



# MALAYSIA NATIONAL PLAN OF ACTION

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## FOR THE CONSERVATION AND MANAGEMENT OF SHARK (PLAN 2)

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**DEPARTMENT OF FISHERIES  
MINISTRY OF AGRICULTURE AND AGRO-BASED INDUSTRY  
MALAYSIA**

**2014**



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Level 1-6, Wisma Tani  
Lot 4G2, Precinct 4,  
62628 Putrajaya  
Malaysia

Telephone No. : 603 88704000  
Fax No. : 603 88891233  
E-mail : [hqhelp@dof.gov.my](mailto:hqhelp@dof.gov.my)  
Website : <http://dof.gov.my>

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## SUMMARY

Malaysia has been very supportive of the International Plan of Action for Sharks (IPOA-SHARKS) developed by FAO that is to be implemented voluntarily by countries concerned. This led to the development of Malaysia's own National Plan of Action for the Conservation and Management of Shark or NPOA-Shark (Plan 1) in 2006. The successful development of Malaysia's second National Plan of Action for the Conservation and Management of Shark (Plan 2) is a manifestation of her renewed commitment to the continuous improvement of shark conservation and management measures in Malaysia. For the purpose of this document, the term 'shark' refers to all chondrichthyan or cartilaginous fishes, comprising sharks, skates, rays and chimaeras.

Lessons learnt through the implementation of Plan 1 were used as the basis for the development of Plan 2. In Plan 2, 17 issues were identified and clustered according to their nature. To this end, seven broadly defined practical action plans are proposed to address these issues. Following the action plans, specific programs are outlined and prioritized for implementation over the life of Plan 2. Programs ranked as "High" will have to be carried out within one year, "Medium" within 2-3 years and "Low" in four years.

Plan 2 is divided into four chapters.

### CHAPTER 1

- A review of NPOA-Shark (Plan 1).
- A description of why Plan 2 is developed and how it will be implemented.
- List of overall objectives.

### CHAPTER 2

- A general overview of Malaysian fisheries.
- Trade of sharks and rays and their products.
- The status of sharks and rays resources in Malaysian waters.
- Relevant Rules and Regulations.

### CHAPTER 3

- A review of Plan 1 and the recommendations for improvement.
- A description of Plan 2.

### CHAPTER 4

- Monitoring and evaluation

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## LIST OF ACRONYMS

ASEAN	Association of Southeast Asian Nations
BOBLME	Bay of Bengal Large Marine Ecosystem
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CTI	Coral Triangle Initiative
DoFM	Department of Fisheries Malaysia
DoFS	Department of Fisheries Sabah
EEZ	Economic Exclusive Zone
FAO	Food and Agriculture Organisation
FRC	Fisheries Research Centre
FDAM/ LKIM	Fisheries Development Authority of Malaysia
IPOA	International Plan of Action
IUU	Illegal, Unreported and Unregulated Fishing
MAQIS	Malaysian Quarantine and Inspection Services
MFRDMD	Marine Fishery Resources Development and Management Department
MOSTI	Ministry of Science, Technology and Innovation
NPOA	National Plan of Action
SEAFDEC	Southeast Asian Fisheries Development Center
SSME	Sulu-Sulawesi Marine Eco-region





## FOREWORD BY THE HONOURABLE MINISTER OF AGRICULTURE AND AGRO-BASED INDUSTRY MALAYSIA

Malaysia shares the global concern on shark-related issues. In light of this, Malaysia joins the global effort in improving conservation and management measures which premised upon the fact that sharks are widely distributed both within waters under national jurisdiction and on the high seas alike. Moreover, Malaysia also subscribes to the importance and significance of international cooperation and coordination to achieve the long-term conservation and sustainable use of sharks.

Malaysia has been very supportive of the International Plan of Action (IPOA-SHARKS) developed by FAO which is to be voluntarily implemented by countries concerned. This led to the development of Malaysia's own National Plan of Action for the Conservation and Management of Shark (Plan 1) in 2006. The establishment of Plan 1 is consistent with Malaysia's commitment to adhere to the principles of international fisheries instruments aimed at achieving sustainable fisheries as enshrined in the National Agro-food Policy.

Moving on, the successful development of Malaysia's second National Plan of Action for the Conservation and Management of Shark (Plan 2) is a manifestation of her renewed commitment towards continuous improvement of shark conservation and management measures in Malaysia. In relation to this, it is worth mentioning that the successful implementation of the action plans is underpinned by strong cooperation among stakeholders and concerted effort by all parties. Therefore, I call on everyone to join hands together to ensure Plan 2 achieves its objectives.

Thank you

DATU' SRI ISMAIL SABRI BIN YAAKOB  
**Minister of Agriculture and Agro Based Industry Malaysia**  
**PUTRAJAYA**





## FOREWORD BY SECRETARY GENERAL MINISTRY OF AGRICULTURE AND AGRO- BASED INDUSTRY MALAYSIA

Rooted from the International Plan of Action for the Conservation and Management of Sharks (IPOA-SHARKS), Malaysia's National Plan of Action for the Conservation and Management of Shark (NPOA-Shark) seeks to shape and implement set of Plan tailored to local scenarios while taking into account the global sentiments pertaining to conservation and management of sharks. At this point, it is worth noting that sharks are primarily landed by trawlers as by-catch in Malaysia and owing to the advancement of processing technology nowadays, they are fully utilized.

The Department of Fisheries Malaysia is fully committed to managing fisheries in Malaysia and shark conservation and management is no exception. Apart from initiatives and action at the national level, Malaysia is also actively involved in a number of regional and international projects and initiatives to effectively manage and continuously improve her capacity in many areas, which include among others, data collection on shark landings and training in taxonomy and biology of sharks.

Plan 2, to a great extent, has included performance indicators as a way to measure its progress over the operational period. Furthermore, Plan 2 has also proposed an annual review to beef up progress monitoring. It has also identified and prioritised action plans. I strongly believe that with these improvements, Plan 2 can achieve its short term and long term objectives.

At the international level, Malaysia has taken note of the recent conclusion of the Conference of the Parties (CoP16) to the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) in Bangkok which saw the adoption of the listing proposals of seven species of sharks and manta rays under CITES. This recent development is expected to affect cross-border trade of sharks and their derivatives and will eventually require increased capacity building of relevant authorities as well as the enhancement of awareness of the public.

I would like to congratulate and thank all those who contributed and made Plan 2 a reality.

Thank you.

DATO' MOHD ARIF BIN AB RAHMAN  
**Secretary General**  
**Ministry of Agriculture and Agro-Based Industry Malaysia**  
**PUTRAJAYA**





## MESSAGE FROM THE DIRECTOR GENERAL OF FISHERIES MALAYSIA

Malaysia's second National Plan of Action for the Conservation and Management of Shark (hereinafter referred to as Plan 2) signifies Malaysia's continuous commitment to the conservation and management of sharks and their long-term sustainable use. Emanated from the previous plan of which its operational period ended in 2010, Plan 2 seeks to better improve implementation of the conservation and management measures building upon the lessons learnt from the first Plan. Plan 2 emphasizes some key important aspects such as monitoring and key performance indicators. Furthermore, it recognizes the need to strengthen data collection and capacity building. It also aims to rectify the negative perception towards shark catching in Malaysia through enhanced public awareness and education programs. It is desirable that over the life of Plan 2, monitoring of progress will be closely undertaken through annual reviews.

Effective conservation and management of sharks in Malaysia is premised upon the need to strike a delicate balance between ecological, social and economic objectives. In the face of this big challenge to achieve this goal, Malaysia exerts every effort to take into account the interest of stakeholders in developing measures through a series of consultations.

I wish to express my sincere gratitude to the Review Team for making Plan 2 a reality in a timely manner. Plan 2 embodies stakeholders' opinions and interests in conserving and managing shark and ray fisheries. I thank everyone who has devoted time and energy to develop this plan. My sincere thanks also go to the staff of the Department of Fisheries Malaysia and other agencies that rendered support and assistance. Last but not least, I appreciate the contributions of NGOs whose ideas and suggestions have added value to Plan 2.

Thank you.

DATU' HJ. AHAMAD SABKI BIN MAHMOOD  
**Director General**  
**Department of Fisheries Malaysia**  
**PUTRAJAYA**



## ACKNOWLEDGEMENTS

The Review Team of the National Plan of Action for the Conservation and Management of Shark would like to take this opportunity to thank The Hon. Dato' Sri Ismail Sabri bin Yaakob, Minister of Agriculture and Agro-Based Industry Malaysia; Dato' Mohd Arif bin Ab Rahman, Secretary General, Ministry of Agriculture and Agro-Based Industry, Datuk Seri Mohd Hashim bin Abdullah, Former Secretary General, Ministry of Agriculture and Agro-Based Industry; and Dato' Hj. Ahamad Sabki bin Mahmood, Director General of Fisheries Malaysia for their guidance, support and encouragement in the preparation for this document.

We would also like to express our sincere gratitude to Mr. Mohamad Shaupi bin Derahman, Deputy Director General of Fisheries (Management); Dato' Hj. Ismail bin Abu Hassan, Deputy Director General of Fisheries (Development); Directors and senior officers of the Department of Fisheries Malaysia for their constructive comments and suggestions in the preparation of this plan.

We also acknowledge the contributions of various stakeholders who have actively participated in the consultation process during the preparation of this plan.

Last but not least, we thank all the agencies, departments and individuals who have provided valuable assistance and comments in the preparation of this document.





## MEMBERS OF MALAYSIA NPOA-SHARKS (PLAN 2) WORKING GROUP

### **Chairman:**

Mr. Mohamad Shaupi bin Derahman

### **Members:**

Mr. Abdul Rahman bin Abdul Wahab

Mr. Ahmad bin Ali

Mrs. Tan Geik Hong

Mrs. Nur Fadhlina Chan bt. Mahadie Chan

Mr. Abu Talib bin Ahmad

Mrs. Mahyam bt. Mohd Isa

Mr. Zaki bin Mokri

Mr. Lawrence Kissol

Mrs. Haryati bt. Abd. Wahab

Mrs. Adilah Hani bt. Yusof

Mrs. Annie Lim Pek Khiok

Mr. Jackson Clive Jusak

Mr. Abdul Haris Hilmi bin Ahmad Arshad

Mr. Albert Chuan Gambang

Mr. Abdullah bin Jaafar

Mr. Halimi bin Abu Hanip

Mr. Arthur Besther Sujang

Mrs. Noorliza bt. Ramli



# CHAPTER 01





# CHAPTER 1

## PREAMBLE

At least 63 species of sharks are found in Malaysian waters and this places Malaysia in the fourth position in the Southeast Asian region (Ahmad and Annie, 2012), in terms of number of species found, after Indonesia (111 species), the Philippines (94 species) and Thailand (64 species). As for rays, Malaysia is in second position with 84 species after Indonesia which has a record of 106 species (Appendix 1). It is clear that in Malaysia, sharks are not specifically targeted by fishers but are caught together with other commercially important species. Sharks are fully utilized in Malaysia and shark meat is widely eaten and used in processing activities in many parts of the country. Interestingly, shark meat is consumed as a traditional food by a small community in the eastern part of Sabah.



As most sharks are migratory and are caught by various fishing gears, the shark fishery needs to be properly managed to minimise any adverse impacts on the shark resources. Thus there is strong need to develop the NPOA-Sharks for Malaysia. Malaysia is among one of the first to develop such a plan in Southeast Asia. The NPOA-Sharks (hereinafter referred to as Plan 1) was developed in 2004 after FAO's International Plan of Action for Conservation and Management of Shark (IPOA-SHARKS) was introduced. The plan was operationalised from 2006 to 2010.

## REVIEW

### Review of NPOA-Shark (Plan 1)

Paragraph 23 of IPOA-SHARKS requires member States to conduct assessment of the implementation of their NPOA-Sharks at least once in every four years. In accordance with this, an evaluation was conducted to assess the implementation of Plan 1 in terms of action taken against the action plans. The detailed evaluation



appears in Table 1. Plan 1 identified five key issues and challenges in the management and conservation of sharks, namely biological information on sharks and related habitats, socio-economic information of fishers and traders, utilization, marketing and trade information, coordinated research and expertise on shark and inadequate management measures. These issues were then translated into key action plans broadly described as strengthening of data collection on biology and related habitats, strengthening of data collection on socio-economics of fishers and traders, strengthening of data collection on shark trade and encouraging the utilization of elasmobranch catches, capacity building, coordinated research and effective conservation and management.

The next evaluation step involved an assessment to determine whether or not issues identified in 2004 are still relevant

to be addressed in the new NPOA-Sharks (hereinafter referred to as Plan 2). The review also focuses on the effectiveness and practicality of action plans in Plan 1. Mainstreaming exercise indicates that some issues are still relevant, and require an array of practical solutions and new action plans in addition to the strengthening the old ones. Specific recommendations are proposed to further address some of the issues. It is worth noting that the FAO Review on the Implementation of the International Plan of Action (IPOA) for the Conservation and Management of Sharks in 2011 has facilitated and added value to this evaluation process.

## Development of Plan 2

One of the major shortcomings in the development of Plan 2 is the insufficient data to generate information pertaining to several aspects, *inter alia*, trade and economic aspects of shark fishery. In addition, specific benchmarks to measure performance have not been identified in Plan 1. In light of the lessons learnt, Plan 2 has now included Key Performance Indicators (KPIs) to enable better performance evaluation in the future. The KPIs appear in Table 2.

In Plan 2, 17 issues have been identified and clustered according to their nature. To this end, broadly defined seven practical action plans are proposed to address the issues which have been clustered. Under the action plans, specific programs are outlined and prioritized for implementation over the life of Plan 2. Programs ranked as “High” will have to be carried out within one year, “Medium” within 2-3




years and “Low” in four years. The detailed matrix appears in Table 2 while the Implementation Schedule appears in Table 3.

The purpose of this Plan 2 is to review the existing Plan 1 as required under paragraph 23 of IPOA–SHARKS. Lessons learnt from Plan 1 were used as the basis for the development of Plan 2. In light of the issues that exist both at the international and national levels and encompassing concerns from various stakeholders, Plan 2 is deemed timely. It should be urgently developed to address issues, such as the declining shark landings, the negative perception of catching sharks and the misconception on shark finning. One unique step in Plan 2 is the inclusion of KPIs to assess its successful implementation towards achieving the final outcome. The expected final outcome is the long term sustainable utilization of sharks and rays for the benefit of future generations in Malaysia.



As most sharks are migratory in nature, their conservation, management and long term sustainable use should also be pursued under international and regional frameworks and agencies such as the Food and Agriculture Organization (FAO), Southeast Asian Fisheries Development Center (SEAFDEC), Coral Triangle Initiative (CTI), Sulu-Sulawesi Marine Eco-region (SSME) and Bay of Bengal Large Marine Ecosystem (BOBLME) of which Malaysia is an active member.

It is important to note that the achievement of KPIs is also dependant on close cooperation and collaboration among relevant agencies and stakeholders. There should also be adequate funding to support the successful implementation of relevant programs, projects and activities.



## OVERALL OBJECTIVES

The overall objective of the NPOA-Sharks is to ensure the conservation and effective management of sharks and rays and their long-term sustainable use, as outlined in the FAO IPOA-SHARKS which aims to:

- Ensure that shark and ray catches are sustainable;
- Assess threats to shark and ray populations, determine and protect critical habitats, and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use;
- Identify and provide special attention in particular to vulnerable or threatened shark and ray stocks;
- Develop and improve and the framework for establishing and coordinating effective consultation involving stakeholders in research, management and educational initiatives within and between States;
- Minimise unutilised incidental catches of sharks and rays;
- Contribute to the protection of biodiversity and ecosystem structure and functions;
- Minimise waste and discards from shark and ray catches in accordance with Article 7.2.2 (g) of the Code of Conduct for Responsible Fisheries (for example, requiring the retention of sharks from which fins are removed);
- Encourage full use of dead sharks and rays;
- Facilitate improved species-specific catch and landing data and monitoring of shark and ray catches; and
- Facilitate the identification and reporting of species-specific biological and trade data.





# CHAPTER 02





## CHAPTER 2

### GENERAL OVERVIEW OF MALAYSIAN FISHERIES

The fisheries sector in Malaysia plays a significant role in supporting the country's economic growth through the provision of employment as well as the supply of proteins as food to the population. In 2012, the total food fish production amounts to 1,780,168 tonnes valued at US\$ 3.44 billion<sup>1</sup>. This contributed to about 1.1% of the Gross Domestic Product (GDP) and provided direct employment to 136,514 fishers and 29,482 fish aquaculturists (Annual Fisheries Statistics, 2012).

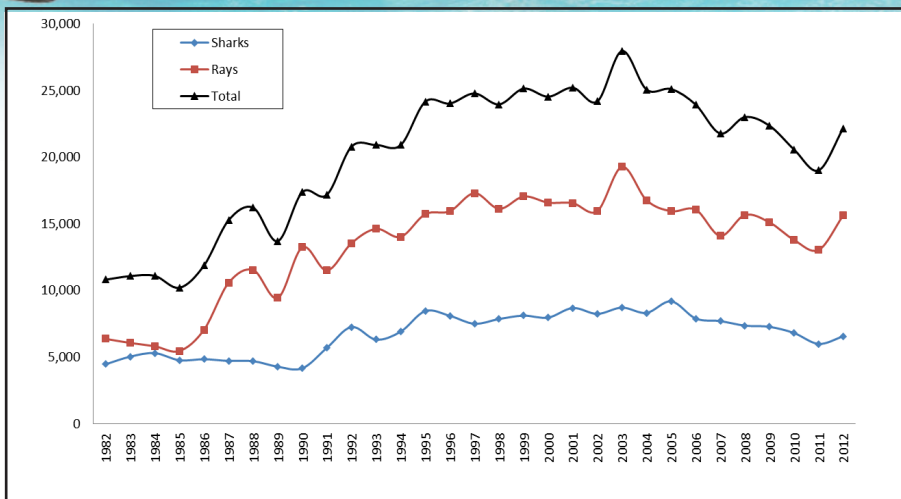
The fishing area for marine capture fisheries covers a total of 547,200 km<sup>2</sup>. Malaysian marine capture fisheries are categorized into coastal and deep-sea fisheries. In 2012, coastal fisheries contributed 1,136,182 tonnes (77.2%) while deep-sea fisheries contributed 336,057 tonnes (22.8%) to the total marine landings.

Sharks and rays, that constitute part of the demersal fishery landings, are caught in Malaysian waters from the coast to the edge of the EEZ. The landings from 1982 - 2012 contributed between 1.4 – 2.2%, with an average of 1.8%, of the total marine landings (Appendix 2). Sharks are not targeted by fishers but are caught together with other commercially important species. They are brought back whole to the port and sold at reasonable prices, with the fins fetching a better price. Similarly rays are caught and sold at reasonable prices. Sharks and rays are mainly caught by trawls, gillnets, and hooks and lines.

### Landings of Sharks and Rays in Malaysia

The annual landings of sharks and rays fluctuated from 10,792 tonnes in 1982 to 22,148 tonnes in 2012. The highest landings were in 2003 at 27,948 tonnes while the lowest landings were in 1985 at 10,185 tonnes. This trend is due to the nature of the fisheries and sharks and rays are seasonal in occurrence. Landing of sharks increased from 4,444 tonnes in 1982 to 6,536 tonnes in 2012 with an average of 6,728 tonnes/year. As for rays the landing also increased from 6,348 tonnes in 1982 to 15,612 tonnes in 2012 with an average of 13,396 tonnes/year. The highest landing for sharks was recorded in 2005 at 9,165 tonnes and rays in 2003 at 19,253 tonnes. (Figure 1).

<sup>1</sup> Conversion rate US\$1=RM 3.09



**Figure 1: Trends of landings (tonnes) of sharks and rays in Malaysia**

Source: Annual Fisheries Statistics (1982 - 2012)

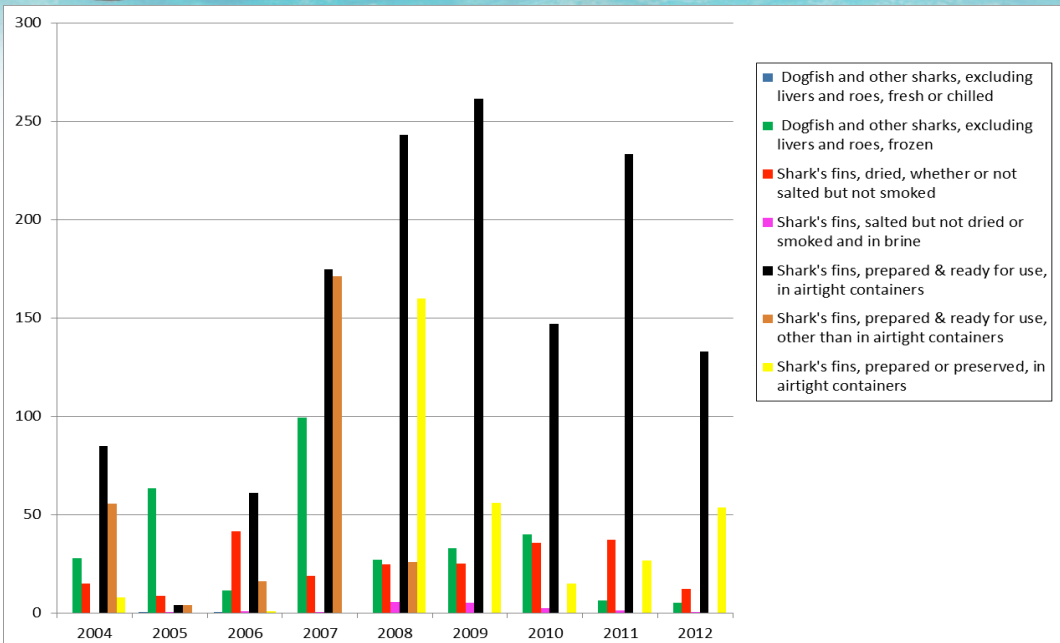
## TRADE OF SHARKS AND RAYS AND THEIR PRODUCTS

### Exports and Imports of Sharks

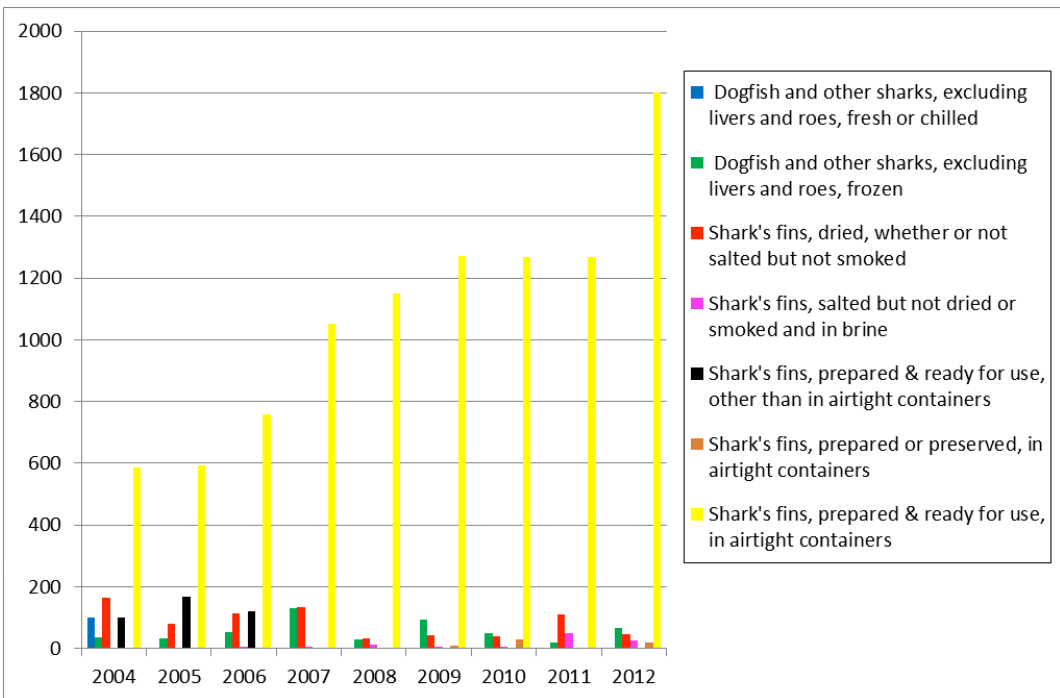
There are five shark's fin products and two other shark products which are traded in Malaysia. The Annual Fisheries Statistics and Customs Code do not differentiate the various species of sharks that are being traded. Data concerning these products are only available under the general headings of;

- Dogfish and other sharks, excluding livers and roes, fresh or chilled
- Dogfish and other sharks, excluding livers and roes, frozen
- Shark's fins, dried, whether or not salted but not smoked
- Shark's fins, salted but not dried or smoked and in brine
- Shark's fins prepared and ready for use and in airtight containers
- Shark's fins, prepared and ready for use, other than in airtight containers
- Shark's fins, prepared or preserved, in airtight containers

A total of 1,341.8 tonnes shark's fins prepared and ready for use and in airtight containers were exported from 2004-2012 with an average of 149.1 tonnes/year. For the same product, Malaysia imported 9,756 tonnes with an average of 1,084.1 tonnes/year during the same period. Overall, there is a steady increase in the trends of the quantities of exports and imports of shark fins prepared and ready for use and in airtight containers from 2006 to 2009. These quantities fluctuated slightly from 2010 to 2012 (Figure 2 and Figure 3).

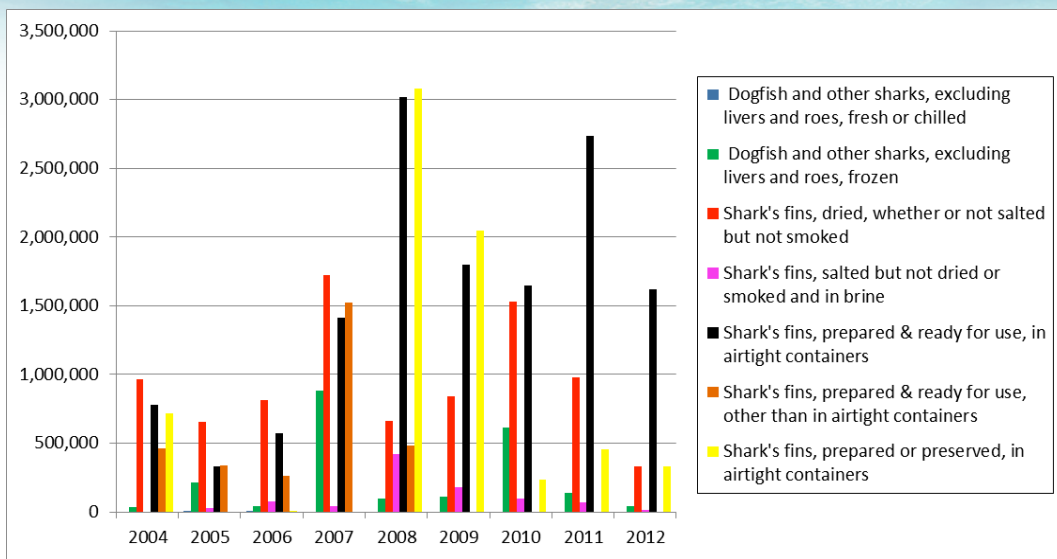


**Figure 2: Trends of quantities (tonnes) of exports of sharks and shark fins, 2004 - 2012**  
 Source: Annual Fisheries Statistics Volume 2 (2004 - 2012)



**Figure 3: Trends of quantities (tonnes) of imports of sharks and shark fins, 2004-2012**  
 Source: Annual Fisheries Statistics Volume 2 (2004 - 2012)

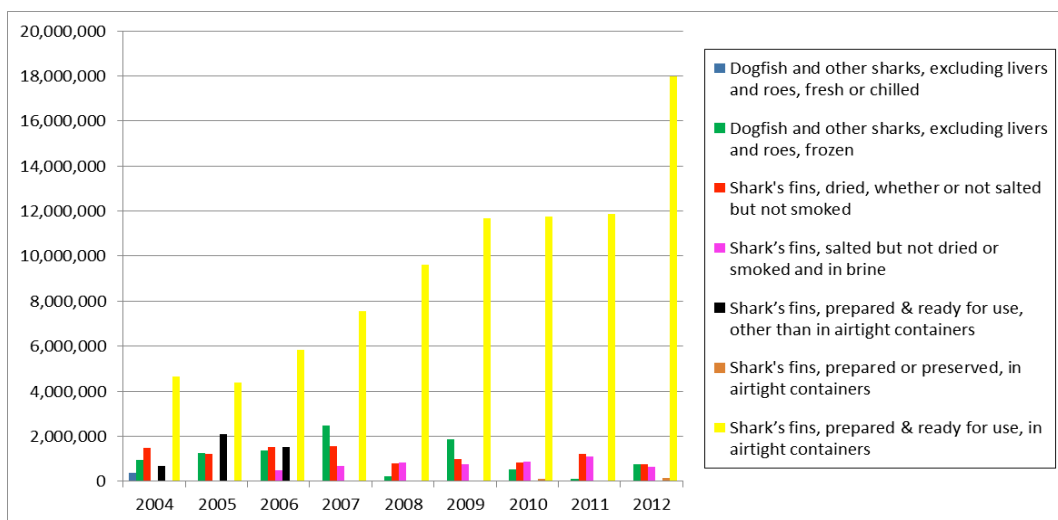




**Figure 4: Trends of export value (RM) of sharks and shark fins, 2004-2012**

Source: Annual Fisheries Statistics Volume 2 (2004 - 2012)

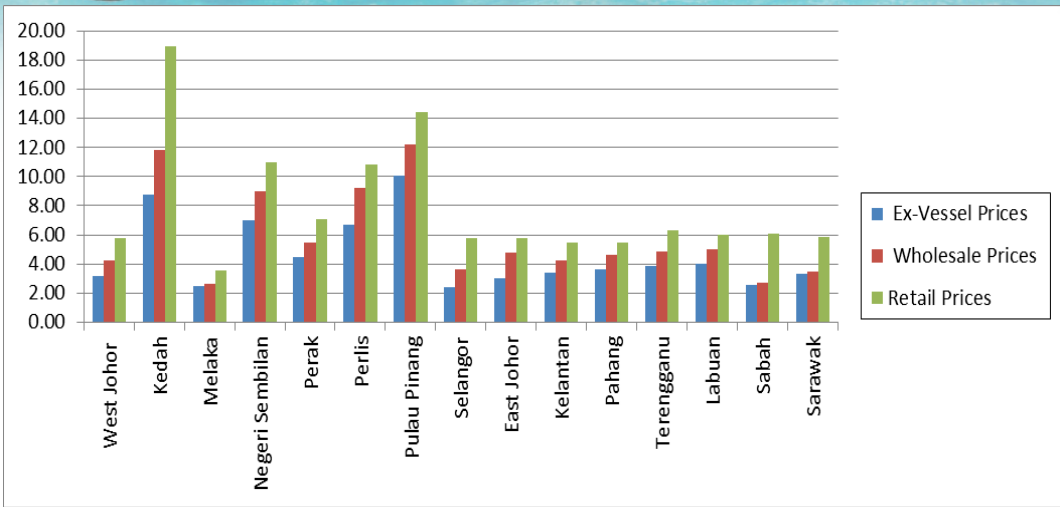
The export values of shark fins, prepared and ready for use in airtight containers, also fluctuated which was more or less similar to the trend of the quantities being exported for the year 2004 - 2012 (Figure 4).



**Figure 5: Trends of import value (RM) of sharks and shark fins, 2004-2012**

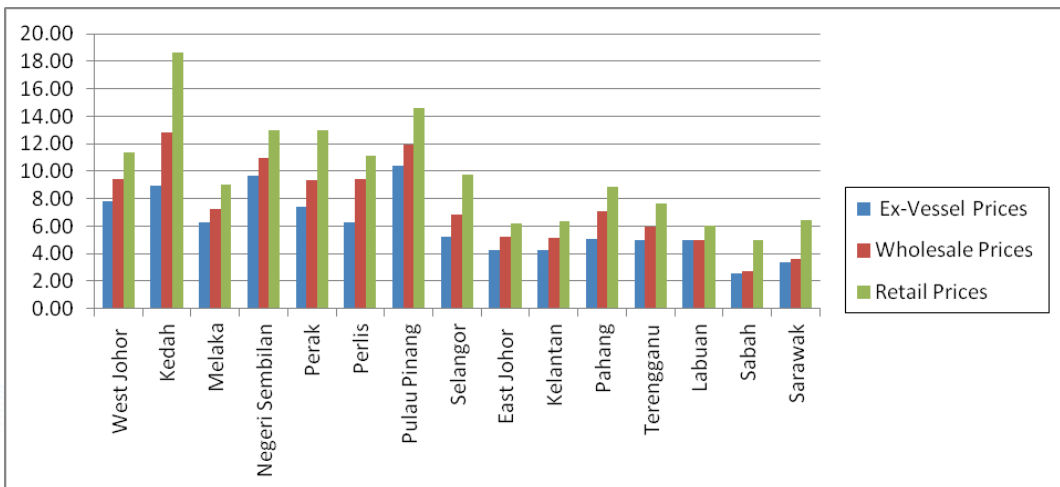
Source: Annual Fisheries Statistics Volume 2 (2004 - 2012)

The import values of shark fins, prepared and ready for use in airtight containers, for the year 2004 - 2012 showed an upward trend which was similar to that of the quantities imported (Figure 5).




**Figure 6: Trends of average prices (RM) of sharks by States in Malaysia in 2012**

The average prices per kilogram for sharks were RM4.59 (ex-vessel), RM5.85 (wholesale) and RM7.90 (retail) respectively. The State of Pulau Pinang registered the highest average ex-vessel and wholesale prices at RM10.07/kg and RM12.18/kg respectively while the State of Kedah showed the highest average retail price of RM18.92/kg. In the northern States such as Pulau Pinang, Kedah and Perlis, sharks fetched a higher price compared to other States due to the greater demand by the locals. The average ex-vessel price per kilogram of sharks increased from RM 3.74 in 2004 to RM 4.59 in 2012 (Figure 6).



**Figure 7: Trends of average prices (RM) of rays by States in Malaysia in 2012**




The average prices per kilogram for rays were RM6.10 (ex-vessel), RM7.51 (wholesale) and RM9.80 (retail) respectively. The State of Kedah recorded the highest average wholesale and retail price at RM12.82/kg and RM18.66/kg respectively while the State of Pulau Pinang showed the highest average ex-vessel price of RM10.37/kg. The average ex-vessel price per kilogram for rays increased significantly from RM 3.40 in 2004 to RM 6.10 in 2012. In the northern States such as Pulau Pinang and Kedah, rays fetched a higher price compared to other States due to the greater demand by the locals (Figure 7).

## STATUS OF SHARKS AND RAYS RESOURCES IN MALAYSIAN WATERS

### Sharks

Malaysia is endowed with rich shark biodiversity. The most comprehensive study on sharks in Malaysia was conducted from 1999 - 2004 by Yano *et al.* (2005). A total of 56 species were recorded. The recent study by Ahmad and Annie (2012), confirmed that at least 63 species of sharks from eight orders and 18 families inhabit Malaysian waters including the freshwater habitat. Two species of freshwater sharks *Glyphis* sp. (Mukah river shark) and *Glyphis fowlerae* (Kinabatangan river shark) inhabit rivers in Sarawak and Sabah (Borneo). The order Carcharhiniformes is the most diverse with six families and 45 species, followed by Orectolobiformes (five families and nine species), Squaliformes (two families and three species), Lamniformes (two families and two species), Hexanchiformes (one family and two species), Squatiniformes and Heterodontiformes (both with one family and one species each). Widely distributed shark species are the grey carpet shark (*Chiloscyllium punctatum*), spot-tail shark (*Carcharhinus sorrah*), Pacific spadenose shark (*Scoliodon macrorhynchus* previously identified as *Scoliodon lauticaudus*), blackspot shark (*Carcharhinus sealei*), milk shark (*Rhizoprionodon acutus*), scalloped hammerhead shark (*Sphyrna lewini*), sicklefin weasel shark (*Hemigaleus microstoma*), grey bamboo shark (*Chiloscyllium griseum*), slit eye shark (*Loxodon macrorhinus*), black tip reef shark (*Carcharhinus melanopterus*), bull shark (*Carcharhinus leucas*), spinner shark (*Carcharhinus brevipinna*), graceful shark (*Carcharhinus amblyrhynchos*), fossil shark (*Hemipristis elongata*), silky shark (*Carcharhinus falciformes*), tiger shark (*Galeocerdo cuvier*) and great hammer shark (*Sphyrna mokarran*). However, the dominant species differ from one landing site to another. Most sharks prefer





'continental/insular shelves' as their habitat. A total of 37 species (59%) occur within this habitat. The second most important habitat is 'shelf to slope' with 11 species (17%). The habitats for other species include 'freshwater', 'shelf to oceanic', 'continental/insular slopes', 'shelf to semi-oceanic' and 'euhaline freshwater/shelves'.

## Rays



Malaysia also has a rich biodiversity of rays. The study conducted by Yano et al. (2005) recorded 52 species of rays in Malaysian waters. The recent study by Ahmad et al. (2014), confirmed that at least 84 species of rays from five orders and 14 families inhabit Malaysian waters including the freshwater habitat. The white-edge freshwater ray (*Himantura signifer*) inhabits the Pahang River in Pahang (Peninsular Malaysia) and the giant freshwater whipray (*Himantura polylepis* previously identified as *Himantura chaophraya*) is found in the Kinabatangan River in Sabah.

The order *Myliobatiformes* is the most diverse with six families and 56 species, followed by order *Rhinobatiformes* (three families and 10 species), *Torpediniformes* (two families and nine species), *Rajiformes* (two families and five species) and *Pristidae* (one family and three species). Like sharks, the dominant species of rays also differ from one landing site to another. The widely distributed species were pale-edged stingray (*Dasyatis zugei*), white-spotted whipray (*Himantura gerrardi*), blue-spotted maskray (*Neotrygon kuhlii*), reticulate whipray (*Himantura uarnak*), bleeker's whipray (*Himantura uarnacoides*), honeycomb whipray (*Himantura undulata*), dwarf whipray (*Himantura walga*), scaly whipray (*Himantura imbricata*), leopard whipray (*Himantura leoparda*), bluespotted fantail ray (*Taeniura lymma*), whitespotted guitarfish (*Rhynchobatus australiae*), pink whipray (*Himantura fai*), Jenkin's whipray (*Himantura jenkinsii*), round whipray (*Himantura pastinacoides*), banana tail ray (*Pastinachus atrus*), whitespotted eagle ray (*Aetobatus ocellatus* previously identified as *Aetobatus narinari*), Javanese cownose ray (*Rhinoptera javanica*) and lesser devil ray (*Mobula kuhlii*).

Most rays prefer 'continental/insular shelves' as their habitat. A total of 62 species (76%) occur within this habitat. The second most important habitat is 'shelf to oceanic' with six species (7.3%). The habitats for other species include 'shelf to slope', 'euhaline freshwater/shelves', 'continental/insular slopes', 'fresh water' and, 'oceanic'.



## RULES AND REGULATIONS

Malaysia's seriousness in managing sharks and rays resources has been demonstrated through the documentation of Plan 1. Malaysia is also committed to increase her contribution in the management and conservation of sharks and rays both at regional and international fora. Efforts have been undertaken to continuously improve policies and Regulations under the current legal frameworks.

### Fisheries Act 1985

Under the Fisheries Act 1985, the Minister of Agriculture and Agro-Based Industry is empowered to make regulations for the proper management of specific marine fisheries resources.

Currently the management of freshwater sharks and rays (elasmobranchs) is under the jurisdiction of the States. In order to improve the conservation and management of freshwater elasmobranchs, the Federal Government will propose to the State Governments to establish and include the management of freshwater sharks and rays in their State fisheries rules. The Federal Government also needs to work closely with the State authorities to harmonise rules.

Under the Fisheries (Control of Endangered Species of Fish) Regulations 1999, there are 25 species listed as endangered marine animals in Malaysia, including the whale shark. In 2008, seven additional species under the Family Pristidae (sawfishes) were listed as endangered species under the same regulations. The regulations stipulate that no person shall fish or, disturb, harass, catch, kill, take, possess, sell, buy, export or transport any endangered species of fish including their parts except with the written permission from the Director General of Fisheries Malaysia.

To ensure sustainable exploitation of resources, restrictions on several methods of fishing are imposed under the Fisheries (Prohibition of Method of Fishing) Regulations 1980 and in Section 26 Fisheries Act 1985. These include the use of explosives, poisons or pollutants, the use of electric shocks and the use of pair trawls and push nets. The locally known 'pukat pari', a drift net with a mesh size of more than 25.4 cm (10 inches), which was once used to catch large sized sharks and rays has been banned since 1990. The banning of these gears and fishing methods nationwide helped to reduce the excessive exploitation of sharks and rays and to conserve their breeding stocks.





### **International Trade in Endangered Species Act 2008 (Act 686)**

This Act has been enforced since December 2009 with a view to implement the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Under CITES, Malaysia has to adopt legislation for implementation and the Department of Fisheries Malaysia (DoFM), Department of Fisheries Sabah (DoFS) and Sarawak Forestry Department have been appointed as Management Authorities for fish. Under the International Trade in Endangered Species Act 2008 (Act 686), trade matters pertaining to hundreds of species, including their parts and derivatives, are being controlled by various authorities. There are currently three species of sharks namely basking shark (*Cetorhinus maximus*), great white shark (*Carcharodon carcharias*), whale shark (*Rhincodon typus*), seven species of rays and all sawfishes in the Family Pristidae listed under this Act. Any new CITES listed species will be added to this existing list. This Act controls any import, export and re-export; and introduction from the sea, possession, transit, breeding or propagation of species are scheduled under this Act.

### **Sabah Aquaculture and Inland Fisheries Enactment 2003**

This Enactment was gazetted in the year 2003 and was fully implemented in 2005. Rules and regulations imposed under the specified section of this Enactment are aimed at conserving any threatened, protected, controlled and rare freshwater sharks and rays such as Borneo river shark (*Glyphis fowlerae*) and giant freshwater whipray (*Himantura polylepis*).

# CHAPTER 03





## CHAPTER 3

### REVIEW AND RECOMMENDATIONS OF PLAN 1

Plan 1 outlined various strategies in order to realize its objectives. The action plans formulated for the period of 2006 till 2010 were divided into seven categories, as follows.

1. Strengthening of Data Collection on Biology and Related Habitats;
2. Strengthening of Data Collection on Socio-economic of Fishers and Traders;
3. Strengthening of Data Collection on Trade;
4. Encouraging Full Utilisation of Elasmobranch Catches;
5. Capacity Building and Coordinated Research,
6. Awareness Raising through Information, Education and Communication, and
7. Effective Conservation and Management.

The review of Plan 1 showed that some of the action plans were successfully implemented and had achieved their goals. Some are either not fully implemented or have yet to be implemented. It has also been identified that all action plans are still relevant and should be included in Plan 2. As such, there is an urgent need for Plan 2 to be developed and implemented. The summary of the evaluation and review of Plan 1 is shown in Table 1.

**Table 1: Evaluation and Review of Plan 1**

	Evaluation and Review	Action Taken	Relevant to Plan 2 (YES / NO)	Recommendation
<b>1.</b>	<b>Strengthening of Data Collection on Biology and Related Habitats</b>			
1.1	Improvement of data collection on landings by major species.	In the Annual Fisheries Statistics, DoFM used the category 'Sharks' for all shark species and 'Rays' for all ray species. A pilot project to separate and record sharks and rays at the species level was initiated in 2012 at several landing sites in Perak.	Yes	This pilot project is ongoing and if successful It should be expanded nationwide.
1.2	Identification of natural habitats for breeding and nursery grounds of elasmobranchs for conservation and protection	No specific research was conducted. However, observations from unscheduled visits to major landing sites on the east coast of Peninsular Malaysia showed that most shark and ray species landed by trawlers (Zone B, Zone C and Zone C2) are still in the juvenile stage. Several mature species with fully developed embryos or egg cases were also observed. This shows that the coastal area is an important breeding and nursery ground for sharks and rays. Most shark and ray species are known to lay their eggs and give birth to their young in coastal waters.	Yes	The project to collect information should be expanded nationwide.
1.3	Study on biology and taxonomy of elasmobranchs to determine the status of resources	No specific research was conducted to determine the status of resources. However a study on taxonomy and biology was conducted using specimens from several training courses on taxonomy and biology of elasmobranchs at SEAFDEC/ MFRDMD in collaboration with local and foreign fish taxonomists. Information from this course was documented in papers and books as shown below:  Manjaji-Matsumoto, M., Annie, L. P.K. and Ahmad, A. 2006. Notes on elasmobranchs recorded from the South China Sea off Sabah and Sarawak, Malaysia. Paper presented at National Fisheries Conference 2006. Kuching, Sarawak, Malaysia.	Yes	Collection of information should be done nationwide.



	Evaluation and Review	Action Taken	Relevant to Plan 2 (YES / NO)	Recommendation
		<p>Ahmad, A., Gambang, A.C., Solahuddin, A. R. and Annie, L.P.K. 2006. Elasmobranch Records In Sarawak. Paper presented at National Fisheries Conference, 2006 Kuching, Sarawak, Malaysia.</p> <p>Ahmad, A., Gambang, A.C. and Annie, L.P.K. 2007. Field guide to rays of Malaysia and Neighbouring Countries. Department of Fisheries Malaysia. 58 pp.</p> <p>Gambang, A.C., Ahmad, A. and Annie, L.P.K. 2007. Field guide to sharks of Malaysia and Neighbouring Countries. Department of Fisheries Malaysia. 56 pp.</p> <p>Ahmad, A. and Annie, L.P.K. 2008. Reproduction strategy of sharks and rays in Malaysia and implication of over fishing. Paper presented at National Fisheries Conference 2008, Kuala Terengganu, Malaysia.</p> <p>Ahmad, A., Annie, L.P.K., Abdul Rahman, M., Raja Bidin, R.H., Gambang, A.C., Nor Azman, Z. 2008. Panduan mengenali spesies ikan yu di Malaysia, Brunei Darussalam, Indonesia dan Thailand (in Bahasa Malaysia). 209 pp.</p> <p>Ahmad, A., Gambang, A.C. and Annie, L.P.K. 2009. Chondrichthyan Biodiversity in Malaysia. Paper presented at National Biodiversity Seminar 2009, Kajang Selangor, Malaysia.</p>		




	Evaluation and Review	Action Taken	Relevant to Plan 2 (YES / NO)	Recommendation
		<p>Last, P.R., White, W. T., Caira, J. N., Fahmi, Dharmadi, Jensen, K., Annie, L. P.K., Manjaji-Matsumoto, M., Naylor, G. J.P., Pogonoski, J.J., Stevens, J. D., and Yearsley, G. K. 2010b. Sharks and Rays of Borneo. CSIRO . 290 pp.</p> <p>Ahmad, A. and Annie, L.P.K. 2012. Field guide to sharks of the Southeast Asian region. SEAFDEC-MFRDM/SP/18. 210 pp.</p>		
1.4	Collection and compilation of information on stock structure, abundance, life history and reproduction rates	No specific research was conducted on stock structure. However information on abundance, life history and reproduction rates of all dominant shark and ray species are available.	Yes	To expand to cover the most economically important species.
<b>2. Strengthening of Data Collection on Socio-economic of Fishers and Traders</b>				
2.1	Study on socio-economic importance of elasmobranch resources	No action	Yes (Project proposal had been submitted)	To conduct pilot project in Sabah
2.2	Study on demographic profile, fisheries profile, fishing operation practices, problems, and fishery systems	No action	Yes (Project proposal had been submitted)	To conduct pilot project in Sabah
<b>3. Strengthening of Data Collection on Trade</b>				
3.1	Improvement of data acquisition on elasmobranch products and trade	No action	Yes	Need to strengthen coordination and cooperation with Customs, LKIM and MAQIS
3.2	Study on marketing mechanism, trade pattern and trade flows and post-harvest / processing activities	No action	Yes	Proposed to be conducted under CTI
3.3	Develop DNA barcoding study to identify shark species listed by CITES	At present only DNA specimens for whale sharks are being collected.	Yes	To continue ongoing activity



	Evaluation and Review	Action Taken	Relevant to Plan 2 (YES / NO)	Recommendation
3.4	Facilitate the identification and reporting of species-specific trade data		Yes	Focus on species listed under CITES
<b>4.</b>	<b>Encouraging Full Utilisation of Elasmobranch Catches</b>			
4.1	Minimise waste and discards from elasmobranch catches	Dead sharks are fully utilized	Yes (low priority)	
4.2	Development of value-added elasmobranch products (meat, skin, cartilage etc.)	No action	Yes (low priority)	To work with Research Agencies such as MARDI
<b>5.</b>	<b>Capacity Building and Coordinated Research</b>			
5.1	Improve and develop knowledge on biology, taxonomy and ecology of elasmobranch resources through training	<p>Several training courses on the taxonomy and biology of sharks were conducted for DoFM officers at SEAFDEC-MFRDMD since 2003. One regional training course was sponsored by SEAFDEC in 2012.</p> <p>Two training courses were conducted in 2003, two in 2007, one each in 2008, 2011 and 2012. Most participants were involved in data collection at landing sites.</p> <p>SEAFDEC/MFRDMD organized several training courses on taxonomy of elasmobranchs and bony fish in 2010, 2011 and 2012. Participants from DoFM also attended.</p>	Yes	Ongoing activity to be continued.
5.2	Participate in seminars and meetings related to elasmobranchs at national, regional and international levels	Officers from SEAFDEC/MFRDMD participated in relevant meetings in FAO, Rome (2007, 2010) and many officers attended meetings and seminars organized by SEAFDEC and other organisations.	Yes	Ongoing activity to be continued.



	<b>Evaluation and Review</b>	<b>Action Taken</b>	<b>Relevant to Plan 2 (YES / NO)</b>	<b>Recommendation</b>
5.3	Effective consultation framework involving stakeholders in research, management and education	No action	Yes	Ongoing activity to be continued (proposed in CTI).
5.4	Encourage multinational surveys targeted at deep-water and oceanic elasmobranchs	Two studies were conducted in Sabah and Sarawak waters. During the study in 2009 (Sulu-Sulawesi Expedition) and the study in Sabah using MV SEAFDEC (2010), several species of deep water sharks and skates were recorded.	Yes	Ongoing activity to be continued.
<b>6.</b>	<b>Awareness Raising through information, education and communication</b>			
6.1	Improve and strengthen public awareness on the importance of elasmobranch resources and their species in the ecosystems	<p>A book in Bahasa Malaysia entitled 'Ikan Yu: Fossil Hidup yang Menggerunkan' was published in 2010 in collaboration with Dewan Bahasa dan Pustaka.</p> <p>DoFM also collaborated with Aquaria KLCC, the biggest aquarium in Malaysia, in a public awareness campaign on the conservation of sharks in 2011.</p> <p>Many scheduled public awareness campaigns on all endangered species are organized by DoFM every year.</p>	Yes	
<b>7.</b>	<b>Effective Conservation and Management</b>			
7.1	Enforcement on the implementation of Fisheries (Control of Endangered Species of Fish) Regulations 1999	Several cases of whale shark strandings were reported: two cases in 2008, three in 2009 and one case in 2010. For the case in 2010, the skipper was compounded under the Fisheries (Control of Endangered Species of Fish) Regulations 1999.	Yes	



	Evaluation and Review	Action Taken	Relevant to Plan 2 (YES / NO)	Recommendation
7.2	Identify and provide special attention in particular to vulnerable or threatened sharks and rays stocks	Whale sharks and all Pristidae are protected species under the Fisheries Act 1985 (Control of Endangered Species of Fish) Regulation 1999 and International Trade In Endangered Species Act 2008	Yes	Ongoing and to be continued.
7.3	Establish baseline data on taxonomy	The baseline data on taxonomy is updated monthly.	Yes	Ongoing and to be continued for taxonomy only
7.4	Conserve and rehabilitate critical habitats	Between 2006-2010 DoFM deployed big size anti-trawling artificial reefs at 115 sites in coastal areas.	Yes	Ongoing activity to be continued. A proposal for a shark sanctuary in Sabah has been made.
7.5	Develop sustainable eco-tourism and recreational activities	This has already been implemented at Pulau Payar Marine Park (shark and ray feeding at Langkawi Geopark).	Yes	Ongoing activity to be continued.

## PLAN 2


The main goal of this action plan is to conserve, rehabilitate and sustain sharks and rays resources in Malaysia. The successful outcome of this plan will be the sustainable exploitation of sharks and rays and the enhancement of the populations of those species that are endangered or threatened. Future generations of Malaysians will continue to benefit from the economic, recreational and educational objectives.

The main strategy of Plan 2 is to focus on issues and take direct and the most effective actions through programs or projects for solving the issues. In essence the plan is action oriented.

Issues are categorized into short, medium and long term priority. Seven action plans have been proposed. For each issue, relevant programs/projects are to be implemented in order to achieve the successful outcome of the plan. The main action plans, issues and programs/projects are listed in Table 2. The seven main action plans are summarized below.

### 1. Improvement of Data Collection

Comprehensive knowledge on biology, taxonomy, socio-economy and trade is the precursor for the successful management of sharks and rays. The availability of knowledge depends on the availability of reliable data collected through scientific methodology. The Annual Fisheries Statistics compiled and published by DoFM does not record the catches of sharks and rays by species, but group them under the general categories termed "Sharks or Rays". A pilot project to record sharks and rays at the species level (there are 10 main species) was initiated in 2013 at



several landing sites in Perak. This will be expanded nationwide. A book on the identification of sharks and rays species was published in 2013. This reference will help in the differentiation and identification of sharks and rays species, many of which look alike. In addition more training courses and workshops will be conducted to build capacity for identifying look-alike species. Research projects aimed at addressing the issues in data deficiency in biology, socio-economy and trade will be implemented.

## **2. Rectifying the Negative Perception on Sharks and Rays**

In Malaysia sharks and rays are not targeted by fishers. This is due to the multispecies nature of fish catches in Malaysia and other tropical countries. In addition all parts of sharks such as the meat, liver and fins are fully utilised as food while the inedible parts such as the skin and teeth are used for ornamental products and souvenirs. However, the negative perception on the catching and utilization of sharks and rays is widespread not only in Malaysia but also in other countries. Some documentaries and online images mainly show live sharks being thrown back to sea after they are finned. To counter this misconception, it is proposed that this plan shows the true picture of the full utilization of sharks and rays. This will be done through public awareness programs and consultations with stakeholders and the public at large.

## **3. Intensifying Capacity Building**

There are very few scientists conducting research specifically on sharks and rays. This is further constrained by the lack of interest in biology, taxonomy and ecology of sharks and rays, which are considered tedious and even boring. There is a need to encourage more young scientists to continue research in sharks and rays and this should include deep water and oceanic sharks and rays species. This could be achieved through training courses and participation in conferences, seminars, workshops and proper mentoring by good senior scientists. Stakeholders also need to know at least the basic biology and ecology of sharks and rays. This knowledge will help them to understand the importance of sustainable exploitation and conservation of sharks and rays resources.

## **4. Strengthening Management and Conservation**

Most species of sharks and rays are migratory. They migrate or straddle between marine protected areas (where ecotourism activities occur) and fishing grounds resulting in conflicts of interest between stakeholder groups e.g. between ecotourism groups and fishers. Thus, there is a need to manage sharks and rays on a collaborative basis among stakeholders and between States. More rehabilitation measures using better technologies and informed decision making are required. The Ecosystem Approach to Fisheries Management (EAFM) is recommended to manage sharks and rays resources since this approach is more holistic. Rehabilitation and enhancement of shark and ray resources could be conducted through deployment of artificial reefs.

The objectives of conservation and management of sharks and rays and their long term sustainable use should also be pursued under regional and international



frameworks such as SEAFDEC, CTI, SSME and BOBLME, of which Malaysia is an active member.

## **5. Strengthening Law and Enforcement**

The enforcement and adequacy of laws and regulations is an important issue in the management of sharks and rays. For example, freshwater sharks and rays that inhabit rivers are under State jurisdiction. This action plan proposes that the State fisheries law incorporates the management of freshwater sharks and rays. In order to strengthen the enforcement of Act 686, the latest technology using genetic bar-coding to identify products and derivatives as listed under the CITES Appendices could be implemented. In order to correct the misconception on shark finning and to address the issue on incidental catches of protected and endangered species, awareness programs on sharks and rays should be intensified. Plan 2 also recognises the need to impose new conditions in fishing licences to ensure no discards of finned sharks and rays and they should be retained and landed whole.

## **6. Comprehensive and Coordinated Research**

There is still insufficient comprehensive knowledge on the biology, taxonomy, ecology, fishing and enhancement technology on sharks and rays. Continuous and intensified coordinated research will enhance our knowledge on sharks and rays for effective and efficient management. Another way to acquire more knowledge on sharks and rays is through data mining and prospecting and sharing of research data among local institutions and other countries. In order to carry out proper research, adequate funding and research facilities are critical factors and are needed.

## **7. Securing Funding**

The successful implementation of Plan 2 needs adequate and sustainable funding from both national and international sources because sharks and rays are migratory and inhabit national and international waters. An efficient mechanism is needed to facilitate faster transfer of research funds especially from international donors.



**Table 2: Plan 2**

Priority:  
 High: within one year  
 Medium: within 2-3 years  
 Low: 4 years

Action Plan	1.IMPROVEMENT OF DATA COLLECTION			
Issues	Action	Priority	Key Performance Indicator (KPI)	Implementing Agencies
i. Misreporting of sharks and rays species due to insufficient training	i. SEAFDEC is preparing a field guide on rays species	High	One book entitled 'Field Guide on Ray Species in the South East Asian Region'	DoFM, SEAFDEC/MFRDMD
	ii. Organise more training courses and workshops on sharks and rays identification and biology.	High	One training per year on taxonomy and biology of sharks and rays for 16 trainees	DoFM,DoFS
ii. Deficiency in data collection on biology, socio-economics and trade	Conduct data collection on biology, socioeconomics and trade	High	One report on biology, socioeconomics and trade of sharks and rays	DoFM, DoFS,Ministry of Science, Technology and Innovation (MOSTI), Fisheries Development Authority of Malaysia (LKIM),Malaysian Quarantine and Inspection Services (MAQIS), The Royal Malaysian Customs, State Government.
iii. Difficulties in recording all shark and ray species (63 species of sharks and 69 species of rays)	Record landings for top ten species of sharks and rays	High	Pilot project to record landings of 10 major sharks and rays species at five selected landing sites	DoFM,DoFS,State Government



Action Plan	2. RECTIFYING NEGATIVE PERCEPTION ON TERMINOLOGY			
Issues	Action	Priority	Key Performance Indicator (KPI)	Implementing Agencies
i. Misreporting or misconception on terminology of sharks finning and sharks fisheries	Intensify public awareness programs	High	<p>One public seminar or workshop or forum per year</p> <p>Four exhibitions per year</p> <p>Two posters on the need to conserve sharks and rays</p> <p>One poster on awareness of endangered shark and ray species (e.g. whale shark and sawfishes)</p> <p>One article in mainstream newspapers per year</p> <p>Publicity through electronic media (TV, etc.)</p> <p>Cabinet directive to ban the serving of any meal derived from sharks including shark fin soup during any official government functions.</p>	DoFM, DoFS, State Government



Action Plan	3. INTENSIFYING CAPACITY BUILDING			
Issues	Action	Priority	Key Performance Indicator (KPI)	Implementing Agencies
i. Insufficient knowledge on biology, taxonomy, ecology and resource assessment	i. Conduct more training courses and workshops on biology, taxonomy, ecology and stock assessment of sharks and rays	High	One workshop per year	DoFM, DoFS, State Government
		High	One seminar or meeting per year	DoFM, DoFS, State Government
	ii. Conduct more stakeholder consultations with those involved in research, management and education	Medium	Two consultations per year	DoFM, DoFS, State Government
	iii. Conduct resource surveys in deep-sea areas	Medium	One survey every five years	DoFM, DoFS, State Government
	iv. Participate in seminars and meetings related to the issues at national regional and international levels	Medium	One seminar/ meeting per year	DoFM, DoFS, SEAFDEC/MFRDMD



Action Plan	4. STRENGTHENING CONSERVATION AND MANAGEMENT			
Issues	Action	Priority	Key Performance Indicator (KPI)	Implementing Agencies
i. Conflict of interest between ecotourism and fisheries	i. Conduct feasibility study on areas of conflict	Medium	One feasibility survey	MOSTI,MOA, DoFM, DoFS, State Government, NGOs
	ii. Engage stakeholders in conservation and management through Ecosystem Approach Fisheries Management (EAFM)	High	One consultation per year	MOA,DoFM, DoFS,State Government, NGOs
	iii. Support the ongoing programs on alternative livelihood from capture fisheries to other activities.	High	Participate in the related programs	MOA,DoFM, DoFS,LKIM, State Government, NGOs
	iv. Promoting 'catch & release' activity during fishing tournament/contest/competition	Medium	Engage with the tourism industry and relevant stakeholders through education and awareness programs  Catch & release will be enforced once the related regulation is put in place	MOA, DoFM, DoFS
ii. Limited cooperation in conservation and management of shared, straddling and highly migratory sharks and rays at regional level	Promote more data and information sharing in conservation and management measures of sharks and rays at regional level	Low	Participate in one regional seminar or workshop	DoFM,DoFS, SEAFDEC/MFRDMD
iii. Insufficient rehabilitation, conservation and resource enhancement activities on sharks and rays	Conduct more programs on rehabilitation and enhancement of shark and ray resources through deployment of artificial reefs.	Medium	Five new sites per year	DoFM,DoFS,State Government

<sup>1</sup> Budget proposed under CTI



iv. Catch of juvenile sharks and rays by moonsoon trawlers in coastal waters	Conduct awareness programs among operators of trawlers and other relevant stakeholders	High	One awareness program at the start of the moonsoon season.  One poster on conservation of sharks and rays	
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<b>Action Plan</b>	<b>5. STRENGTHENING LAW AND ENFORCEMENT</b>			
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Issues	Action	Priority	Key Performance Indicator (KPI)	Implementing Agencies
i. Freshwater sharks and rays is under State jurisdiction	Propose to State government to establish and include the management of freshwater sharks and rays in their State fisheries rules and regulations	Medium	Two consultations per year	DoFM, DoFS, State Government
ii. Incidental catch of protected species and endangered species	Intensify awareness programs on laws and regulations	High	Four exhibitions per year  Two posters on protected and endangered species  Pamphlets, stickers, booklets, etc. on protected and endangered sharks and rays (e.g. whale shark and sawfishes)  One article in mainstream newspapers per year	DoFM, DoFS, State Government, NGOs, Anglers Association, Media
iii. Insufficient expertise to identify sharks and rays and their derivatives listed under CITES and Fisheries (Control of Endangered Species of Fish) Regulations 1999	i. Conduct projects on DNA bar-coding on shark and ray species	High	20 species of sharks and rays per year	SEAFDEC/MFRDMD, DoFM, DoFS, Customs, MAQIS



iv.	Absence of finning regulations under the current legal framework	Amend existing regulation or impose conditions on fishing licence	Medium	One additional condition in fishing licence	DoFM, DoFS, State Government
<b>Action Plan</b>		<b>6. COMPREHENSIVE AND COORDINATED RESEARCH</b>			
<b>Issues</b>		<b>Action</b>	<b>Priority</b>	<b>Key Performance Indicator (KPI)</b>	<b>Implementing Agencies</b>
i.	Insufficient comprehensive research on various aspects (biology, friendly gear, resource enhancement, taxonomy, etc.)	Conduct comprehensive and coordinated research	Medium	One collaborative study every five years	DoFM, DoFS, university, State Government
ii.	Limited resources (facilities, funding)	Request budget for research facilities and implementation	Medium	Upgraded DNA laboratory at SEAFDEC/MFRDMD and taxonomy laboratory at FRI Bintawa, FRI Kg Acheh	DoFM, DoFS,
<b>Action Plan</b>		<b>7. SECURING FUNDING</b>			
<b>Issues</b>		<b>Action</b>	<b>Priority</b>	<b>Key Performance Indicator (KPI)</b>	<b>Implementing Agencies</b>
i.	Insufficient sustainable and specific funding to monitor and implement NPOA- Sharks	Use NPOA- Sharks to justify funding application (RMK-10, RMK-11)	High	Two proposals per year from national funds	DoFM, DoFS, SEAFDEC/MFRDMD
ii.	Stringent mechanism to receive funding from international donors.	Simplify the mechanism for channelling of funds.	High	Two consultations with relevant agencies (EPU, AGC, MOF)	DoFM, DoFS, State Government, MOSTI

# CHAPTER 04





## CHAPTER 4

### MONITORING AND EVALUATION

Over the time frame of Plan 1, regular monitoring of its implementation was insufficient. This made it difficult to assess its performance. In the light of this, it is proposed that over the time frame of Plan 2, regular monitoring will be conducted by a Technical Committee. This Technical Committee will report the progress of implementation of the Plan to the National Steering Committee.

A full review is expected to be conducted at the end of 2018 by the Technical Committee and submitted to the National Steering Committee for guidance.

**Table 3: Implementation Schedule**

NO	ACTIONS	YEAR				
		2014	2015	2016	2017	2018
1	Improving Data Collection					
2	Rectifying Negative Perception on Sharks and Rays					
3	Intensifying Capacity Building					
4	Strengthening Conservation and Management					
5	Implementing Comprehensive and Coordinated Research					
6	Strengthening Laws and Regulations					
7	Securing Funding					

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## Appendix 1 : Checklist of Sharks and Rays in Malaysia and Their Habitat

### List of habitats

SHS= shelf to slope

SOC= slope to oceanic

SHO= shelf to oceanic

SSO= shelf to semi-oceanic

WRH= wide range of habitats

SHF= euryhaline/freshwater/shelves

OCE= confined in oceanic

SHL= continental/insular shelves

SLO= continental/insular slopes

FWO= obligate freshwater

No.	Order/Family/Scientific Name	Common Name (English)	Habitat
	<b>SHARKS</b>		
	<b>ORDER HEXANCHIFORMES</b>	<b>COW AND FRILLED SHARKS</b>	
	<b>Family: Hexanchidae</b>	<b>Sixgill and Sevengill Sharks</b>	
1	<i>Hexanchus griseus</i> (Bonnaterre, 1788)	Bluntnose Sixgill Shark	SHS
2	<i>Heptranchias perlo</i> (Bonnaterre, 1788)	Sharptooth Sevengill Shark	SHS
	<b>ORDER: SQUALIFORMES</b>	<b>Dogfish Sharks</b>	
	<b>Family: Squalidae</b>	<b>Dogfish Sharks</b>	
3	<i>Squalus altipinnis</i> Last, White & Stevens, 2007	Western Highfin Spurdog	SHS
4	<i>Squalus megalops</i> (Macleay, 1881)	Piked Spurdog	SHS
	<b>Family Centrophoridae</b>	<b>Gulper Sharks</b>	
5	<i>Centrophorus moluccensis</i> Bleeker, 1860	Smallfin Gulper Shark	SHS
	<b>ORDER SQUATINIFORMES</b>	<b>Angel Sharks</b>	
	<b>Family Squatinidae</b>	<b>Angel Sharks</b>	
6	<i>Squatina tergocellatoides</i> Chen, 1963	Ocellated Angel Shark	SHL
	<b>ORDER HETERODONTIFORMES</b>	<b>HORNSHARKS</b>	
	<b>Family: Heterodontidae</b>	<b>Hornsharks</b>	
7	<i>Heterodontus zebra</i> (Gray, 1831)	Zebra Hornshark	SHL
	<b>ORDER: ORECTOLOBIFORMES</b>	<b>CARPET SHARKS</b>	
	<b>Family: Orectolobidae</b>	Webbegongs	
8	<i>Orectolobus leptolineatus</i> Last, Pogonoski & White, 2010  Identified as <i>Orectolobus maculatus</i> (Bonnaterre, 1788) in Yano <i>et al.</i> (2005)	Indonesian Wobbegong  Spotted Wobbegong	SHL
	<b>Family: Hemiscyllidae</b>	<b>Longtailed Carpetsharks</b>	



9	<i>Chiloscyllium griseum</i> Müller & Henle, 1838	Grey Bambooshark	SHL
10	<i>Chiloscyllium hasselti</i> Bleeker, 1852	Indonesian Bambooshark	SHL
11	<i>Chiloscyllium indicum</i> (Gmelin, 1789).	Slender bambooshark	SHL
12	<i>Chiloscyllium plagiosum</i> (Bennett, 1830)	Whitespotted Bambooshark	SHL
13	<i>Chiloscyllium punctatum</i> Müller & Henle, 1838	Brownbanded Bambooshark	SHL
	<b>Family: Ginglymostomatidae</b>	<b>Nurse Sharks</b>	
14	<i>Nebrius ferrugineus</i> (Lesson, 1830)	Tawny Nurse Shark	SHL
	<b>Family: Stegostomatidae</b>	Zebra Shark	
15	<i>Stegostoma fasciatum</i> (Hermann, 1783)	Zebra Shark	SHL
	<b>Family: Rhincodontidae</b>	Whale Shark	
16	<i>Rhincodon typus</i> Smith, 1828	Whale Shark	SHO
	<b>ORDER: LAMNIFORMES</b>	<b>MACKEREL SHARKS</b>	
	<b>Family: Alopidae</b>	<b>Thresher Sharks</b>	
17	<i>Alopias pelagicus</i> Nakamura, 1935	Pelagic Thresher	SHO
	<b>Family: Lamnidae</b>	<b>Mackerel Sharks</b>	
18	<i>Isurus oxyrinchus</i> Rafinesque, 1810	Shortfin Mako	SLO
	<b>ORDER: CARCHARHINIFORMES</b>	<b>GROUND SHARKS</b>	
	<b>Family: Scyliorhinidae</b>	<b>Cat Sharks</b>	
19	<i>Apristurus platyrhynchus</i> (Tanaka, 1909)	Bigfin Catshark	SLO
20	<i>Atelomycterus marmoratus</i> (Bennett, 1830)	Coral Catshark	SHL
21	<i>Cephaloscyllium circlupullum</i> Yano, Ahmad & Gambang, 2005	Circleblotch Swellshark	SHS
22	<i>Cephaloscyllium sarawakensis</i> Yano, Ahmad & Gambang, 2005	Sarawak Swellshark	SHS
23	<i>Cephaloscyllium cf speccum</i> Last, Seret & White, 2008	Speckled Swellshark	SHS
24	<i>Cephaloscyllium cf variagatum</i> Last & White, 2008	Stripes Swellshark	SHS
25	<i>Galeus cf eastmani</i> (Jordan & Snyder, 1904)	Gecko Catshark	SLO
26	<i>Halaelurus buergeri</i> (Müller & Henle, 1838)	Blackspotted Catshark	SLO
27	<i>Halaelurus maculosus</i> White, Last & Stevens, 2007  Identified as <i>Halaelurus buergeri</i> (Müller & Henle, 1838) in Yano <i>et al.</i> (2005)	Indonesian Speckled Cat shark  Blackspotted Catshark	SHL
	<b>Family: Proscylliidae</b>	<b>Finback CatSharks</b>	
28	<i>Eridacnis cf radcliffei</i> Smith, 1913	Sarawak Pygmy Ribbontail Catshark	SHS
	<b>Family: Triakidae</b>	<b>Hound Sharks</b>	
29	<i>Mustelus manazo</i> Bleeker, 1854	Starspotted Smoothhound	SHS





30	<i>Mustelus mosis</i> Hemprich & Ehrenberg, 1899 Identified as <i>Mustelus manazo</i> Bleeker, 1854 in Last <i>et al.</i> (2010)	Arabian Smoothhound Starspotted Smoothhound	SHS
31	<i>Mustelus widodoi</i> White & Last, 2006 Identified as <i>Mustelus</i> sp. 1 [Manjaji, 2002]	Whitefin Smoothhound Grey Smoothhound	SHL
32	<i>Mustelus</i> sp. [Yano, <i>et al.</i> , 2005]	Sarawak Smoothhound	SHL
	<b>Family: Hemigaleidae</b>	<b>Weasel Sharks</b>	
33	<i>Chaenogaleus macrostoma</i> (Bleeker, 1852)	Hooktooth Shark	SHL
34	<i>Hemigaleus microstoma</i> Bleeker, 1852	Sicklefin Weasel Shark	SHL
35	<i>Hemipristis elongata</i> (Klunzinger, 1871)	Fossil Shark	SHL
36	<i>Paragaleus tengi</i> (Chen, 1963)	Straight-tooth Weasel Shark	SHL
	<b>Family: Carcharhinidae</b>	<b>Requiem Sharks</b>	
37	<i>Carcharhinus albimarginatus</i> (Rüppell, 1837)	Silvertip Shark	SSO
38	<i>Carcharhinus amblyrhynchos</i> (Bleeker, 1856)	Gray reef Shark	SHL
39	<i>Carcharhinus amblyrhynchoides</i> (Whitley, 1934)	Graceful Shark	SHL
40	<i>Carcharhinus borneensis</i> (Bleeker, 1859)	Borneo Shark	SHL
41	<i>Carcharhinus brevipinna</i> (Müller & Henle, 1839)	Spinner Shark	SHL
42	<i>Carcharhinus dussumieri</i> (Valenciennes, in Müller & Henle, 1839)	Whitecheek Shark	SHL
43	<i>Carcharhinus falciformes</i> (Bibron, in Müller & Henle, 1839)	Silky Shark	SHO
44	<i>Carcharhinus leucas</i> (Valenciennes, in Müller & Henle, 1839)	Bull Shark	SHF
45	<i>Carcharhinus limbatus</i> (Valenciennes, in Müller & Henle, 1839)	Common Blacktip Shark	SHL
46	<i>Carcharhinus macloti</i> (Müller & Henle, 1839)	Hardnose Shark	SHL
47	<i>Carcharhinus melanopterus</i> (Quoy & Gaimard, 1824)	Blacktip Reef Shark	SHL
48	<i>Carcharhinus plumbeus</i> (Nardo, 1827)	Sandbar Shark	SHS
49	<i>Carcharhinus sealei</i> (Pietschmann, 1916)	Blackspot Shark	SHL
50	<i>Carcharhinus sorrah</i> (Valenciennes, in Müller & Henle, 1839)	Spot-tail Shark	SHL
51	<i>Galeocerdo cuvier</i> (Peron & Le Sueur, 1822)	Tiger Shark	SSO
52	<i>Glyphis fowlerae</i> Compagno, White & Cavanagh, 2010 Identified as <i>Glyphis</i> sp. [Yano, <i>et al.</i> , 2005]	Borneo River Shark	FWO
53	<i>Glyphis</i> sp [Last <i>et al.</i> , 2010].	Mukah River Shark	SHF



54	<i>Lamiopsis tephrodes</i> (Fowler, 1905) Identified as <i>Lamiopsis temmincki</i> (Müller & Henle, 1839) in Yano <i>et al.</i> (2005)	Borneo Broadfin Shark	SHF
55	<i>Loxodon macrorhinus</i> Müller & Henle, 1839	Slit-eye Shark	SHL
56	<i>Prionace glauca</i> (Linnaeus, 1758)	Blue Shark	SHO
57	<i>Rhizoprionodon acutus</i> (Rüppell, 1837)	Milk Shark	SHL
58	<i>Rhizoprionodon oligolinx</i> Springer, 1964	Gray Sharpnose Shark	SHL
59	<i>Scoliodon macrorhynchus</i> (Bleeker, 1852) Identified as <i>Scoliodon laticaudus</i> Müller & Henle, 1838 in Yano <i>et al.</i> (2005)	Pacific Spadenose Shark	SHL
60	<i>Triaenodon obesus</i> (Rüppell, 1837)	Whitetip Reef Shark	SHL
	<b>Family: Sphyrnidae</b>	<b>Hammerhead Sharks</b>	
61	<i>Sphyrna lewini</i> (Griffith & Smith, 1834)	Scalloped Hammerhead	SHL
62	<i>Sphyrna mokarran</i> (Rüppell, 1837)	Great Hammerhead	SHL
63	<i>Eusphyra blochii</i> (Cuvier, 1817)	Winghead Shark	SHL
	<b>BATOIDS</b>		
	<b>ORDER: PRISTIFORMES</b>	<b>SAWFISHES</b>	
1	<i>Anoxypristis cuspidata</i> (Latham, 1794)	Narrow Sawfish	SHF
2	<i>Pristis pristis</i> (Linnaeus, 1758)	Freshwater Sawfish	SHF
3	<i>Pristis zijsron</i> Bleeker, 1851	Green Sawfish	SHF
	<b>ORDER: RHINOBATIFORMES</b>	<b>GUITARFISHES</b>	
	<b>Family: Rhinidae</b>	<b>Shark Rays</b>	
4	<i>Rhina ancylostoma</i> Bloch & Schneider, 1801	Shark Ray	SHL
	<b>Family: Rhynchobatidae</b>	<b>Wedgfishes</b>	
5	<i>Rhynchobatus australiae</i> Whitley, 1939	Whitespotted Shovelnose Ray	SHL
6	<i>Rhynchobatus laevis</i> (Bloch & Schneider, 1801).	Smoothnose Wedgfish	SHL
7	<i>Rhynchobatus springeri</i> Compagno & Last, 2010	Broadnose Wedgfish	SHL
	<b>Family: Rhinobatidae</b>	<b>Guitarfishes</b>	
8	<i>Glaucostegus halavi</i> (Forsskal, 1775)	Halavi Guitarfish	SHL
9	<i>Glaucostegus thouin</i> (Anonymous, 1798) Identified as <i>Rhinobatos thouin</i> (Anonymous, 1798) in Yano <i>et al.</i> (2005)	Clubnose Guitarfish	SHL
10	<i>Glaucostegus typus</i> (Bennett, 1830) Identified as <i>Rhinobatos typus</i> (Bennett, 1830) in Yano <i>et al.</i> (2005)	Giant Shovelnose Ray	SHL
11	<i>Rhinobatos formosensis</i> Norman, 1926	Taiwan Guitarfish	SHL





	<b>ORDER: TORPEDINIFORMES</b>	<b>ELECTRIC RAYS</b>	
	<b>Family: Narcinidae</b>	<b>Numbfishes</b>	
12	<i>Narcine brunnea</i> Annandale, 1909	Brown Numbfish	SHL
13	<i>Narcine brevilabiata</i> Bessednov, 1966	Shortlip Numbfish	SHL
14	<i>Narcine indica</i> Henle, 1834	Indian Numbfish	SHL
15	<i>Narcine lingula</i> Richardson, 1840	Rough Numbfish	SHL
16	<i>Narcine maculata</i> (Shaw, 1804)	Darkspotted Numbfish	SHL
17	<i>Narcine prodarsalis</i> Bessednov, 1966	Tonkin Numbfish	SHL
18	<i>Narcine timlei</i> (Bloch & Schneider, 1801)	Blackspotted Numbfish	SHL
	<b>Family: Narkidae</b>	<b>Sleeper Rays</b>	
19	<i>Narke dipterygia</i> (Bloch & Schneider, 1801)	Spottail Sleeper Ray	SHL
20	<i>Temera hardwickii</i> Gray, 1831	Finless Sleeper ray	SHL
	<b>ORDER RAJIFORMES</b>	<b>SKATES</b>	
	<b>Family: Rajidae</b>	<b>Skates</b>	
21	<i>Dipturus kwangtungensis</i> (Chu 1960) in Last <i>et al.</i> , 2010  Identified as <i>Raja (Okamejei) hollandi</i> Jordan & Richardson, 1909 in Yano <i>et al.</i> (2005)	Holland Skate  Kwangtung Skate	SHS
22	<i>Okamejei cairae</i> Last, Fahmi & Ishihara, 2010  Identified as <i>Raja (Okamejei) boesemani</i> Ishihara: Yano <i>et al.</i> (2005)	Borneo Sand Skate	SHS
23	<i>Okamejei hollandi</i> (Jordan & Richardson, 1909)  Identified as <i>Raja (Okamejei) boesemani</i> Ishihara, 1987 in Yano <i>et al.</i> (2005)	Black Sand Skate	SHL
24	<i>Okamejei jensenae</i> Last & Lim, 2010	Philippine Ocellate Skate	SHS
	<b>Family Anacanthobatidae</b>	<b>Legskates</b>	
25	<i>Sinobatis borneensis</i> Chan, 1965	Borneo Leg Skate	SHS
	<b>ORDER: MYLIOBATIFORMES</b>	<b>STINGRAYS</b>	
	<b>Family: Plesiobatidae</b>	<b>Giant Stingarees</b>	
26	<i>Plesiobatis daviesi</i> (Wallace, 1967)	Giant Stingaree	SLO
	<b>Family: Dasyatidae</b>	<b>Whiptail Stingrays</b>	
27	<i>Dasyatis cf acutirostra</i> Nishida & Nakaya, 1988	Pointed snout stingray	SHL
28	<i>Dasyatis akajei</i> (Müller & Henle, 1841)	Red Stingray	SHL
29	<i>Dasyatis bennetti</i> (Müller & Henle, 1841)	Bennett's Stingray	SHL
30	<i>Dasyatis fluviatorum</i> Ogilby, 1908	Estuary Stingray	SHL
31	<i>Dasyatis microps</i> (Annandale, 1908)	Smalleye Stingray	SHL
32	<i>Dasyatis parvonigra</i> Last & White, 2008	Dwarf Black Stingray	SHL





33	<i>Dasyatis sinensis</i> (Steindachner, 1892)	Chinese Stingray	SHL
34	<i>Dasyatis ushiei</i> (Jordan & Hubbs, 1925) Identified as <i>Dasyatis cf thetidis</i> Ogilby, 1899 in Yano <i>et al.</i> (2005)	Cow Stingray	SHL
35	<i>Dasyatis zugei</i> (Müller & Henle, 1841)	Pale-edge Stingray	SHL
36	<i>Himantura astra</i> Last, Manjaji-Matsumoto & Pogonoski, 2008	Blackspotted Whipray	SHL
37	<i>Himantura bleekeri</i> (Blyth, 1860)	Longtail Whipray	SHL
38	<i>Himantura fai</i> (Jordan & Seale, 1906)	Pink Whipray	SHL
39	<i>Himantura fava</i> (Annandale, 1909)	Honeycomb Whipray	SHL
40	<i>Himantura gerrardi</i> (Gray, 1851)	Whitespotted Whipray	SHL
41	<i>Himantura granulata</i> (Macleay, 1883)	Mangrove Whipray	SHF
42	<i>Himantura imbricata</i> (Bloch & Schneider, 1801)	Scaly Stingray	SHL
43	<i>Himantura jenkinsii</i> (Annandale, 1909)	Jenkins Whipray	SHL
44	<i>Himantura leoparda</i> Manjaji-Matsumoto & Last, 2008	Leopard Whipray	SHL
45	<i>Himantura lobistoma</i> Manjaji-Matsumoto & Last, 2006	Tubemouth Whipray	SHL
46	<i>Himantura pastinacoides</i> (Bleeker, 1852)	Round Whipray	SHL
47	<i>Himantura polylepis</i> (Bleeker, 1852) Local synonym <i>Himantura chaophraya</i> Monkolprasit & Roberts, 1990	Giant Freshwater Whipray	SHF
48	<i>Himantura signifer</i> Compagno & Robert, 1982	White-edge Freshwater Whipray	FWO
49	<i>Himantura cf signifer</i> Compagno & Robert, 1982	White-edge Freshwater Whipray	FWO
50	<i>Himantura uarnak</i> (Forsskal, 1775) in Last <i>et al.</i> (2010)	Reticulate Whipray	SHL
51	<i>Himantura uarnacoides</i> (Bleeker, 1852).	Whitenose Whipray	SHL
52	<i>Himantura undulata</i> (Bleeker, 1852)	Leopard Whipray	SHL
53	<i>Himantura walga</i> (Müller & Henle, 1841)	Dwarf Whipray	SHL
54	<i>Himantura</i> sp A. [Yano <i>et al.</i> , 2005]	Penang Whipray	SHL
55	<i>Neotrygon kuhlii</i> (Müller & Henle, 1841) Local synonym <i>Dasyatis kuhlii</i> (Müller & Henle, 1841)	Bluespotted Stingray	SHL
56	<i>Neotrygon cf leylandi</i> Last & White, 2008	Painted Maskray	SHL
57	<i>Neotrygon cf picta</i> Last & White, 2008	Peppered Maskray	SHL
58	<i>Pastinachus atrus</i> (Macleay, 1883) Identified as <i>Pastinachus sephen</i> (Forsskål) in Yano <i>et al.</i> (2005)	Eastern Cowtail Stingray	SHL
59	<i>Pastinachus gracilicaudus</i> Last & Manjaji 2010	Narrowtail Stingray	SHL



60	<i>Pastinachus solocirostris</i> Last & Manjaji-Matsumoto, 2010	Narrowtail Stingray	SHL
61	<i>Pteroplatytrygon violacea</i> (Bonaparte, 1832)	Pelagic Stingray	OCE
62	<i>Taeniura lymma</i> (Forsskal, 1775)	Bluespotted Faintail Ray	SHL
63	<i>Taeniura meyeni</i> Müller & Henle, 1841	Blotched Fantail Stingray	SHL
64	<i>Urogymnus asperimus</i> (Bloch & Schneider, 1801)	Porcupine Ray	SHL
	<b>Family: Gymnuridae</b>	<b>Butterfly Rays</b>	
65	<i>Gymnura japonica</i> (Temminck & Schlegel, 1850)	Japanese Butterfly Ray	SHL
66	<i>Gymnura micrura</i> (Bloch & Schneider, 1801)	Smooth Butterfly Ray	SHL
67	<i>Gymnura poecilura</i> (Shaw, 1804)	Longtail Butterfly Ray	SHL
68	<i>Gymnura zonura</i> (Bleeker, 1852)	Javanese Butterfly Ray	SHL
	<b>Family: Myliobatidae</b>	<b>Eagle Rays</b>	
69	<i>Aetobatus flagellum</i> (Bloch & Schneider, 1801)	Longhead Eagle Ray	SHL
70	<i>Aetomyleus maculatus</i> (Gray, 1832)	Mottled Eagle Ray	SHL
71	<i>Aetomyloaeus milvus</i> (Valenciennes, in Müller & Henle, 1841)	Ocellate Eagle Ray	SHL
72	<i>Aetomyleus nichofii</i> (Bloch & Schneider, 1801)	Banded Eagle Ray	SHL
73	<i>Aetobatus ocellatus</i> (Kuhl, 1823) Identified as <i>Aetobatus narinari</i> (Euphrasen, 1790) in Yano <i>et al.</i> (2005)	Whitespotted Eagle Ray	SHL
74	<i>Aetomyleus vespertilio</i> (Bleeker, 1852)	Ornate Eagle Ray	SHL
	<b>Family: Rhinopterae</b>	<b>Cownose rays</b>	
75	<i>Rhinoptera adspersa</i> Valenciennes, in Müller & Henle, 1841	Rough Cownose Ray	SHL
76	<i>Rhinoptera javanica</i> (Müller & Henle, 1841)	Javanese Cownose Ray	SHL
77	<i>Rhinoptera jayakari</i> Boulenger, 1895	Short-tail Cownose Ray	SHL
	<b>Family: Mobulidae</b>	<b>Devilrays</b>	
78	<i>Manta alfredi</i> (Donndorff, 1758).	Alfred manta	SHO
79	<i>Manta birostris</i> (Donndorff, 1758).	Manta ray	SHO
80	<i>Mobula eregoodootenkee</i> Garman, 1913	Longfin Devilray	SHO
81	<i>Mobula japonica</i> (Müller & Henle, 1841)	Spinetail Devilray	SHO
82	<i>Mobula kuhlii</i> (Valenciennes, in Müller & Henle, 1841)	Shortfin Devilray	SHO
83	<i>Mobula thurstoni</i> (Lloyd, 1908).	Smooth-tail Devilray	SHO
84	<i>Mobula</i> sp [Last <i>et al.</i> , 2010]	Borneo Devilray	SHO

## Appendix 2 : Landings of Sharks and Rays in Malaysia from 1982 to 2012

Year	Sharks (Tonnes)	Sharks (%)	Rays (Tonnes)	Rays (%)	Elasmobranchs (Tonnes)	Elasmobranchs (%)	Total (Tonnes)
1982	4,444	0.6	6,348	0.9	10,792	1.6	694,274
1983	5,016	0.7	6,044	0.8	11,060	1.5	741,205
1984	5,281	0.8	5,795	0.9	11,076	1.6	671,816
1985	4,745	0.8	5,440	0.9	10,185	1.6	630,022
1986	4,820	0.8	7,029	1.1	11,849	1.9	619,247
1987	4,699	0.5	10,550	1.2	15,249	1.7	908,939
1988	4,677	0.5	11,517	1.3	16,194	1.9	869,447
1989	4,264	0.5	9,414	1.0	13,678	1.5	934,582
1990	4,140	0.4	13,220	1.3	17,360	1.7	1,002,576
1991	5,677	0.6	11,485	1.2	17,162	1.8	969,793
1992	7,240	0.7	13,531	1.2	20,771	1.9	1,104,988
1993	6,294	0.5	14,604	1.3	20,898	1.8	1,154,557
1994	6,889	0.6	14,000	1.2	20,889	1.8	1,181,763
1995	8,437	0.7	15,707	1.3	24,144	1.9	1,245,117
1996	8,080	0.7	15,928	1.4	24,008	2.1	1,126,689
1997	7,483	0.6	17,282	1.5	24,765	2.1	1,168,973
1998	7,839	0.6	16,104	1.3	23,943	2.0	1,215,206
1999	8,092	0.6	17,033	1.4	25,125	2.0	1,248,402
2000	7,948	0.6	16,573	1.3	24,521	1.9	1,285,696
2001	8,663	0.7	16,532	1.3	25,195	2.0	1,231,289
2002	8,226	0.6	15,941	1.3	24,167	1.9	1,272,078
2003	8,695	0.7	19,253	1.5	27,948	2.2	1,283,256
2004	8,299	0.6	16,754	1.3	25,053	1.9	1,331,645
2005	9,165	0.8	15,929	1.3	25,094	2.1	1,209,601
2006	7,878	0.6	16,046	1.2	23,924	1.7	1,379,770
2007	7,682	0.6	14,080	1.0	21,762	1.6	1,381,424
2008	7,346	0.5	15,642	1.1	22,988	1.6	1,394,531
2009	7,252	0.5	15,091	1.1	22,343	1.6	1,393,226
2010	6,788	0.5	13,770	1.0	20,558	1.4	1,428,881
2011	5,975	0.4	13,021	0.9	18,996	1.4	1,373,105
2012	6,536	0.4	15,612	1.1	22,148	1.5	1,472,240

Source: Annual Fisheries Statistics, Department of Fisheries Malaysia (1982-2012)





**Department of Fisheries Malaysia,**

Level 1 - 6, Block 4G2, Wisma Tani,  
No. 30, Persiaran Perdana, Precint 4,  
Federal Government Administration Centre,  
62628 Putrajaya.

Telephone No. : 03-8870 4000  
Fax No : 03-8889 2460  
Website : <http://www.dof.gov.my>  
Email : [hqhelp@dof.gov.my](mailto:hqhelp@dof.gov.my)

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