 2016 (Shark of the World)								
1) Hexanchiformes	1) Hexanchidae	1	Chalam pak jing jok	Sharpnose sevengill shark	<i>Heptanchias perlo</i> (Bonnaterre, 1788)	+	RS/FP	NT
		2	Chalam ngeak hok chong	Bigeye sixgill shark	<i>Hexanchus nakamurai</i> Teng, 1962	+	RS	DD
2) Echinorhiniformes	2) Echinorhinidae	3	Chalam nam	Bramble shark	<i>Echinorhinus brucus</i> (Bonnaterre, 1788)	-	FP	DD
3) Squaliformes	3) Squalidae	4	Chalam lang nam	Indonesian shotnout dogfish	<i>Squalus hemipinnis</i> White, Last & Yearley, 2007	+	RS/FP	NT
		5	Chalam lang nam	Shortnose spurdog	<i>S. megalops</i> (Macleay, 1881)	+	RS/FP	DD
		6	Chalam lang nam	Spiny dogfish	<i>Squalus</i> sp.	-	RS/FP	NE
	4) Centrophoridae	7	Chalam gulper	Gulper shark	<i>Centrophorus granulosus</i> (Bloch and Schneider, 1801)	+	RS	DD
		8	Chalam gulper khrip lek	Smallfin Gulper shark	<i>C. cf. maluccensis</i> Bleeker, 1860	+	RS	NE
	5) Etmopteridae	9	Chalam thong dam	Southern lanternshark	<i>Etmopterus granulosus</i> (Gunther, 1880)	+	RS	LC
		10	Chalam thong dam	Smooth lanternshark	<i>E. cf. pusillus</i> (Lowe, 1839)	+	RS	NE
		11	Chalam thong dam	Sculptured lanternshark	<i>E. Sculptus</i> Ebert , Compagno & De Vries, 2011 1839	-	RS	LC
4) Squatiniformes	6) Squatinidae	12	Chalam nang fa	Angelshark	<i>Squatina</i> sp.	-	RS	NE
		13	Chalam nang fa	Ocellated angelshark	<i>S. tergocollataoides</i> Chen, 1963	-	FP	VU
5) Heterodontiformes	7) Heterodontidae	14	Chalam na wua lai	Zebra bullhead shark	<i>Heterodontus zebra</i> (Gray, 1831)	+	RS/FP	LC
6) Lamniformes	8) Odontaspidae	15	Chalam sai	Sandtiger shark	<i>Carcharias taurus</i> Rafinesque, 1810	-	RS	VU
	9) Pseudocarchariidae	16	Chalam cho ra khe	Crocodile shark	<i>Pseudocarcharias kamoharui</i> (Matsubara, 1936)	-	RS	LC
	10) Megachasmidae	17	Chalam pak kwang	Megamouth shark	<i>Megachasma pelagios</i> Taylor, Compagno & Struhsaker,	-	RS	LC
	11) Alopiidae	18	Chalam hang yao	Pelagic thresher	<i>Alopias pelagicus</i> Nakamura, 1935	+	RS/FP	VU
		19	Chalam hang yao na nu	Bigeye thresher	<i>A. superolius</i> (Lowe, 1841)	+	RS/FP	VU
		20	Chalam hang yao	Thresher shark	<i>A. vulpinus</i> (Bonnaterre, 1788)	-	RS/FP	VU
	12) Lamnidae	21	Chalam pak ma	Shortfin mako	<i>Isurus paucus</i> Rafinesque, 1810	-	RS/FP	EN
		22	Chalam pak mom	Longfin mako	<i>I. paucus</i> Guitart, 1966	-	RS/FP	EN
7) Orectolobiformes	13) Orectolobidae	23	Chalam kob yipun	Japanese wobbegong	<i>Orectolobus cf. japonicus</i> Regan, 1906	+	FP	NE
		24	Chalam pak nuat	False cobbler wobbegong	<i>O. leptolineatus</i> Last, Pogonoski & White, 2010	+	RS/FP	NE
	14) Hemisylliidae	25	Chalam kob	Grey bamboo shark	<i>Chiloscyllium griseum</i> Muller & Henle, 1838	++	RS/FP	NT
		26	Chalam kob	Indonesian bamboo shark	<i>C. hasseltii</i> Bleeker, 1852	++	FP	NT
		27	Chalam kob lai	Slender bamboo shark	<i>C. indicum</i> (Gmelin, 1789)	+	FP	NT
		28	Chalam kob lai suea nam	Whitespotted bamboo shark	<i>C. plagiatum</i> (Bennett, 1830)	+	FP	NT
		29	Chalam kob	Brownbanded bamboo shark	<i>C. punctatum</i> Muller & Henle, 1838	+++	RS/FP/OT	NT
	15) Ginglymostomatidae	30	Chalam chi sao	Tawny nurse shark	<i>Nebrius ferrugineus</i> (Lesson, 1831)	+	FP/OT	VU
	16) Stegostomatidae	31	Chalam suea dao	Zebra shark	<i>Stegostoma fasciatum</i> (Hermann, 1783)	+	RS/FP/OT	EN
	17) Rhincodontidae	32	Chalam whale	Whale shark	<i>Rhincodon typus</i> Smith, 1828	+	OT	EN
8) Carchariformes	18) Squalorhinidae	33	Chalam mao hua yao	Longhead catshark	<i>Apristurus longicephalus</i> Nakaya, 1875	+	RS	LC
		34	Chalam kob lai hin on	Coral catshark	<i>Atelomyxterus marmoratus</i> (Bennett, 1830)	+	RS/FP	NT
		35	Chalam khrae	Bristly catshark	<i>Bythaelurus hispidus</i> (Alcock, 1891)	-	RS	DD
		36	Chalam khrae	Mud catshark	<i>B. lutanus</i> (Springer & D' Aubrey, 1972)	+	RS	DD
		37	Chalam phong lom	Australian reticulated swellshark	<i>Cephaloscyllium cf. hicosellum</i> White & Ebert, 2008	-	RS	NE
		38	Chalam thong pong	Indian swellshark	<i>C. sitoi</i> (Talwar, 1974)	-	RS	DD
		39	Chalam thong pong	Speckled swellshark	<i>C. cf. speculum</i> Last, Secret & White, 2008	+	RS	NE
		40	Chalam kob chut dam	Blackspeckled catshark	<i>Haloaelurus buergeri</i> (Muller & Henle , 1838)	+	RS/FP	DD
	19) Proscylliidae	41	Chalam mao hang thaep	Pygmy ribbontail catshark	<i>Endacnis radcliffei</i> smith, 1913	-	RS	LC
		42	Chalam mao chut	Magnificent catshark	<i>Proscyllium magnificum</i> Last & Vongspanich, 2004	+	RS/FP	NE
	20) Triakidae	43	Chalam ma	Magalore houndshark	<i>Iago cf. magalorensis</i> (Cubelio Remya & Kurup, 2011)	+	RS	NE
		44	Chalam ma ta to	Bigeye houndshark	<i>I. omanensis</i> (Norman , 1939)	+	RS	LC
		45	Chalam ma	Starspotted smoothhound	<i>Mustelus manazo</i> Bleeker , 1854	-	RS	DD
		46	Chalam ma	Arabian smoothhound	<i>M. mosis</i> Hemprich & Ehrenberg , 1899	+	RS/FP	DD
		47	Chalam ma chut khao	Whitespotted gummy shark	<i>M. cf. stevensi</i> White & Last , 2008	+	FP	NE
	21) Hemigaleidae	48	Chalam nu	Hooktooth shark	<i>Chaenogaleus macrostoma</i> (Bleeker , 1852)	+	RS/FP	VU
		49	Chalam nu	Sicklefin weasel shark	<i>Hemigaleus microstoma</i> (Bleeker , 1852)	+	RS/FP	VU
		50	Chalam nu	Snaggletooth shark	<i>Hemipristis elongata</i> (Kunzinger , 1871)	+	RS/FP	VU
		51	Chalam nu	Slender weasel shark	<i>Paragaleus randalli</i> Compagno, Krupp & Carpenter, 1996	+	FP	NT
		52	Chalam nu	Straighttooth weasel shark	<i>P. tengi</i> (Chen, 1963)	+	FP	DD
	22) Carcharhinidae	53	Chalam hoo khao	Silvertip shark	<i>Carcharhinus albimarginatus</i> (Ruppell, 1837)	+	FP/OT	VU
		54	Chalam chamuk to	Bignose shark	<i>C. altimus</i> (Springer , 1950)	+	RS/FP	DD
		55	Chalam hoo dam	Graceful shark	<i>C. amblyrhynchoides</i> (Whitley , 1834)	++	FP	NT
		56	Chalam khrip dam yai	Gray reef shark	<i>C. amblyrhynchus</i> (Bleeker , 1856)	+	FP/OT	NT
		57	Chalam ta lek	Pigeye shark	<i>C. ombainensis</i> (Muller & Henle, 1839)	+	FP	DD
		58	Chalam khrip dang	Bronze whaler	<i>C. brachyurus</i> (Gunther, 1870)	+	FP	NT
		59	Chalam hoo dam	Spinner shark	<i>C. brevipinna</i> (Muller & Henle, 1839)	++	RS/FP	NT
		60	Chalam nu	Whiteshark shark	<i>C. dussumieri</i> (Muller & Henle, 1839)	++	RS/FP	EN
		61	Chalam thao	Silky shark	<i>C. falcatrimis</i> (Muller & Henle, 1839)	+	RS/FP	VU
		62	Chalam hua bat	Bull shark	<i>C. leucas</i> (Muller & Henle, 1839)	+	FP/OT	NT
		63	Chalam hoo dam lek	Blacktip shark	<i>C. limbatus</i> (Muller & Henle, 1839)	+	FP	NT
		64	Chalam khrip yao	Oceanic whitemip shark	<i>C. longimanus</i> (Poey , 1861)	+	RS/FP	VU
		65	Chalam chamuk khaoeng	Hardnose shark	<i>C. macroti</i> (Muller & Henle, 1839)	+	RS/FP	NT

Appendix table 1 (Cont)

Order	Family	No.	Thai name	English name	Scientific name	Status	Source	IUCN RedList
		66	Chalam hu dam	Blacktip reef shark	<i>C. melonopterus</i> (Quoy & Gaimard, 1824)	++	FP/OT	NT
		67	Chalam thao	Dusky shark	<i>C. obscurus</i> (LeSueur, 1818)	+	FP	VU
		68	Chalam kradong sung	Sandbar shark	<i>C. plumbeus</i> (Nardo, 1827)	-	RS/FP	VU
		69	Chalam nu	Blackspot shark	<i>C. sealei</i> (Pietschmann, 1913)	+	RS/FP	NT
		70	Chalam hu dam	Spottail shark	<i>C. sarrah</i> (Muller & Henle, 1839)	+++	RS/FP/OT	NT
		71	Chalam nu	Indonesian whaler shark	<i>C. tjujtot</i> (Bleeker, 1852)	+	RS/FP	VU
		72	Chalam suea	Tiger shark	<i>Galeocerdo cuvier</i> (Peron & LeSueur, 1822)	+	RS/FP/OT	NT
		73	Chalam mae nam	Ganges shark	<i>Glyphis cf. gangeticus</i> (Muller & Henle, 1839)	+	FP	NE
		74	Chalam mae nam	Borneo broadfin shark	<i>Lamiopsis tephrodes</i> (Fowler, 1905)	-	RS	NE
		75	Chalam ta chik	Sliteye shark	<i>Loxodon macrorhinus</i> Muller & Henle, 1839	+	RS/FP	LC
		76	Chalam khrip khong	Sharptooth lemon shark	<i>Negaprion acutidens</i> (Ruppel, 1837)	+	FP	VU
		77	Chalam si nam ngoen	Blue shark	<i>Prionace glauca</i> (Linnaeus, 1758)	+	RS	NT
		78	Chalam nu hua laem	Milk shark	<i>Rhizoprionodon acutus</i> (Ruppel, 1837)	+	RS/FP	LC
		79	Chalam nu hua laem	Grey sharpnose shark	<i>R. ologoinx</i> Springer, 1964	+	RS/FP	LC
		80	Chalam nu hua laem	Spadenose shark	<i>Scoliodon laticaudus</i> Muller & Henle, 1838	+	RS/FP	NT
		81	Chalam nu hua laem	New spadenose shark	<i>S. macrorhynchus</i> (Bleeker, 1852)	+	FP	NE
		82	Chalam khrip khao	Whitetip reef shark	<i>Triaenodon obesus</i> (Ruppel, 1837)	+	RS/FP/OT	NT
	23) Sphymidae	83	Chalam hua khon yao	Winghead shark	<i>Eusphya blochii</i> (Cuvier, 1816)	-	FP	EN
		84	Chalam hua khon si nam	Scalloped hammerhead	<i>Sphyrna lewini</i> (Griffith & Smith, 1834)	+	RS/FP/OT	EN
		85	Chalam hua khon yai	Great hammerhead	<i>S. mokarran</i> (Ruppel, 1837)	+	RS/FP	EN
		86	Chalam hua khon san	Smooth hammerhead	<i>S. zygaena</i> (Linnaeus, 1758)	-	FP	VU
Rays 4 order, Organize the list according to Last et al., 2016 (Rays of the World)								
1) Rhinopriformes	1) Pristidae	1	Chanak pak laem	Narrow sawfish	<i>Anaxyrpis cuspidata</i> (Latham, 1794)	-	RS/FP	EN
		2	Chanak yak	Large-tooth sawfish	<i>Pristis pristis</i> (Linnaeus, 1758)	-	RS/FP	CR
		3	Chanak khiao	Green sawfish	<i>P. zijsron</i> (Bleeker, 1851)	-	RS/FP	CR
	2) Rhinidae	4	Ronin	Shark ray	<i>Rhina ancylostoma</i> (Bloch and Schneider, 1801)	++	FP	CR
		5	Ronan chut khao	Bottlenose wedgefish	<i>Rhynchobatus australiae</i> (Whitley, 1939)	++	RS/FP	CR
		6	Ronan chut khao	Smoothnose wedgefish	<i>R. laevis</i> (Bloch and Schneider, 1801)	+	RS/FP	CR
		7	Ronan chut khao	Eyebrow wedgefish	<i>R. palpebratus</i> Compagno & Last, 2008	-	FP	NT
		8	Ronan chut khao lai	Broadnose wedgefish	<i>R. springeri</i> Compagno & Last, 2010	+	FP	CR
	3) Rhinobatidae	9	Ronan hua sai chut khao	Bengal guitarfish	<i>Rhinobatos annandalei</i> Norman, 1926	+	RS/FP	DD
		10	Ronan hua sai	Borneo guitarfish	<i>R. borneensis</i> Last, Secret & Naylor, 2016	+	RS/FP	NE
		11	Ronan hua sai	Ranong guitarfish	<i>R. ranongensis</i> Last, Secret & Naylor, 2019	++	RS/FP	NE
	4) Glaucostegidae	12	Ronan med	Sharpnose guitarfish	<i>Glaucostegus granulatus</i> (Cuvier, 1829)	-	FP	CR
		13	Ronan hua sai yak	Thailand pointed guitarfish	<i>G. cf. granulatus</i> (Cuvier, 1829)	+	FP	NE
		14	Ronan chamuk kwang	Widenose guitarfish	<i>G. obtusus</i> (Muller & Henle, 1841)	+	FP	CR
		15	Ronan hua jing jok	Clubnose guitarfish	<i>G. thouin</i> (Anonymous, 1798)	-	FP	CR
		16	Ronan hua sai yak	Giant guitarfish	<i>G. typus</i> (Bennett, 1830)	-	FP	CR
	5) Platyrrhinidae	17	Ronan hua klom	Indian fanray	<i>Platyrrhina psomadakisi</i> White & Last, 2016	+	RS	NE
2) Topeoformes	6) Narcinidae	18	Kraben fai fa india	Indian blind numfish	<i>Benthobatis moresbyi</i> Alcock, 1898	+	RS	LC
		19	Kraben fai fa chut nam tar	Shortlip numfish	<i>Narcine breviliabata</i> Bessednov, 1966	+	FP	VU
		20	Kraben fai fa chut khem	Smallsport numfish	<i>N. maculata</i> (Shaw, 1804)	+	RS/FP	DD
		21	Kraben fai fa chut lek	Tonkin numfish	<i>N. prodorsalis</i> Bessednov, 1966	+	FP	DD
		22	Kraben fai fa si nam tan	Brown numfish	<i>N. timlei</i> (Bloch and Schneider, 1801)	+	FP	DD
	7) Narkeidae	23	Kraben fai fa hang chut	Spot-tail sleeper ray	<i>Narke dipterygia</i> (Bloch and Schneider, 1801)	+	FP	DD
		24	Kraben fai fa lang riap	Finless sleeper ray	<i>Temera hardwickii</i> (Gray, 1831)	+	RS/FP	VU
3) Rajiformes	8) Rajidae	25	Kraben lang nam chut	Borneo sand skate	<i>Okamejei carae</i> Last, Fahmi & Naylor, 2010	-	RS	NE
		26	Kraben lang nam chut lue	Holland skate	<i>O. hollandi</i> (Jordan & Richardson, 1909)	-	RS	DD
		27	Kraben lang nam chut	Indian ring skate	<i>Orbiraja powelli</i> (Alcock, 1898)	+	RS/FP	DD
	9) Gurgesiellidae	28	Kraben lang nam andaman	Andaman pygmy skate	<i>Cruniraja andamanica</i> (Lloyd, 1909)	+	RS	DD
	10) Anacanthobatidae	29	Kraben kha yao	Andaman legskate	<i>Sinobatis andomansensis</i> Last & Bussarawit, 2016	-	RS	NE
4) Myliobatiformes	11) Hexatrygonidae	30	Kraben nguak hok chong	Singill stingray	<i>Hexatrygon bickelli</i> Heemstra & Smith, 1890	+	RS	LC
	12) Gymnuridae	31	Kraben phisuea yipun	Japanese butterfly ray	<i>Gymnuro japonica</i> (Temminck & Schlegel, 1850)	++	RS/FP	DD
		32	Kraben phisuea phueak	Smooth butterfly ray	<i>G. cf. micrura</i> (Bloch and Schneider, 1801)	-	RS/FP	NE
		33	Kraben phisuea hang yao	Longtail butterfly ray	<i>G. poecilura</i> (Shaw, 1804)	-	RS/FP	NT
		34	Kraben phisuea hang lai	Zonetail butterfly ray	<i>G. zonura</i> (Bleeker, 1852)	+	FP	VU
	13) Dasyatidae	35	Kraben hang san	Smooth stingray	<i>Bathytoshia brevicaudata</i> (Hutton, 1875)	-	RS/FP	LC
		36	Kraben hang nam	Brown stingray	<i>B. lata</i> (German, 1880)	+	FP	LC
		37	Kraben tukkata	Dwarf whipray	<i>Brevitrygon heterura</i> (Bleeker, 1852)	+++	RS/FP	NE
		38	Krabang	Bengal whipray	<i>B. imbricata</i> (Bloch and Schneider, 1801)	+++	RS/FP	DD
		39	Krabang	Scaly whipray	<i>B. cf. imbricata</i> (Bloch and Schneider, 1801)	+++	RS/FP	NE
		40	Kraben mae klong	Roughback whipray	<i>Fluvitrygon kittipongi</i> Vidhayanon & Robert, 2005	+	-	EN
		41	Kraben nam chuet	Marbled whipray	<i>F. oxyrhynchus</i> (Sauvage, 1878)	+	-	EN
		42	Kraben nam chuet khao	White-edge whipray	<i>F. signifer</i> (Compagno & Robert, 1982)	+	-	EN
		43	Kraben hang wai	Red stingray	<i>Hemitrygon akajei</i> (Muller & Henle, 1841)	++	RS/FP	NT
		44	Kraben hang wai	Bennett's stingray	<i>H. bennetti</i> (Muller & Henle, 1841)	+	RS/FP	DD
		45	Kraben pak mae nam	Estuary stingray	<i>H. fluviurum</i> Ogilby, 1908	+	FP	VU
		46	Kraben lao	Mekong stingray	<i>H. laosensis</i> Robert & Kamasuta, 1987	-	-	EN
		47	Kraben hin	Oriental black stingray	<i>H. navarrae</i> (Steindachner, 1892)	+	FP	DD
		48	Kraben khrae dam	Dwarf black stingray	<i>H. parvovirga</i> Last & White, 2008	+	FP	DD

Appendix table 1 (Cont)

Order	Family	No.	Thai name	English name	Scientific name	Status	Source	IUCN Redlist	
		49	Kraben lai suea dao	Leopard whipray	<i>Himantura leoparda</i> Manjaji-Matsumoto & Last,	+	FP	VU	
		50	Kraben lai suea lek	Coach whipray	<i>H. uarnak</i> (Gmelin, 1789)	++	RS/FP	VU	
		51	Kraben lai suea yai	Honeycomb whipray	<i>H. undulata</i> (Bleeker, 1852)	++	RS/FP	VU	
		52	Kraben chut dam	Blackspotted whipray	<i>Maculabatis astra</i> (Last, manjaji-Matsumoto &	+	FP	LC	
		53	Kraben malang wan	Whitespotted whipray	<i>M. gerrardi</i> (Grey, 1851)	+++	RS/FP	VU	
		54	Kraben malang wan	Sharpnose whipray	<i>M. macrura</i> (Bleeker, 1852)	+	FP	NE	
		55	Kraben bua	Round whipray	<i>M. pastinacoides</i> (Bleeker, 1852)	+	FP	VU	
		56	Kraben ta lek	Smalleye stingray	<i>Megatygon microps</i> (Annandale, 1908)	+	FP	DD	
		57	Kraben chamuk to	Bluespotted maskray	<i>Neotrygon caeruleopunctata</i> Last, White & Secret,	++	RS/FP	NE	
		58	Kraben chamuk to	Kuhl's maskray	<i>N. kuhlii</i> Muller & Henle, 1841	+++	RS/FP	DD	
		59	Kraben chamuk to	Oriental bluespotted	<i>N. orientalis</i> Last, White & Secret, 2016	++	RS/FP	NE	
		60	Kraben phrik thai	Speckled maskray	<i>N. cf. picta</i> Last & White, 2008	+	-	NE	
		61	Kraben chamuk to si nam	Mahogany maskray	<i>N. variidens</i> (German, 1885)	+	RS/FP	NE	
		62	Kraben thong hang bai	Broad cowtail ray	<i>Pastinachus ater</i> (Macleay, 1883)	+	FP	LC	
		63	Kraben thong hang khaep	Narrow cowtail ray	<i>P. gracilicaudus</i> Last, manjaji-Matsumoto, 2010	+	FP	NE	
		64	Kraben thong	Roughnose cowtail ray	<i>P. solocastrois</i> Last, manjaji & yearsley, 2005	+	-	EN	
		65	Kraben thong chamuk klet	Starynose cowtail ray	<i>P. stellurostris</i> Last, Fahmi & Naylor, 2010	+	-	NE	
		66	Kraben bua	Bleeker's whipray	<i>Pateobatis bleekeri</i> (Blyth, 1860)	++	RS/FP	NE	
		67	Kraben lai dok mai	Pink whipray	<i>P. fai</i> (Jordan & Seale, 1906)	+	FP	VU	
		68	Kraben thong hang nam	Jenkin's whipray	<i>P. jenkinsi</i> (Annandale, 1909)	++	RS/FP	VU	
		69	Kraben chamuk khao	Whitenose whipray	<i>P. uamocoides</i> (Bleeker, 1852)	+	FP	VU	
		70	Kraben dam	Pelagic stingray	<i>Pteroplatytrygon violacea</i> (Bonaparte, 1832)	+	RS	LC	
		71	Kraben thong	Bluespotted fantail ray	<i>Taeniura lymma</i> (Forsskal, 1775)	+	RS/FP/OT	NT	
		72	Kraben tok kra	Blotched stingray	<i>Taeniuraps meyeri</i> (Muller & Henle, 1841)	+	RS/FP/OT	VU	
		73	Kraben pak laem	Indonesian sharpnose ray	<i>Telatygon bioso</i> Last, White & Naylor, 2016	+++	RS/FP	NE	
		74	Kraben pak laem	Pale-edge sharpnose ray	<i>T. zuger</i> (Muller & Henle, 1841)	+++	RS/FP	NT	
		75	Kraben bai khanun	Porcupine whipray	<i>Urogymnus asperrimus</i> (Bloch & Schneider, 1801)	+	RS/FP	VU	
		76	Kraben chao phra ya	Giant freshwater stingray	<i>U. chaophraya</i> (Monkolprasit and Robert, 1990)	++	FP	EN	
		77	Kraben chut khao	Mangrove whipray	<i>U. granulatus</i> (Macleay, 1883)	+	FP	VU	
		78	Kraben bua	Songkhla lake whipray	<i>U. aff. lobistoma</i> (Manjaji-Matsumoto & Last, 2006)	++	-	NE	
14)	Plesiobatidae	79	Kraben nam luek	Giant stingray	<i>Plesiobatis daviesi</i> (Wallace, 1967)	+	RS/FP	LC	
15)	Urolophidae	80	Kraben ja va nam luek	Java stingaree	<i>Urolophus javanicus</i> (Martens, 1864)	-	RS	CR	
16)	Myliobatidae	81	Kraben nok chut khao	Mottles eagle ray	<i>Aetomylaeus maculatus</i> (Gray, 1834)	+	RS/FP	EN	
		82	Kraben nok bang	Banded eagle ray	<i>A. nichofii</i> (Bloch & Schneider, 1801)	+	RS/FP	VU	
		83	Kraben nok rang kra sae	Ornate eagle ray	<i>A. vespertilio</i> (Bleeker, 1852)	+	RS/FP	EN	
17)	Aetobatidae	84	Kraben nok	Spotted eagle ray	<i>Aetobatus ocellatus</i> (Kuhl, 1823)	++	RS/FP	VU	
18)	Rhinopterae	85	Kraben chamuk wua	Javan cownose ray	<i>Rhinoptera javanica</i> Muller & Henle, 1841	+	FP	VU	
		86	Kraben chamuk wua hang	Shorttail cownose ray	<i>R. jayakari</i> Boulenger, 1895	+	FP	NE	
19)	Mobulidae	87	Kraben rahu naeo	Reef manta ray	<i>Mobula alfredi</i> (Krefft, 1868)	+	OT	VU	
		88	Kraben rahu yak	Giant manta ray	<i>M. birostris</i> (Walbaum, 1792)	+	OT	VU	
		89	Kraben rahu khrip san	Kuhl's devilray	<i>M. kuhlii</i> Muller & Henle, 1841	+	FP	DD	
		90	Kraben rahu hang nam	Giant devilray	<i>M. mobular</i> (Bonnaterre, 1788)	+	RS/FP	NT	
		91	Kraben rahu khrip laem	Chilean devilray	<i>M. tarapacana</i> (Philippi, 1892)	-	OT	VU	
		92	Kraben rahu	Bentfin devilray	<i>M. thurstoni</i> (Lloyd, 1908)	+	FP	NT	
2) Subclass Holocephali : ratfishes , rabbit fishes , elephant fishes , chimaeras , ghost sharks									
Order	Family	No.	Thai name	English name	Scientific name	Status	Source	IUCN Red list	
1)	Chimeriformes	1) Chimeridae	1	Pla nu nam yao	Longspine chimaera	<i>Chimaera aff. macrospina</i> Diddier, Last & White ,	+	RS	NE
			2	Chi me ra si ngoen	Silver Chimera	<i>Chimaera cf. phantasma</i> Jordan & Snyder, 1900	-	RS	NE
			3	Pla kra tai khrip lon	African Chimera	<i>Hydrolagus africanus</i> (Gilchrist, 1922)	+	RS	DD
			4	Chalam pee	Ghost shark	<i>Hydrolagus sp.</i>	-	RS	NE
		2) Rhinochimeridae	5	Pla nu chamuk yao	Sicklefin Chimera	<i>Neohariotta pinnata</i> (Schnakenbeck, 1931)	+	RS	DD

Remarks:

Status:	+++	= dominant
	++	= normal
	+	= rare
	-	= only recorded
Source:	FP	= Fishing port
	OT	= Observation & Tourism
	RS	= Research Survey

Appendix 2

Laws and Management measures for sharks in Thailand

Thailand has several fisheries laws which directly and indirectly affect to sharks conservation by virtue of the Fisheries Act, B.E. 2490; Royal Ordinance on Fisheries, B.E.2558; Marine Fisheries Management Plan of Thailand; National Policy for Marine Fisheries Management 2015–2019; Wildlife Preservation and Protection Act, B.E. 256 2 ; National Park Act, B.E. 25 0 4; Enhancement and Conservation of the National Environmental Quality Act, B.E. 2535; Act on Promotion of Marine and Coastal Resources Management, B.E. 2558; and other legislations related to fisheries. Details of these legislations are as follows:

The Fisheries Act, B.E. 2490 was a major legislation of DoF until 2015. Regulations and Notifications of the Ministry of Agriculture and Cooperatives related to fisheries that issued under the Fisheries Act, B.E. 2490 are as follows:

1) Ministerial notification dated 20 July 1972 on prohibiting the use of trawl net and push net by motorized vessels to protect sharks by prohibiting the use of trawls and push nets in the area within 3,000 meters from shoreline in order to allow marine aquatic animals living in coastal areas will not be caught from these type of fishing gears.

2) Ministerial regulation dated 17 September 1996 on implementation procedure to limit the number of trawlers and push-netters, considering that such fishing gears can significantly catch large number of sharks. Therefore, this regulation limits the number of fishing gears to control fishing efforts exceeding level of fisheries productivities.

3) Ministerial notification dated 24 September 1999 on prohibiting the use of specific types of fishing gear to operate during the determined spawning and breeding seasons in the areas of Prachuap Khiri Khan, Chumphon, and Surat Thani Provinces, also prohibiting the use of these fishing gears from 1 February to 15 May.

4) Ministerial notification dated 24 October 2008 on prohibiting the use of specific types of fishing gear to operate during the determined spawning and breeding seasons in the areas of Phuket, Phangha, Krabi, Trang Provinces, also prohibiting the use of these fishing gears from 1 April to 30 June.

5) Ministerial notification on prohibiting the use of trawl net and push net with motorized vessels in specific fishing areas of 10 provinces, including Krabi Province (dated 9 October 2007), Prachuab Khiri Khan Province (dated 9 October 2007), Trang Province (dated 9 October 2007), Rayong Province (dated 3 January 2008), Narathiwat Province (dated 3 January 2008), Pattani Province (dated 3 January 2008), Satun Province (dated 29 January 2009), Nakorn si thamrat Province (dated 17 July 2009), Chumphon Province (dated 11 April 2011) and Chantaburi Province (dated 11 December 2012), by prohibiting the use of trawl net and push net in the areas within 5,400 meters of shoreline.

6) Ministerial notification dated 13 August 2013 on prohibiting the use of specific types of fishing gear from 1 June to 31 July in some fishing areas of Prachuap Khiri Khan, Phetchaburi, Samut Songkhram, Samut Sakhon, Bangkok, Samut Prakan, Chachoengsao and Chonburi Provinces.

The Royal Ordinance on Fisheries, B.E. 2558 (Fisheries Act, B.E. 2558) is a major legislation in the present time, including the Royal Ordinance on Fisheries issued in 2015 and its amendment issued in 2017, which extremely realize importance for sustainable management of aquatic resources. It was used as a basis to prepare Marine Fisheries Management Plan of Thailand: A National Policy for Marine Fisheries Management 2015–2019. This management plan provides guidelines to resolve problems facing presently. It also provides details on management measures and implementation for replacing the open access scheme to limited access to limit the level of fishing efforts in accordance with the Maximum Sustainable Yield (MSY) of fisheries productions. This management plan has a close link with the National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported, and Unregulated Fishing (NPOA-IUU), 2015 (Department of Fisheries, 2015a, 2016a), including:

1) Defining that all fishing vessels shall be the fishing license holders, and develop electronic fishing license system for all vessels operating in Thai waters to ensure all fishing vessels are registered and licensed.

2) Strengthen coordination across Department of Fisheries, Department of Marine and Coastal Resources, Custom Department, Royal Thai Navy, Marine Police Division, Marine Department, Provincial Administration Department, Ministry of Labor and Thailand Maritime

Enforcement Coordinating Centre (Thai-MECC) through a MOUs for information exchange, enforcement authorization, prosecution, and penalty.

3) Establishment of Port in-Port out control center for commercial fishing vessels size 30 GT and over, effectively to control in all areas.

4) Defining that commercial fishing vessels size 30 GT and over shall install onboard Vessel Monitoring System (VMS)

5) Defining that commercial fishing vessels shall use fishing logbook for recording their catch

6) Developing onboard observer program based on a risk assessment for fishing vessels and transshipment vessels operating beyond Thai waters.

7) Foreign vessels who transship catches in Thailand shall comply with the national Port State Measure.

8) Controlling import and export of goods shall comply with international trade agreement under CITES and the Wildlife Preservation and Protection Act.

9) Enhancing capacity through the use of application system developed for improving and strengthening traceability system.

10) Increasing the total areas of Marine Protected Area

11) Improving fisheries data collection system and fisheries information dissemination in order to effectively monitor implementation of Marine Fisheries Management Plan.

Regarding Whale shark, Ministerial notification was issued to prohibit whale shark fishery dated 28 March 2000 under the Fisheries Act, B.E. 2490 was revoked. Afterwards, Ministerial notification on definition of marine mammals and endangered species to be prohibited for fishing or taking onboard fishing vessels dated 7 April 2016 was issued by virtual of the Fisheries Act, B.E. 2558.

The National Park Act, B.E. 2504 indirectly protects sharks habitats in national parks and connected coastal areas by prohibiting all fishing activities. Currently, there are 22 marine national parks in the Gulf of Thailand and the Andaman Sea covering the areas of 6,166.93 km², namely Khao Laem Ya–Mu Ko Samed National Park, Mu Ko Chumphon National Park, Mu Ko Ang Thong National Park, Tarutao National Park, Mu Ko Lanta National

Park, Had Nopparat Tara–Mu Ko Phi Phi National Park, Had Chao Mai National Park, AoPhang Nga National Park, Mu Ko Similans National Park, and Mu Koh Ranong National Park.

The Act on Ancient Monuments, Antiques Objects of Art and National Museums, B.E. 2504 relates to marine archaeology protected areas which indirectly protects sharks habitats in those areas.

The Wildlife Preservation and Protection Act, B.E. 2562 is the major legislation enforced by DNP and DoF (for aquatic animals), which aims to protect wildlife species, including species listed under CITES appendices and other relevant legislations, as follows:

1) Ministerial regulation on protecting some wildlife species, namely 4 sawfishes (Pristidae), Bowmouth guitarfish, Giant freshwater stringray and 6 devilrays (Mobulidae, except *Mobula tarapacana*) became to enforce since 1 September 2018. Subsequently, Whale shark was declared as wildlife preserved fish as revised under the Appendix of Wildlife Preservation and Protection Act, B.E. 2562 dated 29 May 2019.

2) Natural Resources and Environment Ministerial Notification on definitions of wild animals and carcasses of wild animals prohibited for import and export, dated 25 February 2011, and listing of wild animals as Appendix, dated 18 November 2010, in order to implement the national legislations in accordance with CITES listed species.

3) Department of Fisheries regulation on application and certification of species not listed under CITES appendices dated 29 September 2004 was issued in relevance with the Wildlife Preservation and Protection Act, B.E. 2562 and CITES in order to control trades of aquatic animals listed in CITES appendices.

The Enhancement and Conservation of the National Environment Quality Act, B.E. 2535: indirectly protects sharks habitats in specified environmental protection areas for a certain period of time. There are Natural Resources and Environment Ministerial Notifications and Orders to protect 6 areas covering 12,190.21 km² in total.

The Act on Promotion of Marine Coastal Resources Management, B.E. 2558: indirectly protects sharks habitats and prohibits to hurt sharks. This Act is directly controlled by DMCR.

Appendix 3

International Commitment related to sharks conservation and management

Legal binding on international fisheries commitments and instruments related to sharks conservation and management that Thailand has to conduct or revise or issue national legislations to be consistent with, are as follows:

1. The United Nations Convention on the Law of the Sea, 1982 aims to establish conservation measure, fisheries resources management and other utilization from the sea extensively under legislation of exclusive economic zones and high seas. Furthermore, to specify coordinate obligation of the coastal state and another state in order to conserve and utilize aquatic species which highly migrate such as Sixgill shark (*Hexanchus griseus*), Basking shark (*Cetorhinus maximus*), Thresher sharks (Alopiidae), Whale shark (*Rhinocodon typus*), Requiem sharks (Carcharhinidae), Hammerhead sharks (Sphyrnidae) and Mako sharks (Lamnidae). Thailand submitted ratification on 15 May 2011 and become into force on 14 June 2011.

2. The Port State Measures Agreement to eliminate Illegal, unreported and unregulated fishing aims to prevent marine resources and their products form Illegal, fishing to international fish market that landed or transhipped their catches as Illegal, unreported and unregulated ports considering harmful for sharks, particularly to endangered species. Therefore, Port State Measures Agreement has benefits on sharks resources conservation. Thus, Thailand submitted to accession on 10 May 2016.

3. The Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. The objective of this Agreement can be achieved through specifying flag states' responsibility in respect of fishing vessels entitled to operating on the high seas. Such States should operate essential measure in order to certify vessels entitled to fly its flag unrelated with other activity of fishing vessels affecting to marine resources conservation and management measures in high seas.

4. The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982. This agreement relates to the conservation and management of straddling fish stocks and highly migratory fish stocks. The

objectives of the agreement are to ensure the long-term conservation and sustainable use of straddling fish stocks and highly migratory fish stocks. In addition, it aims to establish collaborative responsibility for State under the regional fisheries management organization in order to conservation and management of straddling fish stocks and highly migratory fish stocks.

Furthermore, this Agreement established obligation of States parties to decrease target species from fishing, including sharks and other associated species especially endangered species, as well as to reduce pollution and waste through precautionary approach for preventing and managing on basis of ecosystem applying to those who operate in High Seas and territorial waters of coastal States. Hence, Thailand submitted to accession on 27 May 2017.

5. Regional Fisheries Management Organization

Thailand is a member of several regional fisheries organizations such as IOTC and SIOFA that complies with the specified conservation and management measures in their respective areas, including Sharks Conservation and Management Measures in IOTC area, for example by-catch measures, sharks fishery, report requirements, data collection and research work.

Moreover, there are a number of non-legal binding instruments and other related international instruments. Thailand therefore shall cooperate and implement resource management measures in consistent with such measures. It includes:

1. The Code of Conduct for responsible fisheries (CCRF). This code aims to set principles and standards applicable for responsible fishing activities in order to promote conservation, management and development of all fisheries. It also defines principles in accordance with the relevant regulations to support the objectives of this code. In this connection, the IPOA-Sharks is an instrument under this code.

2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international treaty to establish principles for international trade in specimen's species of endangered wild animals and plants has to be authorized through a licensing system. Such species are covered in the CITES listed in their appendices where by Appendix I includes species that prohibits for trade; Appendix II includes species that permit

for trade under control in order to avoid inconsistent use with survival in wildlife; and Appendix III includes species that are protected by one member country but requesting other CITES parties to collaborate with an appropriate import permit and a certificate of origin from the State of the member country who has listed the species. Thailand became a member of CITES since 21 January 1983.

3. The Convention on Biological Diversity (CBD) is a convention for promoting conservation of biodiversity to ensure sustainable use of biological ecosystem, fair and equitable sharing of benefits from resources utilization. In addition, Committee of the Convention approved suggestions on sharks conservation and their sustainable use, especially large pelagic shark. Thailand became a member of the Convention on 29 January 2004.

4. The Convention on the Conservation of Migratory Species (CMS), 1979 aims to conserve migratory species within their migratory ranges and/or in out of state jurisdiction to avoid any migratory species becoming endangered. In 2010, Memorandum of Understanding on the conservation of migratory sharks have been adopted in September 2012. Regarding the Appendix of the MOU that announcement in 2018, it was found that shark species listed in Appendix I include Whale shark (*Rhincodon typus*), Great white shark (*Carcharodon carcharias*), Basking shark (*Cetorhinus maximus*), Angelshark (*Squatina squatina*), common guitarfish (*Rhinobatos rhinobatos*), sawfishes (Pristidae) and devilrays (Mobulidae). Shark species in the Appendix II include Whale shark (*Rhincodon typus*), Great white shark (*Carcharodon carcharias*), Mako sharks (*Isurus* spp.), Porbeagle shark (*Lamna nasus*), Basking shark (*Cetorhinus maximus*), Thresher sharks (*Alopias* spp.), Silky sharks (*Carcharhinus falciformis* and *C. obscurus*), Blue shark (*Prionace glauca*), Hammerhead sharks (*Sphyrna lewini* and *S. mokarran*), Spiny dogfish shark (*Squalus acanthias*), Angelshark (*Squatina squatina*), common guitarfish (*Rhinobatos rhinobatos*), Whitespotted guitarfish (*Rhynchobatus australiae*), sawfishes (Pristidae) and devilrays (Mobulidae).

5. The International Union for Conservation of Nature (IUCN) is an international organization who has a mission on conservation of biodiversity by establishing Sharks Specialist Group (SSG) responsible to promote long-term sharks conservation. The SSG

evaluated sharks status and threats of sharks species. SSG also provided IUCN Red List to indicate status of the extinction risk of wild animal species.

6. Ramsar Convention or Convention on Wetlands is the intergovernmental treaty that provide a framework for conservation and wise use of wetland and their resources. The Convention was adopted in the Iranian city of Ramsar on 2 February 1971. For this reason, nine wetlands in Thailand have been designated as Ramsar sites. These wetlands cover a total area of 3,768.52 km² (Office of Natural Resources and Environmental Policy and Planning, 2014).

7. The United Nations Education, Scientific and Cultural Organization (UNESCO). Biosphere Reserve in Ranong was established by UNESCO covering a total area of 303 km² (Mangrove Forest Research Center (Ranong), 2012).

8. ASEAN Declaration on Heritage Parks. Two sites of marine and coastal protected areas in Thailand have been designated as ASEAN Heritage Parks including Tarutao National Marine Park and Ao Phang-Nga-Mu Ko Surin-Mu Ko Similan National Park, covering a total area of 1,361.80 km² (Department of National Park, 2014).



Marine Fisheries Research and Development Division

Department of Fisheries

Ministry of Agriculture and Cooperatives



National Plan of Action for Reducing Incidental Catch of Seabirds (NPOA Seabirds)



Department of Fisheries
Ministry of Agriculture and Cooperatives



National Plan of Action for Reducing Incidental Catch of Seabirds (NPOA-Seabirds)

Department of Fisheries
Ministry of Agriculture and Cooperatives

2024

Foreword

Seabirds live mostly in the ocean, and some seabird species are endangered or threatened because the population of seabirds is greatly reduced caused by human activities. Commercial fishing has also resulted in the depletion of fish which are the prey of seabirds. The incidental catch of seabirds from fishing activities has led to huge numbers of seabirds' mortality. Consequently, the Food and Agriculture Organization of the United Nations (FAO) has developed the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA - Seabirds). As a member of the FAO, Thailand is also aware of the impact of this issue. Therefore, the National Plan of Action for Reducing Incidental Catch of Seabirds (NPOA - Seabirds) has been developed in line with the IPOA - Seabirds for conservation and management to reduce incidental catch of seabirds by longline fisheries. Moreover, it is also applicable as a good practices for oversea Thai fishing vessels in the future.

Executive summary

The global status of seabird population has rapidly declined over the past decades. Many species and groups of seabirds are endangered. Birdlife International has found that Commercial - scale fishery is the most serious threat to seabirds. As a member of the Food and Agriculture Organization of the United Nations (FAO), Thailand has endorsed the Code of Conduct for Responsible Fisheries and has the fisheries laws as the Royal Ordinance on Fisheries B.E. 2558 (2015) and its amendments in place to aware of the importance of sustainable aquatic animal resources management in Thailand, and to comply with the international conservation and management measures, and to increase the opportunity of Thai fishing fleet for fishing outside Thai waters. Therefore, Thailand has developed this National Plan of Action for Reducing Incidental Catch of Seabirds (NPOA - Seabirds) as a practical guide for reducing the Incidental catch of seabird seabirds for Thai fishing vessels operating outside Thai waters. The NPOA - Seabirds consists of the following objectives:

Objective 1: To prevent and reduce incidental catch of seabirds from fishing

Objective 2: To comply with the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA - Seabirds) as well as to be in line with the conservation and management measures of the Indian Ocean Tuna Commission (IOTC), the Southern Indian Ocean Fisheries Agreement (SIOFA), the Western and Central Pacific Fisheries Commission (WCPFC), or other Regional Fisheries Management Organizations (RFMOs).

As such objectives, the Department of Fisheries has, therefore, developed this NPOA - Seabirds, which consists of the status of oversea fisheries of Thai fishing vessels, mitigation measures, and practical guides for reducing incidental catch of seabirds from fisheries, action plan, and review of the action plan. This is to ensure that there are conservation and management measures on seabird resources in Thailand for the long - term sustainable utilization in the fisheries sector.

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Abbreviations

CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CMMs	Conservation and Management Measures
EM	Electronic Monitoring System
ERS	Electronic Reporting System
FAO	Food and Agriculture Organization of the United Nations
IOTC	Indian Ocean Tuna Commission
IPOA-Seabirds	International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries
IUCN	International Union for Conservation of Nature
RFMOs	Regional Fisheries Management Organizations
SIOFA	Southern Indian Ocean Fisheries Agreement
VMS	Vessel Monitoring System
WCPFC	Western and Central Pacific Fisheries Commission

National Plan of Action for Reducing Incidental Catch of Seabirds (NPOA-Seabirds)

1. Introduction

1.1 International legal framework

To aware on the incidental catch of seabirds reduction, the Food and Agriculture Organization of the United Nations (FAO) has developed the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA - Seabirds), and has recommended every State to voluntary adopt it. The IPOA - Seabirds is based on the framework of the Code of Conduct for Responsible Fisheries: Article 2 recommends on how to appropriately apply to formulate and implement the international agreements as well as other legal instruments for both binding and voluntary; Article 3 describes the relationship with other international instruments; Article 7.6.9 regards to the appropriate measures of States for minimizing waste, tackling discards, ghost fishing gear, catch of non - target species, and other negative impacts on symbiosis species; and Article 8.5 deals with the catch selection through selective fishing gear.

The Resolution 12/06 of the Indian Ocean Tuna Commission (IOTC) on the reduction of incidental catch of seabirds by longline fishery has been enforced to prevent seabird bycatch from the fishery in the areas of IOTC competence below latitude 25° S where longliners must comply at least 2 of 3 mitigation measures.

The Conservation and Management Measure 2022/13 of the Southern Indian Ocean Fisheries Agreement (SIOFA) on reduction of seabirds bycatch in demersal longlines fisheries and other demersal fishing gears fisheries has also been considered in corresponding to the FAO IPOA - Seabirds. The cooperation is awakened to reduce the fishing of predatory seabirds in the Southern Indian Ocean in coordination with the regional fisheries management organization (RFMO). This conservation and management measure (CMM) is applied to all fishing vessels of the Contracting Parties, cooperating non Contracting Parties, and Participating Fishing Entities to the Agreement (CCPs) those engage in fishing in the SIOFA area below latitude 25° S; besides, the fishing vessels must comply at least 2 measures to mitigate the impacts.

The Conservation and Management Measure 2018/03 of the Western and Central Pacific Fisheries Commission (WCPFC) on mitigation of the impact of fishing for highly migratory fish stocks on seabirds. Commission members, cooperating non - members, and participating

territories (CCMs) should implement the IPOA - Seabirds and report to the commission as well as should appropriately report the status of their national plan of action for reducing incidental catch of seabirds in longline fishery.

As a member of the FAO, IOTC and SIOFA, Thailand is aware of the potential impacts on seabirds from fishing gears, not only longlines but also trawls and purse seines. Although the IPOA - Seabirds focuses on incidental catch from longlines, Thailand currently has no longliner operating outside Thai waters. However, Thailand establishes the National Plan of Action for Reducing Incidental Catch of Seabirds (NPOA - Seabirds) as a guide for reducing the incidental catch of seabirds from Thai fishing vessels operating outside Thai waters in order to cohere with international conservation and management measures and enhance the opportunities of Thai fishing vessels for operating outside Thai waters.

1.2 Seabirds status

The global status of seabirds was declining in their population over the past decades. Many species and groups of seabirds are endangered. BirdLife International, an organization cooperating with the International Union for Conservation of Nature (IUCN), has assessed the risk of extinction and found that commercial fishing is the most serious threat to seabirds. From a total of 346 seabirds species, more than 90 species are threatened and more than 30 species are near threatened; moreover, about half of all seabird species are in a state of depopulation, particularly 17 out of 22 Albatrosses species is found currently endangered.

FAO (2018) also reported that seabirds have low growth and reproduction rates, and the overall natural mortality is low. These reveal that main cause of seabirds mortality is made by human activities. The slightly increase in mortality may result in a decline in their population. There are eight families of seabirds living in the Indian Ocean area, and these seabirds (Albatrosses and petrels) are often incidentally caught by longliners operating in the IOTC area. Therefore, the FAO has provided seabird identification cards for fishing vessels operating in the Indian Ocean to help observers and fishers identify seabird species (Appendix 3).

1.3 Thai fishing vessels operating outside Thai waters

From 2013 to early 2017, there were 68 Thai fishing vessels operated in the high sea in the Indian Ocean, of which 61 fishing vessels were trawlers. The remaining of seven fishing vessels operated fishing in the IOTC area including six longliners and one purse seiner. In 2017,

all oversea Thai fishing vessels were called back for improving the regulations as well as monitoring, control, and surveillance (MCS) measures; besides, the participation as the contracting parties (CP) of SIOFA was also applied. Then, Thailand permitted oversea Thai fishing vessels to operate in the high sea again and till now; hence, there are only trawlers operate in the SIOFA area, while none of oversea Thai fishing vessel applied for the fishing license for fishing in the IOTC area.

For the Thai longliners operated in the IOTC area in the past, their fishing grounds were above latitude 25° S; however, those fishing vessels strictly complied with the IOTC resolution on reduction of incidental catch of seabirds in longline fishery.

2. Objectives and scope

2.1 Objectives

- (1) To prevent and reduce incidental catch of seabird by Thai fishing vessels.
- (2) To implement the IPOA - Seabirds and in accordance with the conservation and management measures of the IOTC, SIOFA, WCPFC or other RFMOs where Thailand is a member.

2.2 Scope

This national plan of action for reducing incidental catch of seabirds (NPOA - Seabirds) covers the longline fishery of Thai fishing vessels operating outside Thai waters.

3. Mitigation measures on incidental catch of seabirds from fisheries

Prevention and mitigation measures for seabirds is designed to reduce the risk and prevent fisheries that may cause the incidental catch of seabirds according to the conservation and management measures of RFMOs. Mitigation measures consists of the principles and guidelines as follows:

- a) Longliners operating in the competent area of RFMOs should comply with the particular RFMO's conservation and management measures for mitigating the impact on incidental catch of seabirds;
- b) All longliners operating at 23 degrees north latitude and 25 degrees south latitude in all oceans must comply with the prevention and mitigation measures for impacts on seabirds; and
- c) Implementation and improvement of seabird mitigation measures must be considered on the safety of fishers by their experiences as well.

As a party of the IOTC and SIOFA as well as a cooperating non - member of the WCPFC, Thailand determines prevention and mitigation measures for seabirds impacts as follows.

3.1 Indian Ocean Tuna Commission (IOTC)

In according to the Resolution 12/06 of the IOTC, any longliner operates fishing below latitude 25° S must use at least 2 of the following mitigation measures (from a to c):

a) Night setting longline shall be done with minimum deck lighting. No setting longline between nautical dawn and before nautical dusk. Nautical dusk and nautical dawn are defined as set out in the Nautical Almanac tables for relevant latitude, local time, and date. Deck lighting shall be kept to a minimum.

b) Deploy at least 1 bird-scaring line (Tori lines) during the entire longline setting (Appendix 1, a), the vessel is encouraged to use a second tori pole and bird - scaring line at times of high bird abundance or activity regarding the size of fishing vessels as follows:

1) Fishing vessels greater than or equal to 35 m, aerial extent of bird-scaring lines must be greater than or equal to 100 m. long streamers of sufficient length to reach the sea surface in calm conditions must be used. Long streamers must be at intervals of no more than 5 m.; and

2) Fishing vessels with a length of less than 35 m, aerial extent must be greater than or equal to 75 m. Streamers must be greater than 1 m in length, used and placed at intervals of no more than 2 m. of bird scaring line.

c) Line weighting on branch lines shall be as follows:

1) Greater than a total of 45 g attached within 1 m of the hook or;

2) Greater than a total of 60 g attached within 3.5 m of the hook or;

3) Greater than a total of 98 g weight attached within 4 m of the hook.

3.2 Southern Indian Ocean Fisheries Agreement (SIOFA)

In according to the Conservation and Management Measure 2022/13 of the SIOFA, any longliner operating in the area south of 25°S must apply to the prevention and mitigation on seabird impacts at least 2 of the following measures (from a to f):

a) Use white color lines to increase visibility for seabirds;

b) Do not discharge of any waste or gut of animals from the fishing vessel prior to and during the deployment or retrieval of fishing gear;

c) Install at least one bird scaring line (Appendix 1, a) during the line setting, the length of aerial extent must not be less than 150 m; the length of streamer lines must reach the sea surface

in calm sea condition, and the interval between streamer lines should not exceed 5 m. In addition, bird excluding devices (Appendix 1, b) shall be used to prevent birds entering the hauling area;

d) Do not set the line during dawn or nautical twilight (the period of dim light during early morning and late afternoon) where the exact times of nautical twilight are set forth in the Nautical almanac tables for the relevant latitude, local time and date;

e) For a longliner operates using automatic line shooter, there must be weight attached on the branch lines or must be weighted branch lines. As recommendation, 5 kg weight should be installed on hook line every 50 – 60 m, or weighted branch lines should be applied for more than 50 g/m.

f) In case, any vessel catching a total of three (3) seabirds in a single season (fishing trip) shall immediately change to night setting only.

3.3 Western and Central Pacific Fisheries Commission (WCPFC)

In according to the Conservation and Management Measure 2018/03 of the WCPFC on mitigation of the impact of fishing for highly migratory fish stocks on seabirds, there are regulations on longline fishing vessels divided by area, namely the area below latitude 30° S, the area between latitude 25° S and latitude 30° S, the area above latitude 23° N, and other areas (between latitude 25° S and latitude 23° N) with the details as follows:

3.3.1 Area below latitude 30° S

One of the following mitigation measures categories (a or b) must be applied to longliners operating in the area below latitude 30° S (with details shown in Appendix 2):

a) At least two of the three mitigation measures as follows:

- 1) Weighted branch lines;
- 2) Nighttime operation for shooting process;
- 3) Tori lines; or

b) Hook - shielding devices.

3.3.2 Area between latitude 25° S and latitude 30° S

At least one of the following mitigation measures must be applied to longliner operating in the area between latitude 25° S and latitude 30° S (with details shown in Appendix 2):

- a) Weighted branch lines;
- b) Tori Lines; or
- c) Hook - shielding devices.

3.3.3 Area above latitude 23° N

There are two categories regarding size of fishing vessels applied for this area

a) Large longliners with the length overall of 24 m or greater that operating in the area above latitude 23° N must apply at least two of the mitigation measures shown in Table 1 (including at least 1 mitigation measures from column A).

b) Small longliners with the length overall of less than 24 m that operating in the area above 23°N latitude must apply at least one of the mitigation measures from column A in Table 1 (with details shown in Appendix 2).

3.3.4 Other areas (between latitude 25° S and latitude 23° N)

For longliner fishing in the other areas (between 25°S and 23°N), one or more seabird mitigation measures shown in Table 1 are applied

Table 1 Mitigation measures

Column A	Column B
Side setting in combination with bird curtain and weighted branch lines ¹	Tori line ²
Nighttime operation for shooting process with minimum lights on the deck of vessel	Blue dyed bait
Tori line	Deep setting line shooter
Weighted branch lines	Gut discard management
Hook-shielding devices ³	

3.4 Practical guides for Thai fisheries outside Thai waters

Thailand has practical guide for the aquatic animal resources conservation and management, according to the international obligations as well as promoting cooperation with other states, private sectors, and international organizations, under the Royal Ordinance on Fisheries B.E. 2558 and amendments as follows:

¹ If side setting is applied in combination with bird curtain and weighted branch lines from Column A, these can be accounted as 2 mitigation measures.

² If tori line is selected from both Columns A and B, it is equivalent to perform tori lines as pairs simultaneously.

³ Hook-shielding devices can be used as single measures.

Section 48 Any person wishing to use a Thai vessel for the purposes of fishing outside Thai waters shall submit an application for a license to fish outside Thai waters to the Director - General or a person designated by the Director - General.

The issuance of a license pursuant to paragraph one shall be executed specifically for a particular fishing vessel. The number and types of fishing gears authorized for the purposes of fishing operation shall also be specified on the license. If an applicant wishes to engage in a fishing operation in an area under the jurisdiction of coastal state, the Director - General or a person designated by the Director - General may accord authorization therefor only when the applicant is able to present proof of a right to engage in fishing operations in the waters of any such coastal state, and when there is clear evidence that the applicant for the license is in a position to comply with the laws, rules and measures of the coastal state or the international organization concerned.

The provisions of section 39 shall apply to a license application under this section *mutatis mutandis*.

Section 49 In the case where the holder of a license for fishing outside Thai waters engages in a fishing operation in an area under the jurisdiction of a coastal state or in an area under the control and responsibility of an international organization, apart from having to comply with this Royal Ordinance, the licensee shall have to comply with the laws, rules, and standards of conservation and fisheries management of any such coastal state or international organization.

4. Action plan

4.1 Enhance knowledge on seabird resources and disseminate knowledge on mitigation measures on incidental catch of seabirds impacts from fisheries to stakeholders

4.1.1 Disseminate documents and media about general information, importance, biology and ecology of seabirds as well as human activities related to seabird resources with the goal of raising awareness of the importance of seabirds, current status of seabirds, and impacts of human activities on seabirds as well as raising public awareness of the conservation of seabird resources.

4.1.2 Develop a field manual for identifying seabirds to collect accurate scientific data.

4.1.3 Provide training courses to transfer information on conservation and management measures of RFMOs, such as IOTC, SIOFA, and WCPFC to stakeholders.

4.2 Review the laws to comply with the management and conservation measures of the Regional Fisheries Management Organization

Reviewing the laws or regulations for oversea fisheries in accordance with the requirements of RFMOs management and conservation measures to reduce the impacts of incidentally catch of seabirds from fisheries.

4.3 Data collection on incidental catch of seabirds

4.3.1. Compilation of information from the report of observer onboard

Thailand has deployed observers onboard trained in accordance with FAO guidelines. The implementation of the observers onboard is compiled to the particular RFMO. The observers onboard observe and collect data on the incidental catch of seabirds from fisheries, including taking photos and identifying species using the “Seabird Identification Cards for Fishing Vessels Operating in the Indian Ocean”; besides, biological data is recorded and reported to the DOF, Thailand.

4.3.2. Compilation of information from vessel master

The master of fishing vessels must record fishing activities every day from the date of departure from the fishing port until arrival at the fishing port through the Electronic Reporting System (ERS) and logbook covering incidentally catch of aquatic animals from fishery such as marine mammals, sea turtles, and endangered species or high risk from fishing activities, such as mobulid rays, oceanic whitetip sharks, thresher sharks, blue sharks, scalloped hammerhead sharks, and whale sharks. For seabirds, data on coordinates of incidental catch, species, number, and seabird condition including injury or death shall be recorded.

4.3.3 Establishment of a database on incidental catch of seabirds from Thai fishing vessels using collected information from observers onboard and vessel master

4.4 Monitoring, control, and surveillance of fisheries that may cause incidental catch of seabirds

4.4.1 Before leaving the port, fishing vessel, fishing gears, axially fishing gears, and other equipment are inspected according to the requirements of , including aquatic animal recuse tools and incidental catch of seabirds prevention equipment. Besides, an advice on the fishing techniques to prevent of incidental catch of seabirds is provided to vessel masters in accordance with management and conservation measures

4.4.2 Fishing operations are monitored and surveilled using the electronic system. The position of the fishing vessel is tracked through the vessel monitoring system (VMS). Moreover, the fishing behavior and other related activities are monitored through the electronic monitoring system (EM), which consists of closed - circuit television (CCTV) that continuously record activities onboard oversea Thai fishing vessels, electronic sensors installed on fishing equipment and fish handling equipment such as winches, cranes, and hatch covers. and the reporting of accidental fish or seabird catching from fishing logbook.

4.4.3 Recorded data is verified for the accuracy of information among reports obtained from fishing logbook, observers onboard, and the EM, which should be consistent among them.

4.5 Establish a network of participation from all sectors involved in management and conservation of seabird resources

4.5.1 A network among government organizations should be established to monitor and report incidental catch of seabirds from fisheries through meetings, seminars, or social media;

4.5.2 Awareness of seabird resource conservation should be raised in government organizations, private sector, and public through press release, exhibitions, corporate social responsibility activities, and social media

5. Review of the action plan

This NPOA - Seabirds will be reviewed and updated when it is necessary to be consistent with the fisheries situation or revision of management and conservation measures of .

Table 2 National plan of action for reducing incidental catch of seabirds

Activities	Goals	Responsible Agencies
1. Enhance knowledge on seabird resources and disseminate knowledge on mitigation measures on incidental catch of seabirds impacts from fisheries to stakeholders 1.1 Disseminate documents and media 1.2 Prepare a field manual for identifying seabirds 1.3 Provide training courses to transfer information on conservation and management measures of , such as IOTC, SIOFA, and WCPFC to stakeholders	Dissemination of knowledge on the current status of seabirds as well as the impacts of human activities on seabird resources	Core agency: DOF Support agency: DMCR and DNP
2. Review the existing laws to comply with the management and conservation measures of the Regional Fisheries Management Organization	Improve the national laws to comply with the management and conservation measures of RFMOs	Core agency: DOF Support agency: NFAT and TOFA
3. Data collection on accidental catch of seabird 3.1 Compile information from reported by of observer onboard 3.2 Compile information from vessel master 3.3 Establish database on incidentally catch of seabirds from Thai fisheries	A database for responsible fisheries management	Core agency: DOF Support agency: DMCR
4. Monitoring, control and surveillance on fisheries that may cause incidental catch of seabirds 4.1 Inspect fishing vessels before leaving port	Responsible fisheries in accordance with management and conservation measures of RFMOs	Core agency: DOF Support agency: -

Table 2 (continued)

Activity	Goal	Responsible person
<p>4.2 Monitor and surveil fishing operations using electronic system through the vessel monitoring system (VMS), Electronic Reporting System (ERS), and the electronic monitoring system (EM)</p> <p>4.3 Verify recorded data for the accuracy and consistency of information among data obtained from fishing logbook, observers onboard, and the EM.</p>		
<p>5. Create a network for participation of all sectors involved in management and conservation of seabird resources</p> <p>5.1 Develop and create a network among government organizations and private sectors for monitoring and reporting incidental catch of seabirds from fisheries.</p> <p>5.2 Raise awareness of seabird resource conservation in government organizations, private sectors, and public</p>	<p>There is a network for sharing information on seabirds between government organizations and private sectors.</p>	<p>Core agency: DOF Support agency: DMCR; DNP; NFAT; and TOFA</p>

Organizations' abbreviation:

- DOF = Department of Fisheries
DNP = Department of National Parks, Wildlife and Plant Conservation
DMCR = Department of Marine and Coastal Resources
NFAT = National Fisheries Association of Thailand
TOFA = Thai Overseas Fisheries Association

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Annex 1

a. Bird deterrence installed on longliner

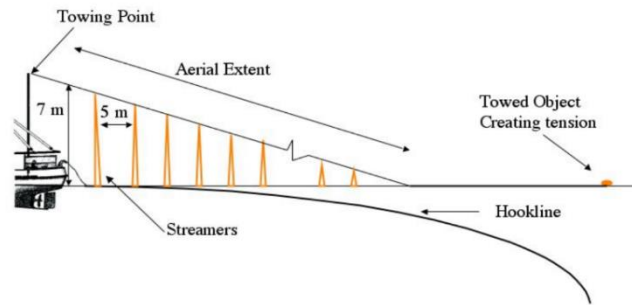


Figure 1 Diagram of Bird Scaring Streamer Line (Modified from SIOFA, 2022)

1. The aerial extent of the bird scaring line, being that part of the line supporting the streamers, is the effective seabird deterrent component of a bird scaring line. Vessels are encouraged to optimize the aerial extent of the bird scaring line and ensure that it protects the hookline as far astern of the vessel as possible, even in crosswinds.

2. The bird scaring line shall be attached to either the port or starboard sides of the vessel.

3. The bird scaring line include an object towed at the seaward end to create tension to maximize aerial coverage. The object towed should be maintained directly behind the attachment point to the vessel such that in crosswinds the aerial extent of the bird scaring line is over the hookline.

4. Each streamer should consist of two or more strands and may also have a swivel or other device at its attachment point to the bird scaring line to prevent fouling of individual streamers.

5. Swivels or a similar device should be placed in the bird scaring line in such a way as to prevent streamers being twisted around the bird scaring line.

6. A spare bird scaring line shall be carried and deployed in the event of loss or damage of a bird scaring line.

b. Bird Excluding Devices

The seabird excluding devices shall have the operation characteristics as follows:

1. prevent seabirds to fly into the area of line hauling process; and
2. prevent seabirds floating on the sea surface to swim into the area of line hauling process.

Annex 2 Specifications

1. Tori lines (South of 25 degrees south)

1.1 For vessels ≥ 35 meters total length

1.1.1 Deploy at least 1 tori line. Where practical, vessels are encouraged to use a second tori line at times of high bird abundance or activity; both tori lines shall be deployed simultaneously, one on each side of the line being set. If two tori lines are used baited hooks shall be deployed within the area bounded by the two tori lines.

1.1.2 A tori line using long and short streamers shall be used. Streamers shall be: brightly colored, a mix of long and short streamers.

- Long streamers shall be placed at intervals of no more than 5 meters, and long streamers must be attached to the line with swivels that prevent streamers from wrapping around the line. Long streamers of sufficient length to reach the sea surface in calm conditions must be used.

- Short streamers (greater than 1 meter in length) shall be placed no more than 1 meter apart.

1.1.3 Vessels shall deploy the tori line to achieve a desired aerial extent greater than or equal to 100 meters. To achieve this aerial extent the tori line shall have a minimum length of 200 meters, and shall be attached to a tori pole >7 meters above the sea surface located as close to the stern as practical.

1.1.4 If vessels use only one tori line, the tori line shall be deployed windward of sinking baits.

1.2 For vessels <35 meters total length

1.2.1 A single tori line using either long and short streamers, or short streamers only shall be used.

1.2.2 Streamers shall be: brightly colored long and/or short (but greater than 1 meter in length) streamers must be used and placed at intervals as follows:

- Long streamers placed at intervals of no more than 5 meters for the first 75 meters of tori line.

- Short streamers placed at intervals of no more than 1 meter.

1.2.3 Long streamers should be attached to the line in a way that prevent streamers from wrapping around the line. All long streamers shall reach the sea-surface in calm conditions. Streamers may be modified over the first 15 meters to avoid tangling.

1.2.4 Vessels shall deploy the tori line to achieve a minimum aerial extent of 75 meters. To achieve this aerial extent the tori line shall be attached to a tori pole >6 meters above the sea surface located as close to the stern as practical. Sufficient drag must be created to maximize

aerial extent and maintain the line directly behind the vessel during crosswinds. To avoid tangling, this is best achieved using a long in - water section of rope or monofilament.

1.2.5 If two Tori lines are used, the two lines must be deployed on opposing sides of the main line.

2. Tori lines (North of 23 degrees north)

2.1 Long Streamer

2.1.1 Minimum length: 100 meters

2.1.2 Must be attached to the vessel such that it is suspended from a point a minimum of 5 meters above the water at the stern on the windward side of the point where the hookline enters the water.

2.1.3 Must be attached so that the aerial extent is maintained over the sinking baited hooks.

2.1.4 Streamers must be less than 5 meters apart, be using swivels and long enough so that they are as close to the water as possible.

2.1.5 If two (i.e. paired) tori lines are used, the two lines must be deployed on opposing sides of the main line.

2.2 Short Streamer (For vessels ≥ 24 meters total length)

2.2.1 Must be attached to the vessel such that it is suspended from a point a minimum of 5 meters above the water at the stern on the windward side of a point where the hookline enters the water.

2.2.2 Must be attached so that the aerial extent is maintained over the sinking baited hooks.

2.2.3 Streamers must be less than 1 meter apart and be 30 centimeters minimum length.

2.2.4 If two (i.e. paired) tori lines are used, the two lines must be deployed on opposing sides of the main line.

2.3 Short Streamer (For vessels < 24 meters total length)

This design shall be reviewed no later than 3 years from the implementation date based on scientific data.

2.3.1 Must be attached to the vessel such that it is suspended from a point a minimum of 5 meters above the water at the stern on the windward side of a point where the hookline enters the water.

2.3.2 Must be attached so that the aerial extent is maintained over the sinking baited hooks.

2.3.3 If streamers are used, it is encouraged to use the streamers designed to be less than 1 meter apart and be 30 centimeters minimum length.

2.3.4 If two (i.e. paired) tori lines are used, the two lines must be deployed on opposing sides of the mainline.

3. Side setting with bird curtain and weighted branch lines

3.1 Mainline deployed from port or starboard side as far from stern as practicable (at least 1 meter), and if mainline shooter is used, must be mounted at least 1 meter forward of the stern.

3.2 When seabirds are present the gear must ensure mainline is deployed slack so that baited hooks remain submerged.

3.3 Bird curtain must be employed:

- Pole aft of line shooter at least 3 meters long;
- Minimum of 3 main streamers attached to upper 2 meters of pole;
- Main streamer diameter minimum 20 millimeters;
- Branch streamers attached to end of each main streamer long enough to drag on water (no wind) – minimum diameter 10 millimeters.

4. Night setting

4.1 No setting between nautical dawn and before nautical dusk.

4.2 Nautical dusk and nautical dawn are defined as set out in the Nautical Almanac tables for relevant latitude, local time and date.

4.3 Deck lighting to be kept to a minimum. Minimum deck lighting should not breach minimum standards for safety and navigation.

5. Weighted branch lines

Following minimum weight specifications are required:

- One weight greater than or equal to 40 grams within 50 centimeters of the hook; or
- Greater than or equal to a total of 45 grams attached to within 1 meter of the hook; or
- Greater than or equal to a total of 60 grams attached to within 3.5 meters of the hook; or
- Greater than or equal to a total of 98 grams weight attached to within 4 meters of the hook.

6. Hook-shielding devices

Hook - shielding devices encase the point and barb of baited hooks to prevent seabird attacks during line setting. The following devices have been approved for use in WCPFC fisheries:

Hookpods, which comply with the following performance characteristics⁴

6.1 The device encases the point and barb of the hook until it reaches a depth of at least 10 meters or has been immersed for at least 10 minutes;

6.2 The device meets current minimum standards for branch line weighting as specified in this Annex

6.3 The device is designed to be retained on the fishing gear rather than being lost.

⁴ Noted by SC14.

7. Management of offal discharge

7.1 Either no offal discharge during setting or hauling;

7.2 Or strategic offal discharge from the opposite side of the boat to setting/hauling to actively encourage birds away from baited hooks.

8. Blue-dyed bait

8.1 If using blue - dyed bait it must be fully thawed when dyed.

8.2 The Commission Secretariat shall distribute a standardized colour placard.

8.3 All bait must be dyed to the shade shown in the placard.

9. Deep setting line shooter

Line shooters must be deployed in a manner such that the hooks are set substantially deeper than they would be lacking the use of the line shooter, and such that the majority of hooks reach depths of at least 100 meters.

Annex 3

Seabird Identification Cards for Fishing Vessels Operating in the Indian Ocean (FAO, 2018)

Wandering Albatross 
Diomedea exulans

Wingspan: 2.5 - 3.5 m
Infrequent in shelf waters
Common in southern latitudes year-round

- NO black cutting edge on bill

Beware: highly variable, with birds getting whiter with age, starting nearly all dark to ending nearly all white.

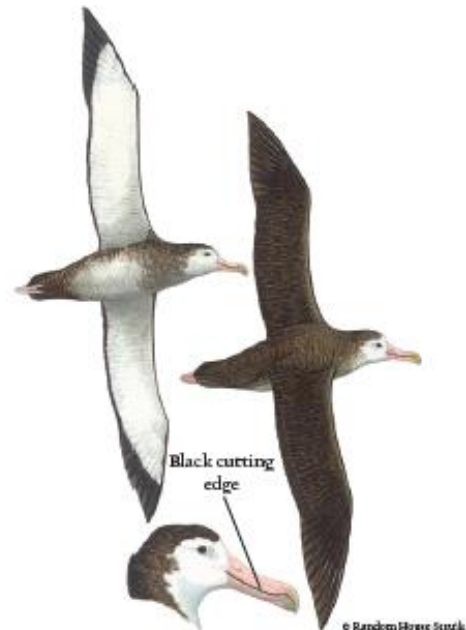


Amsterdam Albatross 
Diomedea amsterdamensis

Wingspan: 2.8 - 3.4 m
Infrequent in shelf waters
Extremely rare, but generally between 20-40°S

- Black-brown all over, except face, underwing and belly
- No white on upper wings
- Black cutting edge on bill

Beware: young Wandering Albatross are nearly identical, but do not have black cutting edge on bill.



Northern Royal Albatross

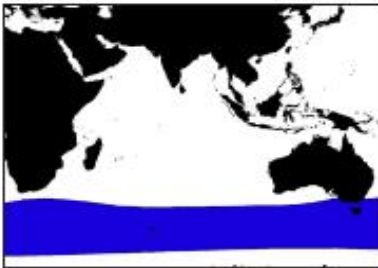
Diomedea sanfordi

EN

Wingspan: 2.9 - 3.4 m
 Infrequent in shelf waters
 Common in southern latitudes year-round

- White back and white tail
- No white on upperwings
- Black cutting edge on bill

Beware: young birds have dark outer tail feathers, and may have some dark feathers on head and back. Adults are indistinguishable from juvenile Southern Royal Albatrosses.



Southern Royal Albatross

Diomedea epomophora

VU

Wingspan: 2.9 - 3.4 m
 Infrequent in shelf waters
 Common in southern latitudes year-round

- Front of wings (leading edge) white
- Whitening on wings starts from leading edge, not from middle of wing
- Black cutting edge on bill

Beware: juveniles Southern Royal Albatrosses are indistinguishable from adults Northern Royal Albatrosses.



Sooty Albatross EN

Phoebastria fusca

- Uniformly brown from head to tail, except white eye-ring
- Creamy-yellow, fleshy line on lower bill (this may fade to colourless/ brown when dead, so not always a reliable feature)



Wingspan: 2 m
Restricted to deep waters
Year-round



Light-mantled Albatross NT

Phoebastria palpebrata

- Dark all over, but back noticeably paler than rest of body, and, head and wings noticeably darker than other parts
- Has a pale blue, fleshy line on lower bill (this may fade to colourless/brown when dead, so not always a reliable feature)



Wingspan: 2 m
Restricted to deep waters
Year-round



Grey-headed Albatross

Thalassarche chrysostoma



Wingspan: 2.2 m
Rare on continental shelf
Mainly winter

Adult:

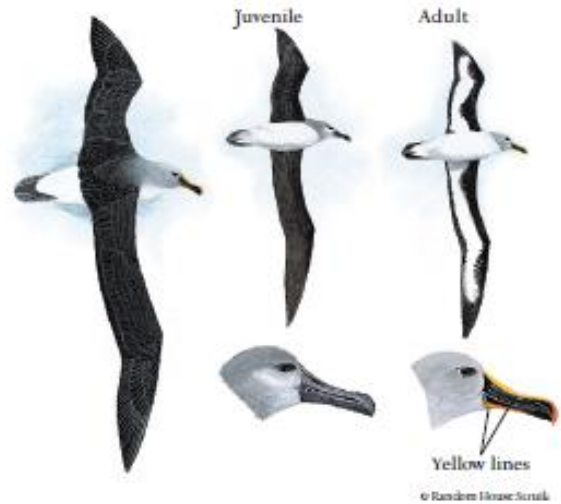
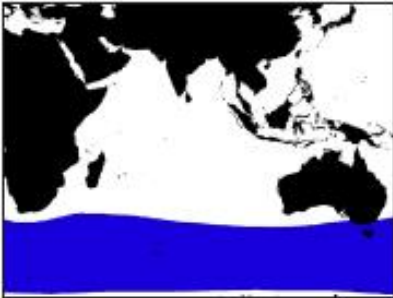
- Dark-grey head and neck
- Yellow line on top of upper AND underside of lower bills
- Underwings have thick black leading edge

Beware: Yellow-nosed Albatross has yellow line only on upper bill

Juvenile:

- All-grey head but white on face
- No yellow on bill
- All-dark underwings

Beware: Juvenile Black-browed Albatross has all-dark underwings and grayish head with white on face and all-dark bill, but bill tip is very visibly darker



Indian Yellow-nosed Albatross

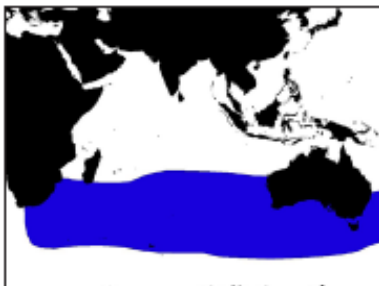
Thalassarche carteri



Wingspan: 1.8- 2 m
Common in shelf waters
All year

- White head and neck, some with light gray on sides of head
- Yellow line on upper bill only

Beware: Atlantic Yellow-nosed Albatross (T. chlororhynchos, not illustrated) is rare in IOTC area, and has dark grey head with contrasting white cap (top of head)



Shy-type Albatross

Thalassarche cauta, T. steadi

NT

Wingspan: 2.1 - 2.6 m
Common
Mainly winter

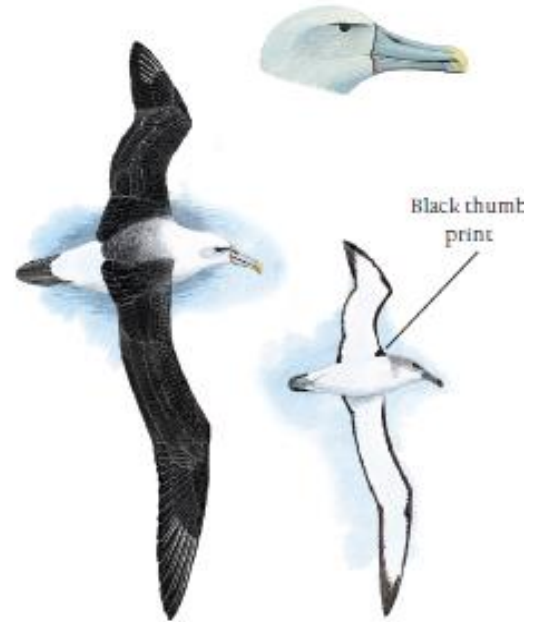
Adult:

- Very long wings with only thin black margins on underwing, otherwise completely white
- Small black notch in armpit
- Largest of the *Thalassarche* group
- Large grey bill with yellow tip only

Juvenile:

- Underwing pattern unique and same as for adult

Beware: juveniles have variable amounts of grey on head and could be confused with juvenile Grey-headed or Black-browed Albatrosses, but these two have dark underwings.



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Black-browed Albatross

Thalassarche melanophrys

EN

Wingspan: 2.1 - 2.5 m
Common
Adult mostly winter

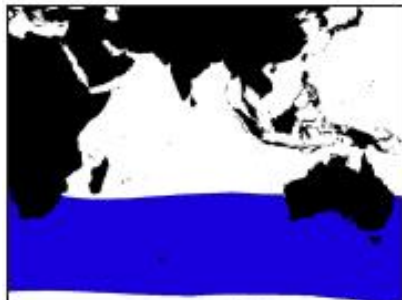
Adult:

- All-orange bill with pinkish tip diagnostic
- Dark around eye creating the 'black-brow'

Juvenile:

- Dark feathers around eye reduced but always present
- Bill lightens toward orange with age, all intermediate stages have dark tip to bill

Beware: juvenile Grey-headed Albatross which has more grey on head and lacks dark eye. Shy and White-capped Albatross have much larger, deeper bill and white underwing.

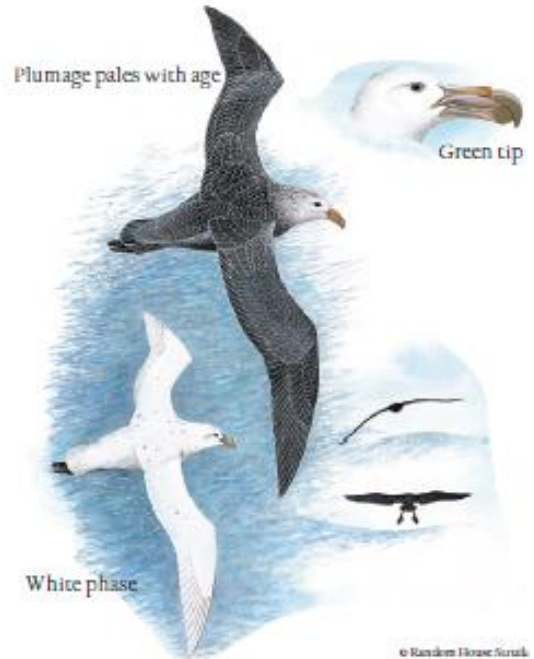
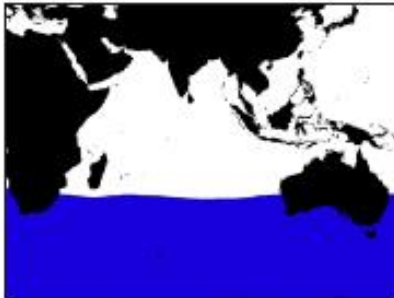


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Southern Giant Petrel *Macronectes giganteus*

Wingspan: 1.5- 2.1 m
Common
Year-round

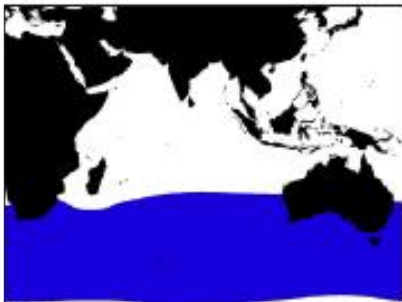
- Albatross-sized
- Huge bill with greenish tip
- Bill tip does not contrast strongly with the rest of the bill
- Nasal tubes are fused into one long tube on top of bill



Northern Giant Petrel *Macronectes halli*

Wingspan: 1.5-2.1 m
Common
Year-round

- Albatross-sized
- Huge bill with red-brown tip
- Bill tip contrasts with the rest of the bill
- Nasal tubes are fused into one long tube on top of bill



Plumage pales with age



White-chinned Petrel *Procellaria aequinoctialis*



Wingspan: 1.4 m
Most common petrel
All year

- All dark with white chin
- Ivory bill with black 'saddle'
- Occasionally more extensive white chin with patch on head or on belly.

Beware: closely related Spectacled Petrel (*P. conspicillata*) is extremely rare in IOTC area, and easily recognizable with white, large circles around eyes and dark bill tip.

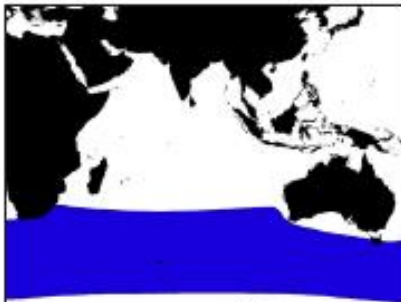


Grey Petrel *Procellaria cinerea*



Wingspan: 1.4 m
Rare
Year-round

- Combination of uniform grey above and clean white body below
- Grey underwings
- Pale bill with dark tip



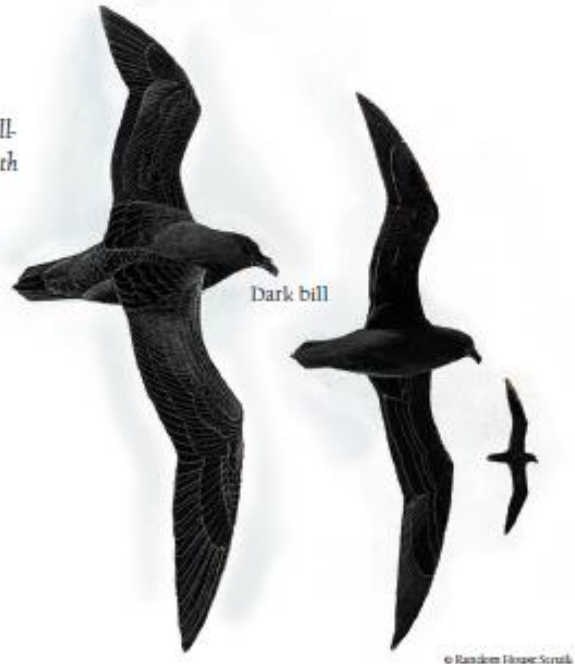
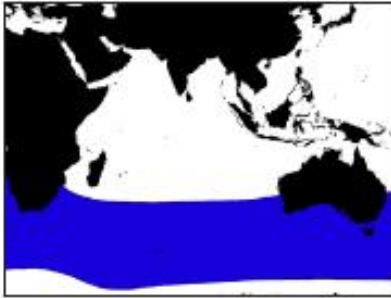
Great-winged Petrel

Pterodroma macroptera

Wingspan: 1 m
Common
Austral Summer

- Mottled, grey-white blaze around all-dark bill diagnostic

Beware: Sooty Shearwater, which has a silvery underwings. Many all-dark petrels could cause confusion, but ranges do not overlap much, with this species seldom occurring north of 20°S.



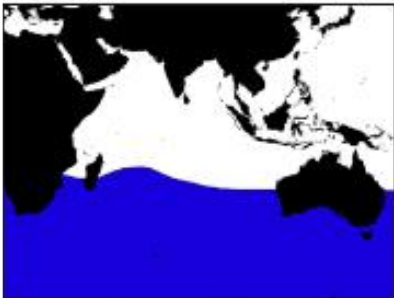
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Cape (Pintado) Petrel

Daption capense

Wingspan: 0.9 m
Common
Austral Winter

- Mottled black-and-white patterns on wings and back
- Seldom recorded as bycatch in longline fisheries



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Sooty Shearwater

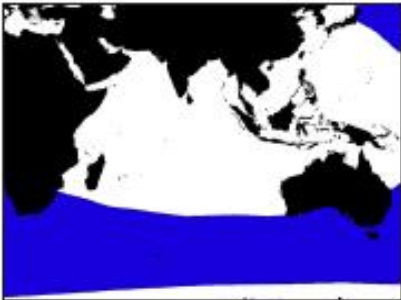
Puffinus griseus



Wingspan: 1 m
Common
All year

- Silvery underwing

Beware: Short-tailed Shearwater, which is confined to the south east of the Indian Ocean and small proportion have obvious silvery underwings

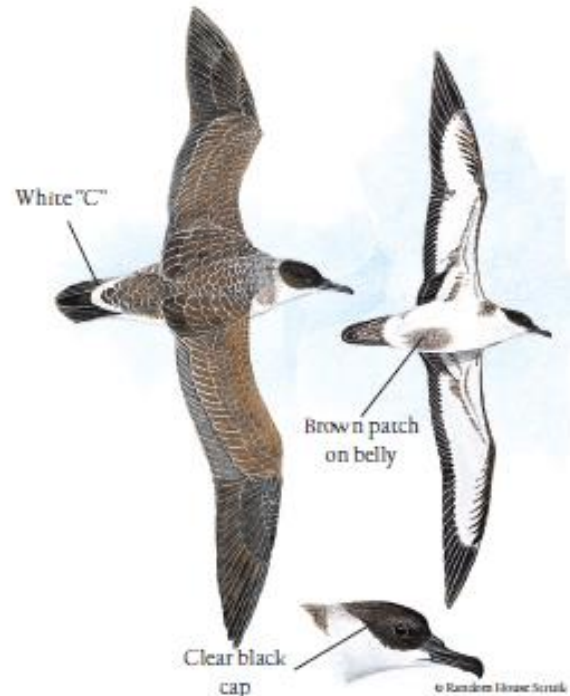


Great Shearwater

Puffinus gravis

Wingspan: 1 - 1.2 m
Common in western Indian Ocean, absent in eastern Indian Ocean
Scarce mid-winter

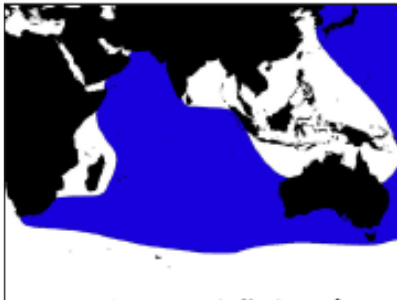
- Dark, smudgy patch on white belly
- Narrow pale neck-band
- White "C" on rump



Flesh-footed Shearwater

Puffinus carneipes

- Pale pinkish feet
- Uniformly dark-brown plumage
- Pale bill with dark tip



Wingspan: 1 m

Northern Indian Ocean during austral winter

South east Indian Ocean in austral summer

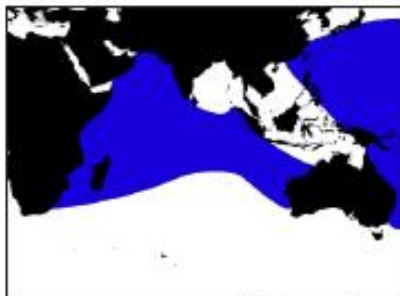


Wedge-tailed Shearwater

Puffinus pacificus

-When spread open, tail forms 'V', or wedge- thus its common name Wedge-tailed Shearwater

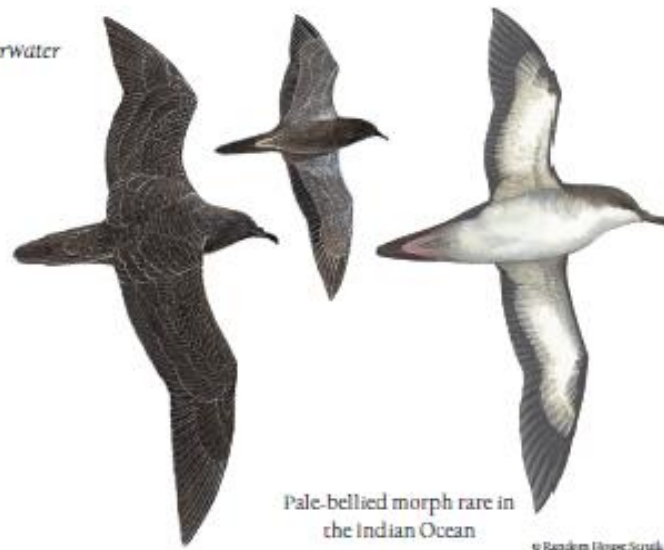
Beware: Great-winged Petrel (see bill shape) and Sooty Shearwater (see underwing pattern)



Wingspan: 1 m

Common in tropical waters

Year around



Red-footed Booby *Sula sula*

Wingspan: 1 m
Common
All year

Adult:

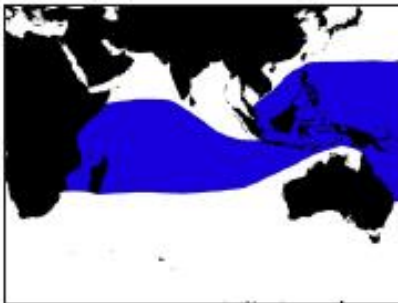
- Bright red feet

Beware: dark and light morphs. Cape and Australian gannets lack red feet and have black tail feathers

Juvenile:

- No clear underwing pattern, feet yellow, brown or reddish

Beware: all other juvenile boobies have clearly defined underwings



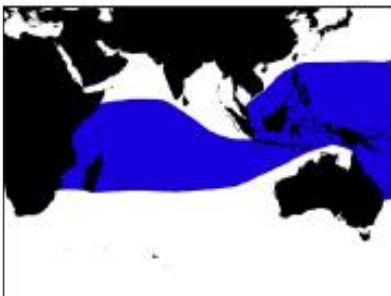
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Brown Booby *Sula leucogaster*

Wingspan: 1 m
Common
All year

- Brown head, upper parts and throat, extending onto upper breast

Beware: juvenile Masked Booby, which have dark throat only and lacks dark on upper breast.



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Masked Booby *Sula dactylatra*

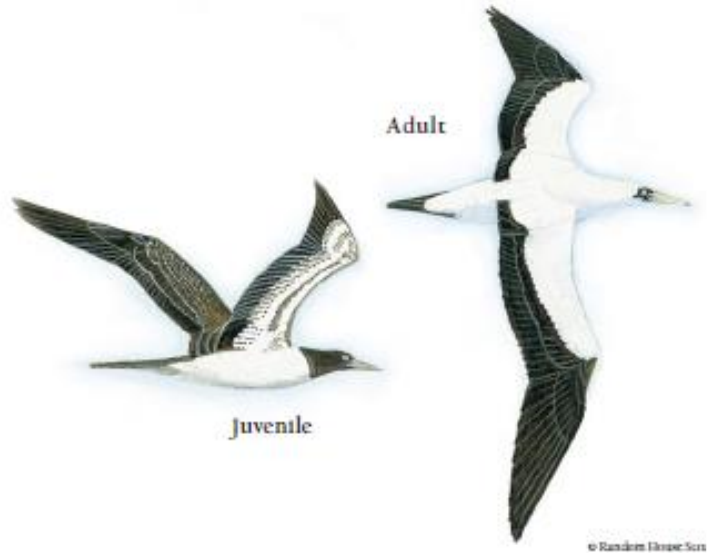
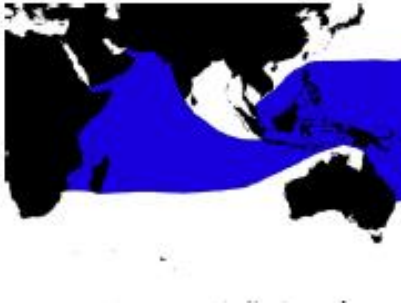
Wingspan: 1.5 m
Common
All year in near shore tropical waters

Adult:

- White body
- Small, black face mask diagnostic

Juvenile:

- Brown does not extend onto upper breast
- White ring around neck



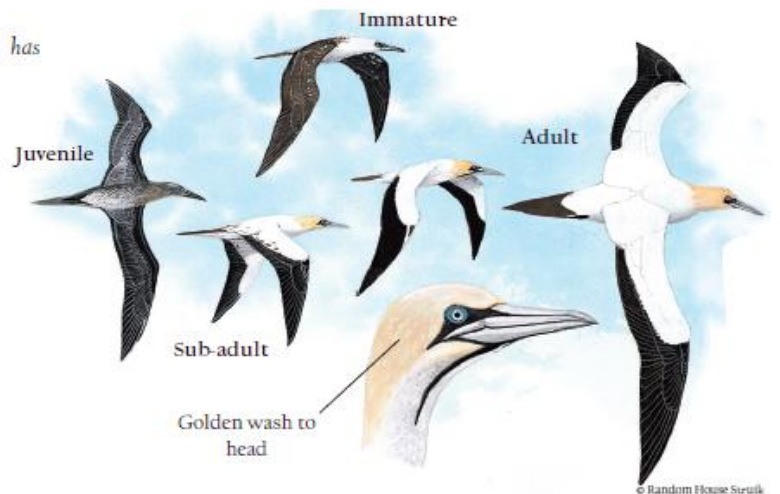
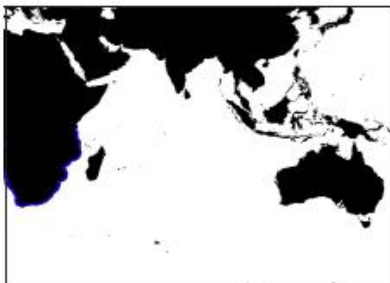
Cape Gannet *Morus capensis*



Wingspan: 1.8 m
Common inshore, endemic to South Africa
All year

- Black tail
- Golden head with black stripe on throat
- Black feet

Beware: Australian Gannet (not illustrated) has white outer tailfeathers



Greater Frigatebird *Fregata minor*

Wingspan: 2-2.3 m
Common inshore, but ranges widely in tropical waters
All year

Male:

- All-black plumage

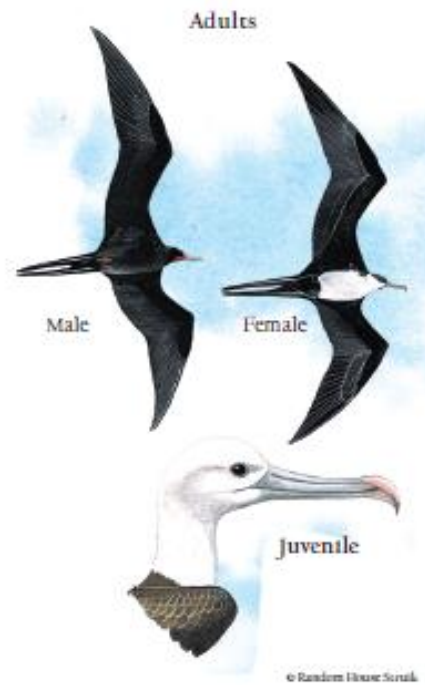
Female:

- White on breast/belly never extends onto wings

Juvenile:

- Reddish head and throat with white breast, but no white extending to underwing

Beware: Lesser Frigatebird has white extending onto underwing



Lesser Frigatebird *Fregata ariel*

Wingspan: 2 m
Common inshore, but ranges widely in tropical waters
All year

Male:

- Otherwise all dark bird has small white patch joining under wing to body

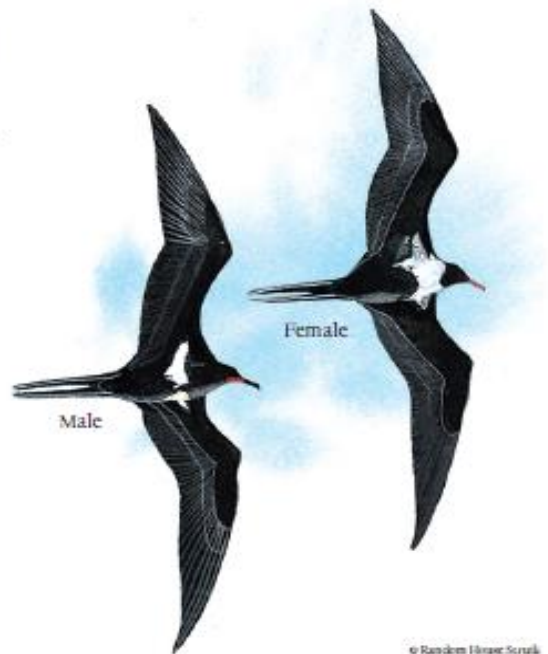
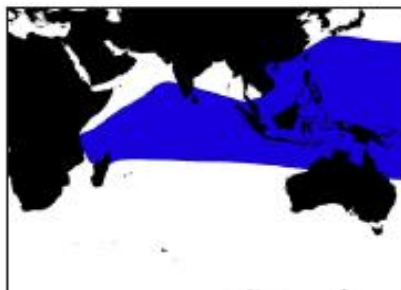
Female:

- Dark belly with white on upper breast extending onto under wing

Juvenile:

- Reddish head and throat with white breast, with white extending to underwing

Beware: female Christmas Frigatebird which has white belly

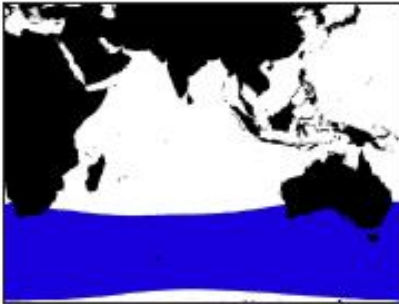


Subantarctic Skua

Stercorarius antarcticus

Wingspan: 1.3 - 1.6 m
Frequent
Adult mostly austral winter

- Subantarctic distinguished from brown morph of South Polar (*S. maccormicki*, not illustrated) with great difficulty, but latter has small, circular, white blaze of feathers at base of bill.
- Pale and intermediate morph South Polar's are rarer, but have paler bodies contrasting strongly with darker wings



Remark:

CR - Critically Endangered

EN - Endangered

VU - Vulnerable

NT - Near Threatened

Marine Diversity and Biology Group
Marine Fisheries Research and Development Division
Department of Fisheries
50 Kaset Klang Phahonyothin Rd., Lat Yao, Chatuchak, Bangkok 10900
Tel. +66 25 61 1589 E-mail: marine.bio@fisheries.go.th



NPOA – Seabirds





Notification of the Department of Fisheries
Rules and Regulations of Thai Fishing Vessels Operating in
Indian Ocean Tuna Commission (IOTC) Competence Area
B.E. 2561 (2018)

Since Thailand is a member of the Indian Ocean Tuna Commission (IOTC), Thailand has the right to fish in IOTC competence area under the control and conservation measures for fisheries resources. The Department of Fisheries notifies the following:

Clause 1 In this Notification

“Data Buoy” are defined as floating devices, either drifting or anchored, that are deployed by governmental or recognized scientific organizations or entities for the purpose of electronically collecting and measuring environmental data, and not for purpose of fishing activities.

“Fishing Vessels” refers to all size of fishing vessels using purse seine, tuna longline, gillnet, pole-and-line, hand-line, and trolling line.

Clause 2 Area and species of aquatic animals that are responsible by Indian Ocean Tuna Commission (IOTC) shall follow the Appendix appended to this Notification.

Clause 3 Fishing vessel, supplement vessel, supplying vessel, or supporting vessel that are fishing or transshipping aquatic animals beyond EEZ of Thailand where it is conducted in the area and aquatic animals are in according to the Clause 2, or carrying such aquatic animals to port for landing, they shall be in the IOTC Authorized Vessels list which can be checked in the website: www.iotc.org.

Entrepreneur and owners in the Authorized Vessels list of RFMO mentioned above paragraph shall not involve or engage in fishing activities or transshipment according to Clause 2 with non-flag State vessels or those who are not in the IOTC Authorized Vessels list.

All fishing vessels shall share information on the vessels suspected of non-flag State vessel to Overseas Fisheries and Transshipment Control Division, Department of Fisheries.

Clause 4 The fishing vessels who received fishing permit for EEZ of other coastal State, the master of the fishing vessel shall record information in the fishing logbook, and submit the copy on the section of fishing operated in the EEZ of such coastal State to the respective coastal State management authority.

Clause 5 The fishing vessels shall arrange fishing gear marking and supporting device by identifying name and call sign of the vessel or the number that can identify clearly identity of the vessel.

The marking mentioned in above paragraph shall perform as follow:

(1) In case of using fishing gear equipped with mainline, attach the marker at the end of the net or mainline of that fishing gear. Flag buoys and radar buoys should also be used during daytime. And to use with lights in order to see the light within normal visual range during the night. Accordingly, that flags or buoys could be used to identify position and scope of the fishing gear.

(2) In case of Anchored Fish Aggregating Devices (AFADs), attach the mark in appropriate area where it can be seen clearly. For Drifting Fish Aggregating Devices (DFADs), attach satellite position identifying device. Accordingly, both AFADs and DFADs shall have an identification number which is not duplicated to each other by ordering manner for each type.

Clause 6 DFADs could be deployed not more than 350 sets in the area mentioned in the Clause 2. The total number of FADs shall not exceed 700 sets/vessel/year.

The use of FADs in according to abovementioned paragraph, report on the number of buoy devices that were used (open) or not used (close) during the previous year shall be submitted to the Overseas Fisheries and Transshipment Control Division, the Department of Fisheries within 31 January annually by using the form as appended to this Notification.

Clause 7 Fishing vessels who are using FADs shall record fishing activities in the fishing logbook on the use of the FADs by using the format as appended to this Notification, and submit to the Overseas Fisheries and Transshipment Control Division, the Department of Fisheries when conducted the transshipment or landing the catch.

Clause 8 Fishing vessels using FADs shall submit the FADs management plan of each vessel to the Overseas Fisheries and Transshipment Division of the Department of Fisheries before notification of port-out.

Details of the FADs management plan in according to above mentioned paragraph shall follow Appendix A and Appendix B appended to this Notification.

Clause 9 Fishing vessels are prohibited to use light for aggregating tuna and tuna-like species.

Clause 10 Fishing vessels are prohibited to use aircraft or unmanned aircraft supporting fishing activities.

Clause 11 Fishing vessels are prohibited to conduct any activity within radius of 1 nautical mile from the data buoy, except it is permitted or requested specifically by the owner who are responsible for the buoy to bring it onboard the vessel.

Clause 12 Fishing vessels are prohibited to have oceanic whitetip sharks and thresher sharks in their possession.

Discards shall be made for case of capturing immature sharks or the pregnant shark.

Clause 13 Preservation of other sharks not include Clause 12, paragraph 1 by using frozen method, prohibit to store shark fins more than 5% of the total weight of sharks onboard until the vessel arrives at the first port for landing.

For shark preservation in the fresh form in according to above mentioned paragraph, whole body of the shark shall be preserved until the vessel arrives the first port for landing.

Clause 14 Purse seiners are prohibited to catch whales, dolphins, dugongs, marine turtles or whale sharks.

Discard of whales, dolphins, dugongs, marine turtles, or whale sharks if it was caught, and record the detail of getting such animals by using the form appended to this Notification, and submit to the Overseas Fisheries and Transshipment Control Division, Department of Fisheries when landing or transshipping the aquatic animals at port.

In case that the marine turtle was caught from fishing and it looks weak or getting injuries, it should be brought up to the vessel and take care of it until healthy and release to the sea.

Clause 15 Fishing vessel using purse seine shall preserve rainbow runner, dolphin fish, trigger fish, billfish, wahoo and barracuda onboard the vessel and landing, except it seems that they are inappropriate for consumption.

Fishing vessel using purse seine shall have scoop net for rescuing marine turtles.

Clause 16 Fishing vessel using longlines shall arrange line cutter and de-hookers for releasing the aquatic animals.

Clause 17 Fishing vessel using longlines operates in area of lat. 25°S and downward shall follow the measures for mitigating capture of sea birds, at least 2 from 3 in according to Table 1 appended to this Notification.

Clause 18 Large – scale driftnets, deep water gillnets or the combination of gillnets or other nets of more than 2.5 kilometers in length are prohibited.

Clause 19 Data submission and report in according to the Clause 6, 7, 8 and 14 shall report directly to competent officials of the Overseas Fisheries and Transshipment Control Division of the Department of Fisheries, or through electronic communication that the report can be verified and reused without any changes in meaning, or through email: thaifoc@fisheries.go.th that can be used to identify the identity of satellite transmission device.

Clause 20 In addition to rules and regulations under this Notification of Department of Fisheries, the owners of vessels must comply to the amended rules and regulations that prescribed by the Indian Ocean Tuna Commission (IOTC)

Notified on 4 June 2018

(Adisorn Promthep)

Director-General of Department of Fisheries

Appendix A DFADs Management Plan Development

1. Scope of information: relevant details
 - (1) Vessel-types and supporting vessel
 - (2) DFAD numbers and DFADs beacon to be deployed
 - (3) Plans for monitoring and retrieval of lost DFADs
2. Characteristic and structure of the DFADs, please explain to cover the following information:
 - (1) Explain structural characteristic of the DFADs
 - (2) DFAD markings and identifiers, including DFADs beacons
 - (3) Must install lights
 - (4) Must use radar reflectors
 - (5) Specify the visible distance
 - (6) Radio buoys must have serial numbers attached
 - (7) Satellite transceivers must have serial numbers attached
3. Applicable areas of the DFADs should be specified in details of any closed areas or period e.g. territorial waters, shipping lanes, proximity to artisanal fisheries, etc.
4. Specify applicable period for DFADs management plan that the coverage period or what time period.
5. DFADs logbook must show information in details of the following:
 - (1) Report of quantity of the catch caught by using the DFADs.
 - (2) Each time of deploying the DFADs, whether the purse seine fishing is operated or not, the following information should be recorded:
 - (a) Position of the DFADs
 - (b) Date
 - (c) Marking of the DFADs or any information allowing to identify the owner
 - (d) DFADs type (drifting natural DFAD, drifting artificial DFAD)
 - (e) Characteristic and structure of the DFADs (dimension and material, floating part and of the underwater hanging structure)
 - (f) Purposes of going to the DFADs (for deployment, hauling, retrieving, loss, intervention on electronic equipment)
 - (g) In case of the fishing operated in association with using the DFADs, weight of catch and by-catch should be recorded.

Appendix B AFADs Management Plan Development

1. Scope of information: relevant details

- (1) Vessel types
- (2) AFAD numbers and/or AFADs beacons numbers to be deployed
- (3) Distances between AFADs
- (4) Explain deployment for using, details on marking, characteristics and devices used, coordinates of deployment, date of deployment, lost, and redeployment.
- (5) Plans for monitoring and retrieval of lost AFADs
- (6) Changing of AFADs and the maintenance

2. Characteristic and structure of the AFADs, please explain

- (1) AFAD design characteristics (a description of both the floating structure and the underwater structure, with special emphasis on any netting materials used)
- (2) Anchorage used for mooring
- (3) AFAD markings and identifiers, including AFAD beacons if any
- (4) Light installation
- (5) Radar reflectors
- (6) Specify the visible distance
- (7) Radio buoys must have serial number attached
- (8) Satellite transceivers must have serial number attached
- (9) Eco sounder

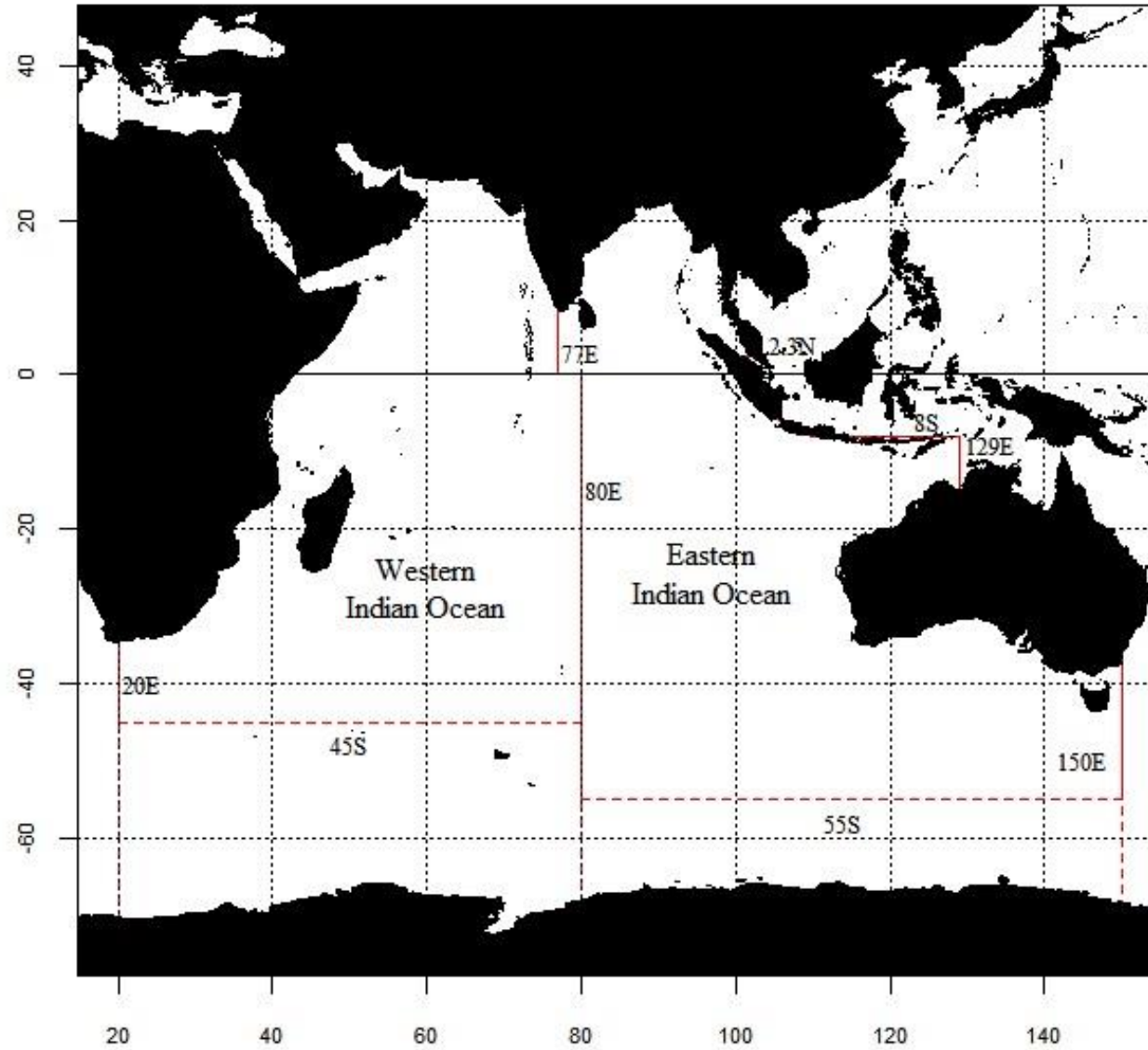
3. Applicable area of the AFADs

- (1) Specify area of deployment, coordinates if applicable
- (2) Specify details of the closed areas, e.g., shipping lanes, Marine Protected Areas, reserves etc.

4. AFAD logbook must specify details

- (1) Report of quantity of the catch caught by the AFADs
- (2) Each time of deploying the AFADs, whether the purse seine fishing is operated or not, the following information should be recorded:
 - (a) Position of the AFADs
 - (b) Date
 - (c) Information identified for marking the AFADs (i.e., AFAD Marking or beacon ID or any information allowing to identify the owner)
- (3) In case of the fishing operated by using the AFADs to catch fish, the weight of catch including by-catch should be recorded

Competent Area of Indian Ocean Tuna Commission (Indian Ocean Tuna Commission - IOTC)



Aquatic Animal Species under the Indian Ocean Tuna Commission (IOTC)

	Scientific Name	Common Name	Thai Name	FAO code
1	<i>Thunnus albacares</i>	Yellowfin tuna	ปลาหูฉลามครีบเหลือง	YFT
2	<i>Katsuwonus pelamis</i>	Skipjack	ปลาหูฉลามท้องแถบ	SKJ
3	<i>Thunnus obesus</i>	Bigeye tuna	ปลาหูฉลามตาโต	BET
4	<i>Thunnus alalunga</i>	Albacore tuna	ปลาหูฉลามครีบยาว	ALB
5	<i>Thunnus maccoyii</i>	Southern Bluefin tuna	ปลาหูฉลามครีบน้ำเงินใต้	SBT
6	<i>Thunnus tonggol</i>	Longtail tuna	ปลาโอตัว	LOT
7	<i>Euthynnus affinis</i>	Kawakawa	ปลาโอลาย	KAW
8	<i>Auxis thazard</i>	Frigate tuna	ปลาโอขาว, ปลาโอแกลบ	FRI
9	<i>Auxis rochei</i>	Bullet tuna	ปลาโอหลอด	BLT
10	<i>Scomberomorus commerson</i>	Narrow barred Spanish Mackerel	ปลาอินทรีบัง	COM
11	<i>Scomberomorus guttatus</i>	Indo-Pacific king mackerel	ปลาอินทรีจุด	GUT
12	<i>Makaira nigricans</i>	Blue Marlin	ปลากระโทงแทงครีบน้ำเงิน	BUM
13	<i>Makaira indica</i>	Black Marlin	ปลากระโทงแทงดำ	BLM
14	<i>Tetrapturus audax</i>	Striped Marlin	ปลากระโทงแทงลาย	MLS
15	<i>Istiophorus platypterus</i>	Indo-Pacific Sailfish	ปลากระโทงแทงรุ่ม	SFA
16	<i>Xiphias gladius</i>	Swordfish	ปลากระโทงแทงดาบ	SWO

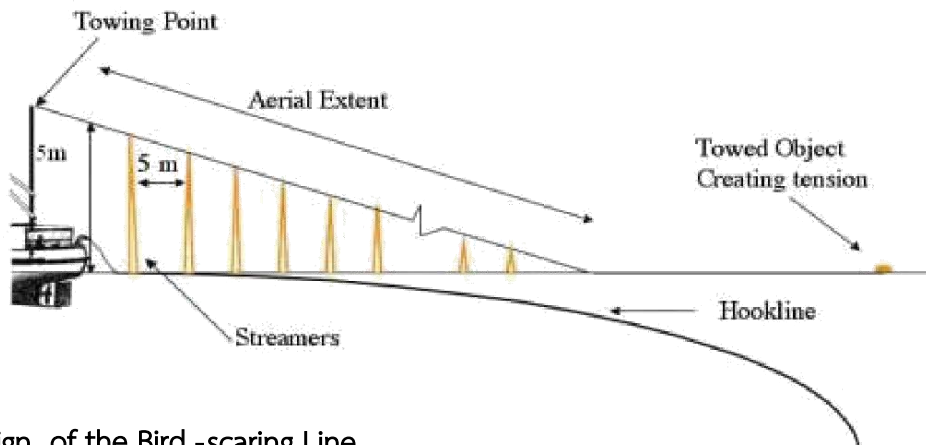
Table 1

Measures to mitigate impact and reduce catching of sea birds

Preventive Measures	Methods	Details
During fishing operation at night time, minimize numbers of lights on vessel's deck.	<ul style="list-style-type: none"> - Do not fishing in early morning and before sunset. - Using low light at the deck as much as possible 	<ul style="list-style-type: none"> • Define the time during early morning and before sunset into the nautical almanac for each latitude, local time, and date. • By using very low light on the deck, shall not ignore minimum standards as defined for safety and navigation
Bird-scaring lines	Must use birdscaring lines during shooting the longlines.	<p>For the vessel of 35 meters in length and over:</p> <ul style="list-style-type: none"> • Use at least 1 bird-scaring line, and if it is possible please use 2 bird-scaring lines if there are many birds. These 2 lines should be used at the same time in each side of the branch line. • The bird-scaring line should be relatively long, and to be above the sea surface not less than 100 meters. • Must use steamers with enough length to touch the sea surface under clam sea condition. • Length of the steamer is long until the sea surface, and attachment of the steamer should be less than 5 meters interval. <p>For the vessel below 35 meters in length:</p> <ul style="list-style-type: none"> • Use at least 1 bird-scaring line • Bird-scaring lines must be long enough to be above the sea surface and still in the air more than or equally not less than 75 meters • Use long- and/or short-type steamer (but should be longer than 1 meter), the interval of the steamer attachment is as follow: <ul style="list-style-type: none"> -Short type steamer: less than 2 meters interval - Long type steamer: not more than 5 meters interval for the first 55 meters of the bird-scaring line
Line weighting	Attach weight at the bird-scaring line before	Use at least 45 grams of weight to attach with the bird-scaring lines at 1 meter from the hook, or use at least 60 grams of weight to attach at 3.5 meters from

	shooting	the hook, or use 98 grams of weight with 4 meters from the hook.
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Diagram of the bird -scaring lines.



Design of the Bird -scaring Line

1. Use appropriate materials for each part of the bird-scaring lines for increasing the movement in the air
2. In the part of the lines over the sea surface, there shall have lightweight to create unpredictable movement of the lines to avoid familiarity of the birds. However, the weight must be enough to avoid its curving.
3. Use swivel in the bird-scaring line to reduce entangling.
4. The streamer shall be made of materials that are easily to see and create unpredictable movements, *e.g.* small and strong line covered with red urethane tube by hanging it from the three-way swivel that is attached on the bird-scaring line to reduce the entanglement. There are two lines in each streamer, and attached a clip for releasing the steamer conveniently.

The Use of Bird-scaring Lines

1. The bird-scaring lines must be hanging from the mask on the vessel and shall be installed at the highest as possible to prevent the birds when shooting the lines from the stern deck. Use appropriate estimation of the distance of the vessel that will not make entanglement with the fishing gear. The height of the mask is more helpful to prevent the birds, for example, 7 meters height from the sea surface can prevent the birds in the distance of 100 meters.
2. Use more numbers of the bird-scaring lines to increase efficiency of the prevention.
3. In case of using only one bird-scaring line, the line should be attached following the wind direction by attaching at the position where the birds go down into the water. If the baited

hooks are releasing from the vessel outside the body of the vessel, the streamer attach point with the vessel should be away several meters from the body of the vessel that will be the position of the birds.

4. In case of using two lines of the bird-scaring line, shooting position should be the same with the area of those two lines.
5. Spare bird-scaring lines onboard the vessel to replace the damaged lines. Lacking of the bird-scaring lines may affect the safety and cause trouble for fishing because entanglement of longline with the steamer line.
6. In case of using bait casting machine (BCM), there is a need to ensure coordination work between bird-scaring line and the BCM under longline shooting prevention. In case of using automatic shooting machine that can shoot longlines from both port and starboard sides, use more than two bird-scaring lines.
7. In case of hand shooting, there is a need to ensure that the baited hooks and hookline are shoot under line prevention to avoid wave created by the propeller that may reduce sinking speed of the lines.

RESOLUTION 12/04 – ON MARINE TURTLES
Reporting of progress of implementation of the FAO Guideline to Reduce Sea Turtle Mortality in Fishing Operation and on the implementation of resolution 12/04 on marine turtles
(Paragraph 5)

DEADLINE

With the implementation report, 60 days before the meeting of the Commission - annually

Reporting year: 2019

Date of reporting: 01/04/2020

Reporting flag CPC: Thailand

Progress of implementation of the measures of the resolution 12/04	Action undertaken
<ul style="list-style-type: none"> Collect (through logbooks and observer programs) and provide to the Scientific Committee all data on their vessels interactions with marine turtles, Furnish information to the Scientific Committee on successful mitigation measures and other impacts on marine turtles (such as the deterioration of nesting sites & swallowing of marine debris). 	<p>Thailand has the Notification of the Department of Fisheries, Rules and Regulations of Thai Fishing Vessels Operating in Indian Ocean Tuna Commission (IOTC) Competence Area B.E. 2561 (2018), Clause 14 Purse seiners are prohibited to catch marine turtles.</p> <ul style="list-style-type: none"> Discard of marine turtles if it was caught and record the detail of getting such animals. <p>-The process DMCR give the collection data by Interview data from vessels of community 1 time per years at Eastern Cost of Thailand) but Do not through logbooks)</p> <p>- The process DMCR give the information to the Scientific Committee of fisheries on successful mitigation measures and other impacts on marine turtles by Education at Mannai Island and Process for Research of nesting sites and swallowing of marine debris. 3 time per years</p>
<ul style="list-style-type: none"> Require fishermen to bring aboard, if practicable, any captured hard shelled turtle that is comatose or inactive as soon as possible and foster its recovery, including aiding in its resuscitation, before safely returning it to the water. Ensure that fishermen are aware of and use proper mitigation and handling techniques and keep on board all necessary equipment for the release of turtles 	<p>Thailand has the Notification of the Department of Fisheries, Rules and Regulations of Thai Fishing Vessels Operating in Indian Ocean Tuna Commission (IOTC) Competence Area B.E. 2561 (2018), Clause 14 Purse seiners are prohibited to catch marine turtles.</p> <ul style="list-style-type: none"> In case that the marine turtle was caught from fishing and it looks weak or getting injuries, it should be brought up to the vessel and take care of it until healthy and release to the sea. <p>-The process DMCR give the information save lives and first aid for Sea Turtle by fishermen to bring aboard,</p>



	<p>and information any captured marine sea turtle return to open sea by give the education to fisherman.</p> <ul style="list-style-type: none"> - Education first aid and aware handling techniques and keep on board all necessary equipment for seaturtles
<ul style="list-style-type: none"> • For gillnet vessels Require vessel to record all incidents involving marine turtles in the logbooks and report incidents to authorities of the CPC 	<p>Not Applicable.</p> <ul style="list-style-type: none"> • The present no data record for gillnet vessels and incidents involving marine turtles in the logbooks and report of the CPC but DMCR maybe to give the information save the sea turtle in the future.
<ul style="list-style-type: none"> • For longline vessels <p>(a) Ensure that longline vessels carry line cutters & de-hookers to facilitate the handling and release of marine turtles caught or entangled Ensure that operators of such vessels are required to carry & use dip-nets</p> <p>(b) Encourage use of whole finfish bait;</p> <p>(c) Require vessel to record all incidents involving marine turtles in the logbooks and report incidents to authorities of the CPC.</p>	<p>Thailand has the Notification of the Department of Fisheries, Rules and Regulations of Thai Fishing Vessels Operating in Indian Ocean Tuna Commission (IOTC) Competence Area B.E. 2561 (2018), Clause 16 Fishing vessel using longlines shall arrange line cutter and de-hookers for releasing the aquatic animals.</p> <p>- For longline vessels</p> <p>(a) The Present DMCR give the information longline vessels carry line cutters & de-hookers to facilitate the handling and release of marine turtles caught or entangled and required to carry & use dip-nets protect area fishing ground of sea turtles specific Kram Island and Kra Island,</p> <p>(b) The Present DMCR give the information no use of whole finfish for sea turtle .</p> <p>(c) The Present DMCR give the information vessel to record all incidents involving marine turtles in the logbooks and report incidents to authorities of the CPC.</p>
<ul style="list-style-type: none"> • For purse seine vessels: <p>(a) Ensure that vessels:</p> <p>(i) Avoid encirclement of marine turtles, if a marine turtle is encircled/ entangled, take measures to safely release the turtle.</p> <p>(ii) Release all marine turtles observed entangled in fish aggregating devices (FADs) or fishing gear.</p> <p>(iii) If a marine turtle is entangled in the net, stop net roll as soon as the turtle comes out of the water; disentangle the turtle without injuring it before resuming the net roll; and assist the recovery of the turtle before returning it to the water.</p> <p>(iv) Carry and employ dip nets to handle turtles.</p> <p>(b) Encourage vessel to adopt FAD designs which reduce the incidence of entanglement of turtles;</p> <p>(c) Require vessel to record incidents involving marine turtles in the logbooks and report incidents to authorities of the CPC</p>	<p>Thailand has the Notification of the Department of Fisheries, Rules and Regulations of Thai Fishing Vessels Operating in Indian Ocean Tuna Commission (IOTC) Competence Area B.E. 2561 (2018), Clause 14 Purse seiners are prohibited to catch marine turtles.</p> <ul style="list-style-type: none"> • Discard of marine turtles if it was caught and record the detail of getting such animals. <p>In case that the marine turtle was caught from fishing and it looks weak or getting injuries, it should be brought up to the vessel and take care of it until healthy and release to the sea.</p> <ul style="list-style-type: none"> • For purse seine vessels: <p>(a) Ensure that vessels:</p> <p>(i) The Present DMCR give the information of marine turtles, and is encircled/ entangled, take measures to safely release the turtle protect area fishing ground of sea turtles specific Kram Island and Kra Island,</p> <p>(ii) The Present DMCR give the information release all marine turtles and observed entangled in fish aggregating devices (FADs) or fishing gear.</p> <p>(iii) The Present DMCR give the information a marine turtle is entangled in the net, stop net roll as soon as the turtle comes out of the water; and no doing disentangle the turtle without injuring it before resuming the net roll; and no information assist the recovery of the turtle before returning it to the water and may be to the information for .the future.</p> <p>(iv) The present do not activity the carry and employ dip nets to handle turtles.</p> <p>(b) The Present DMCR cannot doing give the information encourage vessel to adopt FAD designs which reduce the incidence of entanglement of turtles;</p> <p>(c) The Present DMCR give the information require vessel to record incidents involving marine turtles in the logbooks and report incidents to authorities of the CPC in the furter.</p>
<ul style="list-style-type: none"> • CPCs to undertake research trials of circle hooks, use of whole finfish for bait, alternative FAD designs, alternative handling techniques, gillnet design and fishing practices and other mitigation methods which may improve the 	<p>Under process of consideration to preparing the draft guideline for accidental catch of marine turtle while</p>



<p>mitigation of adverse effects on turtles</p>	<p>fishing, including classification and requirements for managing and releasing marine turtles. By using the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations as a guideline for this drafting.</p> <p>The Present DMCR cannot do give the information and research CPCs to undertake research trials of circle hooks, use of whole finfish for bait, alternative FAD designs, And cannot do to research the alternative handling techniques, gillnet design and fishing practices and other mitigation methods and improve the mitigation of adverse effects on marine sea turtles may be can do in the future by DMCR .</p>
<ul style="list-style-type: none"> • CPCs continue to undertake research and development to improve the mitigation of adverse affects on marine turtles & provide research outcomes to the Scientific Committee. 	<p>Yes.</p> <ul style="list-style-type: none"> • The Present DMCR cannot do to the research and development to improve the mitigation of adverse affects on marine turtles & provide research outcomes to the Scientific Committee.
<ul style="list-style-type: none"> • Collaborate with the IOSEA and take into account the IOSEA MoU 	<p>Yes.</p> <ul style="list-style-type: none"> • The Present DMCR cannot working collaborate with the IOSEA and take into account the IOSEA MoU

<p>Progress of implementation of the Guidelines to Reduce Sea Turtle Mortality in Fishing Operations</p>	<p>Progress of implementation of the Guidelines to Reduce Sea Turtle Mortality in Fishing Operations</p>
<p>Legal framework</p>	<p>Legal framework</p>
<p>1. Fishing operations / A. Appropriate handling and release. In order to reduce injury and improve chances of survival: (i) Requirements for appropriate handling, including resuscitation or prompt release of all bycaught or incidentally caught (hooked or entangled) sea turtles. (ii) Retention and use of necessary equipment for appropriate release of bycaught or incidentally caught sea turtles.</p>	<p>Thailand has the Notification of the Department of Fisheries, Rules and Regulations of Thai Fishing Vessels Operating in Indian Ocean Tuna Commission (IOTC) Competence Area B.E. 2561 (2018), Clause 14 Purse seiners are prohibited to catch marine turtles. In case that the marine turtle was caught from fishing and it looks weak or getting injuries, it should be brought up to the vessel and take care of it until healthy and release to the sea.</p> <p>1. Fishing operations / A. Appropriate handling and release. The Present DMCR doing In order to reduce injury and improve chances of survival: (ii) The Present DMCR doing to the protocol retention and use of necessary equipment for appropriate release of by caught or incidentally caught sea turtles.</p>
<p>1. Fishing operations / B. Coastal trawl (i) In coastal shrimp trawl fisheries, promote the use of turtle excluder devices (TEDs) or other measures that are comparable in effectiveness in reducing sea turtle bycatch or incidental catch and mortality. (ii) In other coastal trawl fisheries, collect data to identify sea turtle interactions and conduct where needed research on possible measures to reduce sea turtle bycatch or incidental catch and mortality. (iii) Implementation of successful methodologies developed as a result of B(ii).</p>	<p>Yes. Thailand promote to fishermen use of turtle excluder devices (TEDs).</p> <p>National law: Notification of Ministry of Agriculture and Cooperatives, Prescribe to install the Turtle Excluder Devices (TED) for shrimp trawler in the fishing area dated 16 September 1996.</p> <p>1. Fishing operations / B. Coastal trawl (i)) The Present DMCR joint doing to the protocol with DOF but DMCR indirect user protocol for coastal shrimp trawl fisheries, promote the use of turtle excluder devices (TEDs) or other measures that are comparable in effectiveness in reducing sea turtle bycatch or incidental catch and mortality protect area fishing ground of sea turtles specific Kram Island and Kra Island. (ii)) The Present DMCR joint doing with to in other trawl fisheries, collect data to identify sea turtle interactions and conduct where needed research on possible measures to reduce sea turtle bycatch or incidental catch and mortality . from the project abundance of sea turtle. (iii) The Present DMCR doing a few to implementation of successful methodologies developed as a result of B(ii).</p>



<p>1. Fishing operations / C. Purse seine</p> <p>(i) Avoid encirclement of sea turtles to the extent practical.</p> <p>(ii) If encircled or entangled, take all possible measures to safely release sea turtles.</p> <p>(iii) For fish aggregating devices (FADs) that may entangle sea turtles, take necessary measures to monitor FADs and release entangled sea turtles, and recover these FADs when not in use.</p> <p>(iv) Conduct research and development of modified FADs to reduce and eliminate entanglement.</p> <p>(v) Implementation of successful methodologies developed as a result of C(iv).</p>	<p>Under process of consideration to preparing the draft guideline for accidental catch of marine turtle while fishing, including classification and requirements for managing and releasing marine turtles. By using the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations as a guideline for this drafting.</p> <p>1. Fishing operations / C. Purse seine</p> <p>(i) The Present DMCR doing difficult and a few to avoid encirclement of sea turtles to the extent practical.</p> <p>(ii) The Present DMCR doing protocol to the fisherman for encircled or entangled, take all possible measures to safely release sea turtles.</p> <p>(iii) The Present DMCR do not have research for fish aggregating devices (FADs) that may entangle sea turtles, take necessary measures to monitor FADs and release entangled sea turtles, and recover these FADs when not in use.</p> <p>(iv) The Present DMCR do not have a research and the protocol conduct research and development of modified FADs to reduce and eliminate entanglement.</p> <p>(v) The Present DMCR do not have a protocol for implementation of successful methodologies developed as a result of C(iv).</p>
<p>1. Fishing operations / D. Longline</p> <p>(i) Development and implementation of appropriate combinations of hook design, type of bait, depth, gear specifications and fishing practices in order to minimize bycatch or incidental catch and mortality of sea turtles.</p> <p>(ii) Research should include consideration of the impact of various mitigation measures on sea turtles, target species and other bycaught or incidentally caught species, such as sharks and seabirds.</p> <p>(iii) Retention and use of necessary equipment for appropriate release of bycaught and incidentally caught sea turtles, including de-hooking, line cutting tools and scoop nets.</p>	<p>Thailand has the Notification of the Department of Fisheries, Rules and Regulations of Thai Fishing Vessels Operating in Indian Ocean Tuna Commission (IOTC) Competence Area B.E. 2561 (2018), Clause 16 Fishing vessel using longlines shall arrange line cutter and de-hookers for releasing the aquatic animals.</p> <p>1. Fishing operations / D. Longline</p> <p>(i) The Present DMCR do not have a protocol for Development and implementation of appropriate combinations of hook design, type of bait, depth, gear specifications and fishing practices in order to minimize bycatch or incidental catch and mortality of sea turtles protect area fishing ground of sea turtles specific Kram Island and Kra Island.</p> <p>(ii) The Present DMCR do not have a research should include consideration of the impact of various mitigation measures on sea turtles, target species and other by caught or incidentally caught species, such as sharks and seabirds.</p> <p>(iii) The Present DMCR do not have a protocol for retention and use of necessary equipment for appropriate release of by caught and incidentally caught sea turtles, including de-hooking, line cutting tools and scoop nets protect area fishing ground of sea turtles specific Kram Island and Kra Island.</p>
<p>1. Fishing operations / E. Other fisheries</p> <p>(i) Assessment and monitoring of sea turtle bycatch or incidental catch and mortality in relevant fishing operations.</p> <p>(ii) Research and development of necessary measures for reducing bycatch or incidental catch or to control mortality in other fisheries with a priority on reducing bycatch or incidental catch in gillnet fisheries.</p> <p>(iii) In other setnet fisheries, collect data to identify sea turtle interactions and conduct when needed research on possible measures to reduce sea turtle bycatch or incidental catch and mortality.</p> <p>(iv) Implementation of successful methodologies developed as a result of E (ii) and (iii).</p>	<p>- Under process of consideration to preparing the draft guideline for accidental catch of marine turtle while fishing, including classification and requirements for managing and releasing marine turtles. By using the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations as a guideline for this drafting.</p> <p>1. Fishing operations / E. Other fisheries</p> <p>(i) The Present DMCR censuses and joint with DOF for Assessment and monitoring of sea turtle bycatch or incidental catch and mortality in relevant fishing operations.</p> <p>(ii) The Present DMCR do not have a protocol and research and development of necessary measures for reducing bycatch or incidental catch or to control mortality in other fisheries with a priority on reducing bycatch or incidental catch in gillnet fisheries.</p> <p>(iii) The Present DMCR have a protocol for protect impact the sea turtle from other setnet fisheries, collect data to identify sea turtle interactions and conduct when needed research on possible measures to reduce sea turtle bycatch or incidental catch and mortality.</p>



	<p>(iv) The Present DMCR do not have a data for implementation of successful methodologies developed as a result of E (ii) and (iii). and some topic DMCR have a few data.</p>
<p>1. Fishing operations / F. Other measures as appropriate for all fishing practices</p> <p>(i) Spatial and temporal control of fishing, especially in locations and during periods of high concentration of sea turtles.</p> <p>(ii) Effort management control especially if this is required for the conservation and management of target species or group of target species.</p> <p>(iii) Development and implementation, to the extent possible, of net retention and recycling schemes to minimize the disposal of fishing gear and marine debris at sea, and to facilitate its retrieval where possible.</p>	<p>Thailand has Wild Animal Preservation and Protection Act B.E. 2535 (1992). Although Wild Animal Preservation and Protection Act has been amended twice in 2003, Ministerial Regulation Prescribing Species of Protected Wildlife that May Be Bred in Captivity B.E. 2546 (2003).</p> <p>In addition, Thailand has the national law to prescribe the marine and coastal protected area.</p> <p>1. Fishing operations / F. Other measures as appropriate for all fishing practices</p> <p>(i) The Present DMCR do not have a function Spatial and temporal control of fishing, especially in locations and during periods of high concentration of sea turtles.</p> <p>(ii) The Present DMCR joint a data and protocol with DOF for Effort management control especially and this is required for the conservation and management of target species or group of target species.</p> <p>(iii) The Present DMCR do not have a this function for development and implementation, to the extent possible, of net retention and recycling schemes to minimize the disposal of fishing gear and marine debris at sea, and to facilitate its retrieval where possible.</p>
<p>2. Research, monitoring and sharing of information / A. Collection of information and data, and research</p> <p>(i) Collection of data and information on sea turtle interactions in all fisheries, directly or through relevant RFBs, regional sea turtle arrangements or other mechanisms.</p> <p>(ii) Development of observer programmes in the fisheries that may have impacts on sea turtles where such programs are economically and practically feasible. In some cases financial and technical support might be required.</p> <p>(iii) Joint research with other states and/or the FAO and relevant RFBs.</p> <p>(iv) Research on survival possibilities of released sea turtles and on areas and periods with high incidental catches.</p> <p>(v) Research on socio-economic impacts of sea turtle conservation and management measures on fishers and fisheries industries and ways to improve communication.</p> <p>(vi) Use of traditional knowledge of fishing communities about sea turtle conservation and management.</p>	<p>2. Research, monitoring and sharing of information / A. Collection of information and data, and research</p> <p>(i) The Present DMCR do not have a function for collection of data and information on sea turtle interactions in all fisheries, directly or through relevant RFBs, regional sea turtle arrangements or other mechanisms.</p> <p>(ii) The Present DMCR do not have a main fuction but joint data with DOF for development of observer programmes in the fisheries that may have impacts on sea turtles where such programs are economically and practically feasible. In some cases financial and technical support might be required.</p> <p>(iii) Joint research with other states and/or the FAO and relevant RFBs.</p> <p>(iv) The Present DMCR do not have a few data research form standing crop of sea turtle on survival possibilities of released sea turtles and on areas and periods with high incidental catches.</p> <p>(v) The Present DMCR have a few data form census a research on socio-economic impacts of sea turtle conservation and management measures on fishers and fisheries industries and ways to improve communication. But joint the project with DOF in the future,</p> <p>(vi) The Present DMCR information form protocol use of traditional knowledge of fishing communities about sea turtle conservation and management.</p>
<p>2. Research, monitoring and sharing of information / B. Information exchange</p> <p>(i) Sharing and dissemination of data and research results, directly or through relevant RFBs, regional sea turtle arrangements or other mechanisms.</p> <p>(ii) Cooperation to standardize data collection and research methodology, such as fishing gear and effort terminology, database development, estimation of sea turtle interaction rates, and time and area classification.</p>	<p>2. Research, monitoring and sharing of information / B. Information exchange</p> <p>(i) The Present DMCR is a sharing and dissemination of data and research results, directly or through relevant RFBs, regional sea turtle arrangements or other mechanisms vie website of DMCR.</p> <p>(ii) The Present DMCR is a cooperation to standardize data collection and research methodology with DOF SEAFDEC , such as fishing gear and effort terminology, database development, estimation of sea turtle interaction rates, and time and area classification.</p>
<p>2. Research, monitoring and sharing of information / C. Review of the effectiveness of measures</p> <p>(i) Continuous assessment of the effectiveness of measures taken in accordance with these guidelines.</p> <p>(ii) Review of the implementation and improvement of measures stipulated above.</p>	<p>2. Research, monitoring and sharing of information / C. Review of the effectiveness of measures</p> <p>(i) The Present DMCR have a protocol of continuous assessment of the effectiveness of measures taken in accordance with these guidelines is manual for sea turtle of Thailaond.</p> <p>(ii) The Present DMCR is a review of the implementation and improvement of measures stipulated</p>



	above Sea turtles .
<p>3. Ensuring policy consistency</p> <p>A. Maintaining consistency in management and conservation policy at national level, among relevant government agencies, including through inter-agency consultations, as well as at regional level.</p> <p>B. Maintaining consistency and seeking harmonization of sea turtle management and conservation-related legislation at national, sub-regional and regional level.</p>	<p>3. Ensuring policy consistency</p> <p>A. The Present DMCR have a planning form maintaining consistency in management and conservation policy at CITES national level, among relevant government agencies, including through inter-agency consultations, as well as at regional level.</p> <p>B. The Present DMCR protocol of sea turtle manual the Maintaining consistency and seeking harmonization of sea turtle management and conservation-related legislation at national, sub-regional and regional level.</p>
<p>4. Education and training</p> <p>A. Preparation and distribution of information materials such as brochures, manuals, pamphlets and laminated instruction cards.</p> <p>B. Organization of seminars for fishers and fisheries industries on:</p> <ul style="list-style-type: none"> - Nature of the sea turtle-fishery interaction problem - Need to take mitigation measures - Sea turtles species identification - Appropriate handling and treatment of bycaught or incidentally caught sea turtles - Equipment to facilitate rapid and safe release - Impacts of their operations on sea turtles - Degree to which the measures that are requested or required to adopt will contribute to the conservation, management and recovery of sea turtle population. - Impacts of mitigation measures on profitability and success of fishing operations - Appropriate disposal of used fishing gear <p>C. Promotion of awareness of the general public of sea turtle conservation and management issues, by government as well as other organizations</p>	<p>4. Education and training</p> <p>A. The Present DMCR preparation and distribution of information materials such as brochures, manuals, pamphlets and laminated instruction cards to community and fisheries man in the local areas approximant 3time per year .</p> <p>B. Organization of seminars for fishers and fisheries industries on:</p> <ul style="list-style-type: none"> - The Present DMCR have activity nature of the sea turtle-fishery interaction problem - The Present DMCR doing to protocol need to take mitigation measures - The Present DMCR information form manual protocol sea turtles species identification - The Present DMCR do not have data appropriate handling and treatment of bycaught or incidentally caught sea turtles - The Present DMCR have protocol equipment to facilitate rapid and safe release - The Present DMCR collection data and research for Impacts of their operations on sea turtles - The Present DMCR doing to policy planning a degree to which the measures that are requested or required to adopt will contribute to the conservation, management and recovery of sea turtle population. - The Present DMCR collection data and research about impacts of mitigation measures on profitability and success of fishing operations - The Present DMCR information form protocol with DOF appropriate disposal of used fishing gear. <p>Promotion of awareness of the general public of sea turtle conservation and management issues, by government as well as other organizations and research Journal international</p>
<p>5. Capacity building</p> <p>A. Financial and technical support for implementation of these guidelines in developing countries.</p> <p>B. Cooperation in research activities such as on status of sea turtle incidental catch in coastal and high seas fisheries and research at foraging, mating and nesting areas.</p> <p>C. Establishment of a voluntary support fund.</p> <p>D. Facilitation of technology transfer.</p>	<p>5. Capacity building</p> <p>A. The Present DMCR action and doing with financial and technical support for implementation of these guidelines in developing countries for Thai government.</p> <p>B. The Present DMCR data collection and research with DOF cooperation in research activities such as on status of sea turtle incidental catch in coastal and high seas fisheries and research at foraging, mating and nesting areas.</p> <p>C. The Present DMCR research establishment of a voluntary support fund from student form university .</p> <p>D. The Present DMCR planning to protocol facilitation of technology transfer.</p>
<p>6. Socio-economic and cultural considerations</p> <p>A. Taking into account :</p> <ul style="list-style-type: none"> (i) socio-economic aspects in implementing sea turtle conservation and management measures. (ii) cultural aspects of sea turtles interactions in fisheries as well as integration of cultural norms in sea turtle conservation and management efforts. (iii) sea turtle conservation and management benefits to fishing and coastal communities, with particular reference to small-scale and artisanal fisheries. <p>B. Promotion of the active participation and, where possible, cooperation and engagement of fishing industries, fishing</p>	<p>6. Socio-economic and cultural considerations</p> <p>A. The Present DMCR information form protocol with community base taking into account :</p> <ul style="list-style-type: none"> (i) The Present DMCR information form protocol socio-economic aspects in implementing sea turtle with fisher man conservation and management measures by wisdom. (ii) The Present DMCR have information form protocol and manual sea turtle in the website from DMCR cultural aspects of sea turtles interactions in fisheries as well as integration of cultural norms in sea turtle conservation and management efforts. (iii) The Present DMCR information form protocol manual of sea turtle conservation and management



<p>communities and other affected stakeholders.</p>	<p>benefits to fishing and coastal communities, with particular reference to small-scale and artisanal fisheries. B. The Present DMCR information form protocol with promotion of the active participation and, where possible, cooperation and engagement of fishing industries, fishing communities and other affected stakeholders at website DMCR .</p>
<p>8. Consideration of other aspects of sea turtle conservation and management Fishers, research institutions, management authorities and other interested parties dealing with fisheries conservation and management should collaborate with relevant conservation and management bodies, at national, sub-regional and regional level, in the following subject matters: A. Collection and sharing of information on sea turtles relative to: (i) Biology and ecology (population dynamics, stock identification, behaviour, diet selection, habitats, breeding, nesting, foraging, migration patterns/areas, nursery grounds, etc). (ii) Sources of mortality other than fisheries. (iii) Status of sea turtle populations, including human-related threats. B. Improvement and development of conservation and management measures applied throughout the sea turtle life cycle (habitat/ nesting beach protection, enhancement of sea turtle populations). C. Promotion, as appropriate, of participation in regional sea turtle conservation and management arrangements with a view to cooperate on sea turtle conservation and management.</p>	<p>8. Consideration of other aspects of sea turtle conservation and management Fishers, research institutions, management authorities and other interested parties dealing with fisheries conservation and management should collaborate with relevant conservation and management bodies, at national, sub-regional and regional level, in the following subject matters: A. The Present DMCR have a protocol with DOF collection and sharing of information on sea turtles relative to: (i) The Present DMCR collection data and research by fisheries biologist for biology and ecology (population dynamics, stock identification, behaviour, diet selection, habitats, breeding, nesting, foraging, migration patterns/areas, nursery grounds, etc). (ii) The Present DMCR collection data and research form project for sources of mortality other than fisheries and primary data support from DOF. (iii) The Present DMCR information form protocol and research in the website of DMCR status of sea turtle populations, including human-related threats. B. The Present DMCR protocol manual of fisheries biologist from improvement and development of conservation and management measures applied throughout the sea turtle life cycle (habitat/nesting beach protection, enhancement of sea turtle populations). C. The Present DMCR information form protocol promotion, as appropriate, of participation in regional sea turtle conservation and management arrangements with a view to cooperate on sea turtle conservation and management with in DOF, IUCN and other.</p>

