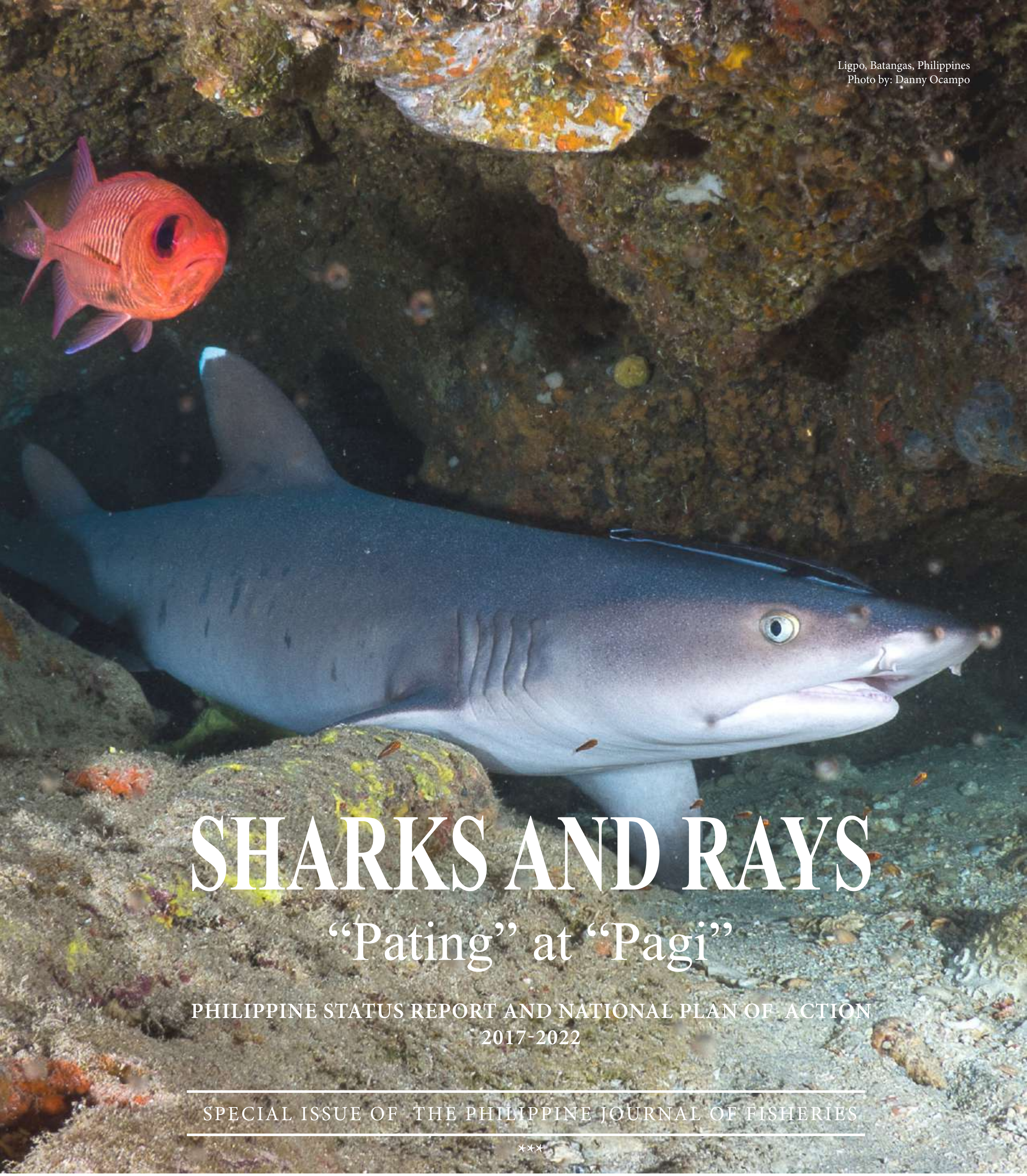


Ligpo, Batangas, Philippines
Photo by: Danny Ocampo

SHARKS AND RAYS

"Pating" at "Pagi"

PHILIPPINE STATUS REPORT AND NATIONAL PLAN OF ACTION
2017-2022

SPECIAL ISSUE OF THE PHILIPPINE JOURNAL OF FISHERIES

***

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
of the Federal Republic of Germany

Bureau of Fisheries and Aquatic Resources
National Fisheries Research and Development Institute,
Corporate 101 Mo. Ignacia Ave. South Triangle, Quezon City, Philippines, 1103

Telefax: (+632) 3725063
Email Address: fisheriesjournal@nfrdi.da.gov.ph
journal.nfrdi@gmail.com

ISBN: 978-971-8722-48-0

Published by
Bureau of Fisheries and Aquatic Resources
National Fisheries Research and Development Institute

Recommended entry:

Bureau of Fisheries and Aquatic Resources - National Fisheries Research and Development Institute. 2017. Sharks and Rays “Pating” at “Pagi” Philippine Status Report and National Plan of Action 2017-2022, Bureau of Fisheries and Aquatic Resources - National Fisheries Research and Development Institute - Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Quezon City, Philippines.
176 pages.

Editors:
Mudjekeewis Santos
Francisco Torres Jr.
Victor Marius Tumilba
Franca Sprong

Cover Photo:
Danny Ocampo
Ligpo, Batangas, Philippines

Design and Layout:
J.K. Dionisio

SHARKS AND RAYS

“Pating” at “Pagi”

PHILIPPINE STATUS REPORT AND NATIONAL PLAN OF ACTION
2017-2022

SPECIAL ISSUE OF THE PHILIPPINE JOURNAL OF FISHERIES

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
of the Federal Republic of Germany

MESSAGE

Greetings!

First, I would like to commend the hard work and inspiring dedication of the noble men of Science from the National Fisheries Research and Development Institute, Bureau of Fisheries and Aquatic Resources, the academe and partner organizations which composed the NPOA-Technical Working Group. It is through your perseverance that we have arrived at a milestone in the conservation and protection of Sharks, Rays and Napoleon Wrasse.

The alarming rate at which these three important marine species has been decreasing in number enacted a regional concern, which the Philippines is now strongly committed on taking part of The National Plan of Action for Sharks, Rays, and Napoleon Wrasse comes at an opportune time when the Bureau is strengthening and beefing up its law enforcement capabilities across Philippine waters as part of our intensive campaign against illegal, unreported and unregulated (IUU) fishing. With the creation of this NPOA, we can be assured of a Science-based, collaborative and systematic management approach for these species.

We are grateful to the Sulu-Sulawesi Seascape Project and the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH for being instrumental to the realization of this project. May our partnership continue for the conservation and sustainable development of our shared marine resources.

Mabuhay Tayong Lahat!

COMMODORE EDUARDO B. GONGONA, PCG (RET.)
BFAR National Director

MESSAGE

We would like to commend the research staff as well as our partners from the different institutions and organizations who worked together in coming up with the National Plan of Acton (NPOA) for Sharks, Rays, and Napoleon Wrasse. Likewise, our appreciation goes to the Sulu-Sulawesi Seascape Project and the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH for supporting this undertaking.

This book serves as a critical guidepost for succeeding initiatives that we will be carrying out in order to properly manage our marine resources. The baseline it provides are significant in crafting appropriate policies that will protect endangered marine species. We hope that through this instrument, we will be able to successfully comply with our global and regional commitments, and implement the NPOA on Sharks, Rays, and Napoleon Wrasse more effectively.

Mabuhay at maraming salamat!

DRUSILA ESTHER E. BAYATE, CESO IV
Interim Executive Director
National Fisheries Research and Development Institute

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF FIGURES

LIST OF TABLES

LIST OF BOXES

LIST OF ANNEXES

FOREWORD

Sharks and related species such as skates, rays and chimaeras are important fishery resources of the Philippines. Shark fins, meat and other body parts and internal organs, are used for food and sustenance in many coastal communities. The Global demand for shark and shark products has been increasing over the past 40 years. Global assessments on shark fisheries have shown that an increasing number of species are facing threats of extinction. These are a combination of factors such as unsustainable fishing practices, degradation of nursery and breeding grounds and other important habitats, unregulated coastal development, pollution and other anthropogenic activities. These species are also vulnerable to the effects of climate change such as ocean warming and acidification.

The increase in shark fishery and utilization triggered worldwide concerns for conservation and management of shark populations. A number of globally threatened species is also reported to occur in Philippine waters which is a cause for concern. However, there are limitations on the shark knowledge base such as shark catches and fishing practices, trade and utilization, and important biological parameters of many shark species.

Government programs such as the National Stock Assessment Program initiated by the Bureau of Fisheries and Aquatic Resources, in collaboration with the National Fisheries Research and Development Institute, can respond to the need of improving our knowledge on the state of shark stocks and facilitate the collection of necessary information to aid policy formulation for the management of shark resources in the Philippines.

The review and updating of the Philippine National Plan of Action for the Conservation and Management of Sharks in the Philippines-2009 (Philippine NPOA-Sharks) is timely for supporting programs for improving national policies on fisheries resource management. The "Sharks and Rays "Pating" at "Pagi" Philippine Status Report and National Plan of Action 2017-2022" is a response to Republic Act 10654 (An Act to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing, Amending Republic Act No. 8550, Otherwise Known as "The Philippine Fisheries Code of 1998," and for Other Purposes) which states "…formulation and implementation of rules and regulations for the conservation and management of straddling fish stocks, highly migratory fish stocks and threatened living marine resources such as sharks, rays and ludong…"

Through this publication, the Bureau balances fishing efforts and resource exploitation with conservation and management to attain sustainability of shark fisheries and "conserve, protect and sustain management of the country's fishery and aquatic resources" for the benefit of our people.

EMMANUEL F. PIÑOL
Secretary
Department of Agriculture

PREFACE

The Sulu-Sulawesi Seascape, shared by Indonesia, Malaysia and the Philippines, ranks among the most diverse and productive marine ecosystems in the world. Located at the apex of the Coral Triangle, it is known as the world's center of marine biodiversity with the highest numbers of coral, crustacean, and marine plant species and about 3,000 species of fish. It is also home to sharks, skates, rays and chimaeras, here collectively known as "sharks."

The marine resources in the Sulu-Sulawesi Seascape face major threats such as overfishing, destructive fishing practices, rapid population growth, unsustainable coastal development, and pollution. As a consequence, valuable coastal habitats like mangrove forests, coral reefs, and seagrass beds are at risk of losing their function as breeding, feeding, and nursery grounds for marine organisms including sharks. This situation is exacerbated by the effects of climate change.

The countries of Indonesia, Malaysia, and the Philippines see the need for transboundary cooperation to address these threats and protect the fragile habitat and resources of the seascape. This is carried out under the umbrella of the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF). Designated as a priority seascape under CTI-CFF by the six member countries (Indonesia, Malaysia, Philippines, Papua New Guinea, Solomon Islands, and Timor-Leste), the Sulu-Sulawesi Seascape serves as a geographic focus of investments, actions, conservation, and climate change initiatives under the CTI-CFF Regional Plan of Action (RPOA).

The German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) commissioned the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH to implement the Sulu-Sulawesi Seascape Project to support the countries in implementing and coordinating their activities under CTI-CFF's RPOA. The project aims to address the urgent threats faced by the coastal and marine resources of the Coral Triangle by establishing mechanisms for cooperation with the overarching goal of conserving marine biodiversity towards a sustainable management of resources in the Sulu-Sulawesi Seascape. In order to address the various issues, one focal area of implementation is to promote an Ecosystem Approach to Fisheries Management (EAFM) in selected marine managed areas. Under the EAFM framework, the Sulu-Sulawesi Seascape Project supported the Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR) in the development of the "Philippine Sharks Assessment Report (SAR) and National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks) 2017-2022." By conducting an assessment on the status of sharks in the country, policy recommendations and management actions at the regional and national levels have been identified for the Philippines, which is the main purpose of this publication.

In the Philippines, the project is jointly implemented by the Department of Environment and Natural Resources (DENR) and the DA-BFAR with Conservation International Philippines (CIP) and GIZ. The Sulu-Sulawesi Seascape Project implementing partners acknowledge the contribution of AA Yaptinchay and Jean Utzurrum of Marine Wildlife Watch of the Philippines, Vince Cinches of Greenpeace Southeast Asia, and Ms. Moonyeen Alava in her capacity as technical consultant.

CONTRIBUTORS

Abina, Lilibeth	- NFRDI
Abrenica, Bruna	- BFAR NSAP 7
Aguila, Roselyn	- NFRDI
Aquino, Ma. Theresa	- MMWP
Alava, Moonyeen Nida	- Species Consultant, Sharks
Alcantara, Maria Aron	- NFRDI
Alcantara, Matt	- BFAR NSAP 8
Apacionado, Wyndel	- BFAR MIMAROPA
Arcamo, Sandra Victoria	- BFAR FRMD CO
Baclayo, Joyce	- BFAR NSAP 13
Belga, Prudencio	- BFAR NSAP 7
Candelario, Myrna	- BFAR NSAP MIMAROPA
Castillo, Carlos Alberto	- PCSD
Cinches, Vince	- Greenpeace
Daclan, Marion Antonette	- GIZ
Del Castillo, Ailyn	- BFAR NSAP MIMAROPA
Dela Cruz, Raymundo	- BFAR MIMAROPA
Donia, Emelyn	- BFAR NSAP 12
Exclamador, Virgelio	- BFAR NSAP 7
Gado, Vincent Jay	- BFAR MIMAROPA
Gaerlan, Rosario Segundina	- BFAR NSAP 1
Gallmann, Maria Rachelle	- GIZ
Gapuz, Vianney Anthony	- BFAR NSAP 10
Gonzales, Lenie	- BFAR NSAP MIMAROPA
Katada, Nilo	- BFAR FIQD CO
Kettemer, Lisa	- GIZ
Labe, Ludivina	- BFAR FRLD CO
Lanzuela, Noemi	- BFAR NSAP 5
Laroco, Maureen	- BFAR NSAP 1
Mamalangkap, Macmod	- BFAR NSAP ARMM
Mendoza, Kaye Kirsteen	- BFAR IFCU CO
Mendoza, Rachelle	- BFAR NSAP 3
Mesa, Sheryll	- BFAR NSAP 6
Morano, Joarlyn	- GIZ
Munap, Pedling	- BFAR NSAP 9
Nakayama, Lovella	- PENRO Province of Cebu
Nañola, Cleto	- UP Mindanao
Ramos, Maribeth	- BFAR NSAP CALABARZON
Rengel, Davelyn	- CI-P
Roldan, Raul	- ADB Reta 7813
Romero, Filemon	- Species Consultant, Napoleon Wrasse
Rosaceña, Ruth	- BFAR NSAP 7
Santos, Mudjekeewis	- NFRDI
Songco, Angelique	- TMO
Sprong, Franca	- GIZ
Tan, Mercedita	- BFAR FRMD CO
Torres, Francisco	- NFRDI
Tuante, Janice	- BFAR FRMD CO
Utzurrum, Jean Asuncion	- Siliman University
Villanueva, Jose	- BFAR NSAP 11
Villarao, Melanie	- BFAR NSAP 2
Yaptinchay, Arnel Andrew	- MWWP
Yutuc, Romina	- BFAR NSAP 3

ACRONYMS

ASEAN - Association of Southeast Asian Nations
BAS-DA - Bureau of Agricultural Statistics of the Department of Agriculture
BMUB - German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
CAP - Comprehensive Action Plan
CBD - Convention on Biological Diversity
CCEF - Coastal Conservation and Education Foundation
CCSBT - Commission for the Conservation of Southern Bluefin Tuna
CIP - Conservation International Philippines
CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS - Convention on Migratory Species
COFI - Committee on Fisheries
CSO - Civil Society Organization
CTI - Coral Triangle Initiative
CTI-CFF - Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security
DENR - Department of Environment and Natural Resources
EAFM - Ecosystem Approach to Fisheries Management
ECP - Ecoregion Conservation Plan
EU - European Union
FAO - Fisheries Administrative Order
FARMC - Fisheries and Aquatic Resources Management Council
FGD - Focus Group Discussion
FRQD - Fisheries Regulatory and Quarantine Division
FQWRS - Fisheries Quarantine and Wildlife Regulations Section
GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
IATTC - Inter-American Tropical Tuna Commission
ICCAT - International Commission for the Conservation of Atlantic Tunas
ICES - International Council for the Exploration of the Sea
ICM - Integrated Coastal Management
IEC - Information, Education, and Communication
IOTC - Indian Ocean Tuna Commission
IPOA - International Plan of Action for the Conservation and Management of Sharks
IRR - Implementing Rules and Regulations
IUCN - International Union for Conservation of Nature (World Conservation Union)
KBA - Key Biodiversity Area
LAMAVE - Large Marine Vertebrates Research Institute
LGU - Local Government Unit
MKBA - Marine Key Biodiversity Area
MPA - Marine Protected Area
MWWP - Marine Wildlife Watch of the Philippines
NAWMC - National Aquatic Wildlife Council
NFRDI - National Fisheries Research and Development Institute
NIPAS - National Integrated Protected Areas System
NPOA - National Plan of Action

ACRONYMS

NSAP	-	National Stock Assessment Program
NWAFO	-	Northwest Atlantic Fisheries Organization
OFPPC	-	Oceanic Fisheries Programme of the Pacific Community
PARLC	-	Philippine Aquatic Red List Committee
PAWRRES	-	Philippine Aquatic Wildlife Resources and Regulatory Services
PCA	-	Priority Conservation Areas
PCRA	-	Participatory Coastal Resource Assessment
PEF	-	Philippine elasmobranch fisheries
PCSD	-	Palawan Council for Sustainable Development
PRLC	-	Philippine Red List Committee
RFMO	-	Regional Fisheries Management Organization
RLA	-	Red List Assessment
RPOA	-	Regional Plan of Action
RTC	-	Regional Technical Consultation
SAR	-	Shark Assessment Report
SEAFDEC	-	Southeast Asia Fisheries and Development Center
SnAP	-	Snapshot Assessment Protocol
SPS	-	Save Philippine Seas
SSC	-	Species Survival Commission
SSG	-	Shark Specialist Group
SSME	-	Sulu Sulawesi Marine Ecoregion
SSNP	-	Save Sharks Network Philippines
SSS	-	Sulu Sulawesi Seascape
SUC	-	State Universities and Colleges
TEF	-	Total Elasmobranch Fisheries
TMO	-	Tubbataha Management Office
TRNP	-	Tubbataha Reefs Natural Park
TWF	-	Total World Fisheries
UN	-	United Nations
UNEP	-	United Nations Environment Programme
UNCED	-	UN Conference on Environment and Development
UNCLOS	-	United Nations Convention on the Law of the Sea
UN FAO	-	Food and Agriculture Organization of the United Nations
VCA	-	Value Chain Analysis
WCPFC	-	Western Central Pacific Fisheries Commission
WWF	-	World Wildlife Fund

Tubbataha Reef, Philippines
Photo by: Maria Teresa Lara

EXECUTIVE SUMMARY

This document presents the updated version of the "National Plan of Action for the Conservation and Management of Sharks in the Philippines (Philippine NPOA-Sharks[1])" of 2009, and was developed in response to the call of the United Nations Food and Agriculture Organization (UN-FAO) to all member-states with fisheries catching sharks to identify needed research, monitoring, conservation, and management measures to ensure sustainable fisheries and populations for all chondrichthyan fishes that occur in their waters, following the guidelines identified in the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks).

The IPOA-Shark is a voluntary international instrument adopted by UN-FAO Committee on Fisheries (COFI) in 1999. The Philippines, although not a major shark fishing nation, has committed to produce its own NPOA-Sharks as a member-state of the UN-FAO and as part of the agreements during the ASEAN-SEAFDEC 2nd Regional Technical Consultation on Sharks Fisheries in 2004.

The 2009 Philippine NPOA-Sharks was produced following a participatory process where representatives from government agencies and civil society organizations involved in fisheries management and conservation were convened and consulted prior to its finalization. The same participatory process is conducted in producing this "Sharks and Rays "Pating" at "Pagi" Philippine Status Report and National Plan of Action 2017 - 2022", taking into consideration shark conservation and management agenda as incorporated in the Sulu-Sulawesi Marine Ecoregion Comprehensive Action Plan (SSME-CAP) and the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) National and Regional Plan of Action (N/RPOA) adopted in 2007 and 2009, respectively. The aims of this publication are to review existing information on shark resources, its fisheries utilization and trade vis-à-vis relevant conservation measures and legislations; to identify significant data gaps and/or issues; and recommend priorities for action to promote the sustainable use of shark resources.

This document is composed of eight chapters: Chapters 1–6 cover the Philippine Shark Assessment Report which include a brief background of the IPOA- and NPOA-Sharks, based on the global, regional, and national initiatives (Chapter 1); a profile of Philippine shark resources, based on current shark taxonomy and classification, species occurrence and distribution, population abundance, habitat status, and ecology (Chapter 2); shark fisheries from global, national, and subnational/regional perspectives (Chapter 3); shark utilization and trade, based on Philippine export and import data (Chapter 4); conservation status including research initiatives and efforts undertaken in the country as well as areas for further shark conservation research and collaboration (Chapter 5); and legal and management status, based on international agreements, national, and local legislations or policies relevant to shark species and habitat management (Chapter 6). Chapter 7 covers data needs, issues and challenges, as well as recommendations to improve processes and systems for the management of shark resources. Chapter 8 is the updated National Plan of Action for the Conservation and Management of Sharks.

[1] The term "sharks" refers to all cartilaginous fishes, as used in the UN-FAO IPOA-Sharks

CHAPTER 1: INTRODUCTION

1.1 GLOBAL, REGIONAL AND NATIONAL INITIATIVES

Global Initiatives. Sharks fisheries are among the world's unmonitored, unregulated, and unmanaged resources. Over 125 countries are involved in shark fishing and international trade. Less than 20 of these countries implement management for domestic fisheries and less than 15 species have national legal protection (Camhi et al. 1998). Increasing concerns for the plight of sharks and the sustainability of its fisheries highlighted the need for its conservation and management.

In 1991, the Shark Specialist Group (SSG) was established by the International Union for Conservation of Nature (IUCN)—or the World Conservation Union—to assess and address the conservation needs of cartilaginous fishes. In 1994, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) adopted a resolution on the biological and trade status of sharks and consequently requested the Food and Agriculture Organization of the United Nations (UN FAO) to monitor the production of sharks and trade in shark products, in cooperation with all nations utilizing and trading shark products.

Box 1.1: IPOA-Sharks Timeline

- 1991: IUCN-SSG formed
- 1994: CITES adopted a resolution on the biological and trade status of sharks; requested UN FAO to monitor shark production and trade
- 1998: IPOA-Sharks and Seabirds drafted
- 1999: IPOA-Sharks adopted
- 2001: SARs due and NPOA-Sharks implementation: no later than 24th COFI meeting, February 2001
- 2003 and every 2 years: States report their progress as part of their biennial reporting to the UN FAO on the Code of Conduct for Responsible Fisheries
- 2005 and every 4 years: regular assessment of the NPOA implementation

In 1997, the 22nd meeting of the UN FAO Committee on Fisheries (COFI) decided that the Fisheries Department investigates issues relating to the conservation of elasmobranchs. An expert consultation was requested to determine the specific requirements for sustainable global and regional management of shark species; develop guidelines for such management; and develop a plan of action to promote the widespread use of these guidelines by appropriate management bodies and arrangements at national, regional and/or international levels (Oliver et al. 1998; Shotton 1999; Camhi et al. 1998).

In 1998, world governments met at UN FAO in Rome to discuss the management of fishing capacity, shark fisheries, and incidental catch of seabirds in longline fisheries. The meeting produced drafts for the International Plans of Action (IPOA) for sharks and seabirds, which were endorsed by consensus at the UN FAO COFI meeting in February 1999 and adopted by the UN FAO Conference in November 1999. The IPOA called upon all member states with fisheries catching sharks to produce a Shark Assessment Report (SAR). States should carry out a regular assessment of the status of shark stocks subject to fishing to determine if there is a need to develop a shark plan. This assessment should be guided by Article 6.13 of the Code of Conduct for Responsible Fisheries (FAO 1995).

Member states with shark fisheries were requested to develop and implement National Plans of Action (NPOAs) that will identify needed research, monitoring, conservation, and management measures to ensure sustainable fisheries and populations for all chondrichthyan fishes that occur in their waters. UN FAO published technical guidelines to support the implementation of the IPOA that states can use to develop and implement their NPOAs (see Annex A).

The respective SARs and NPOAs are to be submitted by shark fishing nations before the 24th COFI Session in 2001. Every two years thereafter, starting in 2003, member states are to report on their progress as part of their biennial reporting to UN FAO on the Code of Conduct for Responsible Fisheries (FAO 1995). The implementation of the NPOA should also be regularly assessed every four years.

At the 24th COFI Session in February 2001, only a few countries were able to submit SARs and shark plans. The Philippines is reported to have undertaken its SAR. It was not until 2009, however, that the Philippine SAR and NPOA-Sharks were drafted.

Regional Initiatives. The IPOA-Sharks also encouraged shark fishing nations to cooperate and, where appropriate, develop regional shark plans through regional and sub-regional fisheries management organizations or arrangements and other forms of cooperation, to ensure effective conservation and management of sharks that are transboundary, straddling, highly migratory, and high seas stocks.

In Southeast Asia, trade of sharks and shark products (e.g., fins, cartilage, and liver oil) has been highly profitable (Chen 1996). Increasing trade volumes is recognized to lead to increasing shark harvests in the region as well as in many other regions in the world (SEAFDEC 2006). In November 2001, discussions on the sustainability of regional shark fisheries

Box 1.2: RPOA-Sharks Timeline

- 1999: IPOA-Sharks adopted, to include ASEAN-SEAFDEC member countries
- 2001: ASEAN-SEAFDEC initiated discussion on the sustainability of shark fisheries in Southeast Asia
- 2003: Regional Technical Consultation (RTC) on sharks organized; regional ad hoc study on sharks implemented
- 2004: Member countries committed to produce their own NPOA-Shark
- 2005: Guidelines developed for member countries' NPOA-Sharks in the Southeast Asian Content
- 2006-2008: ASEAN-SEAFDEC technical support provided for the NPOA-Shark

were initiated at the Association of Southeast Asian Nations-Southeast Asia Fisheries and Development Center (ASEAN-SEAFDEC) Millennium Conference, or the Conference on Sustainable Fisheries for Food Security in the New Millennium: "Fish for the People," held in Bangkok. Member countries acknowledged the potential threats to shark populations and the need to comprehensively address species management-related issues, but also recognized the difficulty and challenges considering the lack of available information on shark catches, utilization, and trade in the region (SEAFDEC 2006).

SEAFDEC, as a regional fisheries management organization, provided a forum for the member countries to discuss and build a common stand on the issue of the management of sharks. In October 2002, ASEAN-SEAFDEC member countries endorsed the collection and analysis of data on sharks and its fisheries as basis for the development of appropriate fisheries management policy and actions. In 2003, the 1st Regional Technical Consultation (RTC) on sharks was organized (under a component of the Japanese Trust Fund Program on Environment-Related Tasks in the Southeast Asian Region), to provide a technical basis in initiating a new SEAFDEC project, which was the ad hoc study on sharks aimed at establishing baseline information on shark production, use, and trade in member countries. The project goal was to assist ASEAN member countries in the development of their respective NPOA-Sharks and to support the formulation of a regional policy and management mechanisms for fisheries catching sharks in Southeast Asia. At the 2nd RTC held in Phuket, Thailand in July 2004, member states, including the Philippines, made a commitment to produce their respective NPOA-Sharks. Since the Millennium Conference in 2001, ASEAN member countries including the Philippines have taken several actions toward the formulation of the NPOA-Sharks.

Around the same timeline, parallel regional consultations were conducted involving the three countries bounding the Sulu-Sulawesi seas for the development of the Ecoregion Conservation Plan (ECP 2001) to address conservation and management concerns of coastal and marine resources in Indonesia, Malaysia, and the Philippines. Regional and in-consultations among governments of the three countries were initiated in 2001 and formalized through a memorandum of agreement in 2004 during the 7th Meeting of the Conference of the Parties (CoP 7) to the Convention on Biological Diversity held in Kuala Lumpur, Malaysia. The first meeting of the Sulu-Sulawesi Marine Ecoregion (SSME) Tri-National committee occurred in 2006, and subcommittees on fisheries, marine protected areas (MPAs), and species were subsequently created. The regional shark conservation agenda was incorporated into the ECP under the work plan of the Subcommittee on Threatened, Charismatic and Migratory Species. The work plans of the three subcommittees were later transformed into the SSME Comprehensive Action Plan (CAP), with each of the three countries providing estimates on cost of implementation of both regional and in-country activities.

Shark conservation and management agenda was also incorporated in the regional plan of action (RPOA) of the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF), the consultation process of which was initiated in 2007 with the RPOA being formally adopted in 2009. Regional and national CTI-CFF goals and action plans specific for sharks and related species are shown in Chapter 7.

National Initiatives. In 1999 and 2000, World Wildlife Fund-Philippines conducted a special training workshop for representatives of the academic community and government agencies[2] and the Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR) National Stock Assessment Program (NSAP)[3], with the objective of enhancing the capacity of field personnel in the biology and taxonomy of chondrichthyan species and making these skills usable in the conduct of a sustained shark and batoid fishery assessments in the 15 coastal regions covered by NSAP. Data gathered from these region-based assessments was envisioned for use in the development of the Philippines Shark Assessment Report (Philippine SAR) and formulation of the Philippine Shark Plan (Philippine NPOA-Sharks).

In 2002, a year after the 24th COFI Session, the Philippines was reported as one of the few countries that conducted initial assessment of the status of shark stocks[4] but no actual SAR was submitted. In 2003, the Philippines, with support from ASEAN-SEAFDEC, conducted a targeted but ad hoc study on sharks in four monitoring/landing sites

[2]The First Elasmobranch Taxonomy and Fishery Assessment Training Workshop was conducted in April-May 1999 and was attended by representatives from Silliman University, Mindanao State University (Tawi-Tawi, General Santos), State Polytechnic College of Palawan, University of the Philippines in Los Baños, DENR (Central Office and Region 7), DA-BFAR (Central Office and Region 10), National Museum of the Philippines, and nongovernment organizations.

[3]The Second Elasmobranch Taxonomy and Fishery Assessment Training Workshop was conducted in April-May 2000 and was attended by the Bureau of Fisheries and Aquatic Resources National Stock Assessment Program project leaders and/or assistant project leader from the regions.

[4]http://www.fao.org/docrep/meeting/003/X9187E.htm

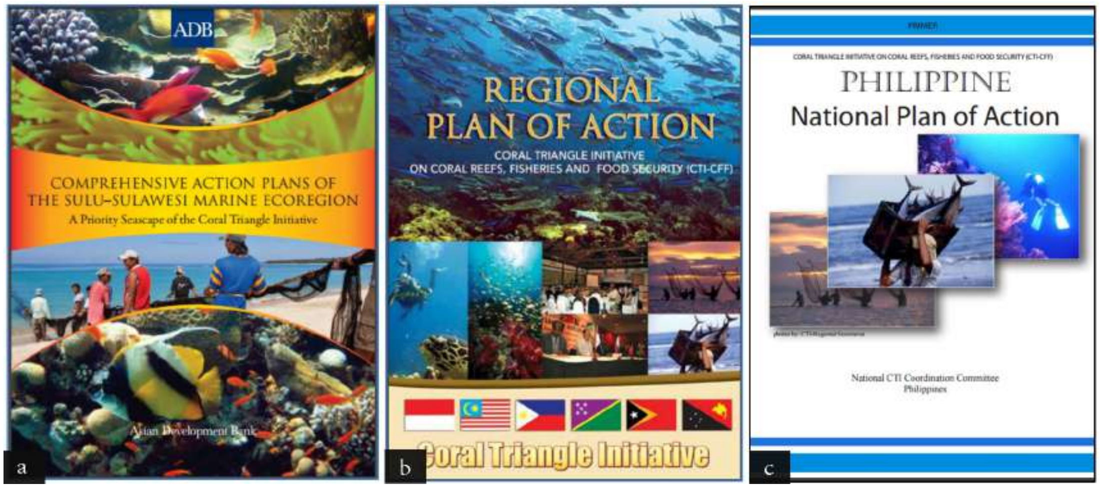


Figure 1.1. SSME and CTI regional (a, b) and national (c) plans of action that identified targets and priority activities for shark conservation and management in the Philippines.

Box 1.3: NPOA-Sharks Timeline

- 1999-2000: 1st and 2nd Philippines Elasmobranch Taxonomy and Fishery Assessment Training Workshops conducted; elasmobranch biodiversity assessment initiated in 14 coastal regions
- 2003: ASEAN-SEAFDEC ad hoc shark fisheries assessment conducted in 4 sites (i.e., Palawan, Cagayan, Occidental Mindoro, Surigao del Norte)
- 2004: Philippines adopted the ASEAN position and made a commitment to produce its NPOA-Shark
- 2008: In-country consultations conducted on elasmobranch fisheries in selected regions
- 2009: 1st SAR and NPOA-Sharks drafted
- 2010: Shark conservation and management concerns incorporated in the SSME and CTI plans of action
- 2013: Review and assessment of the NPOA implementation (based on the IPoA timeline) proposed under SSME
- 2016: In-country consultations to review and update the NPOA-Sharks 2009 implementation
- 2020 and every 4 years: proposed regular assessment of the NPOA implementation (based on the IPoA timeline)

(i.e., Coron/Panlaitan, Palawan; Aparri, Cagayan; San Jose, Occidental Mindoro; and Mabua, Surigao del Norte).

In 2004, at the second ASEAN-SEAFDEC RTC meeting on Shark Fisheries in Phuket, Thailand, the Philippines (along with other member countries) adopted the ASEAN position to manage its sharks fisheries and also committed to the development of its NPOA-Sharks, highlighting practical steps to include: doing a comprehensive review of all existing information and data available on sharks; raising level of awareness through production of awareness building materials and the implementation of an information campaign on sharks; preparing relevant policies and regulations; and conducting dialogue and consultations and engaging stakeholders in the development, implementation and monitoring of the NPOA-Sharks.

Consultations toward the development of the Philippine SAR and NPOA-Shark, however, were only conducted in 2008, with support from USAID's Fisheries for Improved Sustainable Harvest (FISH) Project and other nongovernment organizations. The documents were finalized in 2009. As prescribed by COFI, the implementation of the NPOA should be regularly assessed every four years. The opportunity to review and update the Philippines SAR and the NPOA-Sharks, came in 2013, with the approval of the Sulu-Sulawesi Seascape Project, implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH for the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), which supported government initiatives in the three SSME countries, i.e., Indonesia, Malaysia, and the Philippines. These three countries are also referred to as the CT3, or the other half of the six countries composing the Coral Triangle Initiative. The Philippines incorporated priority concerns for shark conservation and management in both the SSME CAP and the CTI-CFF national and regional plans of action.

The conservation agenda for sharks under SSME-CAP falls within the Subcommittee on Threatened, Charismatic and Migratory Species chaired by Indonesia, which covers species groups such as marine turtles, marine mammals, and sharks, to wit: "*Facilitate effective management of feeding grounds, migratory routes, and protection of target species from overfishing and as bycatch; design MPAs and MPA networks in relation to the protection and management of target species and their habitat; and promote implementation of best practices in habitat conservation and management.*" Three key results areas (KRAs) and seven activities for shark conservation and management have been identified (see Chapter 5).

The species conservation agenda in the SSME-CAP was also incorporated in the CTI-CFF national and regional plans of action during the consultation process, which falls within Goal 5, with the target: "*Improved status of sharks, sea turtles, seabirds, marine mammals, corals, seagrass, mangroves and other identified threatened species.*"

1.2 DEFINITIONS

The term "shark" or "sharks" is used here as a generic term to apply to all shark and shark-like species— which includes the "true sharks," "winged sharks" or the batoids (i.e., skates and rays), and the silver sharks or chimaeras— belonging to the cartilaginous group of fishes under the Class Chondrichthyes.

The chondrichthyan fishes, so-called based largely on a cartilaginous endoskeleton, are generally grouped into two major extant (i.e., living) subclasses, namely the Subclass Elasmobranchii, to which true sharks and winged sharks belong, and the Subclass Holocephalii to which the silversharks (or chimaeras) belong.

The "true sharks" technically belong to eight specific orders under Subclass Elasmobranchii, generally characterized with a fusiform body shape and 5–7 laterally positioned gill openings. Some shark taxonomists sometimes refer to true sharks as "non-batoids." The "winged sharks" under Subclass Elasmobranchii are the skates and rays including guitarfishes, sawfishes, and electric rays, and as a group, is often collectively called as "batoids." The winged sharks are generally characterized by a disc-like dorso-ventrally flattened body and ventrally positioned gills.

"Silversharks" refer to chimaeras, characterized by a large head, scale-less skin, a long sharp spine on the leading edge of the first dorsal fin, and often a whip-like tail; also known as ratfishes or elephantfishes. The term "elasmobranchs", although technically refers only to the true sharks and batoids, have also been used as a collective to also include the chimaeras.[5]

In this document, the term "shark" or "sharks" will be used in the same generic sense to refer to all cartilaginous species, as applied by the UN FAO IPOA-Sharks. The country status report on sharks is referred to as the Shark Assessment Report (or SAR) while the National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks) is used interchangeably with the term "shark plan."

1.3 PURPOSE AND NEED

Generally, sharks and related species are characterized by K-selected life history traits such as slow growth, late sexual maturity, low fecundity, low natural mortality, and relatively longer lifespan, thus also low rates of population increase. Sharks have a complex spatial structures (size/sex segregation and seasonal migration) making them highly vulnerable to overexploitation and stock collapse. Once the population is depleted, recovery is slow. The population stock-to-recruitment relationship is relatively low and, as such, stock recovery time is also low particularly when populations are overfished.

Increasing demands for shark and shark products (such as fins, meat, skin, cartilage, teeth, jaws, liver, and other internal organs) in the past 30–40 years have led to a considerable number of species threatened with extinction due to a combination of factors including unsustainable fisheries practices and degradation of important habitats (i.e., nursery and breeding grounds) due to coastal area development and pollution. Consequently, the rise in shark fishery and utilization increased concerns for conservation and management of shark populations worldwide.

There is a need to balance fishing efforts and resource exploitation with conservation and management to attain sustainability of shark fishery resources. The currently limited knowledge on sharks and the practices employed in shark fisheries is a major challenge for shark conservation and management. Largely, there is limited information on shark catches, fishing effort, landings and trade data, as well as on identification and important biological parameters of many species. There is a need, therefore, to improve knowledge on the state of shark stocks and to facilitate the collection of necessary information to aid policies that will improve the management of sharks. Additionally, there is a need to foster an enabling environment in terms of providing adequate funding and support systems to do the necessary research to inform, monitor, and assess management strategies.

1.4 ISSUES AND CONCERNS

As in most other developing countries in the region, there is no dedicated stock assessment of shark fisheries in the country. After the shark taxonomy and data collection training conducted in 1999 and 2000 by WWF-Philippines and Silliman University for government personnel, mostly representing the National Stock Assessment Program of BFAR regions, ad hoc sharks fisheries catch data collection began in about 15 coastal regions and continued up to the present. Intermittent research on shark diversity and/or fisheries have also been conducted in the past 10 or more years either independently by academic/research institutions or nongovernment organizations (e.g., WWF-Philippines and Silliman University) or in collaboration with BFAR-National Fisheries Research and Development Institute (NFRDI) and the NSAP. Results from these research efforts can now inform the current review and updating process.

In spite of these initiatives, major issues pertaining to the conservation and management of sharks as identified in the 2009 SAR/NPOA-Sharks are still surfacing in this current review. For example, species-specific information needed for conservation and management is still insufficient for most, and capacity for assessment and monitoring is still limited (see Chapter 7). These issues are grouped into the following: 1) monitoring; 2) data collection and analysis; 3) research; 4) capacity-building; and 5) conservation and management (further sub-grouped into

---

[5]The term "elasmobranch" was used in the 1998-2001 WWF Elasmobranch Biodiversity Project with the initial focus on the documentation of shark and ray species in market and landing sites; in the course of project implementation, chimaeras were also found to factor in local fisheries. The term, thus the project title, was maintained for convenience.

policy; institutional arrangements; information, education, and communication (IEC); and compliance and enforcement).

1.5 AIMS AND OBJECTIVES OF THE PHILIPPINE NPOA-SHARKS

As prescribed by the UN FAO IPOA-Sharks (see Annex A), the overall objective of the NPOA-Sharks is to ensure the conservation and management of sharks and their long-term sustainable use (see Box 1.4). The NPOA-Sharks addresses the importance of shark resources in the conservation of marine biodiversity and sustainable use of the resources for future generations. The success of the plan hinges on the close cooperation among the implementing agencies and stakeholders. It requires collection and ongoing synthesis of compatible data at the appropriate resolution, including commercial data and data leading to improved species identification and, eventually, abundance indices.

Box 1.4: Minimum Requirements of the NPOA-Sharks

The Shark Plan (=NPOA-Sharks) aims to:

- Ensure that shark catches from directed and non-directed fisheries are sustainable;
- Assess threats to shark 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 stocks;
- Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States;
- Minimize unutilized incidental catches of sharks;
- Contribute to the protection of biodiversity and ecosystem structure and function;
- Minimize waste and discards from shark 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;
- Facilitate improved species-specific catch and landings data and monitoring of shark catches; and
- Facilitate the identification and reporting of species-specific biological and trade data.

In this context, this current document reviews the 2009 SAR and NPOA-Sharks in terms of its responsiveness to the aims and objectives of the IPOA-Sharks, as also translated into the SSME CAP and CTI-CFF plans of action, based on best available knowledge on shark resources, status, pressures, and management measures. The specific objectives are:

1. Review existing knowledge of general biology, including distribution and ecology, fisheries, and trade of sharks in the Philippines;
2. Review existing shark conservation measures and legislation at the regional and national level;
3. Identify significant gaps in scientific knowledge, problems/issues/concerns related to elasmobranch conservation and management;
4. Contribute to IPOA-Sharks by targeting minimum requirements of a National Action Plan (see Box 1.4);
5. Develop recommendations and guidelines for sustainable management of sharks in the Philippines as well as identify priorities for action, institutional responsibilities for such actions and resources needed for the implementation of these actions; and
6. Develop a National Plan of Action aimed at promoting the widespread use of these guidelines in the country.

1.6 PROCESS/METHODS

The lead agency in the development and review of the Philippine SAR/NPOA-Shark is the Department of Agriculture's Bureau of Fisheries and Aquatic Resources (DA-BFAR). The Philippine SAR/NPOA is based on research results and findings of the NPOA-Shark Technical Working Group, composed of representatives from the following agencies and/or institutions (see list in Annex B, NPOA-Shark Technical Working Group):

- National Fisheries Research and Development Institute
- National Stock Assessment Program (Regional Offices)
- Fisheries Regulatory and Quarantine Division (Central and Regional Offices)
- Academic Institutions/Non-government Organizations

The current review and updating process involved the conduct of two major workshops in Sam Remigio, Cebu (August 2016), and Puerto Princesa, Palawan (October 2016), which focused on the updates of shark catch information in a regional/subnational basis (i.e., Philippine geo-political regions), to include: sharks species present and distribution, population status, fisheries status (catch and by-catch), research initiatives and/or programs, conservation and/or management plans or policies, recommendations for sustainable development, identification of gaps, and priorities for action.

The two three-day workshops involved plenary sessions for the regional presentations of NSAP project leaders or representatives and invited resource speakers on the status of shark fisheries, research initiatives, conservation and management at the national, subnational (regional), and local levels. Focus group discussions (FGDs) were conducted as facilitated by a workshop facilitator and/or FGD facilitators. Workshop outputs were presented and critiqued during plenary sessions and during the final policy workshop review in Quezon City in January 2017.

Additional inputs to research initiatives and related concerns were made during the Shark Conference in Taguig in October 2016, Second Shark Summit in Dumaguete in November 2016 and the Shark Roadmapping Workshop in February 2017 as organized by the Save Sharks Network Philippines (SSNP). Participants to the SSNP meetings included field researchers, practitioners, academicians, environmental advocates, and representatives from the following organizations/institutions: Balyena.org, Fishbase Information and Research Group, Inc. (FIN), Greenpeace Southeast Asia, Large Marine Vertebrates Research Institute (LAMAVE), Marine Wildlife Watch of the Philippines (MWWP), Manta Trust, Palawan Council for Sustainable Development (PCSD), Save Philippine Seas (SPS), Silliman University Institute of Environmental and Marine Sciences (SU-IEMS), Simon Fraser University, Tubbataha Management Office (TMO), and WWF-Philippines.

1.7 MONITORING AND EVALUATION

The lead agency in the development and review of the Philippine NPOA-Sharks is DA-BFAR.

The Shark Plan is based on research results and findings of the NPOA-Shark Technical Working Group (see Annex B) composed of national and regional shark specialists; fisheries scientists; and conservationists, managers, and local practitioners from the following agencies:

- BFAR-National Fisheries Research and Development Institute
- BFAR-National Stock Assessment Project (Regional Offices)
- BFAR-Fisheries Regulatory and Quarantine Division

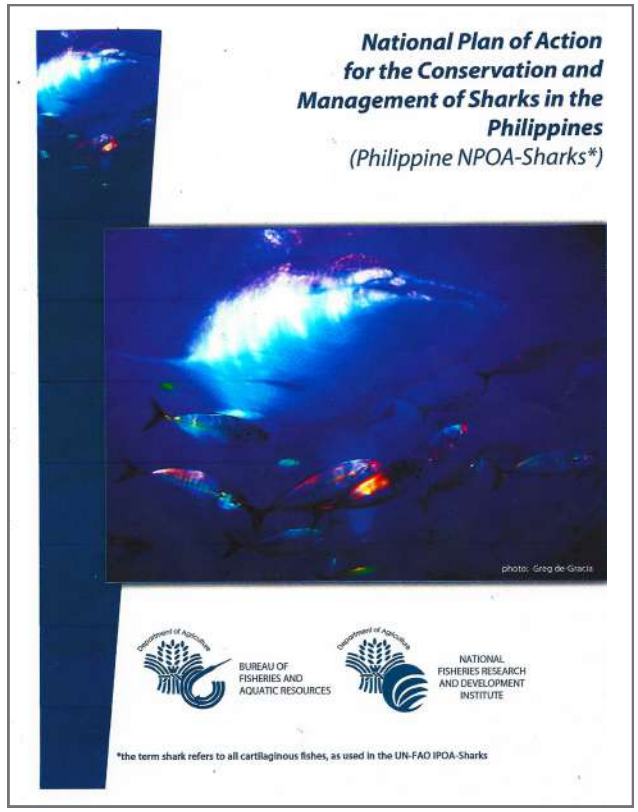


Photo by: M.D. Santos, National Plan of Action for the Conservation and Management of Sharks in the Philippines

***

CHAPTER 2: PHILIPPINE SHARK RESOURCES

2.0 BACKGROUND

Compagno et al. (2005) discusses in detail the historical account on ichthyofaunal research in the Philippines, an overview of which is shown in Box 2.1. Most, if not all, of the shark species reported factor in Philippine fisheries are either in directed/targeted catch or incidental/by-catch of commercial and/or municipal fisheries. As such, the checklist of cartilaginous fishes is largely based on records of various landing and market sites in the country.

Secondary information is collected from reports of individuals or groups on shark species encountered in dive sites as well as results of habitat survey research in established marine protected areas in the country (e.g., Tubbataha Reefs Natural Park).

2.1 TAXONOMY AND BIODIVERSITY

Historically, research on the biodiversity of Philippine sharks has, for the most part, been accomplished as part of exploratory research on the diversity of Philippine fishes (see Box 2.1).

Luchavez-Maypa et al. (2001) conducted an initial review of at least 18 published and unpublished papers, reports, and manuscripts dealing with shark and ray catches in 44 provinces in the country, and also found similar pitfalls. The preliminary literature review yielded at least 120 species (6 species unidentified) belonging to 24 families, and identified priority areas for spot assessments and validation. Follow-up field visits and voucher specimen collections in at least 10 provinces in central Visayas and northern Mindanao confirmed 83 elasmobranch species, 43 of which are accorded provisional record status as new species to science, or new/confirmed records to the Philippines (Alava & Yaptinchay 2000; Maypa et al. 2001).

The first and only known focused elasmobranch species inventory was conducted during 1998–2001 by WWF-Philippines through Silliman University in collaboration with Commonwealth Scientific and Industrial Research Organisation and the South African Museum. The inventory yielded productive results, with species confirmed present in Philippine waters and/or validated with voucher specimens and new species discoveries as new records for the Philippines or new records to science. At least 83 species belonging to 34 families were collected during the said project. About 54% (or 45 species) of the 83 species were tagged with "Provisional Record Status" (PRS), with the following classification: potentially new species (PRS-1), new records for the Philippines (PRS-2), resurrected species (PRS-3); first confirmed record in the Philippines (PRS-4), rare record (PRS-5), first available record from the Philippines (PRS-6), or new record through amended identification (PRS-7).

Box 2.1: Brief History of Philippine Ichthyofaunal Research

Compagno et al. (2005) discusses in detail the historical account on ichthyofaunal research in the Philippines. Linaeus' *Systema Naturae* published in 1758 "… set the stage for ichthyological exploration of the world by European research institutions as a part of the great wave of conquest, colonization, trade, and exploitation in the 18th and 19th centuries."

Consequently, Philippine waters were explored and fishes were collected and deposited in various museums in Europe (Museum National d'Histoire Naturelle in Paris; British Museum Natural History in London; Humboldt Museum in Berlin). The University of Santo Tomas accumulated a considerable collection of fishes, including a stuffed whale shark acquired around 1840. Ateneo de Manila University started their own collection in 1865.

Collections from the Albatross (1907–1910) expeditions, mostly lodged at the U.S. National Museum of Natural History in Washington, D.C., were partially reported on by various U.S. ichthyologists including Hugh M. Smith, Lewis Radcliffe, Henry W. Fowler, and Barton A. Bean (Fowler 1941). Independent collections were done by other ichthyologist such as Alvin Seale and Albert Herre (during 1920–1948). Specimens were deposited at Stanford University and at various Philippine institutions, including the Philippine Bureau of Sciences and Silliman University. Herre's checklist of Philippine fishes in 1953 listed 2,145 species which included new species of sharks. The collections at the Philippine Bureau of Sciences, however, were completely destroyed by the Japanese during World War II. Herre had to rebuild his Philippine checklist.

Despite the seemingly "large amount of collecting," Herre (1953) concluded Philippine fish fauna is by no means completely known while Compagno et al. (2005) reiterated that cartilaginous fishes, in particular, is "sketchily understood." The first and only known focused elasmobranch species inventory was conducted between 1998–2001 by the WWF through Silliman University in collaboration with Commonwealth Scientific and Industrial Research Organisation and the South African Museum. The inventory yielded productive results in terms of confirming species present in the waters and discovering new ones, to either the Philippines, in particular, or science in general.

The WWF collection contributed to a detailed checklist of cartilaginous fishes in the Philippines in Compagno et al. 2005, which reported at least 164 species belonging to 45 families: at least 96 species (59%) were confirmed present based on vouchers specimens, photos and/or data validated by the authors; 26 species (16%) reported and needed confirmation; 40 species (25%) were considered as new, still to be described, and potentially endemic to the Philippines; and 1 species (0.01%; i.e., the basking shark *Cetorhinus maximus*) considered as vagrant. The summary of the Compagno et al. 2005 checklist of cartilaginous fishes is presented in Table 2.1 of the 2009 SAR.

Out of the potentially new species recorded in the WWF collection (i.e., PRS-1), at least five have been described since the publication of Compagno et al. 2005 checklist, or roughly 13 years after the WWF inventory study in 1998–2001: Sulu Sea skate (*Okamejei jenseneae* Last & Lim 2010); Sulu gollumshark (*Gollum suluensis* Last & Gaudiano 2011); Ridgeback skate (*Dipturus amphispinus* Last & Alava 2013); Lana's sawshark (*Pristiophorus lanae* Ebert and Wilms, 2013);

Philippine guitarfish (*Rhinobatus whitei* Last et al. 2014). These new descriptions made it to the field guide entitled "*Pating Ka Ba? An Identification Guide to Sharks, Batoids and Chimaeras in the Philippines*" by Alava et al. (2014). The field guide was produced to respond to the need as identified in the NPOA-Sharks 2009. Species numbers as reported in Alava et al. (2014) is 167 species in 44 families: 95 true shark species in 26 familes, 67 winged sharks (batoids) in 17 families, and three silver sharks (chimaeras) in 1 family.

Recent taxonomic papers show major changes in the nomenclature for families (e.g., Myliobatidae to Aetobatidae in White and Naylor 2016), in genera (e.g., *Dasyatis* to *Neotrygon* or to *Bathytoshia*; *Himantura* to *Brevitrygon* in Last et al. 2016a), and in species (e.g., *N. kuhlii* species complex to *N. orientale*, Last et al. 2016a) (See Annex C). *Bathytoshia* formerly was considered a junior synonym of *Dasyatis*, which is now recognized as a valid genus as revised by Last et al. 2016a; hence *Dasyatis* (*Bathytoshia*) *lata* is now *Bathytoshia lata* (Ebert et al. 2016). At least two species from the Compagno et al. 2005 list (which was reflected in the 2009 SAR species checklist) are deleted, being now considered as a synonym of another species (e.g., the ocellate eagle ray *Aetomylaeus milvus* as a synonym of *A. maculatus*) or misidentification and consequently lumped into another species (e.g., Largetooth or Freshwater sawfish, *Pristis macrodon*, now lumped with *P. pristis* (Alava et al. 2014).

A summary list of cartilaginous fishes (i.e., all sharks to include the silversharks or chimaeras, true sharks, and flat sharks or batoids) in the Philippines, showing status of occurrence per species, is shown in Table 2.1. Taking into consideration the taxonomic changes mentioned, about 205 species are nominally listed: 116 species (i.e., 54%) are confirmed to occur in Philippine waters, 8 of which are new species descriptions (i.e., within the past 5–10 years); 59 species (27%) are reported from various sources (e.g., published sources; NSAP data) but which need further validation, particularly with at least 6 species of which still has their taxonomy to be resolved; and 39 species are still considered as potentially new species, possibly endemics and need to be described. A comparative checklist showing species additions and taxonomic changes from the 2009 SAR is shown in Annex D.

Table 2.1. List of cartilaginous fishes in the Philippines and status of species occurrence in Philippine waters. (Source: Alava et al. 2014; Compagno et al. 2005).

	SPECIES	AUTHORITIES	COMMON NAME	STATUS OF PHILIPPINE OCCURRENCE		REMARKS
	Subclass Holocephalii (chimaeras)					
1.	*Chimaera phantasma*	(Jordan & Snyder, 1900.)	Silver chimaera.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014
2.	*Hydrolagus mitsukurii*	(Jordan & Snyder, 1904)	Mitsukurii's chimaera.	N	Confirmed, NO species account	Authorities changed from original (see Dagit 2006).
3.	*Hydrolagus sp.*		Philippines reticulate chimaera.	U	Undescribed; potentially new	
	3					
	Subclass Elasmobranchii (sharks and batoids)					
	SHARKS					
4.	*Alopias pelagicus*	Nakamura, 1935.	Pelagic thresher.	✓	Confirmed, with species account	
5.	*Alopias superciliosus*	(Lowe, 1839).	Bigeye thresher.	✓	Confirmed, with species account	
6.	*Alopias vulpinus*	(Bonnaterre, 1788).	Common thresher.	✓	Confirmed, with species account	Common name changed from original (see Goldman et al. 2009).
7.	*Apristurus herklotsi*	(Fowler, 1934).	Longfin catshark.	✓	Confirmed, with species account	Not in Compagno et al 2005; Listed in Alava et al. 2014.
8.	*Apristurus longicephalus*	Nakaya, 1975.	Longhead catshark.	?	? =Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.
9.	*Apristurus platyrhynchus*	(Tanaka, 1990).	Borneo catshark.	?	? =Uncertain	
10.	*Atelomycterus marmoratus*	(Bennett, 1830).	Coral catshark, marbled catshark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
11.	*Carcharhinus albimarginatus*	(Rüppell, 1837).	Silvertip shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
12.	*Carcharhinus altimus*	(Springer, 1950).	Bignose shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
13.	*Carcharhinus amblyrhynchoides*	(Whitley, 1934).	Graceful shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
14.	*Carcharhinus amblyrhynchos*	(Bleeker, 1856).	Gray reef shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
15.	*Carcharhinus borneensis*	(Bleeker, 1858).	Borneo shark.	?	? =Uncertain	Authorities changed from original (see Compagno 2009).
16.	*Carcharhinus brevipinna*	(Müller & Henle, 1839).	Spinner shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
17.	*Carcharhinus dussumieri*	(Valenciennes, 1839).	Whitecheek shark.	?	? =Uncertain	

	SPECIES	AUTHORITIES	COMMON NAME	STATUS OF PHILIPPINE OCCURRENCE		REMARKS
18.	*Carcharhinus falciformis*	(Bibron, 1839).	Silky shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
19.	*Carcharhinus hemiodon*	(Valenciennes, 1839).	Pondicherry shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
20.	*Carcharhinus leucas*	(Valenciennes, 1839).	Bull shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
21.	*Carcharhinus limbatus*	(Valenciennes, 1839).	Blacktip shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
22.	*Carcharhinus longimanus*	(Poey, 1861).	Oceanic whitetip shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
23.	*Carcharhinus macloti*	(Müller & Henle, 1839).	Hardnose shark.	?	? =Uncertain	
24.	*Carcharhinus melanopterus*	(Quoy & Gaimard, 1824).	Blacktip reef shark, black-finned shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
25.	*Carcharhinus sealei*	(Pietschmann, 1913).	Blackspot shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
26.	*Carcharhinus sorrah*	(Valenciennes, 1839).	Spot-tail shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
27.	*Carcharodon carcharias*	(Linnaeus, 1758).	White shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
28.	*Centrophorus* cf. *moluccensis*	Bleeker, 1860.	Philippine smallfin gulper shark.	U	Undescribed; potentially new	
29.	*Centrophorus granulosus*	(Bloch & Schneider, 1880).	Gulper shark.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.
30.	*Centrophorus isodon*	(Zhu, Meng & Liu, 1981).	Black gulper shark, blackfin gulper shark, longnose gulper shark.	✓	Confirmed, with species account	Additional common names from IUCN
31.	*Centrophorus lusitanicus*	Bocage & Capello, 1864.	Lowfin gulper shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
32.	*Centrophorus moluccensis*	Bleeker, 1860.	Smallfin gulper shark.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.
33.	*Centrophorus squamosus*	(Bonnaterre, 1788).	Leafscale gulper shark.	?	Uncertain	reportedin Compagno et al.2005 (and in 2009 SARNPOA) as *Centrophorus ?squamosus*
34.	*Centroscyllium* cf. *kamoharai*	Abe, 1966.	Bareskin dogfish	U	Undescribed; potentially new	
35.	*Cephaloscyllium fasciatum*	Chan, 1966.	Reticulated swellshark.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.
36.	*Cephaloscyllium isabellum*	(Bonnaterre, 1788).	Draughtboard shark.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.
37.	*Cephaloscyllium* sp.		Philippines swellshark.	U	Undescribed; potentially new	
38.	*Cetorhinus maximus*	(Gunnerus, 1765).	Basking shark.	?	Uncertain	Vagrant; no known population (Compagno et al. 2005; Alava et al. 2014).
39.	*Chiloscyllium griseum*	Müller & Henle, 1838.	Gray bambooshark.	?	Uncertain	
40.	*Chiloscyllium indicum*	(Gmelin, 1788).	Slender bambooshark, ridgebacked bambooshark.	?	Uncertain	Additional common names (see Barratt et al 2003).
41.	*Chiloscyllium plagiosum*	(Bennett, 1830).	Whitespotted bambooshark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
42.	*Chiloscyllium punctatum*	Müller & Henle, 1838.	Brownbanded bambooshark, grey carpetshark.	✓	Confirmed, with species account	Additional common names (see Dudgeon et al. 2016).
43.	*Cirrhoscyllium expolitum*	Smith & Radcliffe, 1913.	Barbelthroat carpetshark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
44.	*Deania calcea*	(Lowe, 1839).	Birdbeak dogfish.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014: *D. calcea* a senior synonym of *D. rostrata*
45.	*Deania cf. rostrata (Lowe, 1839).*		Birdbeak dogfish.	U	Undescribed; potentially new	
46.	*Deania profundorum*	(Smith & Radcliffe, 1912).	Arrowhead dogfish.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
47.	*Echinorhinus cookei*	Pietschmann, 1928.	Prickly shark.	?	Uncertain	
48.	*Eridacnis radcliffei*	Smith, 1913.	Pygmy ribbontail catshark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
49.	*Eridacnis* sp. 1		Philippine ribbontail catshark.	U	Undescribed	
50.	*Etmopterus brachyurus*	Smith & Radcliffe, 1913.	Shorttail lanternshark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.

	SPECIES	AUTHORITIES	COMMON NAME	STATUS OF PHILIPPINE OCCURRENCE		REMARKS
51.	*Etmopterus lucifer*	Jordan & Snyder, 1902.	Blackbelly lanternshark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
52.	*Eusphyra blochii*	(Cuvier, 1816).	Winghead shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
53.	*Galeocerdo cuvier*	(Peron & Lesueur, 1822).	Tiger shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
54.	*Galeus eastmani*	(Jordan & Snyder, 1904).	Gecko catshark.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.
55.	*Galeus sauteri*	(Jordan & Richardson, 1909).	Blacktip sawtail catshark.	✓	Confirmed, with species account	Common name changed from "Taiwan sawtail catshark" to "Blacktip sawtail catshark" based on McCormack 2009.
56.	*Galeus schultzi*	Springer, 1979.	Dwarf sawtail catshark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
57.	*Galeus* sp. *G. nipponensis*	Nakaya, 1979.		U	Undescribed; potentially new	
58.	*Glyphis sp.*	Agassiz, 1843.	River shark.	?	Uncertain	
59.	*Gollum suluensis*	Last & Gaudiano, 2011.	Sulu gollumshark.	✓	Confirmed, with species account	New species; listed in Compagno et al 2005 as *Gollum* sp. nov. (Sulu gollumshark).
60.	*Halaelurus cf. boesemani*	Springer & D'Aubrey, 1972.	Speckled catshark.	T	Taxonomy to be resolved	
61.	*Halaelurus cf. buergeri*	Müller & Henle, 1838.	Blackspotted catshark.	T	Taxonomy to be resolved	
62.	*Halaelurus maculosus*	White, Last & Stevens, 2007.	Indonesian speckled catshark.	N	Confirmed, NO species account	Not in Compagno et al 2005; Listed in Alava et al. 2014.
63.	*Hemigaleus microstoma*	Bleeker, 1852.	Sicklefin weasel shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
64.	*Hemipristis elongatus = H. elongata*	(Klunzinger, 1871).	Snaggletooth shark, fossil shark.	✓	Confirmed, with species account	Typo error in Compano et al 2005 for species as H. elongatus. Corrected species to H. elongata . Additional common name based on White and Simpfendorfer 2016.
65.	*Hemitriakis leucoperiptera*	Herre, 1923.	Whitefin topeshark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
66.	*Hemitriakis sp. near H. complicofasciata*	Takashi & Nakaya, 2004.	Ocellate topeshark.	T	Taxonomy to be resolved	
67.	*Heptranchias perlo*	(Bonnaterre, 1788).	Sharpnose sevengill shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
68.	*Heterodontus zebra*	(Gray, 1831).	Zebra bullhead shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
69.	*Hexanchus griseus*	(Bonnaterre, 1788).	Bluntnose sixgill shark.	✓	Confirmed, with species account	Changes in common name based on Cook and Compagno 2005; also in Alava et al. 2014
70.	*Hexanchus nakamurai*	Teng, 1962.	Bigeyed sixgill shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
71.	*Iago garricki*	Fourmanoir, 1979.	Longnosed houndshark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
72.	*Isistius brasiliensis*	(Quoy & Gaimard, 1824).	Cookie-cutter shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
73.	*Isurus oxyrinchus*	Rafinesque, 1810.	Shortfin mako.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
74.	*Isurus paucus*	Guitart Manday, 1966.	Longfin mako.	?	Uncertain	
75.	*Loxodon macrorhinus*	Müller & Henle, 1838.	Sliteye shark, slender dogshark.	✓	Confirmed, with species account	Additional common names from IUCN
76.	*Megachasma pelagios*	Taylor, Compagno & Struhsaker, 1983.	Megamouth shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
77.	*Mustelus cf. griseus Pietschmann, 1908.*		Philippine grey smooth-hound.	U	Undescribed; potentially new	Listed in Compagno et al 2005 as Mustelus 3 cf. griseus Pietschmann, 1908 (Philippine gray smoothhound). Listed in Alava et al. 2014 as Mustelus cf. griseus.
78.	*Mustelus cf. manazo Bleeker, 1854.*		Philippine white-spotted smooth-hound.	U	Undescribed; potentially new	Listed in Compagno et al. 2005 as Mustelus 1 cf. manazo Bleeker, 1854 (Philippine white-spotted smoothhound); in Alava et al. 2014 as Mustelus cf. manazo.
79.	*Mustelus griseus*	Pietschmann, 1908.	Spotless smooth-hound.	T	Taxonomy to be resolved	Not in Compagno et al 2005; Listed in Alava et al. 2014.

	SPECIES	AUTHORITIES	COMMON NAME	STATUS OF PHILIPPINE OCCURRENCE		REMARKS
80.	*Mustelus manazo*	Bleeker, 1855.	Star-spotted smooth-hound.	T	Taxonomy to be resolved	Not in Compagno et al 2005; Listed in Alava et al. 2014.
81.	*Mustelus* sp. 1		Philippine brown smooth-hound.	U	Undescribed	Listed in Compagno et al. 2005 Mustelus 2 cf. griseus Pietschmann, 1908 (Philippine brown smoothhound). Listed in Alava et al. 2014.
82.	*Nebrius ferrugineus*	(Lesson, 1830).	Tawny nurse shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
83.	*Negaprion acutidens*	(Rüppell, 1837).	Sharptooth lemon shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
84.	*Orectolobus cf. ornatus (De Vis, 1883).*		Philippine wobbegong.	U	Undescribed	
85.	*Orectolobus japonicus*	Regan, 1906.	Japanese wobbegong.	?	Uncertain	
86.	*Orectolobus leptolineatus sp.nov.*	Last, Pogonoski & White, 2010.	Indonesian wobbegong.	?	Uncertain	New species.
87.	*Orectolobus ornatus*	(De Vis, 1883).	Ornate wobbegong.	?	Uncertain	
88.	*Parmaturus melanobranchus*	(Chan, 1966).	Blackgill catshark.	?		Not in Compagno et al 2005; Listed in Alava et al. 2014.
89.	*Pentanchus profundicolus*	Smith & Radcliffe, 1912.	Onefin catshark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
90.	*Prionace glauca*	(Linnaeus, 1758).	Blue shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
91.	*Pristiophorus lanae sp.nov.*	Ebert & Wilms, 2013.	Lana's sawshark.	N	Confirmed, NO species account	A new species of sawshark, Pristiophorus lanae sp. nov., is described from off the Philippine Islands. Not in Compagno et al 2005; Listed in Alava et al. 2014.
92.	*Pristiophorus* sp. C	Compagno & Niem, 1998.	Philippine sawshark.	U	Undescribed; potentially new	
93.	*Pseudocarcharias kamoharai*	(Matsubara, 1936).	Crocodile shark.	?	Uncertain	
94.	*Rhincodon typus*	(Smith, 1828).	Whale shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
95.	*Rhizoprionodon acutus*	(Rüppell, 1835).	Milk shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
96.	*Scoliodon macrorhynchos*	(Bleeker, 1852).	Pacific spadenose shark.	N	Confirmed, NO species account	Listed in Compagno et al. 2005 as ?*Scoliodon laticaudus* Müller & Henle, 1838 (Spadenose shark). Listed in Alava et al. 2014 *Scoliodon macrorhynchos* (Bleeker, 1852) (Pacific spadenose shark). *S. laticaudus* a possible misidentification of *S.macrorhynchos*
97.	*Scyliorhinus garmani*	(Fowler, 1934).	Brownspotted catshark.	?	Uncertain	
98.	*Scyliorhinus torazame*	(Tanaka, 1908).	Cloudy catshark.	?	Uncertain	
99.	*Sphyrna lewini*	(Griffith & Smith, 1834).	Scalloped hammerhead.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
100.	*Sphyrna mokarran*	(Rüppell, 1837).	Great hammerhead.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
101.	*Sphyrna tiburo*	(Linnaeus, 1758).	Bonnethead shark.	?	Uncertain	Confirmed, with species account in Alava et al. 2014.
102.	*Sphyrna zygaena*	(Linnaeus, 1758).	Smooth hammerhead.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
103.	*Squaliolus aliae*	Teng, 1959.	Smalleye pygmy shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
104.	*Squaliolus laticaudus*	Smith & Radcliffe, 1912.	Spined pygmy shark, big-eye dwarf shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
105.	*Squalus* cf. *megalops Macleay, 1881.*		not in original table but in Alava et al. 2014.	U	Undescribed; potentially new	
106.	*Squalus cf. mitsukurii Jordan & Snyder, 1903.*		Philippines shortspine dogfish	U	Undescribed; potentially new	
107.	*Squalus japonicus*	Ishikawa, 1908.	Japanese spurdog.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.
108.	*Squalus megalops*	Macleay, 1881.	Shortnose spurdog.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.
109.	*Squalus mitsukurii*	Jordan & Snyder, 1903.	Shortspine spurdog.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.

	SPECIES	AUTHORITIES	COMMON NAME	STATUS OF PHILIPPINE OCCURRENCE		REMARKS
110.	*Squalus montalbani*	Whitley, 1931.	Philippine spurdog.	N	Confirmed, NO species account	Not in Compagno et al 2005; Listed in Alava et al. 2014. Common name as 'Philippine spurdog' (White 2009). *Squalus montalbani* was resurrected by Last et al. 2007. Referred to as *Squalus sp*. 1 in White et al. (2006).
111.	*Squalus nasutus*	Last, Marshall & White, 2007.	Western longnose spurdog.	N	Confirmed, NO species account	Listed in Alava et al. 2014. *Squalus nasutus sp*. nov., a new long-snout spurdog of the '*japonicus*-group' from the Indian Ocean (Last et al. 2007).
112.	*Squalus sp. 1*		Philippine fatspined dogfish.	U	Undescribed; potentially new	Listed in Compagno et al 2005 as *Squalus sp*. (Philippine fatspined dogfish). Listed in Alava et al. 2014 as Squalus sp. 1 (Philippine fatspined dogfish).
113.	*Squalus sp. 2*		Philippine longnose spurdog.	U	Undescribed; potentially new	Listed in Compagno et al 2005 as *Squalus sp*. (Philippine longnose spurdog). Listed in Alava et al. 2014 as Squalus sp. 2 (Philippine longnose spurdog).
114.	*Squatina caillieti sp.nov.*	Walsh, Ebert & Compagno, 2011.	Philippine angelshark.	N	Confirmed, NO species account	Listed in Alava et al. 2014: Squatina caillieti sp. nov., a new species of angel shark (Chondrichthyes: Squatiniformes: Squatinidae) from the Philippine Islands. Previously misidentified as the Taiwanese angelsharks *S.formosa*.)
115.	*Squatina formosa*	Shen & Ting, 1972.	Taiwan angelshark.	?	Uncertain	Status change from Confirmed (in Compagno et al 2005) to Uncertain (in Alava et al 2014). Species identified as the Taiwanese angelsharks (S.formosa) may be the *Squatina caillieti* sp.nov.
116.	*Squatina japonica*	Bleeker, 1858.	Japanese angelshark.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.
117.	*Stegostoma fasciatum*	(Hermann, 1783).	Zebra shark, leopard shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014. Additional common name from Fishbase
118.	*Triakis scyllium*	Müller & Henle, 1839.	Banded houndshark.	?	Uncertain	
119.	*Trianeodon obesus*	(Rüppell, 1837).	Whitetip reef shark.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
	116					
	BATOIDS					
120.	*Aetomylaeus milvus* = *Aetomylaeus maculatus*			?	Uncertain	Listed in Compagno et al 2005 as ?*Aetomylaeus milvus* (Valenciennes, 1841) (Ocellate eagle ray). Listed in Alava et al. 2014 as *Aetomylaeus maculatus*. *A. milvus* considered most likely a synonym of *A. maculatus* (White 2006); Note: *A. maculatus* & *A. milvus* are considered as two distinct species entries in CTOL and Fishbase. Needs further validation.
121.	*Aetomylaeus nichofii*	(Bloch & Schneider, 1801).	Banded eagle ray.	?	Uncertain	Note: typo error in Compagno et al 2005: *A. niehofii* = *A. nichofii*.
122.	*Aetobatus cf. guttatus (Shaw, 1804).*		Indian eagle ray.	U	Undescribed; potentially new	
123.	*Aetobatus cf. narinari (Euphrasen, 1790).*		Spotted eagle ray.	U	Undescribed; potentially new	
124.	*Aetobatus narinari*	(Euphrasen, 1790).	Spotted eagle ray.	T	Taxonomy to be resolved	Not listed in Compagno et al 2005. Listed in Alava et al. 2014: possibly a species complex with A. cf. *narinari* and *A.* cf. *guttatus*. A major taxonomic revision of the *A. narinari* complex is recommended (White et al 2010).

	SPECIES	AUTHORITIES	COMMON NAME	STATUS OF PHILIPPINE OCCURRENCE		REMARKS
125.	*Aetobatus ocellatus*	White, Last, Naylor, Jensen & Caira, 2010.	Ocellated eagle ray.	?	Uncertain	New species. Listed in Alava et al. 2014. *Aetobatus ocellatus* (Kuhl, 1923) was previously considered to be an Indo-West and Central Pacific form of the wider ranging Aetobatus narinari (Euphrasen, 1790).
126.	*Aetomylaeus vespertilio*	(Bleeker, 1852).	Ornate eagle ray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
127.	*Aetoplatea zonurus = Gymnura zonura*	(Bleeker, 1852).	Zonetail butterfly ray.	✓	Confirmed, with species account	Listed in Compagno et al 2005 as *Aetoplatea zonurus*; listed in Alava et al. 201 as *Gymnura zonura*. Note of genus name change based on Jacobsen 2007 and White 2006.
128.	*Anacanthobatis borneensis = Sinobatis borneensis*	Chan, 1965.	Borneo legskate	✓	Confirmed, with species account	Listed in Compagno et al 2005 as *Anacanthobatis* cf. *borneensis*. In Alava et al. 2014 as *Sinobatis borneensis*.
129.	*Anoxypristis cuspidata*	(Latham, 1794).	Knifetooth sawfish, narrow sawfish.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
130.	*Dasyatis akajei = Hemitrygon akajei*	(Müller & Henle, 1841).	Red stingray.	T	Taxonomy to be resolved	Listed in Compagno et al 2005 and in Alava et al. 2014 as *Dasyatis akajei*. Taxonomy revised in Last et al. 2016. Changes in genus from *Dasyatis* to *Hemitrygon*.
131.	*Dasyatis bennettii = Hemitrygon bennetti*	(Müller & Henle, 1841).	Bennet's stingray.	?	Uncertain	Listed in Compagno et al 2005 and in Alava et al. 2014 as *Dasyatisbennettii*. Taxonomy revised in Last et al. 2016. Changes in genus from *Dasyatis* to *Hemitrygon*.
132.	*Dasyatis cf. akajei = Hemitrygon cf. akajei (Müller & Henle, 1841).*		Philippine red stingray.	U	Undescribed; potentially new	Listed in Compagno et al 2005 and in Alava et al. 2014 as *Dasyatis akajei*. Taxonomy revised in Last et al. 2016. Changes in genus from *Dasyatis* to *Hemitrygon*.
133.	*Dasyatis kuhlii = Neotrygon kuhlii*	(Müller & Henle, 1841)	Bluespotted stingray, bluespotted maskray.	✓	Confirmed, with species account	Note of genus and species change based on taxonomy revision: from *Dasyatis* to *Neotrygon* (Last and White 2008). Listed as *Dasyatis kuhlii* in Compagno et al. 2005; *Neotrygon kuhlii* in Alava et al. 2015. The bluespotted maskray, *Neotrygon kuhlii* (Müller & Henle, 1841) consists of a complex of several species and the type series consists of multiple species (Last, White and Seret 2016).
134.	*Dasyatis sp. (Adon's maskray) = Neotrygon sp.*		Adon's maskray.	U	Undescribed; potentially new	Note of genus and species change based on taxonomy revision: from *Dasyatis* to *Neotrygon* (Last and White 2008). Listed in Compagno et al 2005 as *Dasyatis sp*. (Adon's maskray)and in Alava et al. 2014 as *Neotrygon sp.* (Adon's maskray)
135.	*Dasyatis zugei = Telatrygon zugei*	(Müller & Henle, 1841).	Sharpnose stingray, pale-edged stingray.	✓	Confirmed, with species account	Note changes in genus, authorities & additional common names. Last et al. (2016) revised the family Dasyatidae, erecting the morphologically conservative genus *Telatrygon* and moving *zugei* across to this new genus. Listed in Compagno et al 2005 as *Dasyatis zugei* (Bürger In Müller & Henle, 1841) (Pale-edged stingray); also in Alava et al. 2014.
136.	*Dipturus sp. 1.*		Philippine longnose skate.	U	Undescribed; potentially new	Listed in Compagno et al. 2005. Not listed in Alava et al 2014: made a wrong reference to Compagno et al 2005's *Dipturus* sp.1. (Philippine longnose skate) as *Dipturus amphispinus*. Corrected here, see below to refer to *Dipturus sp.* (Tilted thorn skate).

	SPECIES	AUTHORITIES	COMMON NAME	STATUS OF PHILIPPINE OCCURRENCE		REMARKS
137.	*Dipturus gigas*	Ishiyama, 1958.	Giant skate.	N	Confirmed, NO species account	
138.	*Dipturus sp. (Tilted thorn skate) = Dipturus amphispinussp.nov*	Last & Alava, 2013.	Ridgeback skate.			A new Philippine species. Listed in Compagno et al 2005 as *Dipturus* sp. 4 (Tilted thorn skate). Listed in Alava et al 2014 as *Dipturus amphispinus* which made a wrong reference to Compagno et al 2005's *Dipturus* sp.1. (Philippine longnose skate).
139.	*Dipturus sp. 2*		Philippine skate	U	Undescribed; potentially new	Change in Common Name based on Alava et al. 2014
140.	*Dipturus sp.3 [Seret] (Philippines)*		Seret's Philippine skate.	U	Undescribed; potentially new	Listed in Compagno et al. 2005 as *Dipturus* sp. [Seret] (Philippines); in Alava et al 2014 as *Dipturus* sp. 3 [Seret] (Philippines).
141.	*Dipturus tengu*	(Jordan & Fowler, 1903).	Goblin skate, tengu skate, acutenose skate.	N	Confirmed, NO species account	
142.	*Glaucostegus granulatus*	(Cuvier, 1829).	Sharpnose guitarfish.	?	Uncertain	
143.	*Glaucostegus halavi*	(Forsskål, 1775)	Halavi guitarfish.	?	Uncertain	
144.	*Glaucostegus microphthalmus = Rhinobatos microphthalmus = Glaucostegus typus (?)*	(Teng, 1959).	Smalleyed guitarfish.			Listed in Compagno et al 2005 as *Glaucostegus microphthalmus*;.Not listed in Alava et al 2014. Possibly a junior synonym of G. typus Bennett, 1830 (Ebert et al. 2013).
145.	*Glaucostegus typus*	(Bennett, 1830).	Giant shovelnose ray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
146.	*Gymnura cf. micrura*	(Bloch & Schneider, 1801).	Smooth butterfly ray.	U	Undescribed; potentially new	
147.	*Gymnura micrura*	(Bloch & Schneider, 1801).	Smooth butterfly ray.	?	Uncertain	Nominal records in PH. *Gymnura micrura* is reasonably widespread in inshore waters (to 40 m depth) in the Eastern and Western Atlantic (Grubbs & Ha 2006).
148.	*Gymnura poecilura*	(Shaw, 1804).	Longtail butterfly ray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
149.	*Hexatrygon bickelli*	Heemstra & Smith, 1980.	Sixgill stingray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
150.	*Himantura bleekeri = Pateobatis bleekeri*	Blyth, 1860.	Bleeker's whipray.			Listed in Compagno et al 2005 as *Himantura bleekeri* which in Alava et al. 2014 was reported as a junior synonym of *H. uarnacoides*. *Pateobatis uarnacoides* (genus change)to be a distinct species from *P. bleekeri* (Last et al 2016).
151.	*Himantura cf. undulata*	(Bleeker, 1852)		U	Undescribed; potentially new	Listed in Alava et al. 2014. Note the taxonomic revision of the family Daysatidae by Last et al. 2016.
152.	*Himantura fai = Pateobatis fai*	(Jordan & Seale, 1906).	Pink whipray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014. Genus change based on IUCN ref: Last, Naylor & Manjaji-Matusumoto, 2016.
153.	*Himantura gerrardi = Maculabatis gerrardi*	(Gray, 1851).	Whitespotted whipray.	?	Uncertain	Genus *Maculabatis*, consisting of nine medium to large, marine whiprays previously placed in Himantura (including gerrardi). Reports of the species are often confused with *Himantura uarnak* (e.g., Chaudhuri 1911, Devanesen and Chidambaram 1953, Mohsin and Ambak 1996).
154.	*Himantura granulata = Urogymnus granulatus*	(Macleay, 1883).	Mangrove whipray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014. Scientific Name change based on IUCN ref: Last, Naylor & Manjaji-Matusumoto, 2016.
155.	*Himantura imbricata = Brevitrygon imbricata*	(Bloch & Schneider, 1801).	Scaly whipray.	?	Uncertain	Note of genus and species change based on taxonomy revision by
156.	*Himantura jenkinsii = Pateobatis jenkinsii*	(Annandale, 1909).	Jenkin's whipray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.Genus change based on IUCN ref: Last, Naylor & Manjaji-Matusumoto, 2016.

	SPECIES	AUTHORITIES	COMMON NAME	STATUS OF PHILIPPINE OCCURRENCE		REMARKS
157.	*Himantura leoparda*	Manjaji-Matsumoto & Last, 2008.	Leopard whipray.	?	Uncertain	Listed in Alava et al. 2014: possibly in a species complex. The Leopard Whipray (*Himantura leoparda*) is possibly widely distributed in the Indo-West Pacific in mainly coastal inshore waters. (Rigby et al. 2016).
158.	*Himantura uarnacoides = Pateobatis uarnacoides*	(Bleeker, 1852).	Bleeker's whipray, whitenose whipray.	?	Uncertain	Not in Compagno et al 2015 but in Alava et al. 2014. Status changed from Confirmed to Uncertain. *Pateobatis*, consisting of five medium-size to very large, marine whiprays previously placed in *Himantura* (including uarnacoides). P. bleekeri was treated as a junior synonym of uarnacoides (M. Manjaji pers. obs. 2007). However Pateobatis bleekeri is considered a valid species by Last et al. (2016) (White et al. 2004).
159.	*Himantura uarnak*	(Forsskål, 1775)	Reticulate whipray, marbled stingray, leopard stingray, honeycomb stingray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014. Additional common names from IUCN
160.	*Himantura undulata*	(Bleeker, 1852).	Leopard whipray, ocellate whipray, Bleeker's variegated whipray.	T	Taxonomy unresolved	in Compagno et al 2005; in Alava et al 2014: species complex with various other stingrays. Needs confirmation.
161.	*Himantura walga = Brevitrygon walga*	(Müller & Henle, 1841).	Dwarf whipray.	✓	Confirmed, with species account	Note of genus and species name change based on taxonomy revision by Last et al. 2016. Listed as Himantura walga in Compagno et al. 2005 and in Alava et al. 2015.
162.	*Insentiraja subtilispinosa*	(Stehmann, 1989).	Western looseskin skate, velvet skate.	N	Confirmed, NO species account	Listed in Compagno et a 2005 as *Insentiraja* cf. *subtilispinosa*, with Philippine occurrence as New/ Undescribed/Endemic. In Alava et al 2014, occurrence in PH is confirmed).
163.	*Manta alfredi*	(Krefft, 1868).	Reef manta ray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014. Not listed in Compagno et al 2005. The genus was re-evaluated and two species, Reef Manta Ray (*Manta alfredi*) and Giant Manta Ray (*Manta birostris*), were identified (Marshall et al. 2009). Philippines' first record of *Manta alfredi* in Tubbataha reefs (Aquino 2013 in Alava et al 2014).
164.	*Manta birostris*	(Walbaum, 1792).	Giant manta ray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
165.	*Mobula eregoodootenkee*	(Bleeker, 1859).	Longhorned mobula, pygmy devilray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
166.	*Mobula japanica*	(Müller & Henle, 1841).	Spinetail mobula, spinetail devil ray, Japanese devil ray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014. Not in Compagno et al. 2005.
167.	*Mobula kuhlii*	(Müller & Henle, 1841).	Shortfin devil ray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
168.	*Mobula tarapacana*	(Philippi, 1892).	Chilean devil ray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014. Not in Compagno et al. 2005.
169.	*Mobula thurstoni*	(Lloyd, 1908).	Bentfin devil ray, smoothtail mobula.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
170.	*Myliobatis cf. tobijei Bleeker, 1854.*		Philippine kite ray.	U	Undescribed; potentially new	
171.	*Myliobatis tobijei*	Bleeker, 1854.	Japanese eagle ray, kite ray.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014.
172.	*Narcine lingula*	Richardson, 1846.	Chinese numbfish.	✓	Confirmed, with species account	Not in Compagno et al 2005; Listed in Alava et al. 2014.
173.	*Narcine maculata*	(Shaw, 1804).	Darkfinned numbfish, darkspotted electric ray.	?	Uncertain	Not in Compagno et al 2005; Listed in Alava et al. 2014. Nominal listing only; possibly mis-identifications; confused with *N.lingula* or the undescribed species *Narcine sp*. nov. H

	SPECIES	AUTHORITIES	COMMON NAME	STATUS OF PHILIPPINE OCCURRENCE		REMARKS
174.	*Narcine sp. nov. H*	de Carvalho, 1999.	Darkfin numbfish.	U	Undescribed	not in original table but in Alava et al. 2014.
175.	*Narcine timlei*	(Bloch & Schneider, 1801).	Blackspotted numbfish.	?	Uncertain	not in original table but in Alava et al. 2014; Nominal listing only; possibly mis-identifications; confused with *N.lingula* or the undescribed species *Narcine sp*. nov. H
176.	*Narke dipterygia*	(Bloch & Schneider, 1801).	Spottail sleeper ray.	?	Uncertain	
177.	*Neotrygon orientale*	Last, White & Seret, 2016.	Bluespotted stingray, bluespotted maskray.	✓	Confirmed (NEW)	New species. Note of genus and species change based on taxonomy revision: from *Dasyatis* to *Neotrygon* (Last and White 2008). New species is part of the *Neotrygonkuhlii*-complex. Occurrence confirmed from PH samples (Naylor et al. 2012).
178.	*Okamejei boesemani*	(Ishihara, 1987).	Black sand skate, Boeseman's skate.	?	Uncertain	Additional common names from IUCN
179.	*Okamejei hollandi*	(Jordan & Richardson, 1909).	Yellow-spotted skate.	?	Uncertain	in Alava et al 2014 as nominal records; occurrence in the Philippines needs further investigation.
180.	*Okamejei jensenae*	Last & Lim, 2010.	Sulu Sea skate.	N	Confirmed, NO species account	Listed in Compagno et al 2005 as *Okamejei sp*. nov. Philippine ocellate skate; Described in 2010. In original table as *Okamejei jensenae* sp. nov. with common name Philippine ocellate skate.
181.	*Okamejei kenojei*	(Müller & Henle, 1841).	Spiny rasp skate, ocellate spot skate.	?	Uncertain	in Alava et al 2014 as nominal records; occurrence in the Philippines needs further investigation. Additional common names from IUCN
182.	*Okamejei meerdervoortii*	(Bleeker, 1860).	Bigeye skate.	?	Uncertain	Listed in Compagno et al 2005 as *Anacanthobatis* cf. *borneensis* Chan, 1965. Philippine legskate. in Alava et al 2014 as nominal records; occurrence in the Philippines needs further investigation.
183.	*Pastinachus atrus* = *Pastinachus ater*	(Macleay, 1883).	Cowtail stingray, fantail ray, banana-tail ray, bull ray, feathertail ray.			Status change: from Confirmed to Needs confirmation. Not in Compagno et al. 2005. Listed in Alava et al. 2014 as *Pastinachus atrus*. May be in a species complex with various other stingrays (e.g., *P. sephen*). Needs confirmation. Synonyms include: *P. atrus* (Macleay, 1883); *P. sephen* (Forsskål, 1775), *T. atra* Macleay, 1883 (Morgan et al. 2016).
184.	*Pastinachus cf. sephen*	(Forsskål, 1775)	Cowtail stingray.	U	Undescribed; potentially new	in Compagno et al. 2005 . Listed in Alava et al. 2014: may be in a species complex with various other stingrays (e.g., *P. sephen*). Needs confirmation.
185.	*Pastinachus sephen*	(Forsskål, 1775)	Cowtail stingray.	T	Taxonomy to be resolved	May be in a species complex with various other stingrays (e.g., *P. sephen*). Needs confirmation. Synonyms include: *P. atrus* (Macleay, 1883); *P. sephen* (Forsskål, 1775), *T. atra* Macleay, 1883 (Morgan et al 2016).
186.	*Platyrhina sinensis*	(Bloch & Schneider, 1801).	Fanray.	?	Uncertain	
187.	*Plesiobatis daviesi*	(Wallace, 1967).	Deepwater stingray, giant stingaree.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
188.	*Pristis pectinata*	Latham, 1794.	Smalltooth sawfish.	?	Uncertain	

	SPECIES	AUTHORITIES	COMMON NAME	STATUS OF PHILIPPINE OCCURRENCE		REMARKS
189.	*Pristis pristis*	(Linnaeus, 1758).	Largetooth sawfish, common sawfish.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014. Note: *Pristis pristis* is lumped *Pristis microdon* (Pacific fresheater sawfish) and *Pristis perotteti* (Atlanatic largetooth sawfish) based on molecular and morphological characters (Faria et al. 2013)
190.	*Pristis zijsron*	Bleeker, 1851.	Green sawfish.	✓	Confirmed, with species account	
191.	*Rhina ancylostoma*	Bloch & Schneider, 1801.	Shark ray, bowmouth guitarfish.	✓	Confirmed, with species account	Typo erros: *Rhina ancylostomus* =*Rhina ancylostoma.* Additional common names from IUCN.
192.	*Rhinobatos cf. schlegelii* = *Rhinobatos whitei*	Last, Corrigan & Naylor, 2014.	Philippine guitarfish.	N	Confirmed, with No species account	New species; listed in Compagno et al 2005 and in Alava et al 2014 as *Rhinobatos* cf. *schlegelii* (*Philippine guitarfish*).
193.	*Rhinobatos formosensis*	Norman, 1926.	Taiwan guitarfish.	?	Uncertain	
194.	*Rhinobatos schlegelii*	Müller & Henle, 1841.	Brown guitarfish.	?	Uncertain	Not in Compagno et al 2014; reported in Alava et al. 2014 as reference to the Philippine guitarfish (*Rhinobatos* cf. *schlegelii*; now the new species *R. whitei*). Taxonomic problems still needs to be resolved for the species (Compagno & Ishihara 2009).
195.	*Rhinoptera javanica*	Müller & Henle, 1841.	Javanese cownose ray, flapnose ray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
196.	*Rhynchobatus australiae*	Whitley, 1939.	Whitespotted wedgefish.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
197.	*Rhynchobatus* cf. *laevis*	(Bloch & Schneider, 1801).	Smoothnose wedgefish.	U	Undescribed; potentially new	
198.	*Rhynchobatus laevis*	(Bloch & Schneider, 1801).	Smoothnose wedgefish.	?	Uncertain	Not listed in Compagno et al 2005. Has been mistaken for *Rhynchobatusdjiddensis* (Forsskael, 1775) and *R. australiae* Whitley, 1939 (Compagno and McAuley 2016).
199.	*Rhynchobatus* sp. 2	in Last & Compagno, 1999.	Broadnose wedgefish.	U	Undescribed; potentially new	
200.	*Taeniura lymma*	(Forsskål, 1775).	Bluespotted ribbontail ray, fantail ray, blue-spotted stingray, ribbontailed stingray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014.
201.	*Taeniura meyeni* = *Taeniurops meyeni*	Müller & Henle, 1841.	Round ribbontail ray, blotched fantail ray.	✓	Confirmed, with species account	Genus change from *Taeniura* to *Taeniurops*(Last et al. 2016b). Other synonyms: *Taeniura melanospilos* Bleeker, 1853; *Taeniura meyeni* Müller & Henle, 1841; additional common name from Kyne and White 2015.
202.	*Temera hardwickii*	(Bloch & Schneider, 1801).	Finless sleeper ray.	?	Uncertain	
203.	*Torpedo sp.* Philippine spotted torpedo. = *Torpedo* sp. 1		Philippine spotted torpedo.	U	Undescribed; potentially new	Listed in Compagno et al 2005 as *Torpedo* sp. (Philippine spotted torpedo). Listed in Alava et al. 2014 as *Torpedo* sp. 1
204.	*Torpedo marmorata*	Risso, 1810.	Spotted torpedo, marbled electric ray.	?	Uncertain	Not in Compagno et al 2005. Listed in Alava et al. 2014: nomial listing only, occurrence needs to be confirmed.
205.	*Torpedo* sp. *Philippine offshore torpedo.*= *Torpedo* sp. 2		Philippine offshore torpedo.	U	Undescribed; potentially new	Listed in Compagno et al 2005 as *Torpedo* sp. (Philippine offshore torpedo). Listed in Alava et al. 2014 as *Torpedo* sp. 2
206.	*Urogymnus asperrimus*	(Bloch & Schneider, 1801).	Porcupine ray, thorny ray.	✓	Confirmed, with species account	Confirmed, with species account in Alava et al. 2014. Additional common names from Bray 201.
	87			.		

2.2 SPECIES OCCURRENCES AND DISTRIBUTION

Species Occurrences. Compagno et al. 2005 summarizes the localities from which specimens are collected. An independent and largely opportunistic discovery by WWF field personnel between 2003–2006 confirmed presence of three other species, namely *Dalatias licha, Zameus squamolusos,* and *Isurus paucus,* and listed at least eight others which were not initially identified to the genus and/or species level (Gaudiano and Alava 2003). A SEAFDEC-funded shark fisheries studies in four monitoring/landing sites (i.e., Coron/Panlaitan, Palawan; Aparri, Cagayan; San Jose Occidental Mindoro; and Mabua, Surigao del Norte) by BFAR-NFRDI yielded at least 24 species, a report on a shovelnose ray (*Aptychotrema sp*.) suggest possibly a new record for the Philippines and needing further verification and validation (Barut 2006).

NSAP-initiated shark and ray assessments in the regions, between 1998–2016, also yielded additional species (see Table 2.2). The first SAR, which reported shark species only, numbered up to 100 species that were landed in at least 9 regions (i.e., Regions 1, 2, 3, 4A, 6, 7, 8, 10, 13) (see SAR/NSAP 2009 Table 2.2). At least 68 species (or 69%) were identified to the species level, though needing confirmation.

Based on nominal listings alone, the highest shark species number is reported in Regions 6 and 1, at 26 and 25 species, respectively. While there were at least three species considered as new records, more than half (i.e., 52%) of the species in the list need further validation in the absence of voucher specimens and/or photos. Some of the regional report also showed a number of species identified at family and genus levels only or by common names and/or local names (i.e., about 31%). A site-based photo-identification guide needs to be developed at the regional level as a base reference for species reported to occur in the region so as to confirm the list.

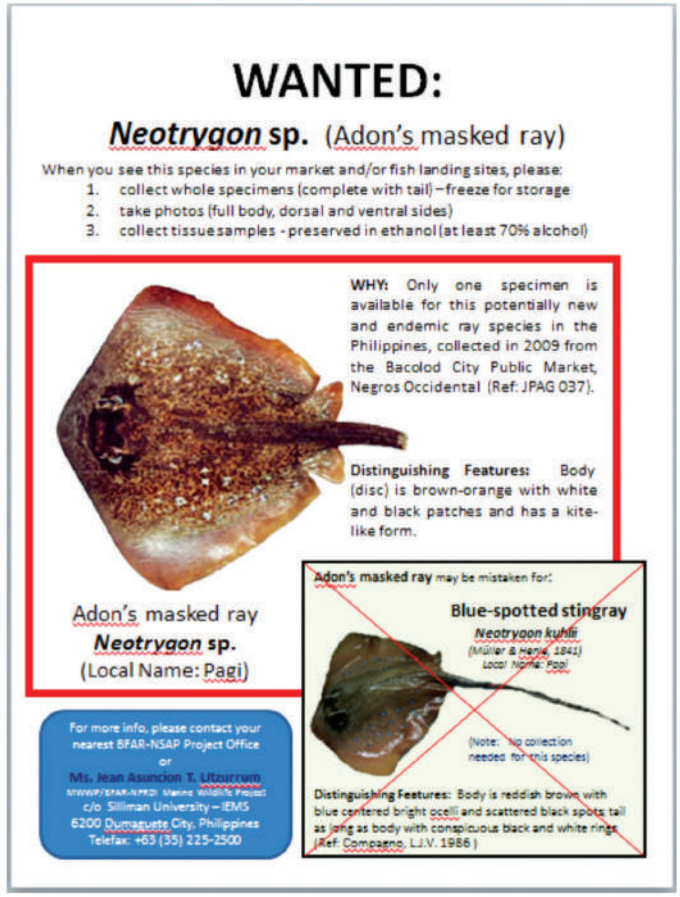


Figure 2.1. A "wanted" poster in 2010 highlighting need for more information to validate a single specimen of Adon's ray (*Neotrygon sp*.), a potentially new species record for the Philippines collected in Bacolod, Negros Occidental.

Table 2.2. List of cartilaginous fishes caught in Philippine waters, from 1999 to 2016.
(Source: NSAP Shark Fisheries Regional data, combined summaries from 2009 SAR (A) and September/October 2016 reports (B).

	SPECIES	REGIONS															REMARKS
		1	2	3	4A	4B	5	6	7	8	9	10	11	12	CARAGA	ARMM	
	SHARKS	AB		AB	B		B	AB	B			AB	B		AB	B	
1	*Alopias pelagicus*						B	AB									
2	*Alopias sp.*			A			B	B				AB				B	Unidentified to species level.
3	*Alopias superciliosus*			AB			B	AB	AB			B					
4	*Alopias vulpinus*							B									Confirmed from photo.
5	*Anoxypristis cuspidata*							B		B							
6	*Atelomycterus macleayi*	AB	B				B	AB	AB								
7	*Atelomycterus marmoratus*						B										Also in Barut 2006.
8	*Aulohalaelurus kanakorum*						B										Possibly a misidentification. The Kanakorum catshark is known only from one specimen collected near southwestern New Caledonia in the western central Pacific Ocean (Compagno and Niem 1998; Fowler et al. 2003). Some records listed the species under rays/batoids, resulting in double reporting.
9	*Cacharhinus albimarginatus*													B			
10	*Carcharhinus falciformis*		AB			B	B	B	A	AB				B	AB		
11	*Carcharhinus albimarginatus*		B							B					A		
12	*Carcharhinus altimus*					B									A		Also in Barut 2006.
13	*Carcharhinus amblyrhynchoides*							A		AB							
14	*Carcharhinus amblyrhynchos*		A														
15	*Carcharhinus amboinensis*																In Barut 2006. Not in Compagno et al 2005 checklist; needs confirmation.
16	*Carcharhinus brachyurus*							A									Not in Compagno et al. 2005; needs confirmation.
17	*Carcharhinus brevipinna*	B	A	A			B								A		
18	*Carcharhinus dussumieri*	B	AB	B	AB		B			AB			B				Needs confirmation (refer to Compagno et al. 2005).
19	*Carcharhinus falciformis*	B	A	B	A		B	AB					B			B	
20	*Carcharhinus galapagensis*	AB	B	A			B										Not in Compagno et al. 2005; needs confirmation.
21	*Carcharhinus leucas*	AB						A									in Barut 2006.
22	*Carcharhinus limbatus*	AB		AB		B	B	AB	AB	AB		B			B		
23	*Carcharhinus longimanus*		AB	B			B	AB		AB				B			
24	*Carcharhinus melanopterus*	AB	AB	AB	B	B	B	AB	AB	AB				B	AB		
25	*Carcharhinus obscurus*						B			B		A					Needs confirmation. Not in Compagno et al 2005 checklist.
26	*Carcharhinus plumbeus*			A			B										Not listed in Compagno et al. 2005. Needs confirmation.

27	*Carcharhinus sealei*		B				B	B	B	B		B			A		Typo errors (e.g., in species name *C. seale*) in some entries resulting to double reporting; At least one record for *C. sealei* misplaced under Rays.
28	*Carcharhinus signatus*					B											
29	*Carcharhinus sorrah*	AB	AB	B	AB	B	B	AB	AB	AB		B		B	B		Typo errors (e.g., in genus name *Carcarhinus*) in some entries resulting to double reporting.
30	*Carcharhinus sp./spp.*	AB	A		A		B	AB									Unidentified to species level. Needs confirmation. Typo errors in some records (e.g., *Charcharhinus sp.* or recorded as spp.) , resulting to double reporting.
31	*Carcharias melanopterus*				B	B				B							
32	*Carcharias taurus*						B										in Barut 2006. Senior synonym for *Eugomphodus taurus* (sand tiger shark).
33	*Carcharodon carcharias*						B										
34	*Centrophorus lusitanicus*																in *Gaudiano unpub ms* ; Confirmed from photo.
35	*Centrophorus moluccensis*	AB					B										Also in Barut 2006. Needs confirmation (refer to Compagno et al. 2005).
36	*Centrophorus sp.*																in *Gaudiano unpub ms* ; With photo but unidentified to species level.
37	*Chiloscyllium arabicum*						B										
38	*Chiloscyllium griseum*	B		B	B		B	AB		B							Needs confirmation (refer to Compagno et al. 2005); mispelled in some records as *Chielocyllium griseum.*
39	*Chiloscyllium indicum*							AB	A					B			Needs confirmation (refer to Compagno et al. 2005).
40	*Chiloscyllium plagiosum*		B				B	B	B	B							
41	*Chiloscyllium punctatum*	AB		A	B	B	B	AB		B					B	B	Also in Barut 2006.
42	*Chiloscyllium spp.*						B	B									
43	*Daenia spp.*																confirmed in photos as reported in *Gaudiano unpub ms*. Needs confirmation. Not in Compagno et al 2005 checklist.
44	*Dalatias licha*																Gaudiano unpub ms; New record; confirmed from photo.
45	*Eridacnis radcliffei*	B					B										
46	*Eucrossorhinus dasypogon*	AB															Not in Compagno et al. 2005; needs confirmation. Probably a mis-ID.
47	*Euptromicrus sp.* =*Euprotomicrus*																Typo error; reported in Gaudiano unpub ms; With photo but unidentified to species level. Common name: pygmy shark (4 matches) (FishBase).

	SPECIES	REGIONS															REMARKS
		1	2	3	4A	4B	5	6	7	8	9	10	11	12	CARAGA	ARMM	
48	*Eusphyra blochii*									B							
49	*Galeocerdo cuvier*	AB	A	AB			B	AB	AB			A	B			B	
50	*Hemigaleus microstoma*		AB		AB			B									
51	*Hemipristis elongata*	A					B										
52	*Hemiscyllium ocellatum*	AB					B			B					A		Not in Compagno et al. 2005; needs confirmation.
53	*Hemiscyllium sp./spp.*						B									B	Not identified to species level; reported as sp. Or spp. Or at genus level only.
54	*Hemiscyllium trispeculare*						B										Known to occur in Australia, possibly also in Indonesia. Not reported in Compagno et al 2005, Alava et al 2014.
55	*Hemispristis sp.*																in *Gaudiano unpub* ms ; With photo but unidentified to species level.
56	*Hemitriakis japonica/japanica*				B												Typo error in some entries for species name (e.g., japanica/japonica).
57	*Hemitriakis leucopteriptera*								A								*Gaudiano unpub ms.*
58	*Hemitriakis leucopterygia*						B		B								
59	*Heterodontus sp. = Heterodontus zebra*							AB	A								Also reported in Barut 2006. Some records only identified at genus level.
60	*Hexanchus nakamurai*		B				B										
61	*Hexanchus spp.*	B															
62	*Hexanchus griseus*	B	A														
63	*Hexanchus nakamurai*	AB															
64	*Himantura uarnak*														B		
65	*Isurus oxyrinchus*	AB		AB	B							A			A		Also reported in Barut 2006.
66	*Isurus paucus*		B														*Gaudiano unpub ms* ; With supporting photo by author to confirm presence.
67	*Loxodon macrorhinus*						B	AB		AB							
68	*Megachasma pelagios*			B					AB								
69	*Mustelus palumbes*				B												Needs confirmation. Not in Compagno et al. 2005. Species is known to occur on Southeast Atlantic (from Namibia to central Natal, South Africa) (FishBase).
70	*Nebrius ferrugineus*							B		B							Also reported in Barut 2006.
71	*Negaprion acutidens*							B									Also reported in Barut 2006.
72	*Notorhynus cepedianus = Notorhynchus cepedianus*		A														Typo error ingenus name. Broadnose sevengill shark is not listed in Compagno et al. 2005. Needs confirmation.
73	*Orectolobus ornatus*	AB						A	AB	B						B	Needs confirmation (refer to Compagno et al. 2005).
74	*Orectolobus sp.*							B									
75	*Orectolobus wardii*	B															

76	*Pliotrema warreni*									B							Not listed in Compagno et al. 2005. Needs confirmation. The sixgill sawshark (Pliotrema warreni) is known to occur in the Western Indian Ocean (off Madagascar and from southern Mozambique to Cape Agulhas, South Africa; Fishbase).
77	*Prionace glauca*	AB		B			B	B					B				Also reported in Barut 2006.
78	*Pristiophorus cirratus*											B					Longnose sawshark, probably a mis-identification with species reported in the Phil as *Pristiophorus sp.* C, still an undescribed species (Alava et al.2005).
79	*Pseudocarcharias kamachara* = *Pseudocarcharias kamoharai*								B								Needs to be confirmed. Possibly a mis-ID or a typo error (i.e., as *Pseudocarcharias kamoharai*).
80	*Rhina ancylostoma*							B	B								Also reported in Barut 2006. Typo errors in some records (e.g., *Rhina ancylostomata*), resulting to double reporting.
81	*Rhincodon typus*						B	B		B							
82	*Rhizoprionodon acutus*									B							
83	*Scoloidon laticaudus*		A					A	AB								Needs confirmation; not in Compagno et al. 2005).
84	*Scoloidon palasotah*								B								Needs confirmation (refer to Compagno et al. 2005).
85	*Sphyrna lewini*	AB	B	B	AB	B	B	AB	AB	AB		A				B	Also in Barut 2006.
86	*Sphyrna sp.*		B														
87	*Sphyrna zygaena*					B		A		AB		A					
88	*Squalus acanthias* = *Squalus spp.*											B			B		Possibly a mis-identification. *Squalus acanthias* Linnaeus, 1758 is known to occur in the North Pacific. The species reported in the Philippines may be of a species complex still undergoing taxonomic evaluation. *S. acanthias* is now being replaced as *Squalus suckleyi* (Girard, 1855), species name as resurrected by Ebert et al. 2010.
89	*Squalus megalops*	B					B			B			B				
90	*Squatina aculeata*						B										Possibly a mis-identification (see Alava et al. 2005; Compagno et al 2005). This species, the sawback angelshark, is known to occur in the Eastern Atlantic (from western Mediterranean, Morocco, Senegal, Guinea to Nigeria, Gabon to Angola; Compagno 1984).

	SPECIES	REGIONS															REMARKS
		1	2	3	4A	4B	5	6	7	8	9	10	11	12	CARAGA	ARMM	
91	*Squatina californica*											B					Possibly a mis-identification (see Alava et al. 2005; Compagno et al. 2005). This species, Pacific angel shark, is known to occur in the Eastern Pacific: southeastern Alaska to Gulf of California; Costa Rica to southern Chile; Compagno 1984).
92	*Squatina tergocellata*											B					Possibly a mis-identification (see Alava et al. 2005; Compagno et al 2005). This species, the ornate angel shark, is endemic to Australia (Compagno 1984; Kyne et al 2016).
93	*Stegostoma fasciatum*						B	B		B							
94	*Triaenodon obesus*		B				B		B	B							
TOTAL	*94*	28	24	19	14	10	44	38	22	28	0	15	6	6	14	8	
	Unidentified sharks																
1	balanakon								B								
2	bensulan								B								
3	black spotted shark								B								
4	bonggol								B								
5	Carcharhinidae				B	B	B										
7	iho								B								
8	Iho puntik white								B								
9	Iho-brown								B								
10	lawihan								B								
11	noog-noog								B								
12	pating								B								
13	Scyliorhinidae				B												
14	Sharks								B						B		
15	Squalidae				B												
16	tangiguehon								B								
TOTAL	*15*	0	0	0	3	1	1	0	12	0	0	0	0	0	1	0	
	BATOIDS																
1	*Aetobatus narinari*	B	B				B	B	B				B			B	Needs confirmation. See Table 2.1.
2	*Aetomylaeus maculatus*						B										
3	*Aetomylaeus nichofii*							B									Type error in some entires (i.e., *Aetomyleus nichofii*) resulting to double reporting. Needs confirmation.
4	*Aetomylaeus vespertilio*							B									
5	*Aphychotrema rostrata*					B											Possibly a mis-identification. Not in Compagno et al 2005 checklist. Only four species reported in the world; three are endemic to Australia.
6	*Atelomycterus marmoratus*						B										

7	*Dasyatis akajei = Hemitrygon akajei*	B					B	B									Reported, needs confirmation. The genus *Hemitrygon* formerly was a junior synonym of *Dasyatis*; it was resurrected by Last et al. (2016) in their revision of the family *Dasyatidae*. Hence *Dasyatis akajei* is now *Hemitrygon akaje*i (Last, Naylor & Manjaji-Matsumoto, 2016).
8	*Dasyatis annotata = Neotrygon annotata*					B		B									Possibly a mis-identification. Typo error in some entries as Dasyatis annotatus. This species, plain mask ray, is known to occur in the Eastern Indian Ocean (Timor Sea) and Western Pacific (Arafura Sea and off northern) Australia (Last and Stevens 1994; Jacobsen et al. 2015). Note: Genus change from Dasyatis to Neotrygon.
9	*Dasyatis brevicaudata = Bathytoshia brevicaudata*	B				B	B	B									Possibly a mis-identification. The Short-tail Stingray *hytoshiabrevicaudata*) is widespread and common to abundant in temperate areas of the southern hemisphere, recorded from New Zealand, Australia and southern Africa (Last and Stevens 1994; Duffy et al. 2016). Note: Genus change from *Dasyatis* to *Bathytoshia* (Eschmeyer 2016).
10	*Dasyatis brevis*			B	B												Possibly a mis-identification. The Whiptail Stingray (*Dasyatis brevis*) is known to occur in Eastern Pacific: Hawaii and from California, USA to Peru (Nishida and Nakaya, 1990.; Duffy et al. 2016).
11	*Dasyatis centroura*					B											Possibly a mis-identification. The Roughtail Stingray (*Dasyatis centroura*) is known to occur inwestern and estern Atlantic (Séret 2003; Menni and Lucifora, 2007). Genus name needs validation based on recent taxonomic review by Last et al 2016.
12	*Dasyatis kuhlii = Neotrygon kuhlii (?) = Neotrygon orientale (?)*	B	B	B	B	B	B	B				B		B	B		Belongs to a species complex; taxonomic changes in recent years lead to confusion and double reporting in most entries: (i.e., genus change from *Dasyatis* to *Neotrygon*; species change of some specimens from *kuhlii* to orientale). Needs further validation of specimens in the collection.
13	*Dasyatis lata = Bathytoshia lata*														B		Needs confirmation. Not in Compagno et al 2005; Alava et al 2014. Known record for the species is only on Hawaii and Taiwan (Nishida and Nakaya 1990; Cartamil et al. 2002). Note in genus change: *Bathytoshia* formerly was a junior synonym of Dasyatis, which is now recognised as a valid species (Last et al. 2016); hence *Dasyatis* (*Bathytoshia*) lata is now *Bathytoshia lata* (Ebert et al. 2016).

	SPECIES	REGIONS														REMARKS
		1	2	3	4A	4B	5	6	7	8	9	10	11	12	CARAGA	ARMM	
14	*Dasyatis leylandi = Neotrygon leylandi*	B					B						B				Possibly a mis-identification. The Painted maskray (*Neotrygon leylandi*) is known to occur in the northern Australia and New Guinea, including the Arafura Sea and Timor Sea (Last and Stevens 1994; Pierce and Kyne 2015.). Note: Genus change from *Dasyatis* to *Neotrygon* (Last et al. 2016).
15	*Dasyatis lymma*																Possibly a mis-identification: *Dasyatis kuhlii* (= *Neotrygon orientales*) or *Taeniura lymma.*
16	*Dasyatis parvoniga (?)*					B		B									Possibly a mis-identification: no species record in FishBase.
17	*Dasyatis pastinaca*					B	B	B					P				Possibly a mis-identification. Needs confirmation. The Common stingray (*Dasyatis pastinaca*) is known to occur only in North-eastern Atlantic Ocean, the Mediterranean Sea and the African coast southwards to Senegal (Séret 2003). Note taxonomic revision by Last et al. 2016.
18	*Dasyatis quttata*		B														
19	*Dasyatis sephen*							B									Possibly a mis-identification: *Pastincahus sephen* (Cowtail stingray)?
20	*Dasyatis sp. = Neotrygon sp. (?)*	B	B			B	B	B									Note traxonomic revision of Last et al. 2016. There are also typo error in some records (as sp, sp. or spp.) resulting to double reporting. Not identified to species level. Need further confirmation.
21	*Dasyatis thetidis*	B		B			B	B					P				Possibly a mis-identification. The Thorntail stingray (*Dasyatis thetidis*) is known to occur in Mozambique, South Africa, Reunion, southern Australia, and New Zealand. Not in Compagno et al 2005; Alava et al 2014; Note taxonomic revision by Last et al. 2016.
22	*Dasyatis ushiei*					B	B	B									The Cow stingray (*Dasyatis ushiei*) is known to occur on northern Japan to the East China Sea (Nishida and Nakaya, 1990).
23	*Dasyatis zugei =Telatrygon zugei*				B			B									Note taxonomic revision of Last et al. 2016.
24	*Gymnura australis*							B									Possibly a mis-identification. Known to occur in Indo-West Pacific: northern Australia and south coast of New Guinea (Last and Stevens 1994). Also in the Arafura Sea.
25	*Gymnura sp.*							B									
26	*Himantura alcocki*				B												Possibly a mis-identification. Known to occur in the Indian Ocean: India to Indonesia.

27	*Himantura bleekeri = Pateobatis bleekeri*						B										Note taxonomic revision of Last et al. 2016.
28	*Himantura fai = Pateobatis fai*							B									Note taxonomic revision of Last et al. 2016.
29	*Himantura gerrardi= Maculabatis gerrardi*		B					B									Note taxonomic revision of Last et al. 2016.
30	*Himantura granulate = Urogymnus granulatus*											B					Note taxonomic revision of Last et al. 2016.
31	*Himantura jenkinsii = Pateobatis jenkinsii*		B			B	B	B									Synonym of Himantura draco =*Himantura jenkinsii*. Genus change from Himantura to Pateobatis(see Last et al. 2016).
32	*Himantura sp.*						B	B									Needs confirmation.
33	*Himantura uarnak*	B	B	B	B		B	B	B								Needs confirmation.
34	*Himantura undulata*							B									Needs confirmation.
35	*Manta birostris*	B	B		B		B	B		B			B		B		Needs confirmation.
36	*Manta sp.*							B									Needs confirmation.
37	*Mobula diabola = Mobula eregoodootenkee (?)*		B				B	B		B					B		Possibly mis-ID. = *Mobula eregoodootenkee* (?).
38	*Mobula eregoodootenkee*						B	B				B					
39	*Mobula japanica*	B					B										
40	*Mobula kuhlii*						B					B					
41	*Mobula mobular*							B									No record in PH; possibly a mis-ID. Species known to occur in the Eastern Atlantic.
42	*Mobula spp.*						B	B									
43	*Mobula tarapacana*						B										
44	*Mobula thurstoni*						B										
45	*Mobular mobula*							B									
46	*Pastinachus sephen*	B					B	B									See comments in Table 1.1.
47	*Pristis sp.*							B									Mis-classified in rcords as a shark species. Pristis, commonly known as sawfishes, are rays.
48	*Rhynchobatus australiae*	AB			B		B	B	B								Some records list the species as *Rhincodon australiae*. Possibly typo error or mis-identification as *Rhincodon typus* (whale shark) or *Rhynchobatus australiae* (wedgefish). Needs verification.
49	*Rhynchobatus djiddensis*	B			B		B					B				B	Typo error in some entries as *Rhycobatus djiddensi*. Needs confirmation. Possibly a mis-identification (refer to Compagno et al. 2005).
50	*Rhynchobatus spp.*							B									Needs to be confirmed to species level.
51	*Rhinobatos granulatus*		A														Needs confirmation (refer to Compagno *et al.* 2005: *Rhinobatos* cf. *schlegelii*). Typo error in some entries (as "*Rhinobatus*" or "*schoegelhi*"). In some records the genus is misclassified under sharks.

52	*Rhinobatos schlegelii*	B					B		B								Needs confirmation (refer to Compagno et al. 2005: *Rhinobatos cf. schlegelii*). Typo error in some entries (as "*Rhinobatus*" or "*schoegelhi*"). Also misclassified in some records under sharks.
53	*Rhinobatos spp.*	B															Typo error in some records (i.e., misspelled as *Rhinubatus* sp.). Needs confirmation to species level. There are two species reported present in the Philippines but needs validation. Also reported in Barut 2006.
54	*Rhinoptera javanica*						B		B								
55	*Taeniura lymma*	B		B			B	B	B	B		B	B		B		
56	*Taeniura sp.*						B										Needs confirmation.
57	*Taeniurops meyeni*					B	B	B		B							Synonyms: *Taeniura meyeni; Taeniura melanospilos.*
58	*Trygonoptera testecea*						B										Possibly a misidentification. Species known to occur in Western Pacific: southern Queensland to New South Wales.
59	*Urolophus sp.*						B										Needs confirmation.
60	*Urolophus westraliensis*	P					B										Possibly a misidentification. Species known to occur in Western Australia.
TOTAL	*60*	17	10	5	8	11	34	35	6	4	0	6	6	1	5	2	
	Unidentified batoids																
1	baliwan								B								
2	Cow-tail sting ray								B								
3	dahonan								B								
4	Dasyatidae				B	B											
5	felisan								B								
6	lepot								B								
7	pagi								B								
8	Raja spp.						B										
9	Rays						B		B								
10	spineless devil ray								B								
11	sting ray								B								
TOTAL	*11*	0	0	0	1	1	2	0	9	0	0	0	0	0	0	0	

Table 2.3. Comparative number of species of sharks and batoids as reported in in 15 regions of the Philipines, 1998–2016. (Source: NSAP Shark Fisheries Regional data from 1998–2016:, combined summaries from 2009 SAR and September/October 2016 reports).

SPECIES	REGIONS															TOTAL No. Species
	1	2	3	4A	4B	5	6	7	8	9	10	11	12	CAR	ARMM	
NSAP (1998-2006)																
SHARKS	24	15	11	6			26	16	12	1	12			10		68
TOTAL	24	17	14	6	0	5	32	23	20		22	11	12	10	0	68
NSAP (1998-2016)																
SHARKS	28	24	19	17	11	45	38	34	28	0	15	6	6	15	8	109
BATOIDS	17	10	5	9	12	36	35	15	4	0	6	6	1	5	2	71
TOTAL No. Species	45	34	28	28	26	81	94	49	32	0	21	12	8	20	10	180

The 2009 and 2016 lists are summarized in Table 2.3, which shows 180 species: 94 species for sharks (15 of which were not identified to species) and 67 batoids (at least 11 of which were not identified to species). A marked increase in number of species is reported, due to the inclusion of batoid species in the second reporting period (compared to only sharks in 2009 list) and to the increase in the number of regions that were monitoring elasmobranch landings (i.e., 14 out of 15 coastal regions, roughly about 93%) (see Table 2.3).

The summary list was reviewed based on occurrence as reported in Compagno et al. 2005, Alava et al. 2014, and recent taxonomic papers (i.e., new species descriptions, including taxonomic reviews of Last et al. 2016ab for some batoids). In both reporting periods, similar problems in species listings were encountered. Some species were identified only by their common names or local names while others at the family or genus levels only. Some species are considered as possible misidentifications, particularly those species known to occur only in certain areas (e.g., *Squalus acanthias* Linnaeus, 1758 in North Pacific, now being replaced as *Squalus suckleyi* [Girard, 1855] as resurrected by Ebert et al. 2010); some species have ranges reported outside Philippine waters (e.g., *Dasyatis ushiei* in Japan; *Gymnura australis* in the Indo-West Pacific).

Aside from basic identification concerns, there were a number of typo errors and misspellings and general inconsistencies in recording which resulted in double reporting and wrong entries, making analysis more difficult. There were also misclassification of species; for example, ray species classified under sharks and vice-versa. The need to train/re-train field personnel on basic taxonomy and classification cannot be overemphasized. However, accurate reporting and data management is also highly recommended to ensure better utilization of datasets for species-specific management and decision-making.

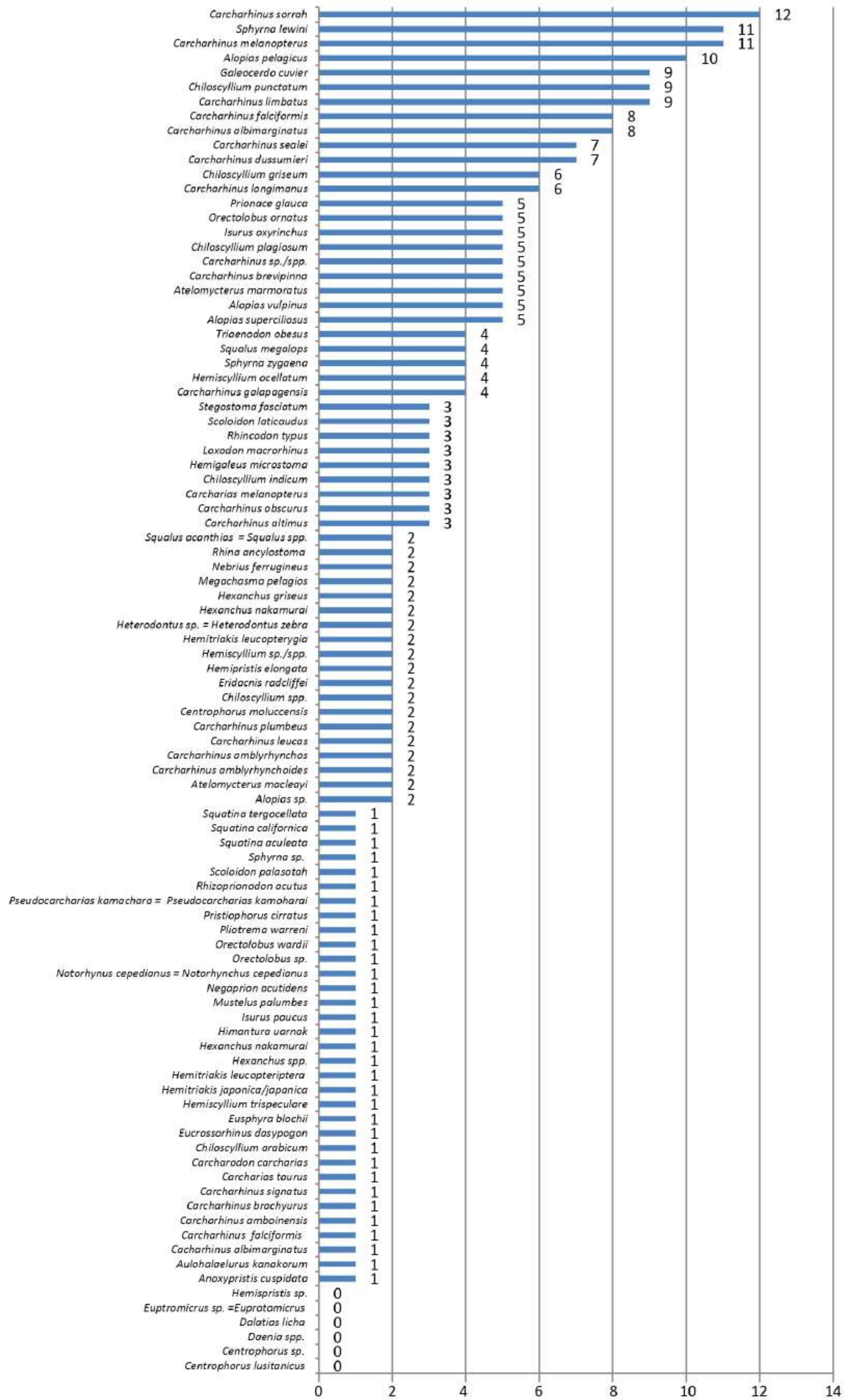


Figure 2.2. Frequency distribution of shark species across landing sites in 15 coastal regions in the Philippines, from 1999 to 2016. (Source: NSAP Shark Fisheries Regional data, combined summaries from 2009 SAR and September/ October 2016 reports).

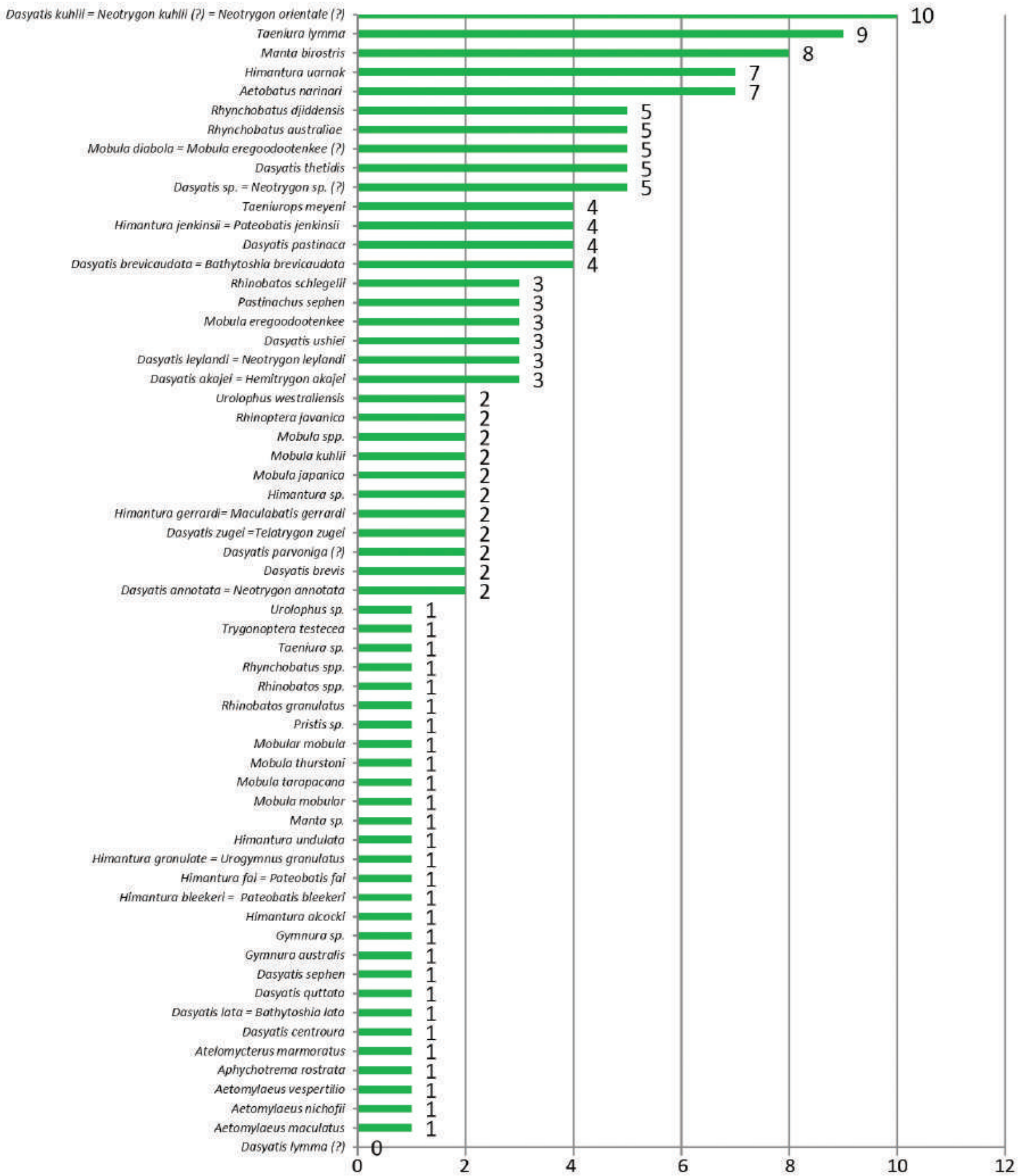


Figure 2.3. Frequency distribution of batoid species across landing sites in 15 coastal regions in the Philippines, from 1999 to 2016. (Source: NSAP Shark Fisheries Regional data, combined summaries from 2009 SAR and 2016 SAR, partial data).

Distribution. Collection sites and localities of museum specimens are summarized in part by Compagno et al. 2005. Other sources are taxonomic papers written by various authors which can be mapped out to establish distribution. Given the limitations and the need for species confirmation on site, partial data from NSAP shark catch summaries in 15 regions show that less than half (about 48%) is reported to occur in more than 1 region (see Table 2.5; also see Figure 2.2 and 2.3). Excluding species un-identified or listed under local or common names only, this translates to 55 sharks out of 94 species and 31 batoids out of 60 species identified. Only less than 10% (or 16 species) are reported to occur in more than 6 regions (i.e., 11 sharks, 5 batoids, see Table 2.6).

The top shark species occurring in at least 12 regions are: *Carcharhinus sorrah*, followed by *Carcharhinus melanopterus* and *Sphyrna lewini* (11 regions); *Alopias pelagicus* (10 regions); *Carcharhinus limbatus*, *Chiloscyllium punctatum*, and *Galeocerdo cuvier* (9 regions); *Carcharhinus albimarginatus* and *Carcharhinus falciformis* (8 regions); and *Carcharhinus dussumieri* and *Carcharinus sealei* (7 regions). At least 5 batoid species are reported in more than 6 regions, namely, *Dasyatis*

Table 2.4. Frequency distribution of shark and batoid species in 15 regions of the Philipines, 1998-2016. (Source: NSAP Shark Fisheries Regional data from 1998-2016: combined summaries from 2009 SAR and September/October 2016 reports).

Number Regions	Sharks		Batoids		TOTAL	
	# Spp.	%	# Spp.	%	# Spp.	%
>1 region	55	58.5%	31	51.7%	86	47.8%
>2 regions	36	38.3%	20	33.3%	56	31.1%
>3 regions	27	28.7%	14	23.3%	41	22.8%
>4 regions	22	23.4%	10	16.7%	32	17.8%
>5 regions	13	13.8%	5	8.3%	18	10.0%
>6 regions	11	11.7%	5	8.3%	16	8.9%
>7 regions	9	9.6%	3	5.0%	12	6.7%
>8 regions	7	7.4%	1	1.7%	8	4.4%
>9 regions	4	4.3%	1	1.7%	5	2.8%
>10 regions	3	3.2%			3	1.7%
>11 regions	1	1.1%			1	0.6%

Table 2.5. More prevalent shark and batoids species reported to occur in more than 6 regions in the Philippines, from 1999 to 2016. (Source: NSAP Shark Fisheries Regional data, 2009 SAR and 2016 reports).

SPECIES	Sharks/Batoids	Freq. Dist.	%	Habit
Carcharhinus sorrah	Shark	12	80.0%	pelagic
Carcharhinus melanopterus	Shark	11	73.3%	pelagic
Sphyrna lewini	Shark	11	73.3%	pelagic
Alopias pelagicus	Shark	10	66.7%	pelagic
Dasyatis kuhlii = Neotrygon kuhlii (?) = Neotrygon orientale (?)	Batoids	10	66.7%	demersal
Carcharhinus limbatus	Shark	9	60.0%	pelagic
Chiloscyllium punctatum	Shark	9	60.0%	demersal
Galeocerdo cuvier	Sharks	9	60.0%	pelagic
Taeniura lymma	Batoids	9	60.0%	demersal
Carcharhinus albimarginatus	Sharks	8	53.3%	pelagic
Carcharhinus falciformis	Sharks	8	53.3%	pelagic
Manta birostris	Batoids	8	53.3%	pelagic
Aetobatus narinari	Batoids	7	46.7%	pelagic
Carcharhinus dussumieri	Sharks	7	46.7%	pelagic
Carcharhinus sealei	Sharks	7	46.7%	pelagic
Himantura uarnak	Batoids	7	46.7%	demersal

kuhlii (= *Neotrygon kuhlii* (?) + *N. orientale* (?) in at least 10 regions, followed by *Taeniura lymma* (9 regions), *Manta birostri* (8 regions), and *Aetobatus narinari* and *Himantura uarnak* (7 regions). As shown, 75% of the top 16 prevalent species are pelagics (e.g., carcharhinid sharks, sphyrnids, threshers, and even mantas and eagle rays) while about 25% are demersals (e.g., dasyatid stingrays and bamboosharks).

There are no chimaera species reported in NSAP regional summaries. Specimens of chimaeras, however, have been collected in some market sites (i.e., as reported in Compagno et al. 2005). NSAP regional data for 1999–2016 still needs review for the presence of chimaeras in the fisheries operations of some regions.

2.3 POPULATION AND HABITAT STATUS

There are limited studies on the population abundance and structure of shark species in the Philippines. For at least two species, i.e., whale sharks and mantas/mobulas, population abundance were estimated from historical and landed catches in specific fishery sites or aggregate areas gathered through interview surveys and/or actual monitoring (e.g., Trono 1996; Alava et al. 1997a; Yaptinchay et al. 1998, and Alava and Yaptinchay 2000). Due to the estimated declines in catches, whale sharks (*Rhincodon typus*) and mantas (*Manta birostris*) were given protection through the implementation of Fisheries Administrative order 193 series of 1998 (also known as the whale shark/manta ban).

For whale sharks, based on surrogate population information such as catch data in the Bohol Seas between 1993 and 1997 (Alava et al. 1997b) and on sighting information in Donsol between 1997 and 1998 (Alava and Yaptinchay 2000), the whale shark numbers have been shown to be going down. Whale shark catch data was used in estimating a declining population in the Philippines through the application of the IUCN Red List Categories and Criteria and was classified as Critically Endangered (Alava 2005). Whale shark aggregation sites were later identified as priority conservation areas in the Philippine Biodiversity Conservation Priorities (Alava 2002). There was no initial estimate as to size much less the characteristics of the population of whale sharks. WWF-Philippines initiated a participatory research (i.e., involving volunteers and tourists) on the whale sharks in Donsol, Sorsogon to identify individuals through distinguishing markings, sexing, behavior, as well as photo-identification. This was envisioned to at least provide valuable information on the characteristics of the whale shark population in Donsol. A population discovered in Honda Bay by the Palawan Whale Shark Society in 1999 led to some behavioral studies on the species in their natural habitat, sans tourists, by Torres et al. (2000). A number of other whale sharks aggregation sites have been reported (e.g., Bohol Sea, Southern Leyte, Southern Cebu) which were subsequently identified as priority conservation areas in the Philippines (Alava 2002).

Studies on migration patterns of whale sharks through telemetry and satellite tracking as well as population stock analysis through genetic-microsatellite technique and feeding biology through plankton sampling were conducted during 1997–1998 in Malaysia and Philippines by Hubbs Sea World Research Institute, in collaboration with Scripps Institute of Oceanography and Southwest Fisheries Science Center in La Jolla, San Diego, California. Initial results included one individual tagged in the Bohol Sea in early 1997 and monitored to be transmitting signals off the coasts of Vietnam in mid-1997 (Eckert, personal communication). This study revealed that the whale sharks are indeed highly migratory, suggesting, though not conclusively as yet, that the whale shark is a global population requiring global management. Eckert (1998) also provided additional information on the migratory nature of whale sharks in the movement patterns of whale shark population at the Sea of Cortez, Mexico. One individual tagged from Mexico sent back a signal in the middle of the Pacific Ocean, after a span of over one year. In recent years, more focused studies on whale shark populations in known aggregations sites have been conducted, particularly in the Bohol Sea, Southern Leyte, and Southern Cebu in Central Philippines (e.g., Araujo et al. 2013; So et al. 2014; Snow et al. 2014; Araujo et al. 2014a, Araujo et al. 2014b).

For the mantas, there was an ad hoc lifting of the ban in favor of the continuance of the fishery in the Bohol Sea, with a caveat for monitoring and reporting of catches (c/o BFAR Region 7 and NFRDI). During that time, only *Manta birostris* was reported to occur in the Philippines, thus protection was afforded to the species under the whale shark/manta ban. A rapid resource assessment (RRA) of the manta or devil rays was conducted in the area from April 2002 to March 2003, the results of which suggested that there were three other species found to occur in the area, namely, the Bentfin devil ray (*Mobula thurstoni*), Longfin devil ray (*Mobula eregoodootenke*), and Shortfin devil ray (*Mobula khulii*) (Rayos et al. 2012). The exploitation ratio (proportion of fishing mortality over the total mortality) of the rays was also calculated to have reached the critical level of 0.52. During the study period, manta rays (*Manta birostris*) comprised 6% of the total catch while the other species that include the Bentfin devil ray (*Mobula thurstoni*), Longfin devil ray, (*Mobula eregoodootenke*), and Shortfin devil ray (*Mobula khulii*) comprise the remaining 94%). The results highlighted the need for improved management for mobulid species excluded from the said ban.

The presence of *Manta alfredi* in the Bohol Sea is confirmed through morphometrics and genetic studies of landed individuals (e.g., Acebes et al. 2016, Rambahiniarison et al. 2016) while that in Tubbataha Reefs Natural Park, Cagayancillo, Palawan, Philippines is confirmed through photo-markings (e.g., Aquino et al. 2015).

In 2010, the landed catch and effort of the mobulid species in Bohol Sea as well as some aspects of the biology of the species were collected, analyzed, and compared with the 2002–2003 study to assess whether the issuance of BFAR Fisheries Administrative Order 193 is warranted. The results of the RRA suggested that mobulid populations appearead to be in good condition (i.e., no decline in catch of the mobulids amidst a maintained mobulid fishing effort). This finding was attributed to the very seasonal nature of the fishery and the fishing methods employed (Rayos et al. 2012). Of the recorded Mobulas caught, 11% were identified to be immature based on the disc width. In addition, with a newly-born *Mobula thurstoni* among the catch, Bohol Sea was also identified as a possible spawning ground for the species. The history, characteristics and sustainability of the Mobulidae fishery in the Bohol Sea is reported by Freeman et al. (2014) and Acebes and Tull (2016).

Fishery-independent research initiatives have been conducted for selected species of sharks in the Philippines, to include: whale sharks (in Donsol by WWF; Sogod, Palawan, and Oslob by LAMAVE); Tubbataha/Apo Reef sharks, such tiger sharks and grey reef sharks (by TMO and LAMAVE); thresher sharks *Alopias pelagicus* (in Monad Shoal by the Thresher Sharks Conservation Research Project); *Manta/Mobula spp*. (in Tubbataha by the TMO, in Bohol by LAMAVE, in Ticao Pass by Y. Barr, Philippines in general by Manta Trust); and *Neotrygon* *sp.* (in Negros Island by J. Utzurrum of Silliman University). Initial results of some of these studies and other initiatives were made available during the Shark Conference in October 2016 conducted by Marine Wildlife Watch of the Philippines.

Shark and batoid catch data from NSAP regions for 1998–2016 still needs to be processed to get better estimates of stocks and population. Data is still patchy in reference to catch volume and number of individuals per species. In some regions (e.g., Region 2), an initial estimation of the relative abundances of species landed showed that the more prevalent species (i.e., those occurring and are reported in more regions in Philippines fisheries, refer to Chapter 3) were also reported to have higher landed volume (expressed in kg).

There is a need to review and analyze data based on fishing grounds and or habitats to get specific areas where these species are most impacted by fisheries operations. The information will feed into the threat assessment of each species known to occur in the Philippines using the IUCN Red List Categories and Criteria.

In 2015, at least one site was identified and established as a protected area for sharks and rays, which is Monad Shoal & Gato Island in Malapascua, northern Cebu. Current management initiatives conducted in the area include strengthening local capacity for MPA management and the enforcement of other fishery related laws. The thresher sharks and other species were accorded additional protection with the listing under CITES Appendix II in CoP 17 in 2016.

Recently, the municipality of Cagayancillo in Palawan passed a local ordinance (Cagayancillo SB Resolution No. 14 Series 2016, dated 7 September 2016) establishing a multiple-use MPA covering an area of 1,013,340 ha. In addition to the existing marine reserves managed as no-take (i.e., 500 ha), the Arena Reef (in the middle of Sulu Sea) is being proposed as a shark sanctuary with 120.71 ha core (the lagoon) and 997.6 ha buffer (the surrounding reef and shallow water). With technical assistance from WWF-Philippines, the local government of Cagayancillo will target the formulation of the MPA management/business plan in 2017.

2.4 CONCLUSIONS AND RECOMMENDATIONS

Same concerns are raised here as in the 2009 SAR—there is limited local knowledge, capacity, and skill to identify shark and ray catches to the species level. This leads to misidentification of species; recording of synonyms, misspellings, and general inconsistencies; absence of standards in terms of recording and reporting; and insufficient evidence-based identification process (e.g., lack of reliable photos, voucher specimens, tissue samples to validate or confirm species reported). The fact that there are now more shark species that factor in fisheries, a good percentage of which is still new to science, and that shark species groups are also undergoing taxonomic changes, make monitoring more complicated than usual. The same gaps are also identified to include: lack of biological and environmental data; limited information on transboundary, highly migratory, and high seas stocks; and limited information or lack of data analysis on demersal and near-shore stocks.

As in the 2009 SAR, it has been recommended that a basic standard identification/field guide, data collection and monitoring protocols be developed and with a training of new field personnel on basic taxonomy, data collection and analysis to better equip them in research and monitoring. Although some field personnel have undergone basic training in taxonomy, local capacity needs to be regularly evaluated and strengthened to correct identification lapses. Shark catch monitoring and reporting is recommended to be an integral part of the National Stock Assessment Program. Capacity to gather information as well as the capability for scientific analysis need to be strengthened. A newer and younger set of field data collectors and monitoring team needs to be trained to sustain the process and an enabling environment and system of support (e.g., policies and budgets in place) should be put in place for them to effectively implement their roles.

The shark field guide (i.e., *Pating Ka Ba?*), which was produced only in 2014, is now in need of a revision based on the taxonomic changes of the shark species and groups in the past couple of years alone. It also needs to be updated based on new information on species resulting from field monitoring and research. The checklists provided by the regions need to be reviewed and validated so that an updated list can be produced and circulated for use in field monitoring. Regional catch data also need to be analyzed so that it can be effectively used for species-specific threat assessment and eventual protection, regulation, and/or management.

***

CHAPTER 3: PHILIPPINE SHARK FISHERIES

3.1 ELASMOBRANCH FISHERIES TRENDS

Historical Data. Philippine elasmobranch fisheries (PEF), first recorded for the year 1950, was only at 300 metric tons (mt), which is only about 0.1% of total elasmobranch fisheries (TEF) in that year. From 1950 to 1969, the annual average was only at 625 mt, which was still only about 0.2% of global elasmobranch catches. It gained relative importance in 1970 when it jumped to 690 mt and, within the next 20 years, averaged at 11,395 mt annually. It was close to 2% of global elasmobranch catches for the same period (see Box 3.1).

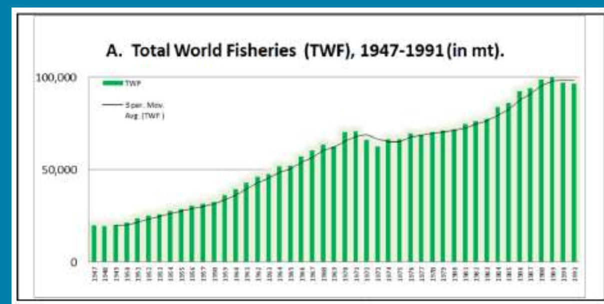
Philippines elasmobranch fisheries, based on the combined data from UN FAO FishStat 1950–2003 and Bureau of Agricultural Statistics of the Department of Agriculture (BAS-DA) 1976–2006 (or PEF1) reached its first peak in 1991 (at 19,049 mt) and followed a downward trend thereafter at an average of 6,398 mt per year from 1992 to 2006 (see Table 3.1; Figure 3.1). It achieved a second longer peak from 1989–1991 (for a three-year average of about 18,900 mt).

NSAP Data. Philippines elasmobranch fisheries (PEF2) based on partial data from the National Stock Assessment Program (NSAP) on catch landings from 15 coastal regions in the Philippines (see Annex E) is lumped to show total collective landings from 1998¬–2016 of about 72.7 mt, averaging 3.8 mt per year (see Table 3.1; Figure 3.1).

NSAP regional elasmobranch fisheries reached its first but very minor peak in 2004 (at 10.9 mt) and did a downward trend thereafter at an average of 6.8 mt per year from 2005 to 2009, reaching its lowest level for that period at 3.9 mt in 2010.

Box 3.1: Overview of Sharks in Global Fisheries

The production of total elasmobranch fisheries in relation to total global fisheries and has been discussed extensively in Bonfil 1994. As a group, elasmobranchs are a minor group in global fisheries contributing to an average of only 0.82% of the total world fishery based on catch landings from 1947–1991. About 454,9778,900 mt elasmobranch catches is reported, out of 57,895,580 mt total world catches which is translated to about 91 million individual animals harvested within that period.



Generally, global fisheries (A) and total elasmobranch fisheries (B) production has been on an incline from 1947 to 1991 at an average of 57,895,580 mt (or 189%) and 454,980 mt (126%) per year, respectively. Percent contribution of total global elasmobranch fisheries production, however, has been decreasing in relation to the total world fisheries production. In 1947, total elasmobranch catches was at 201 mt, which is about 1% of global catches (i.e., 20,000 mt). In 1991, elasmobranch catches is recorded at 7,804,000 mt, but this only contributed to about 0.7% of total world fisheries (96,926,000 mt).

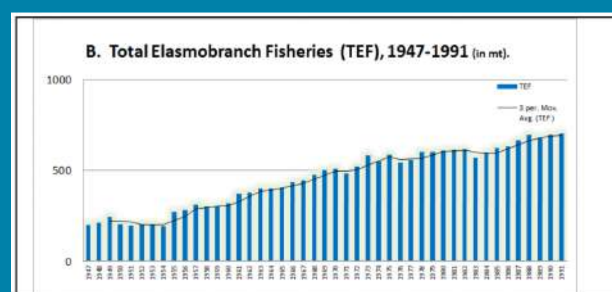


Table 3.1. Philippine elasmobranch fisheries (PEF, 1950-2016; data from various sources) in relation to total world fisheries (TWF, 1947–1991) and total world elasmobranch fisheries (1947–1991), expressed in thousand metric tons (mt). Sources: TWF/TEF: Compagno 1990 and UN FAO in Bonfil 1994. PEF1: UN FAO FishStat 1950–2003 and BAS-DA 1976–2006. PEF2: NSAP regional elasmobranch fisheries data 1998–2016.

YEAR	TWF	TEF	PEF[1]	PEF[2]	YEAR	TWF	TEF	PEF[1]	PEF[2]
1947	20,000	201			1983	77,591	568	8.2	
1948	19,600	211			1984	83,989	598	11.3	
1949	20,100	245			1985	86,454	623	11	
1950	21,100	204	0.3		1986	92,822	630	18.1	
1951	23,600	197	0.1		1987	94,379	666	16.2	
1952	25,200	203	0.5		1988	99,016	694	17.9	
1953	25,900	204	0.8		1989	100,208	679	19	
1954	27,600	194	1		1990	97,434	695	18.4	
1955	28,900	270	1.3		1991	96,926	704	19.1	
1956	30,500	280	1		1992			9.0	
1957	31,500	310	0.6		1993			10.9	
1958	32,800	300			1994			9.1	
1959	36,400	300	0.4		1995			9.1	
1960	39,500	320	0.8		1996			8.6	
1961	43,000	370	0.5		1997			3.8	
1962	46,400	380	0.7		1998			4.3	0.05
1963	47,600	400	0.3		1999			4.5	0.3
1964	52,000	400	0.1		2000			4.3	0.4
1965	52,400	405			2001			5.3	0.1
1966	57,300	433			2002			5.5	0.4
1967	60,400	444			2003			5.9	0.9
1968	63,900	476	1.1		2004			5.8	0.8
1969	62,700	502	0.5		2005			4.7	0.6
1970	70,388	508	6.9		2006			5.4	0.8
1971	70,747	482	7.3		2007				1.0
1972	66,121	519	8.2		2008				5.8
1973	62,824	583	9		2009				5.7
1974	66,597	549	9.4		2010				3.9
1975	66,487	586	10.4		2011				7.3
1976	69,930	544	9.1		2012				8.9
1977	69,226	556	8.9		2013				9.9
1978	70,596	600	14.3		2014				14.7
1979	71,331	603	9		2015				10.4
1980	72,141	609	9.7		2016				0.4
1981	74,884	612	12.6		AVG (1947 - 1991)	57,896	455	6.6	
1982	76,810	617	11.4		Average (1950 - 2006)			742.3	
					Average (1997 - 2016)				3.8

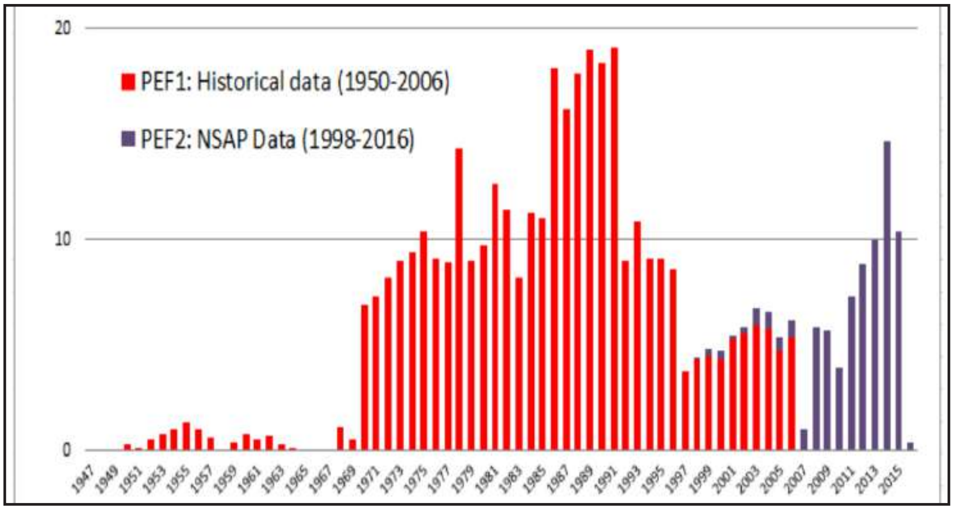


Figure 3.1. Philippine elasmobranch fisheries based on historical data (from 1950-2006, in selected areas in the Western Central Pacific) and NSAP regions (1998-2016, in 15 regions), expressed in metric tons (mt). Sources: PEF1: FAO FishStat 1950-2003; BAS-DA 1976–2006 in SEAFDEC Fishery Bulletins for South China Sea. PEF2; NSAP regional data (1998–2016).

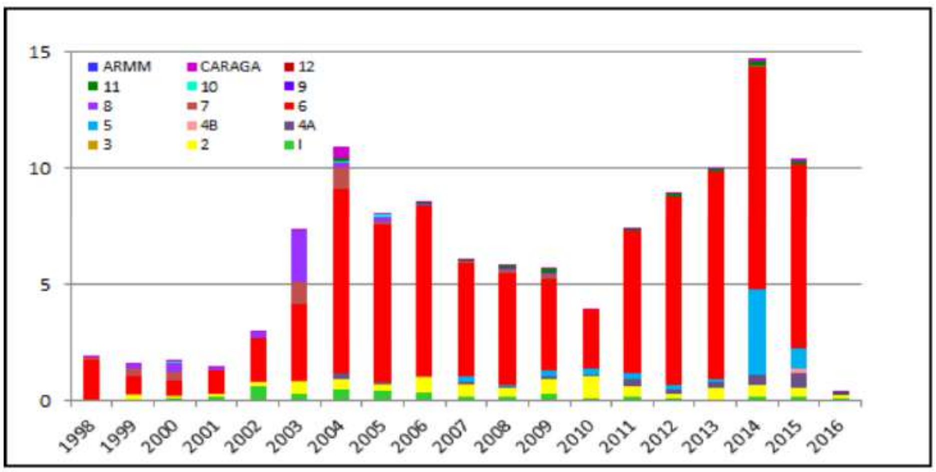


Figure 3.2. Philippine regional elasmobranch fisheries (expressed in mt) from 1998-2016 showing peak production in 2014. Source: NSAP 1998–2016, partial data (Annex F to S).

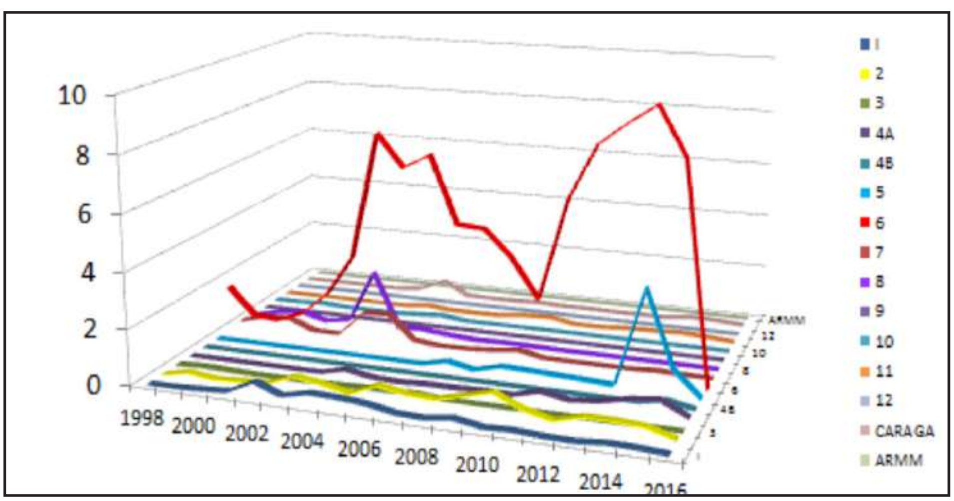


Figure 3.3. Philippine regional elasmobranch fisheries (expressed in mt) from 1998-2016, showing highest landing from Region 6. Source: NSAP 1998–2016, partial data (Annex F to S).

The second longer peak is reached in 2014 (at 14.69 mt), increasing at an average of 8.72 mt per year from 2010 to 2013, decreasing by about 30% in 2015 (see Table 3.1; Figure 3.1). In general, the collective data sets show major peaks, particularly in the year 1978, 1986–1991, 2003–2004, 2014, and troughs years following each.

Using NSAP data only, the elasmobranch fisheries was below 10 mt prior to 2007 and did not pick up until after 2007 (see Figure 3.2). The highest elasmobranch catch volume is reported in Region 6 (Western Visayas), followed by Region 5.

At the regional level, similar trends may be seen in some fisheries, particularly those with more consistent monitoring (e.g., Region 1, 2, 4A, 6, 8), with elasmobranch fisheries going into peaks and troughs within the 18-year reporting period (see Figure 3.4–3.15).

There is no estimation of fishing effort, efficiency, and fishing areas in these reports, as yet; thus it cannot be ascertained whether the peaks and troughs are results of increase or decrease in fishing effort or fishing efficiency. It is possible that fishing grounds might have been expanded (i.e., new fishing grounds were used) and/or there might also have been an increase in fish landing monitoring.

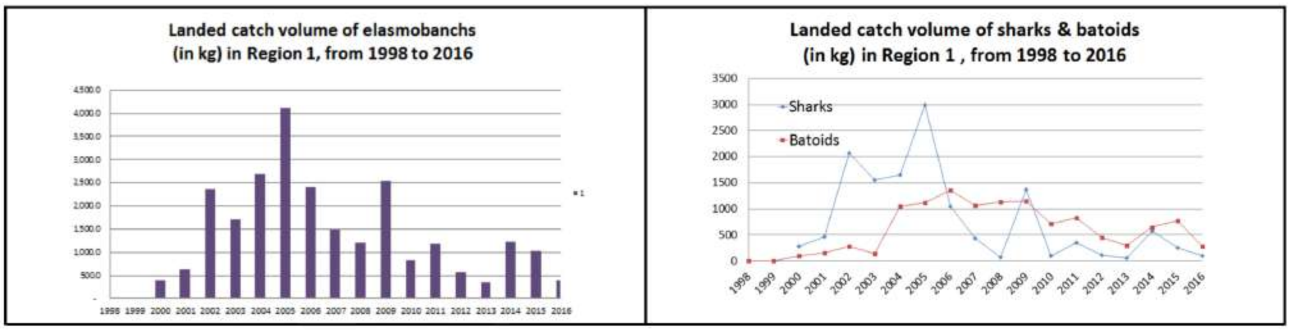


Figure 3.4. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in Region 1 (expressed in kg) from 1998-–2016. Source: NSAP 1998–2016, partial data (Annex F).

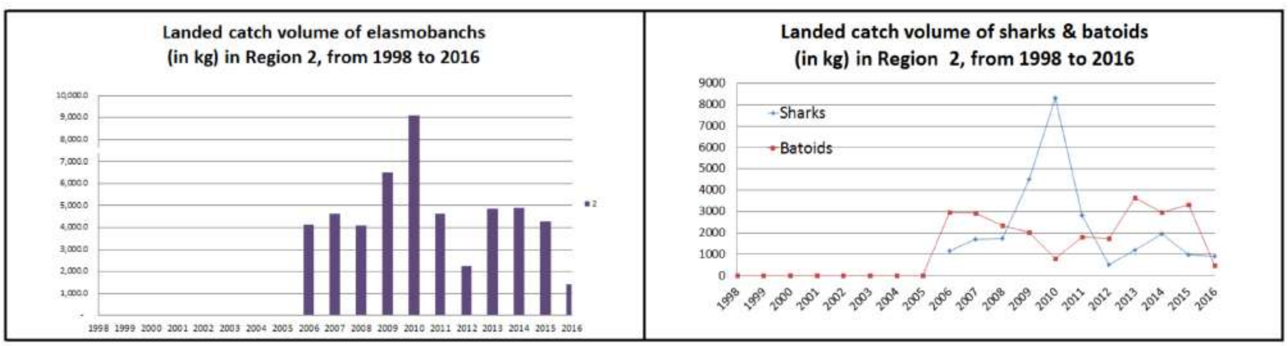


Figure 3.5. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in Region 2 (expressed in kg) from 1998–2016. Source: NSAP 1998–2016, partial data (Annex G).

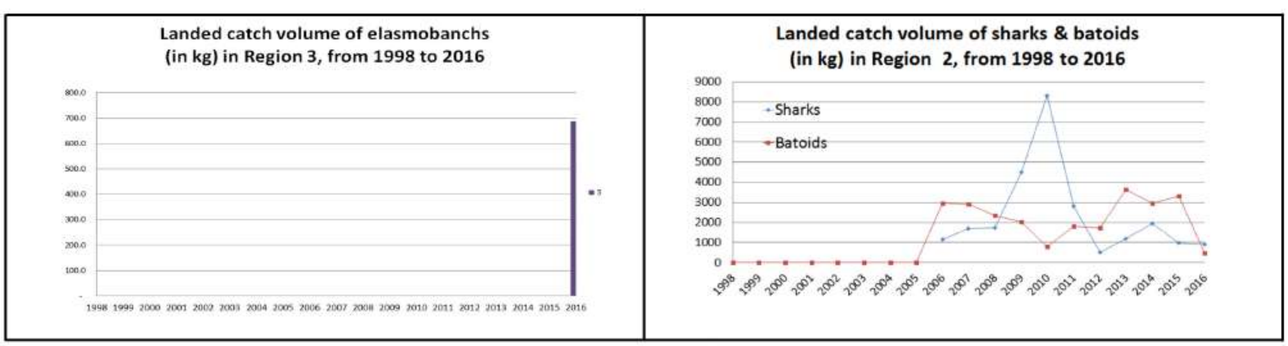


Figure 3.6. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in Region 3 (expressed in kg) from 1998-2016. Source: NSAP 1998-2016, partial data (Annex H).

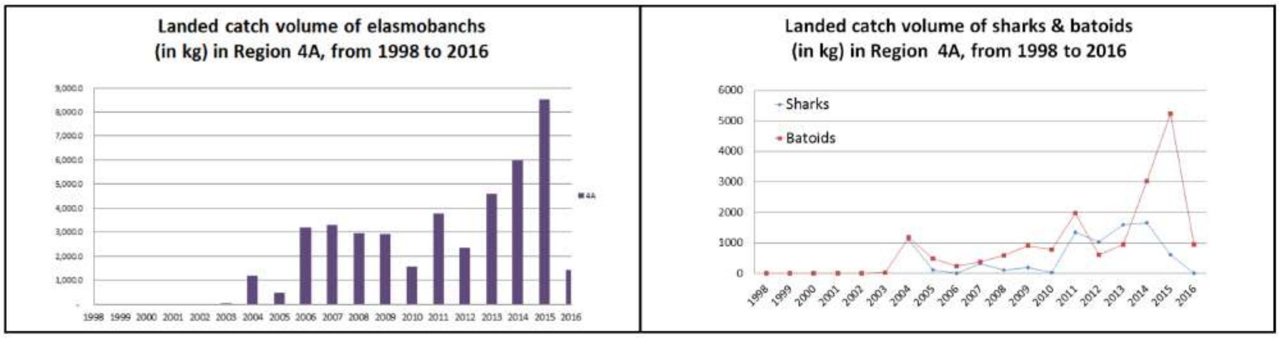


Figure 3.7. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in Region 4A (expressed in kg) from 1998–2016. Source: NSAP 1998–2016, partial data (Annex I).

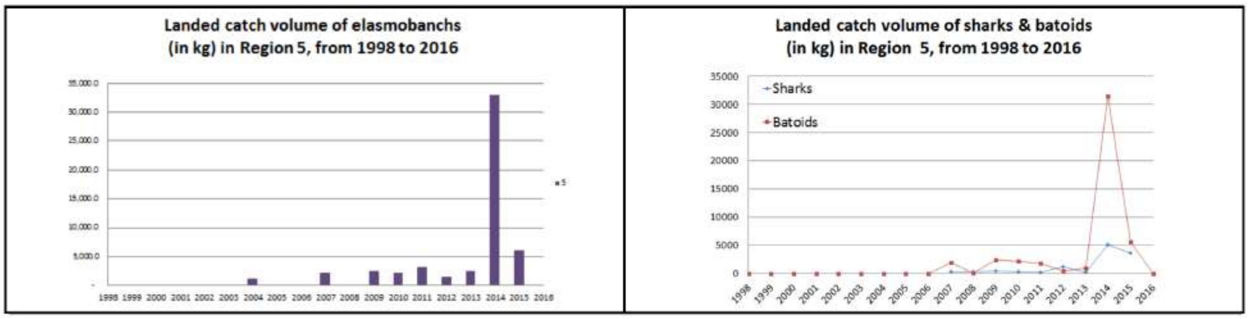


Figure 3.8. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in Region 5 (expressed in kg) from 1998–2016. Source: NSAP 1998–2016, partial data (Annex K).

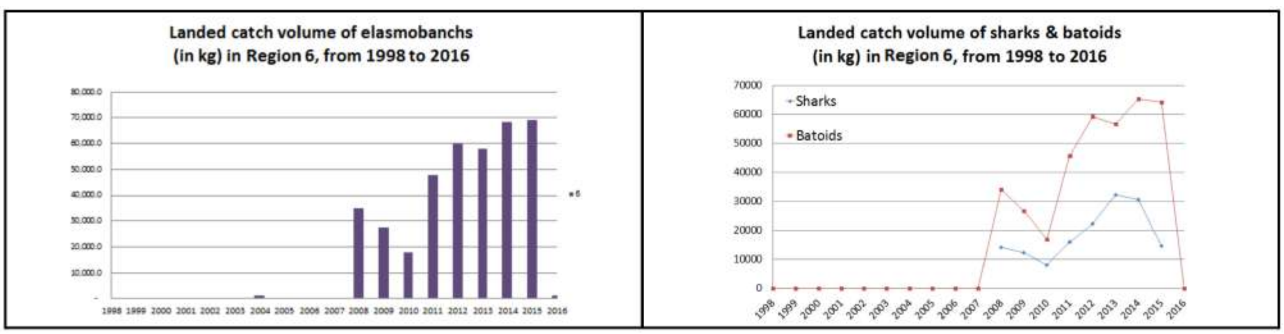


Figure 3.9. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in Region 6 (expressed in kg) from 1998-2016. Source: NSAP 1998–2016, partial data (Annex L).

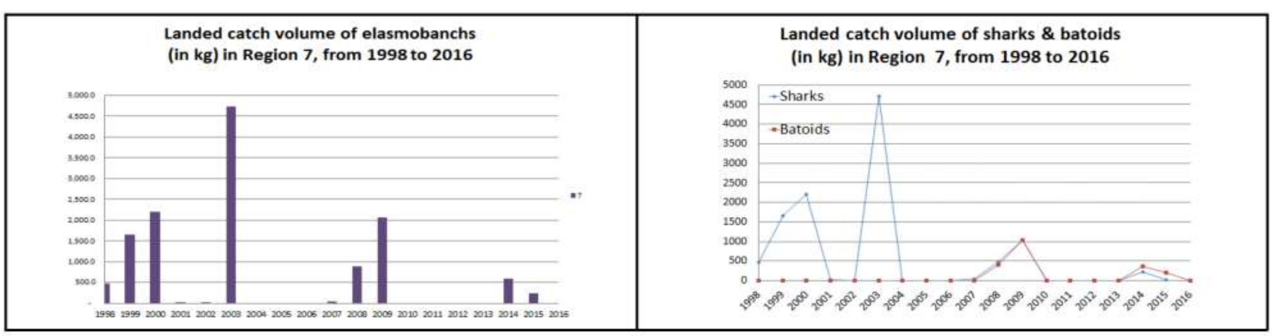


Figure 3.10. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in Region 7 (expressed in kg) from 1998–2016. Source: NSAP 1998–2016, partial data (Annex M).

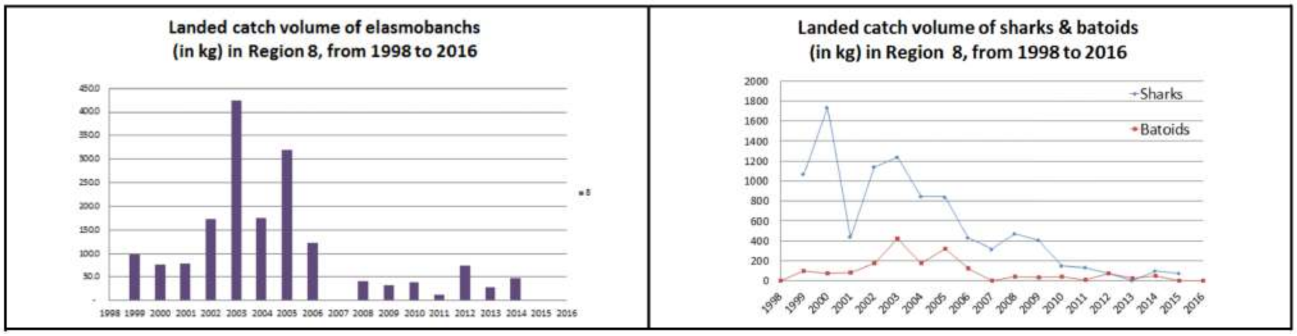


Figure 3.11. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in Region 8 (expressed in kg) from 1998–2016. Source: NSAP 1998–2016, partial data (Annex N).

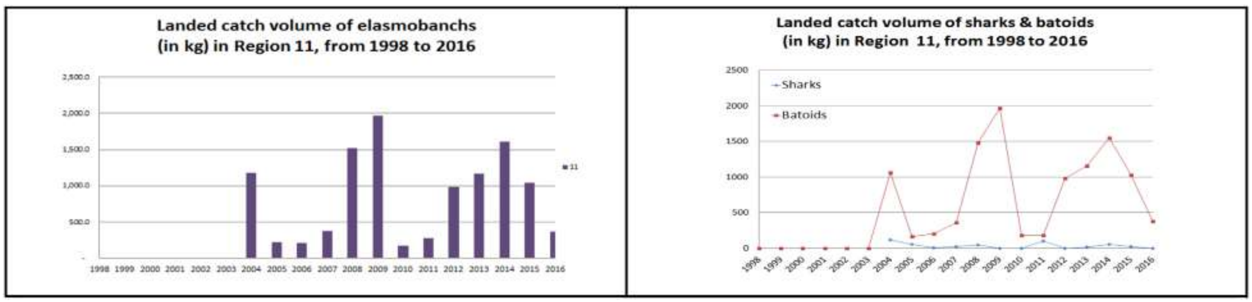


Figure 3.12. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in Region 11 (expressed in kg) from 1998–2016. Source: NSAP 1998–2016, partial data (Annex Q).

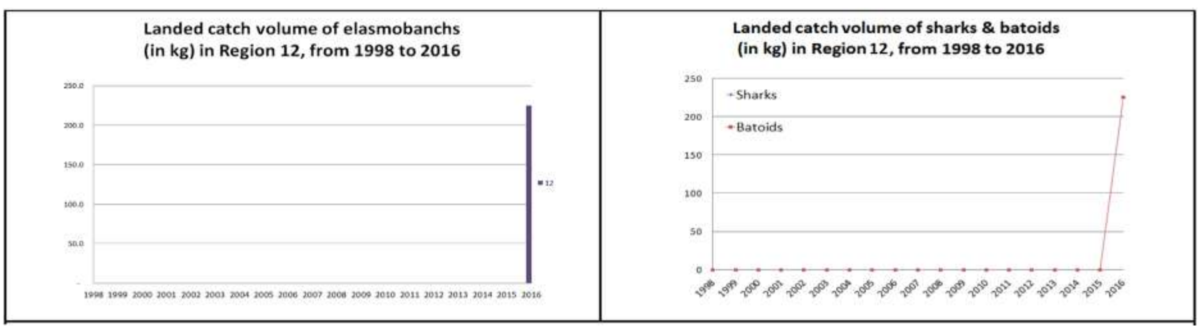


Figure 3.13. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in Region 12 (expressed in kg) from 1998–2016. Source: NSAP 1998–2016, partial data (Annex M).

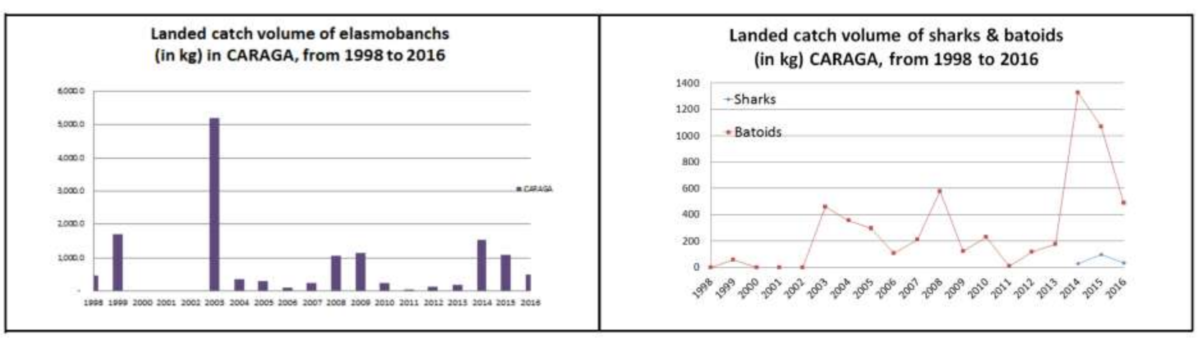


Figure 3.14. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in CARAGA (expressed in kg) from 1998–2016. Source: NSAP 1998–2016, partial data (Annex S).

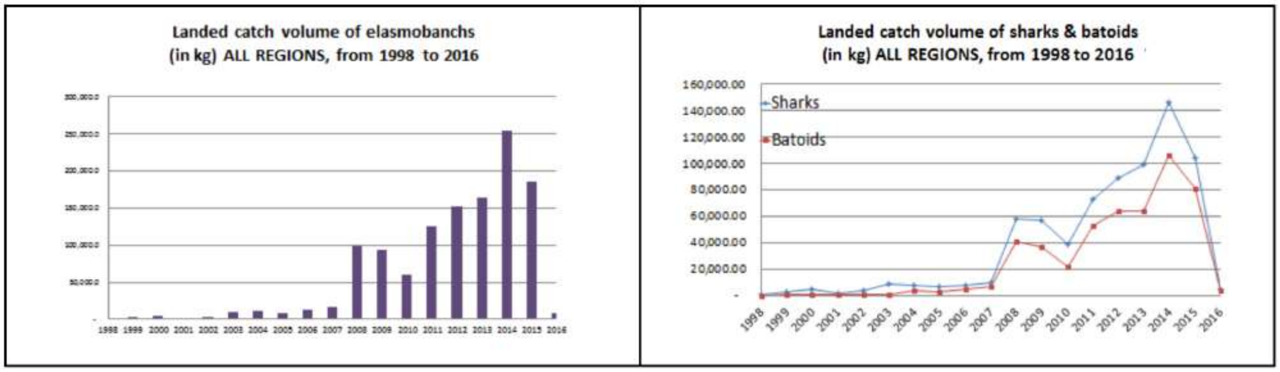


Figure 3.15. Total elasmobranch (left) and segregated shark/batoids fisheries (right) in all regions (except 4B, 9, ARMM) (expressed in kg) from 1998–2016. Source: NSAP 1998–2016, partial data. Data from 4B, 9, ARMM were not available for this reporting period.

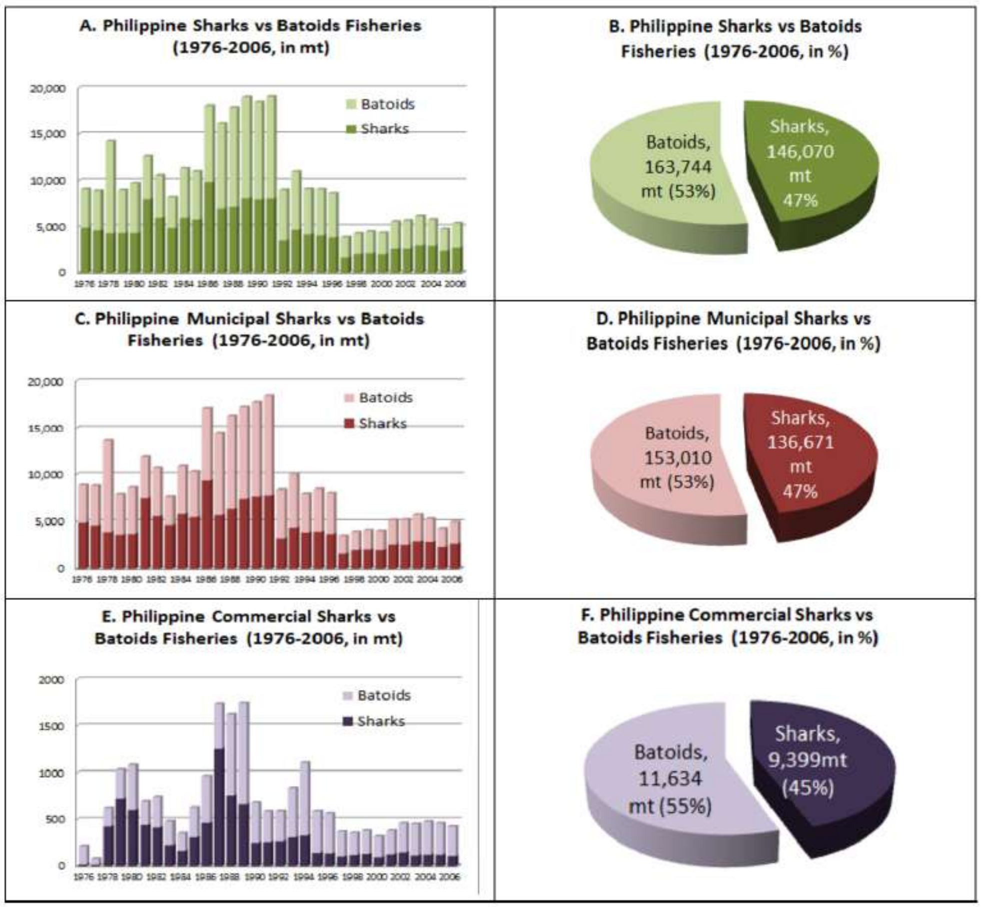


Figure 3.16. Relative sharks and batoids fisheries production in municipal and commercial fisheries in the Philippines, 1976–2006. Source: DA-BAS, 1976–2006 in FAO FishStat 1950–2003 and SEAFDEC 1976–2006.

3.2 SHARKS VS BATOIDS FISHERIES

Sharks and batoids fisheries data from historical catches (both municipal and commercial fisheries) showed arbitrary groupings into general categories such as "sharks, rays, skates, etc." and "rays, stingrays, mantas" (as reported in UN FAO Fish Stat 1950–2003) or as "sharks" and "rays" (as reported in DA-BAS, 1976–2006 and SEAFDEC 1976–2006) (see Table 3.16). In this discussion, "shark" data is separated from "rays," "skates," "stingrays," and "mantas" which are collectively called as "batoids" (see Table 3.2).

Sharks and batoids fisheries production during 1976–2006 period show close to 1:1 ratio in both municipal and commercial fisheries (see Figure 3.16). More batoids were being landed in the municipal rather than in commercial fisheries. The total volume of batoids landed for the 30-year period was at 153,010 mt and 11,634 mt from municipal and commercial fisheries while for sharks, it was at 136,671 mt from municipal landings and 9,399 mt from commercial landings. Batoids were landed in greater volume than sharks and are thus impacted more in municipal rather than in commercial fisheries.

Based on NSAP data for 1998–2016, regional elasmobranch fisheries production show initial takes of sharks (see Figures 3.4–3.15). Batoid catches, however, were increasing in the latter part of the first decade. Both groups increased roughly about 33% from its baseline value of 4,163 mt in 1976, and in the next decade at about 89% (or about 8,211 mt/yr). As reflected on total elasmobranch fisheries trend, it declined thereafter by about 39% from 1996–2006 (see Figure 3.15).

For the 18-year monitoring period, it seems batoids are getting to be more important in the fisheries, comprising about 68% of total elasmobranch catch volume.

In some regions, batoids comprise the majority (i.e., in Region 3) or the only species groups landed (e.g. in Regions 11 and 12).

Further analysis, however, is needed for a comparison of shark and batoid and elasmobranch production from NSAP regional fisheries data for the years 1998 to 2016. In addition to getting partial data from most regions, catch volumes of at least three other regions (i.e., Regions 4B, 9, and ARMM are not available to date.

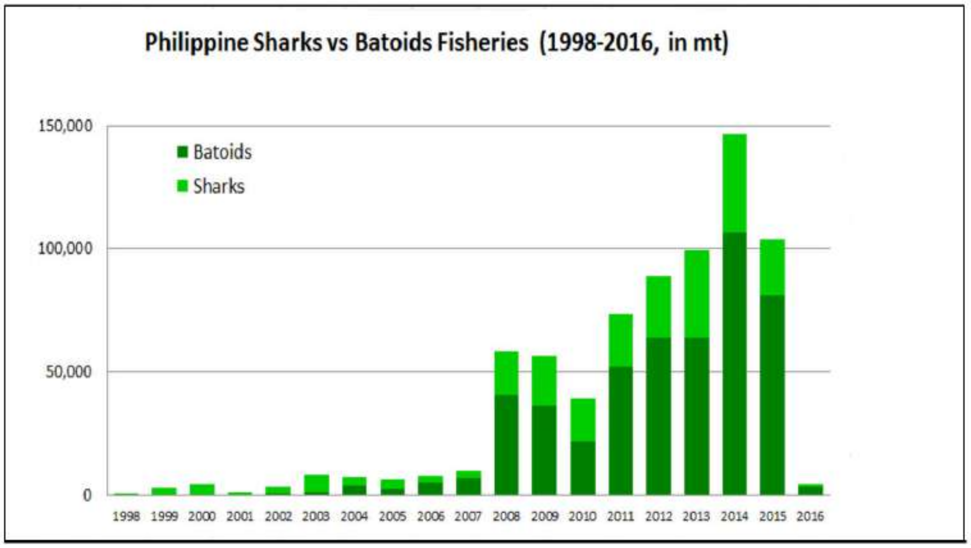


Figure 3.17. Relative sharks and batoids fisheries production in the Philippines, 1998-2016.
Source: NSAP regional fisheries data 1998-2016, partial.

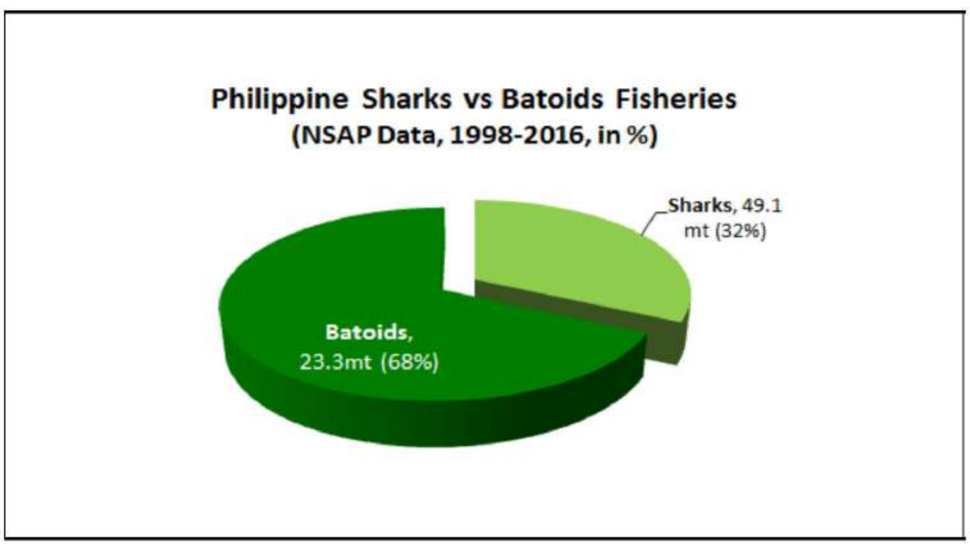


Figure 3.18. Relative sharks and batoids fisheries production in the Philippines, 1998-2016.
Source: NSAP regional fisheries data 1998-2016, partial.

3.3 MUNICIPAL AND COMMERCIAL ELASMOBRANCH FISHERIES

Historical data show that Philippine municipal fisheries dominate over commercial fisheries, representing about 66% of the elasmobranch yields during 1976–2006 fisheries production period at 9,345 mt, compared to commercial fisheries which was only at 34% or at 4,717 mt (Figure 3.2; Table 3.2).

Production trends for municipal elasmobranch fisheries was at a rate of 14% within the first decade (from 1976–1985), increased by 49% in the second decade (i.e., 1986–1995) but showed progressive decline at a rate of -48% in the third decade (i.e., 1996-2005).

Commercial elasmobranch fisheries also show increasing trends in the first 10 and 20 years. It more than doubled its baseline catches of 216 mt in 1976 (i.e., about 593 mt/yr from 1977–1986) and almost quadrupled in the second decade (i.e., 1,046 mt/yr from 1987–1996). Commercial elasmobranch fisheries also declined in the years thereafter by about -89% (i.e., 422 mt/yr from 1997–2006).

Municipal fisheries generally operate within the 15-kilometer zone from shore (i.e., municipal waters) while commercial fisheries operate beyond the 15-kilometer zone (i.e., offshore areas). Elasmobranch fisheries trends show decreasing elasmobranch production in both near-shore and offshore areas, suggesting collapsing fisheries and possibly, geographic overfishing. Data on fishing effort and extent in both municipal and commercial fisheries, however, is not available.

Comparative catches on the municipal and commercial elasmobranch production based on more recent information (i.e., 1998–2016) from NSAP regional reports are not available for this report.

Table 3.2 Municipal and elasmobranch fisheries production in the Philippines, 1976–2006. Sources: FAO FishStat 1950–2003 and BAS-DA 1976–2006 in SEAFDEC Fishery Bulletin for South China Sea 1976–2006.

Year	Municipal (in mt)			Commercial (in mt)			GRAND TOTAL (in mt)
	Sharks	Batoids	Total	Sharks	Batoids	Total	
1976	4,883	3,966	8,849	19	197	216	**9,065**
1977	4,604	4,192	8,796	16	63	79	**8,875**
1978	3,876	9,774	13,650	426	199	625	**14,275**
1979	3,608	4,325	7,933	720	312	1,032	**8,965**
1980	3,702	4,914	8,616	604	478	1,082	**9,698**
1981	7,545	4,389	11,934	444	246	690	**12,624**
1982	5,593	5,111	10,704	417	320	737	**11,441**
1983	4,661	3,019	7,680	226	256	482	**8,162**
1984	5,817	5,106	10,923	166	186	352	**11,275**
1985	5,490	4,827	10,317	311	320	631	**10,948**
1986	9,386	7,708	17,094	467	497	964	**18,058**
1987	5,709	8,708	14,417	1,258	480	1,738	**16,155**
1988	6,379	9,875	16,254	755	870	1,625	**17,879**
1989	7,440	9,794	17,234	663	1,083	1,746	**18,980**
1990	7,706	10,059	17,765	252	425	677	**18,442**
1991	7,800	10,661	18,461	260	328	588	**19,049**
1992	3,229	5,165	8,394	268	323	591	**8,985**
1993	4,376	5,717	10,093	309	526	835	**10,928**
1994	3,846	4,129	7,975	329	777	1,106	**9,081**
1995	3,935	4,533	8,468	144	447	591	**9,059**
1996	3,700	4,328	8,028	139	428	567	**8,595**
1997	1,586	1,899	3,485	104	266	370	**3,855**
1998	1,965	1,940	3,905	122	234	356	**4,261**

Year	Municipal (in mt)			Commercial (in mt)			GRAND TOTAL (in mt)
	Sharks	Batoids	Total	Sharks	Batoids	Total	
1999	2,043	2,050	4,093	131	249	380	**4,473**
2000	1,974	2,026	4,000	97	222	319	**4,319**
2001	2,553	2,616	5,169	128	251	379	**5,548**
2002	2,532	2,676	5,208	150	310	460	**5,668**
2003	2,906	2,819	5,725	115	337	452	**6,177**
2004	2,851	2,445	5,296	125	353	478	**5,774**
2005	2,313	1,971	4,284	125	335	460	**4,744**
2006	2,663	2,268	4,931	109	316	425	**5,356**
AVG/year	4,409	4,936	9,345	303	375	678	**10,023**

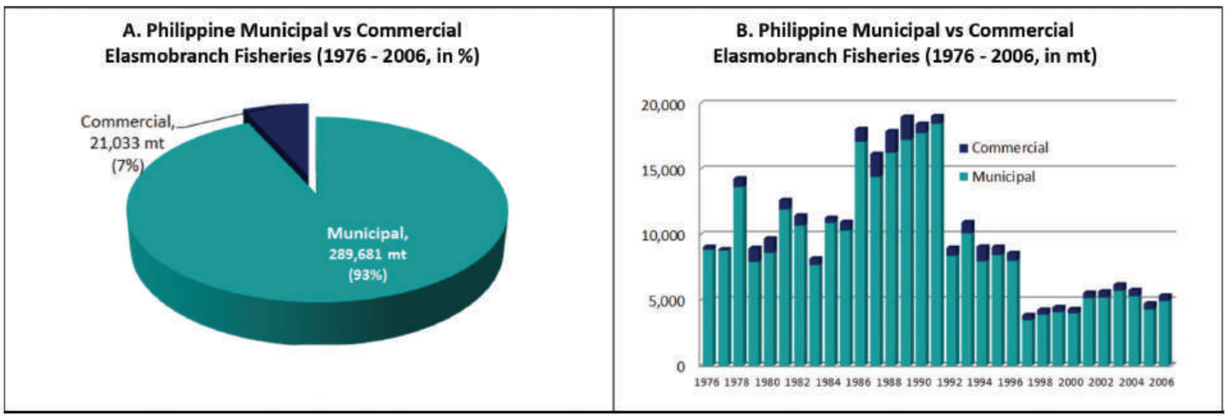


Figure 3.19. Relative abundance of municipal and commercial elasmobranch fisheries production in the Philippines, 1976–2006 (expressed as a percentage of total, A, and of annual production, B). Sources: DA-BAS, 1976–2006 in FAO FishStat 1950-2003 and SEAFDEC 1976–2006.

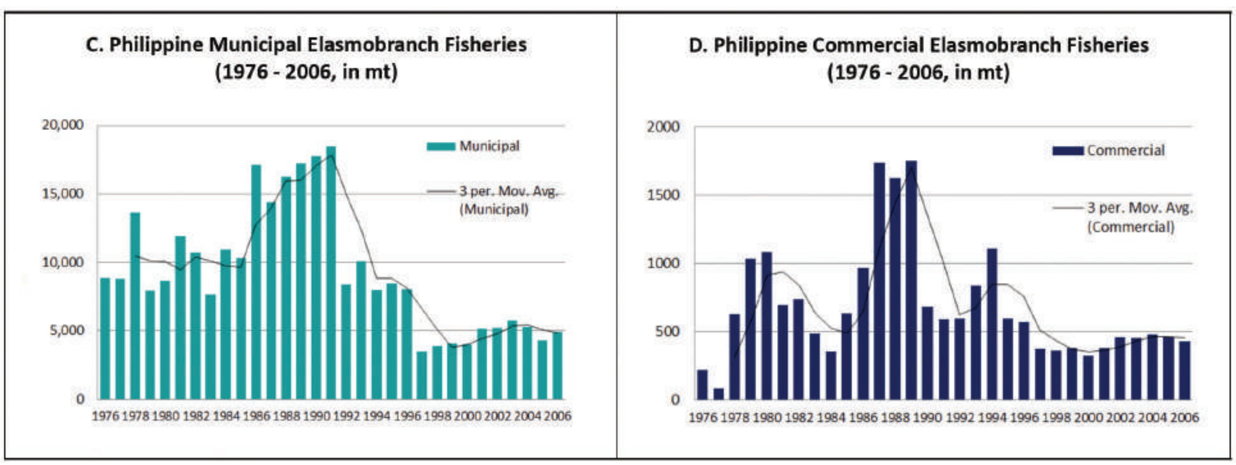


Figure 3.20. Annual production of municipal (C) and commercial (D) elasmobranch fisheries production in the Philippines, 1976-2006 (expressed in mt per year). Sources: DA-BAS, 1976–2006 in FAO FishStat 1950–2003 and SEAFDEC 1976–2006.

3.4 FISHING GROUNDS AND LANDING SITES

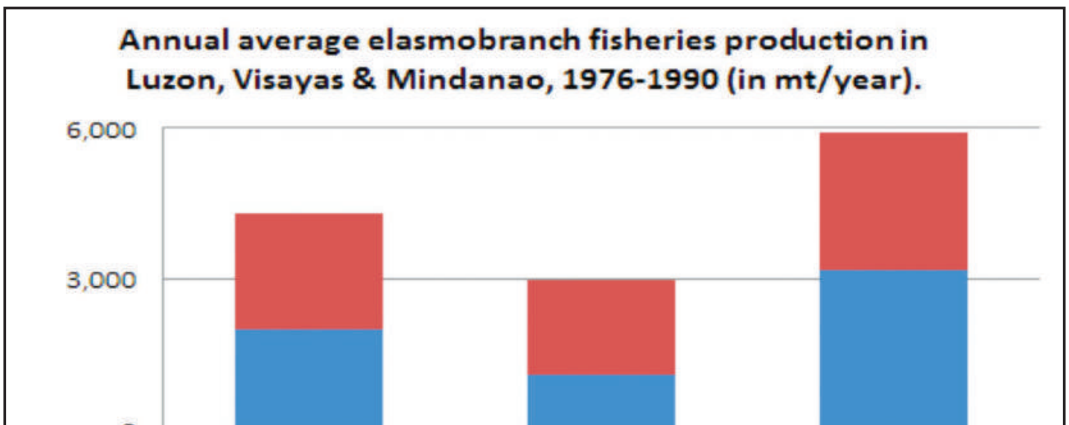
Production data for 1976–1990 were based from SEAFDEC data as reported in Bonfil 1994 (see Figure 3.21) and DA-BAS data in 1990 and 1994 as reported in Chen 1996 (see Figure 3.22). Both datasets show production of major island groups, i.e., Luzon, Visayas and Mindanao. In DA-BAS 1990 and 1994 datasets, 7 fishing grounds were reported.

Based on SEAFDEC data for 1976–1990, the annual average elasmobranch fisheries production for the three major island groups (i.e., Luzon, Visayas and Mindanao) is shown in Figure 3.21. Mindanao shows highest annual average production rate at 5,933 mt/yr (or 45%; 3,185 mt/year for sharks and 2,724 mt/year for batoids), followed by Luzon at 4,320 mt/yr (or 33%; 1,993 mt/year for sharks and 2,312 mt/year for batoids). Visayas had the least average landed volume per year at 2,972 mt/year (or 22%; 1,108 mt/year for sharks and 1,856 mt/year for batoids).

Based on DA-BAS data in 1990 and 1994 (in Chen, 1996), the average landing volume was lower by about 60% and the ranking also shifted with Visayas on top at 566.4 mt/yr for the two reporting years (or 64%; 144.6 mt/year for sharks, 421 mt/year for batoids), followed by Luzon at 282.2 mt/yr (or 32%; 128.1 mt/year for sharks and 154.1 mt/year for batoids). Mindanao had the least landed volume both in 1990 and 1994, at 55.8 mt/year (or 6%; 19.2 mt/year for sharks and 33.2 mt/year for batoids) (see Table 3.3; Figure 3.22). Batoid catches were higher than sharks (i.e., comprising about 67% of total elasmobranch catches) and highest also in Visayas (i.e., 70%) in both years.

For Luzon, the elasmobranch catches were reported in all seven (7) fishing grounds, namely, Babuyan Channel, Batangas Coast, Cuyo Pass, Lamon Bay, Manila Bay, West Palawan waters, and West Sulu Sea. West Palawan was the most productive, yielding on average 225.4 mt/year for 1990 and 1994.

For Visayas, elasmobranch catches were reported in eight (8) of the nine (9) fishing grounds: Bohol Sea, East Sulu Sea, Guimaras Strait, Leyte Gulf, Ragay Gulf, Visayan Sea, Samar Sea, and Sibuyan Sea. Guimaras Strait was the most productive, yielding an average of 22,534 mt/year for 1990 and 1994. There was no report for Camotes Sea. For Mindanao, four (4) fishing grounds are reported: Davao Gulf, Mindanao waters (Pacific), Moro Gulf, and South Sulu Sea. The latter was most productive in the group, posting 28.9 mt/year for 1990 and 1994.



	Luzon	Visayas	Mindanao
Batoids	2,312	1,856	2,724
Sharks	1,993	1,108	3,185

Figure 3.21. Annual average shark and batoid fisheries production (in mt/year) in Luzon, Visayas and Mindanao (Philippines), 1976-1980. (Source: SEAFDEC Data in Bonfil 1994).

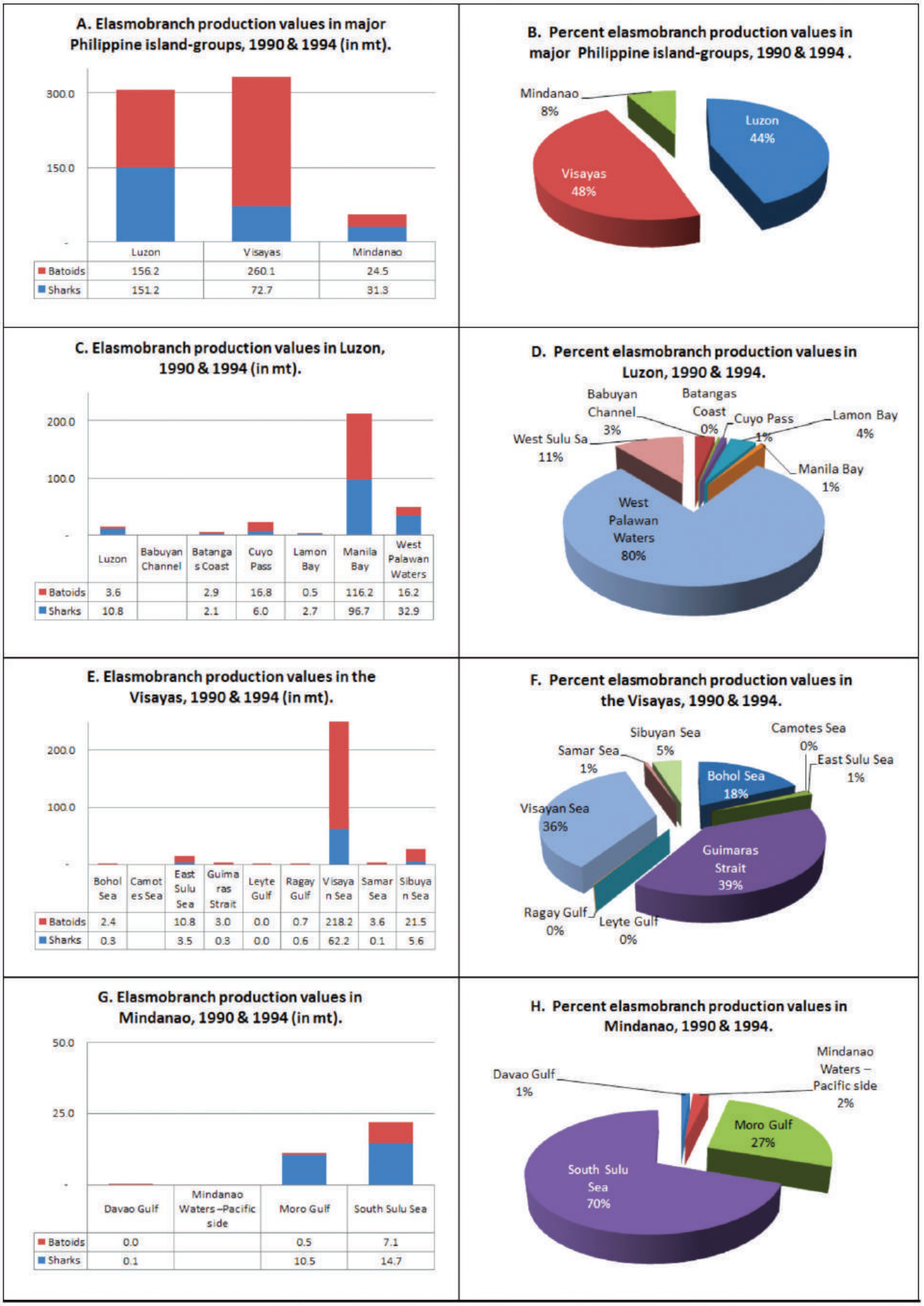


Figure 3.22. Percentage of elasmobranch (i.e., sharks and batoids) fisheries production, in various fishing gears in large- and small-scale fisheries in the Philippines, 1998, expressed as a percentage of total. Source: SEAFDEC 1988; data recalculated from Chen 1996.

Table 3.3. Major fishing grounds of commercial fisheries and elasmobranch production values (in mt) of elasmobranchs in the Philippines, 1990 and 1994. Source: DA-BAS in Chen 1996.

FISHING GROUND	1990			1994		
	Sharks	Batoids	Total	Sharks	Batoids	Total
Luzon						
Babuyan Channel	10.8	3.6	14.4		3.0	3.0
Batangas Coast				1.0	1.0	2.0
Cuyo Pass	2.1	2.9	5.0			
Lamon Bay	6.0	16.8	22.8			
Manila Bay	2.7	0.5	3.3	2.0		2.0
Western Palawan Waters	96.7	116.2	212.9	91.0	147.0	238.0
West Sulu Sea	32.9	16.2	49.1	11.0	1.0	12.0
Subtotal	**151.2**	**156.2**	**307.5**	**105.0**	**152.0**	**257.0**
Visayas						
Bohol Sea	0.3	2.4	2.6	163.0	39.0	202.0
Camotes Sea						
East Sulu Sea	3.5	10.8	14.3			
Guimaras Strait	0.3	3.0	3.4	14.0	430.0	444.0
Leyte Gulf	0.0	0.0	0.1			
Ragay Gulf	0.6	0.7	1.2			
Visayan Sea	62.2	218.2	280.4	38.0	84.0	122.0
Samar Sea	0.1	3.6	3.7	1.0	3.0	4.0
Sibuyan Sea	5.6	21.5	27.1	1.0	27.0	28.0
Subtotal	**72.7**	**260.1**	**332.8**	**217.0**	**583.0**	**800.0**
Mindanao						
Davao Gulf	0.1	0.0	0.1		1.0	1.0
Mindanao Waters-Pacific					1.0	1.0
Moro Gulf	10.5	0.5	11.1	2.0	9.0	11.0
South Sulu Sea	14.7	7.1	21.8	5.0	31.0	36.0
Subtotal	**31.3**	**24.5**	**55.8**	**7.0**	**42.0**	**49.0**
TOTAL	**253.4**	**424.5**	**677.9**	**329.0**	**777.0**	**1,106.0**

NSAP Data. During 2006–2016, about 68 fishing grounds were monitored for sharks and batoids catches in 15 regions by NSAP. Catches were landed in at least 262 landing sites in the country (see Table 3.4; also see Annex E). The list of fishing grounds and landing sites being monitored by NSAP in each region, at least for the period 2000–2016, is shown in Annex E. There has been an increase in the number of fishing grounds and landing sites monitored under NSAP for 2000–2016.

In terms of fishing grounds, Region IV-B (MIMAROPA, in Luzon) has the highest number (i.e., 18), followed by the Caraga region (i.e., 8) and Regions I, VI and VII (i.e., 5).

In terms of landing sites, Region IV-B is reported to have the highest number (i.e., 18 fishing grounds), followed by Region I (i.e., 29), Region II (i.e., 25) and Region VII (i.e., 21). In Region IV-B, both sharks and batoids are harvested and landed in all landing sites except in Coron (Palawan), which is reported to land sharks only. In general, there are more landing sites for batoids than for sharks.

On the regional level, the top three regions which recorded 85% (or about 101.1 mt) of the total elasmobranch catches from 1998 to 2016 are: Region VI (Western Visayas) at 88.2 mt or 75%; Region II (Ilocos Region) at 7.1 mt or 6%; and Region V (Bicol Region) at 5.8 mt or 5%. These are followed by Region VIII, Region I, and Region VII which comprise about 9% of the total regional catches at 3.8, 3.3, and 3.2 mt, respectively (see Figure 3.2). The remaining nine regions contribute about 9 mt or about 5% of total regional catches.

Comparative elasmobranch catches per fishing from NSAP regional data still needs analysis. Relative shark catch

Table 3.4. Number of fishing grounds and landing sites catching sharks, batoids, or both (elasmobranchs) in the regions. Source: NSAP regional reports, 1998–2016, partial data.

Region	Province	Municipality	Fishing Ground	Landing Sites	With elasmo landings (Species Group)		
					Sharks only	Batoids only	Both
Region I	6		6	29	5	12	12
Region II	2		2	25	9	4	12
Region III	2		5	20	5	6	9
Region IV-A			4	19	2	6	11
Region IV-B			18	81	1	0	80
Region V							
Region VI	5		6				
Region VII	3	15	6				
Region VIII	3		1				
Region IX							
Region X			5				
Region XI	6		2	16			
Region XII	3		3	7			
CARAGA	4		8	21			
ARMM	2		2	4			
TOTAL	36		68	262			

landing volume in important fishing grounds as reported by NSAP regions for at least one reporting period (i.e., for the year 2014) is mapped out in Figure 3.21.

In terms of metric tons, Region V (Bicol Region) reports the highest volume at 854 mt, followed by Region IV-B (MIMAROPA) at 485 mt and Region VI (Western Visayas). Existing information on catch landing volume from shark and ray fishery grounds forms valid criteria for site prioritization, particularly for research, monitoring, and management.

3.5 LARGE-SCALE VS SMALL-SCALE FISHERIES.

In the 1990 and 1994 BAS data, large-scale fisheries provided the majority of the landed catches (see Table 3.5; Figure 3.6). Landings from purse seine accounted for 63% and 24% of the catch in 1990 and 1994, respectively. Trawl, on the other hand, provided 27% and 43% of the catch in 1994 (see Table 3.4; Figure 3.6).

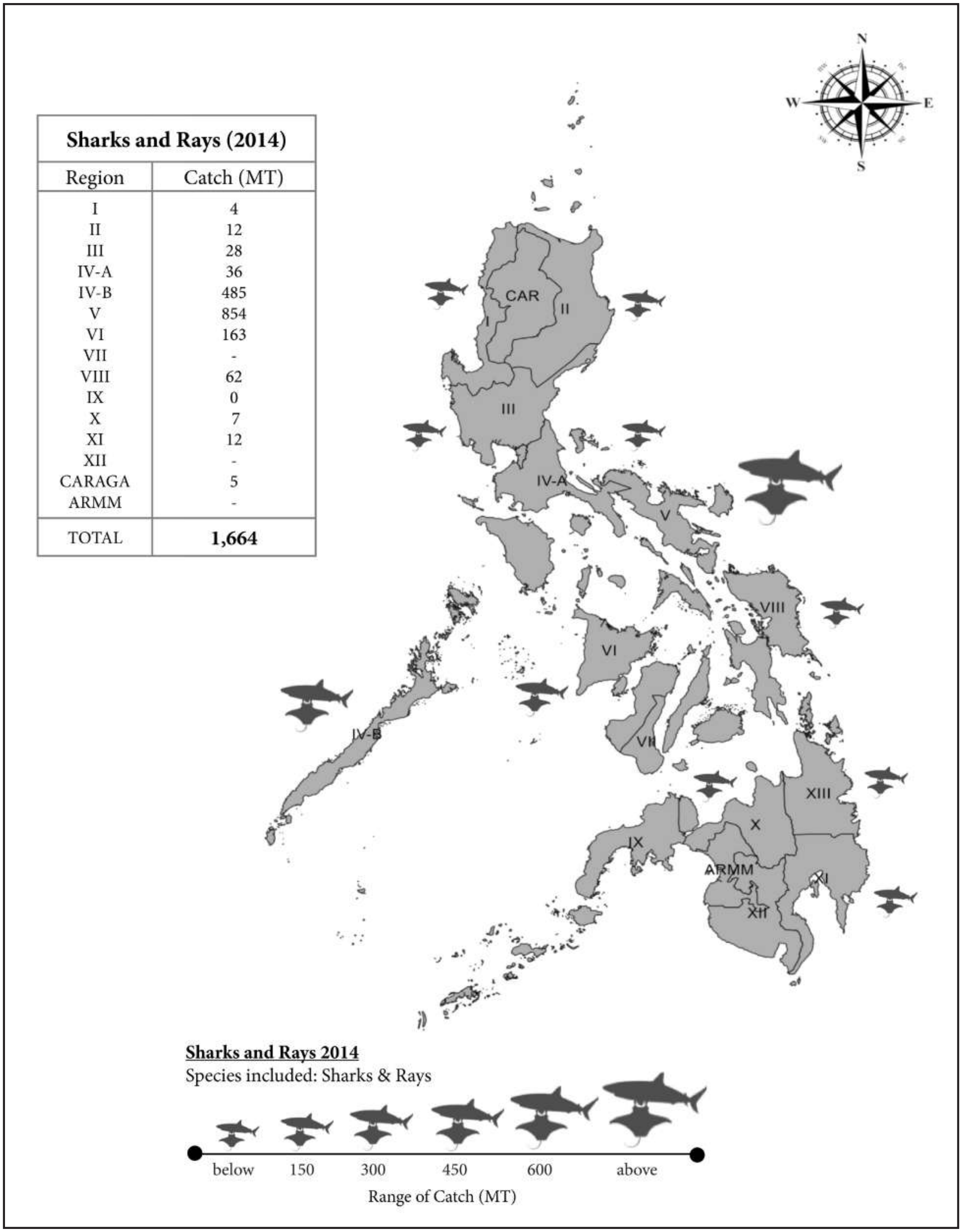
Small-scale fisheries land the majority of elasmobranch catches for Luzon, Visayas, and Mindanao at 83%, 79%, and 100%, respectively. Catches from small-scale fisheries for both sharks and batoids in Luzon and for sharks in Visayas were mainly taken by hook and line or longline (38%–76%) and gillnet (8%–30%). In the Visayas, gillnet catches were greater than those from hook and line and long line (42% vs. 22%). In Mindanao, gill/drift gill nets accounted for 81% of elasmobranch catches, followed by hook and line for sharks (27%).

Trawl is the major gear involved in large-scale elasmobranch fisheries in the three areas (ca. 1,102 mt or 6% of total catch), mainly in Luzon. In Luzon, large scale trawlers accounted for 30% of shark catches and only 6% of batoids; purse seiners accounted for only 3% of both groups. In the Visayas, trawls were the main gear for batoids (23%) but accounted for only 1% for sharks. Large-scale purse seiners account for 11% and 8% of shark and batoids catches, respectively.

In selected areas in southern Philippines (e.g., Visayas and Mindanao), fishing gear reported used in elasmobranch fisheries include: lines (troll lines, hand lines, single and multiple hook and lines, single and set longlines), nets (*pamo*/ driftnets, bottom set gill nets, purse seines, ring nets), traps (otoshi-ami, fish corrals, fish pots and fish traps), and spear gun (Luchavez-Maypa et al. 2001). Handlines and long lines were more prevalent, followed by surface and bottom set gill nets. Traps, trawls, and spear gun were the least prevalent. In Zamboanga, longlines, bottom set lines, and drift nets were used to catch sharks (Chen 1996).

In general, small-scale fisheries provide the large majority of elasmobranch catches in the Philippines (i.e., based on BAS 1990 and 1994 data, Chen 1996, SEAFDEC 1988 and Luchavez-Maypa et al. 2001), as it is more prevalent.

Catch data enumeration of small-scale fisheries thus need to be regularly monitored. More batoids than sharks are landed in both small- and large-scale fisheries, suggesting increased vulnerability of batoids in both small- and large-scale fisheries. Species-level monitoring and stock assessment is recommended on site to identify most threatened species and populations.



Sharks and Rays (2014)

Region	Catch (MT)
I	4
II	12
III	28
IV-A	36
IV-B	485
V	854
VI	163
VII	-
VIII	62
IX	0
X	7
XI	12
XII	-
CARAGA	5
ARMM	-
TOTAL	**1,664**

Figure 3.21. Catch map of shark and ray catch landing volume in NSAP regions for 2014.
Source: BFAR-NFRDI-DA (in press). The Philippine Marine Fisheries Atlas: NSAP.

Table 3.4. Sharks and batoids production (expressed in metric tons) in various fishing gear in the Philippines, 1988. (Source: SEAFDEC 1988; data recalculated from Chen 1996).

	1988											
	LUZON			VISAYAS			MINDANAO			TOTAL		
	Sharks	Batoids	Total	Sharks	Batoids	Total	Sharks	Batoids	Total	Sharks	Batoids	Total
LARGE SCALE	**529**	**282**	**811**	**226**	**539**	**765**	**-**	**-**	**-**	**755**	**821**	**1,576**
Trawl	454	188	642	17	443	460	-	-	-	471	631	1,102
Purse Seine	45	63	108	192	96	288	-	-	-	237	159	396
Hook/line	30	-	30	-	-	-	-	-	-	30	-	30
Others	-	31	31	17	-	17	-	-	-	17	31	48
SMALL SCALE	**984**	**2,850**	**3,834**	**1,515**	**1,385**	**2,900**	**3,879**	**5,689**	**9,568**	**6,378**	**9,924**	**16,302**
Gill/Drift net	318	940	1,258	139	808	947	582	4,608	5,190	1,039	6,356	7,395
Hook/line	575	1,315	1,890	1,324	423	1,747	2,211	398	2,609	4,110	2,136	6,246
Others	91	376	467	52	77	129	1,086	569	1,655	1,229	1,022	2,251
Trap	-	219	219	-	58	58	-	57	57	-	334	334
Otter trawl	-	-	-	-	19	19	-	57	57	-	76	76
TOTAL	**1,513**	**3,132**	**4,645**	**1,741**	**1,924**	**3,665**	**3,879**	**5,689**	**9,568**	**7,133**	**10,745**	**17,878**

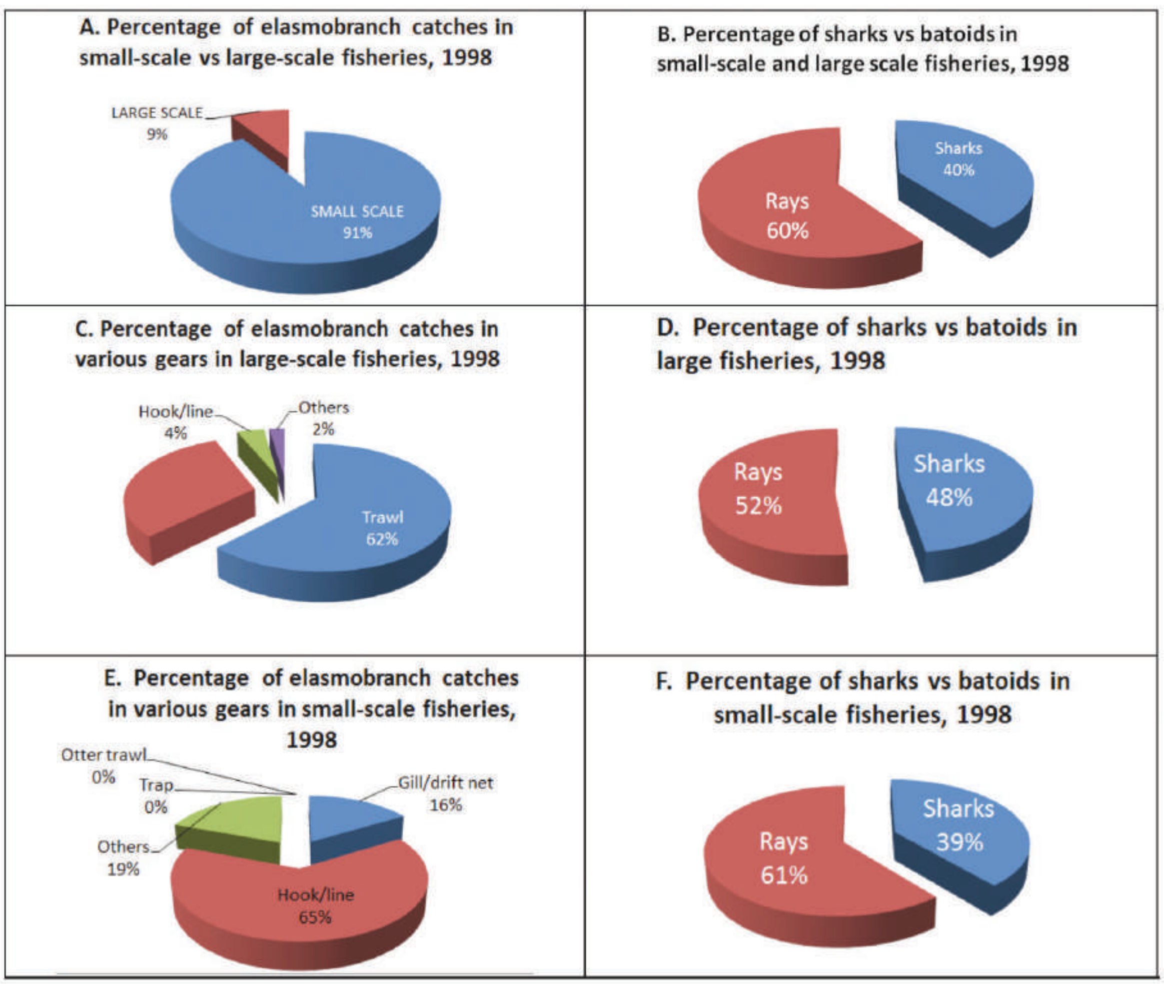


Figure 3.22. Percentage of elasmobranch (i.e., sharks and batoids) fisheries production, in various fishing gears in large- and small-scale fisheries in the Philippines, 1998, expressed as a percentage of total. Source: SEAFDEC 1988; data recalculated from Chen 1996.

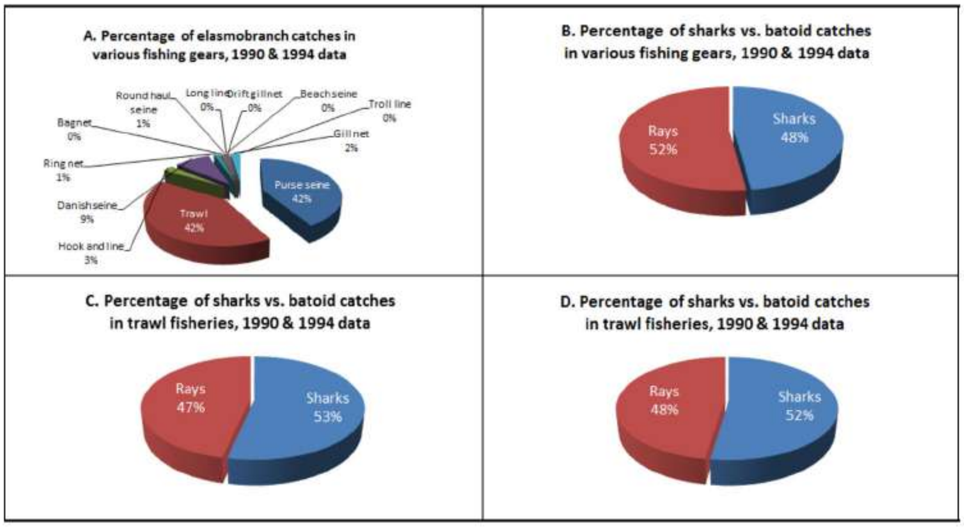


Figure 3.23. Percentage of elasmobranch (i.e., sharks and batoids) fisheries production, in various fishing gears in the Philippines, 1990 and 1994. Source: SEAFDEC 1988; data recalculated from Chen 1996.

3.6 CATCH COMPOSITION

Historical catch statistics do not provide details on shark and batoid species composition. Targeted catches for some species have been reported, such as the whale sharks, where traditional fishery is reported in Bohol and which have been in operation in the mid-1940's (Alava et al. 1997b). Another species group reported to factor in commercial fisheries are the dogfishes, which were exploited in the late 1960s for squalene oil (Chen 1996; Barut and Zartiaga 1997). Species reported include *Squalus spp.* and *Centrophorus spp.* (Encina 1977). Encina (1977) reports the commercial fishery for piked spiny dogfish *Squalus acanthias* was reported to have been started in 1967, specifically for squalene oil (as cited in Barut and Zartiaga 1997 and in Chen 1996). The initial identification *S. acanthias*, however, is highly suspect since there is no confirmed collection record for the species in the country. Dogfishes are one of the more diverse group of sharks having more than 20 species with very similar features in one genus alone and more new species being discovered as new fisheries are monitored. Reports, historical or current, on the fishery or population of this species therefore, would be a collective for the members of the family exploited in the fishery (e.g., *Squalus* spp. and *Centrophorus* spp.).

Prior to the targeted and commercial exploitation of the above species and groups, sharks were reported caught as by-catch to major fisheries such as tuna and trawl fisheries. Exploratory fishing conducted by the US Fish and Wildlife in the 1950s under its Philippine Fishery Program, mainly to assess the potential of establishing a shark fishery in the country for the production of vitamin A oil from sharks, reported tiger sharks *Galeocerdo cuvier* as the major catch of shark longlines around the Philippines. Other sharks reported include at least six species corresponding to the genus *Carcharhinus*, plus *Sphyrna zygaena, Scyliorhinus torazame, Hexanchus griseus* and an unidentified nurse shark. For batoids, at least two species were reported caught in gillnets: *Pristis cuspidatus* and *Rhynchobatus djiddensis*. No documentation is found for other batoid species, which as a group contributed the majority of the fisheries production.

NSAP Data. The list of species landed in regional elasmobranch fisheries for the reporting period 1998–2016 is summarized in Chapter 2 (Philippine Shark Resources; Table 2.3), showing a total of 180 species (to include both sharks and batoids).

In terms of species, there are more shark species than batoids that are landed in local fisheries. In terms of volume, however, there are more batoids than sharks. A closer review and analysis of the regional data needs to be done to get a profile of local fisheries. Species-specific assessment is recommended to identify species and sites under threat and to develop management measures to improve or conserve stocks at the site level.

3.7 CONCLUSIONS AND RECOMMENDATIONS

Philippine shark fisheries data and information collection and analysis system is generally weak. Technical skills for species-level identification and data collection, along with the capacity for record-keeping and reporting, are still relatively low. Current information available on sharks is thus of limited value to management. A preliminary clean-up of the list was done to edit out misspellings, double reporting, non-shark species (e.g., Napoleon wrasse, other labrids or bonyfishes) and segregation of unidentified species listed under their local names, common names, genus or family collective. Additional review is needed to validate and confirm species list for synonyms and/or recent taxonomic changes. Collection and proper documentation of voucher specimens and/or photos per fishing ground or landing site is recommended to increase species-level identification, data collection, and reporting. Field enumerators need to be trained on taxonomy and systematics, especially since they are the first liners in data collection and thus must maintain data integrity. Sharks are undergoing taxonomic changes, and as such, data collectors need to develop their own species guide based on locally landed catches from which future monitoring can be validated. Misidentifications can lead to missed opportunities to identify newer species in fisheries as well as mask underlying serial depletion of individual stocks or populations.

Sharks are considered as non-priority commodities; thus, stock assessments of shark populations are not prioritized. Stock assessments, monitoring, and management rely heavily on fisheries data (referred to as fishery-dependent data) from which informed decisions are made to help in conserving exploited shark populations and avoid socioeconomic and ecological problems. A variety of stock assessment methods, each requiring certain types of data, have been used to assess status of shark populations worldwide. Basic fisheries data needs are shark fishing mortality by species, gear type, and region, including current and historical records on the following: commercial, artisanal and recreational catches; size, length-weight, age structure and sex composition of catch; landings (number and volume); by-catch, discards and discard mortalities; catch per unit effort; and exploitation rates. Much of this information is not readily available for sharks.

A standardized data collection and reporting system has been recommended to enable better analysis and comparison of fisheries trends for certain shark species, between and among regions and over time. Mechanisms and support systems to collect and enhance the reliability of the reporting and monitoring system as well as improve the accuracy of stock assessment are needed. While the NSAP data management base and information system is currently being upgraded and improved to accommodate increasingly complex analysis of commercially important stocks (e.g., pelagic fisheries), it needs to be reviewed and evaluated with the goal of strengthening it to accommodate shark fisheries data collection, monitoring, and reporting, as well as to improve information accessibility and timeliness.

NSAP may hold more than 10 years of shark fisheries data collected on-site but data is too raw to be used in management. Accurate quantification and/or estimation of direct catches vis-à-vis by-catch in the numerous fisheries and gear types in which different species are caught still need to be done. Production data at the local/regional levels is also not readily accessible. NSAP data needs to be analysed to better characterize shark fisheries so that appropriate and site-based management measures can be developed and implemented. Fisheries information will help determine whether a decrease or increase in the shark production data in one area is a reflection of declines/inclines in shark populations, fishing effort, shift in fishing grounds, or even monitoring effort.

Additional data gaps are on the socioeconomic aspects of shark fisheries such as demographic profiles, fisheries profile, fishing operation practices including fleet and vessel size, gear used, areas fished, number of fishers, markets and values for different products, and the structure and flow of trade, problems, and fishery systems.

***

CHAPTER 4: SHARK UTILIZATION AND TRADE

Shark and shark products, historically of low economic value, are increasingly becoming valuable fisheries resources. However, documentation of the trade and utilization still remain poor. Production data of shark meat, shark fins, or shark liver oil are difficult to access. Customs data for trade of shark meat are also not readily available; while data for shark fins, when available, are incomplete.

The same applies to other shark products and by-products such as skins (which are made into leather and used for fashion accessories), cartilages (either or both soft and hard cartilages of sharks and batoids which are used in medical research), jaws and teeth (used as curios), and even whole or stuffed animals. Imports of these products may be reported in some countries but not in others. Available reports are often patchy, which may lead to the sometimes false assumption of the absence of trade.

Dedicated research on the trade and utilization of sharks and shark products, both in domestic and international markets, need to be done to get a better estimation and correlation of trade and shark catches.

For this report, data from the 2009 SAR is briefly discussed as basis for recommendations for next steps. Import-export data of shark fins in Hong Kong during 2006–2017 from Census and Statistics Department (CSD 2016) was recently added as reference.

Box 4.1: Shark Products & By-Products

Sharks products and by-products, their uses and trade have been discussed extensively in TRAFFIC reports by Rose (1996) and Chen (1996).

Shark meat has been traditionally consumed in dried, salted, and/or smoked forms in global communities worldwide. It may be sold under market names designated to disguise true identities in the marketplace (e.g., piked dogfish = "grayfish"; "rock salmon". "huss" or "rig", "flake"; "cape shark" = for other species). Processed forms are often used in the domestic production of minced fish products, including fish balls, fish sausage, tempura, artificial crabs or scallops, and fish "ham."

Shark fins are highly appreciated in the Chinese cuisine. They are among the world's most expensive fisheries commodities, with nearly all species considered commercially valuable. Fin value varies according to color, size, thickness, and fin needle content.

Shark liver oil yield various compounds such as squalene, diacyl glyceryl ethers, and squalamine which are used in textile and tanning, lubricants, pharmaceutical and cosmetics products (e.g., skin creams as moisturizing or skin whitening ingredient, compounds in vitamin A), other and medicinal product research to heal wounds, prevent bacteria spread, protect from viruses (including HIV) and several sexually transmitted diseases (including herpes, gonorrhea, and Chlamydia) and radiation.

Cartilages are used in fishmeal and also in cancer research and a wide variety of additional ailments such as eye fatigue, rheumatism, even skin burns.

Shark skins are used as rough abrasives for rasping and polishing or tanned for production of high-quality and expensive leathers in traditional armors and sword handles and recently as fashion accessories, used for handbags, wallets, watch straps, boots, and belts.

Teeth and jaws are traditionally used in some cultures in making both functional and ceremonial objects (e.g., carvings, swords, knives, war clubs, weapons); recently as tourist curios.

Other parts used are vertebrae used in walking sticks; dried or stuffed shark heads, bodies as curios; and offals, internal organs and other "wastes" used in the production of animal, fish or shrimp feeds, and fertilizers. Other products and uses include: glue in traditional Japanese lacquerware; shark bile in traditional Chinese medicine for the treatment of laryngopharyngitis; dogfish carcasses for biology dissections and for medical research.

4.1 SHARK MEAT

Shark meat in domestic production is directly utilized in the local market as part of the local cuisine or as minced fish products which are more difficult to trace. There is no preference for species or size, thus all may be utilized.

Processing and selling of shark meat varies from one region to the next (Barut and Zartiaga 1997). Meat is usually consumed locally, as fresh products, while some are processed into fish balls. Buying rate at the landing site is usually lower than in market places.

Price of dried meat is usually higher than fresh products. Fresh meat prices ranged from PhP20–PhP60/kg in Luzon and PhP10–PhP24/kg in Visayas and Mindanao. Dried products were priced at PhP35–PhP75/kg. In a 1996 WWF-TRAFFIC Southeast Asia report, fresh meat (e.g., from a small tiger shark) was marketed at PhP120/kg while dried meat was at PhP40/kg in Zamboanga (Samaniego and Cruz 1996).

Shark meat, while usually low value, is becoming increasingly popular, and reported world landings have tripled since 1985. European Union (EU) states (particularly Spain and Italy) were responsible for 56% of global shark meat imports in 2005.

Table 4.1. Annual quantity (in kg) and value of squalene liver oil exports, Philippines 1973- 1981. (Source: Fishery Statistics of the Philippines in Chen 1996).

Squalene Liver Oil	1973	1974	1975	1976	1977	1978	1979	1980	1981	TOTAL
Quantity (kg)	7,300	11,412	45,364	252,386	95,546	83,622	261,743	336,079	190,190	1,283,642
Value (PhP)	59,300	150,867	636,895	4,363,710	1,570,572	1,376,395	5,596,588	11,849,896	6,519,156	32,123,379
PhP/kg	8.12	13.22	14.04	17.29	16.44	16.46	21.38	35.26	34.28	25.03

4.2 SHARK FINS

Nearly all species of sharks and rays are considered commercially valuable for their fins (Kreuzer and Ahmed 1978; Subasinghe 1992). The value of the fins varies according to color, size, thickness, and fin needle content. Hong Kong, the world capital of shark fin cuisine, imports fins in a variety of stages of processing, consumption, and/or re-export (Parry-Jones 1996). Preferred species (depending on availability) are the hammerheads, mako, and blue sharks which are the most highly valued, followed by requiem sharks, great white, threshers, tiger, and tope sharks. White fins (e.g., hammerheads; sandbar sharks) are considered more valuable than black fins (e.g., mako sharks and blue sharks); black fins have 50% less of fin ray content.

Shark fins are usually dried before being sold. Fins are sold in sets consisting of all fins of the sharks, to include dorsal, pectoral, anal, and caudal fins of individual sharks (Samaniego and Cruz 1996). Prices vary depending on the species. Prices ranged from PhP300–PhP 3,100/kg in the local market to PhP400–PhP3,400 when traded in Manila (Barut and Zartiaga 1997). Larger fins fetched higher prices. Large black fins from hammerhead or tiger sharks were marketed at about PhP2,300.00 and PhP2,500.00, by local traders and in Manila, respectively. Large white fins from guitarfishes, with sizes 12" and above, were sold for PhP3,100/kg (or =US$ 110/kg at that time). Fins of the giant guitarfish are considered as most superior in Taiwan (Chen 1996). Whale sharks were reported to have been exported to other Asian countries at approximately US$14/kg. Other fin importers also include the Middle East (for blacktip reef sharks).

The Philippine National Statistics Office listed at least eight countries importing a total of 96.5 mt "dried unsalted shark fins" during 1990–1994, namely: Australia, Brunei, China RP, Hong Kong, Japan, Korea, Singapore, and Taiwan. Hong Kong was the top importer receiving about 90% (86.7 mt) of the total traded commodity, followed by Singapore (6% or 5.3 mt), Korea (2% or 2.3 mt), and Brunei (1% or 1.2 mt). The remaining 0.5% was spread out among the five other countries. The trade peaked in volume in 1992 (at 36 mt) and declined thereafter; while price averaged at US$10.34/kg within the five-year period and increased at an average of 17% per year—from US$8.85 in 1990 to US$12.9 in 1994.

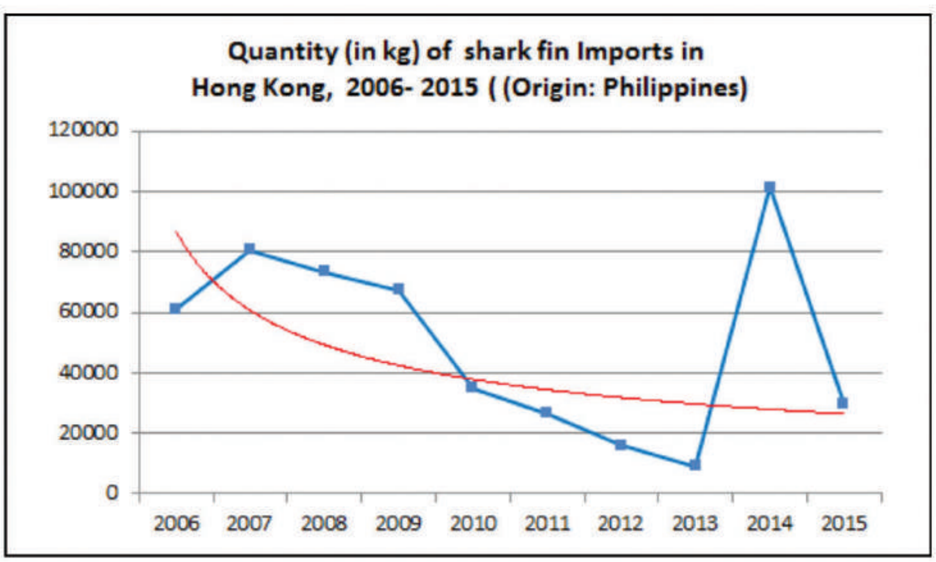


Figure 4.1. Annual quantity (in kg) of shark fin imports in Hong Kong (originating from the Philippines) in 1973–1981, with trendlines (in red). (Source: Hong Kong Census and Statistics Department 2016).

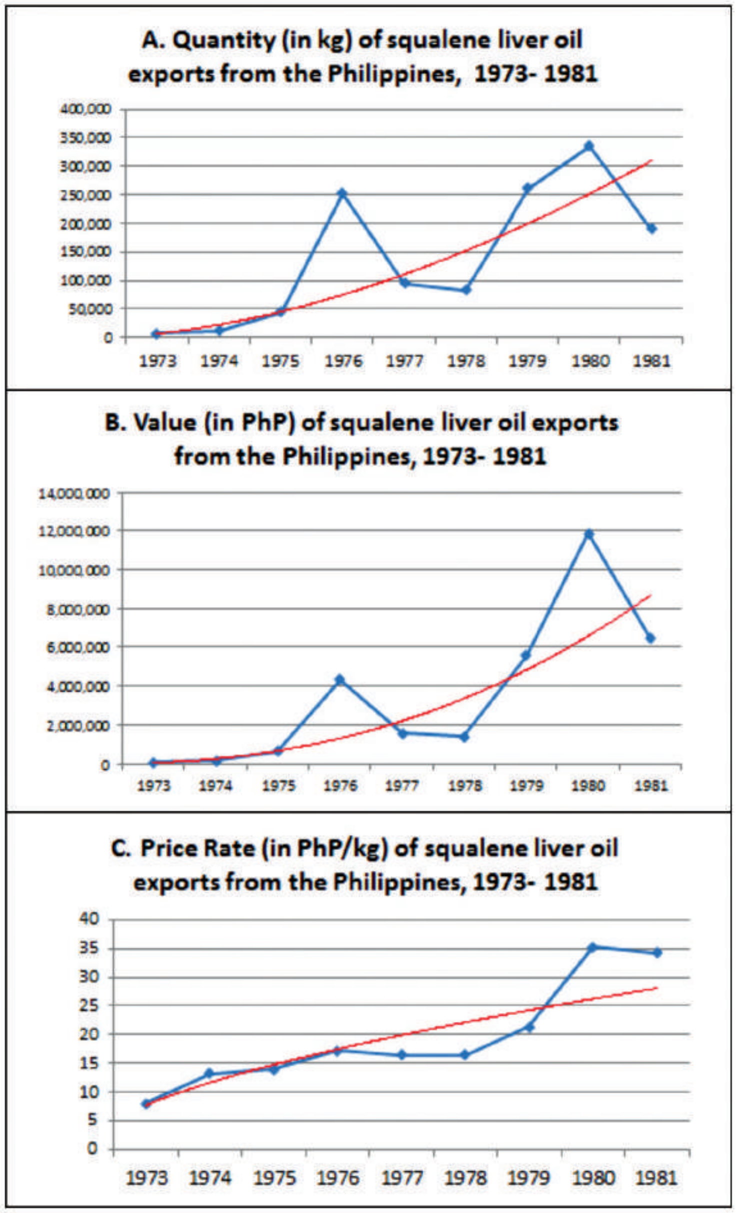


Figure 4.2. Annual quantity (in kg) (A) and value (in PhP (B) and PhP/kg(C)) of squalene liver oil exports, Philippines 1973–1981, with trendlines (in red). (Source: Philippine Fishery Statistics, in Chen 1996).

For the period 2006–2015, a total of 500,456 kg of shark fins originating from the Philippines were reported to have been imported by Hong Kong (Census and Statistics Department 2016) (see Figure 4.1). The data is considered as unadjusted (i.e., raw data) showing the origin of the reported fin trade (i.e., origin is the Philippines but doesn't necessarily mean that the fins were shipped directly from Philippines; Stan Shea, personal communication).

4.3 SHARK LIVER OIL

Livers vary in size and weight by species and by season and the relative weight of the liver to the total body weight tend to increase with size. Market prices of shark liver oil thus vary based on species, size, and season. Traditionally, dogfishes have been targeted for squalene liver oil, since as deepwater species, they have large livers. Other species include the tope shark, piked dogfish, catsharks (*Galeus spp.*), longfin mako, starspotted smooth-hound, and hammerhead shark because of the Vitamin A found in their liver oils.

Chen (1996) briefly described a shark liver oil fishery in which 60–80 piked dogfishes ranging 35–40cm in size were caught in one boat trip in a hook and line fishery. The production estimate was at 151 liters of crude oil priced at US$14–US$17.5 per liter and sold to buyers in Manila, in gasoline drums. The drums were approximately 200 liters each, which takes an estimated 800–1,000 sharks to produce. A 200-liter squalene liver oil was marketed between PhP2,000–PhP3,000. Refined oil was packed in 25-liter containers, eight of which make up a drum worth about US$7,700.00 and exported to other Asian countries.

The primary importer was Japan, receiving at an average of 263 tons of shark liver oil annually during 1979–1981. Export fell to 45 tons in 1993, and amounted to 1,121 tons in

1994, with exports in those years reported only to Japan (134 tons or 85% of total exports) and South Korea (23 t or 15% of total exports). A total of 1,283.6 mt had been exported out of the country from 1973 to 1981, with annual variation in value and prices rates (Chen 1996).

The Philippine National Statistics Office listed eight countries importing a total of 517.9 mt of squalene liver oil from 1990–1994, namely: Australia, Brunei, China RP, Hong Kong, Japan, Korea, Singapore, and Taiwan. This volume is more than four times the volume of shark fins exported in the same years. Japan was the highest importer, receiving about 71% (365.6 mt) of the total traded commodity for the period 1990–1994, followed by Hong Kong (18% or 91.9 mt), and Korea (12% or 60.1 mt). Taiwan imports for shark liver oil is only about 0.1% or about 0.4 mt. Market trends for shark liver oil also declined within the four-year period.

Shark fins, now among the most expensive seafood products in the world, are exported to East and Southeast Asia for processing and preparation of shark fin soup. The EU is the world's largest exporter of shark fins to China, the biggest consumer market. Official data on the quantity of shark fins landed, in particular, are clearly huge underestimates. The number of sharks that must be caught globally to produce the fins observed in international trade (some 26 to 73 million sharks *per annum*) is more than four times higher than the UN FAO's mid-range estimate of landings, and three times higher than the high-end estimate. These calculations demonstrate the benefit of using trade data to generate comparative estimates of fish landings, but require accurate conversion factors from products to whole weight of fish.

4.4 OTHER PRODUCTS

Other shark products in the international market include liver oil, skins, cartilage (soft and hard cartilages of sharks and batoids), jaws and teeth, and many others (see Box 4.1). **Shark skin**, in its rough form, is known as shagreen. These were originally used as rough abrasives for rasping and polishing. Dried skin was priced at PhP50/kg. Tanned and polished shark skins are used in the production of high quality and expensive leathers, used in traditional armors and sword handles in Japan and recently, for handbags, watch straps, cowboy boots, belts and other similar products in the USA, Japan, and Europe (Chen 1996).

Teeth and jaws of requiem sharks such as mako or great white are utilized largely as tourist curios but in many cultures, they are traditionally used in making both functional and ceremonial objects (e.g., carvings, swords, knives, war clubs, other weapons). Market for teeth and jaws is largely opportunistic and are by-products of growing commercial fisheries. Jaws were priced at PhP110/kg (fresh) or between PhP800-PhP1,000/kg (dried). Other curiosity or souvenir products include **dried and stuffed sharks or rays**, whole or head part, and **vertebrae** used in walking sticks.

Other parts of the sharks (e.g., shark waste, offal, internal organs and other related products) are also used in fishmeal production for use in animal feeds, fertilizers, or feed for shrimp aquaculture. Other products and uses include: glue in traditional Japanese lacquerware, shark bile (from starspotted smooth-hound) in traditional Chinese medicine in the treatment of laryngopharyngitis, or dogfish carcasses in biology dissections and for medical research.

4.5 LIVE SPECIMENS

Live specimens are increasingly used in both public and private aquaria, including some species such as nurse sharks, catsharks (juveniles and egg cases), Freshwater stingrays (*Potamotrygon laticeps*), and Epaulette sharks (*Hemiscyllium ocellatum*). In the Philippines, shark and ray species are known to be exhibited in both public and private aquaria but species exploited and status of each still need to be assessed.

Wild populations of sharks and rays have become major tourism products in a number of areas, for scuba diving and recreational fisheries. In the Philippines, the thresher sharks in Malapascua and the whale shark populations in Donsol, Sorsogon and Oslob, Cebu are drawing a number of tourists yearly. Though these are now new markets for sharks under non-consumptive utilization, newer concerns are raised in terms of appropriate management and ethical practices in species-based tourism.

4.6 CONCLUSIONS AND RECOMMENDATIONS

Available information on fisheries, trade, and utilization of sharks and shark products is generally poor. There is thus difficulty in getting estimates and correlation of trade and shark catches, and the total volume of shark fisheries that the country is contributing to the global market. Available data collected thus far, though needing further review and analysis, show that fisheries is increasing locally, and, presumably, so does the volume of traded shark products. Current data and information management system of fisheries in general and shark/shark products in particular is somehow counterintuitive to the increasing demand for shark products.

When sharks are already cut up into preferred body parts (e.g., fins, meat, liver) before they are brought to the landing and/or market sites, challenges are posed not only in species identification but also in the estimation of numbers and sizes of animals taken. The precautionary approach to fisheries dictates that fisheries management needs to be in place in spite of these uncertainties. A certain level of estimation is still needed which can then be translated into closer estimates in number of sharks individuals taken, or the so-called "conversion factor" which needs to be arrived at from these landings to better inform management of the fisheries.

Such a conversion factor for Philippine shark fisheries still needs to be done to get a better estimate of the relationship between the volume of shark products traded and the quantities of sharks originally taken by fisheries. Conversion factors are important for the regulation of fisheries, for use in the calculation and enforcement of fishing quotas and/or bans on shark finning.

Shark fisheries and trade data collection and information management still remains a systematic issue. Production data on shark meat, fins and other products/by-products (e.g., skins and leather, jaws, liver oil, cartilage or even fins, offals, fishmeal and fertilizer) is still not available or readily accessible. Reporting systems are also inconsistent while categories and classifications in trade statistics are not standardized.

In the case of shark fins, imports may be reported but these are not necessarily accurate since import permits are applied for in advance and not validated on-site. Reports of outgoing trade are not also reported consistently. There are different government offices responsible for handling import permits (i.e., BFAR Central Office and regional offices in major cities with international ports) and another office for exports (i.e. Bureau of Customs). Trade data (to include imports and exports) as presented does not capture all shark trade statistics, and is disjointed at best.

A primary and prevalent data gap is species-level identification and reporting. Most traded products, which are not of whole individual sharks but of parts and by-products or commodities, are not identified to species level. Big volumes of fins, possibly belonging to various species of sharks, are often lumped as a single species and recorded as a single commodity.

The standard six-digit customs tariff headings adopted under the Harmonized System of classification are specific for meat, categories used being "dogfish" and "other sharks," which, even then, are often combined into a single category. Validation protocol is also not in place. Monitoring and reporting data, particularly of species and populations that are protected or regulated (e.g., species listed under CITES Appendices), are thus largely unreliable.

Analysis of the trade and utilization of shark and shark products is thus highly recommended. Though some of the recommendations for improving knowledge on trade and utilization identified during the 2009 SAR have been addressed (e.g., development of field ID guides for sharks and shark products), more still need to be implemented and regularly monitored and evaluated for effectiveness (see Box 4.2).

Box 4.2: Recommendations to Improve Reporting of Shark Utilization and Trade

The recommendations below were made to address data gaps and concerns on shark trade and utilization identified in the 2009 SAR and NPOA-Sharks and still considered valid during the 2016 NPOA-Shark workshops:

- Inclusion of shark scientific names in the Harmonized System Code
- Development of suitable export permitting system for visiting boats buying shark products
- Development of capability of fisheries quarantine personnel and the local government units in shark identification at the species level (e.g., taxonomy)
- Development of identification guide for sharks and shark products
- Enhancement of current export permitting system by requiring exporters to provide scientific name of shark products to be exported
- Enactment of policy to regulate shark species listed as endangered and critically endangered under the IUCN Red List
- Defining and standardizing of data collection system and establishment of database for fisheries quarantine personnel
- Development and implementation of a bar coding system (i.e., genetic/molecular identification) to identify shark commodities (e.g., fins, jaws, meat, gills, bones, others) to species level
- Establishment of monitoring system for foreign vessels poaching in Philippine waters, trading fish and fishery products in "blind spots" such as Palawan and Tawi-Tawi, or exporting such through country's back door to Malaysia and other countries.

***

CHAPTER 5: LEGAL & MANAGEMENT INSTRUMENTS

5.1 INTERNATIONAL LAWS AND POLICIES APPLICABLE TO SHARK MANAGEMENT

The Philippines is a party to several multilateral environmental agreements (MEAs) such as the United Nations Convention on the Law of the Sea (UNCLOS); Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES); Ramsar Convention on Wetlands of International Importance; Convention on Biological Diversity (CBD); Convention concerning the Protection of the World Cultural and Natural Heritage or World Heritage Convention; and the Convention on the Conservation of Migratory Species of Wild Animals (Convention on Migratory Species or CMS).

MEAs are international legal instruments which allow countries to work together on global environmental issues, the conservation of marine wildlife and fisheries resources, and resource conservation concerns. Most of these instruments are legally binding to parties or member countries/signatories, which are mandated to implement the provisions of the various instruments through national legislations.

5.1.1 United Nations Convention on the Law of the Sea

UNCLOS (also called the **Law of the Sea Convention** or the **Law of the Sea Treaty**[6]), is the international agreement which defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources.

UNCLOS sets provisions for the conservation and management of fisheries and other uses of the sea. Its provisions on the exclusive economic zones (EEZ) of coastal states and high seas require cooperation among states for the conservation and utilization of highly migratory species. In 1995, the UN created a multilateral treaty known as the Straddling Fish Stocks Agreement to enhance the cooperative management of fisheries resources that span wide areas, and are of economic and environmental concern to a number of nations. The Agreement came into force in 2001 and had been ratified by 84 parties, which includes 83 states and the European Union.

The Agreement sets out principles for the conservation and management of straddling stocks (i.e., fish stocks that migrate through, or occur in, more than one EEZ) based on the precautionary approach and the best available scientific information. It elaborates on the fundamental principle established in UNCLOS that states should cooperate to ensure conservation and promote the objective of the optimum utilization of fisheries resources both within and beyond the EEZ.

It promotes good order in the oceans through the effective management and conservation of high seas resources by establishing, among other things, detailed minimum international standards for the conservation and management of straddling fish stocks and highly migratory fish stocks; ensuring that measures taken for the conservation and management of those stocks in areas under national jurisdiction and in the adjacent high seas are compatible and coherent; ensuring that there are effective mechanisms for compliance and enforcement of those measures on the high seas; and recognizing the special requirements of developing states in relation to conservation and management as well as the development and participation in fisheries for the two types of stocks mentioned above.

The Agreement establishes rules and conservation measures for high seas fishery resources, and is complemented by the UN Food and Agriculture Organization (UN FAO) Code of Conduct for Responsible Fisheries (FAO 1995) which sets out principles and international standards of behavior. In 1999, the UN FAO Conference endorsed the IPOA-Sharks (see Chapter I; see Annex A).

Aside from the recommendation for member states with shark captures to produce its SAR and NPOA-Sharks, it also assigned the management of high seas fishery resources to the regional fisheries management organizations (or RFMOs). Notable of these RFMOs are the Inter-American Tropical Tuna Commission (IATTC), the International Council for the Exploration of the Sea (ICES), the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Northwest Atlantic Fisheries Organization (NWAFO), the Sub-regional Fisheries Commission of West African States, the Latin American Organization for Fishery Development, the Indian Ocean Tuna Commission (IOTC), the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), and the Oceanic Fisheries Programme of the Pacific Community (OFPPC) which were identified to have initiated efforts encouraging member countries to collect information about sharks, and in some cases developed regional databases for the purpose of stock assessment.

Management measures proposed and/or implemented by some of the RFMOs (e.g., IATTC, ICCAT, IOTC) include prohibition of catches or reduction of by-catches of key shark species such as: Bigeye thresher shark (*Alopias supercilious*), Oceanic whitetip (*Carcharhinus longimanus*), Silky sharks (*Carcharhinus falciformis*), Whale shark (*Rhincodon typus*),

[6] http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm

Table 5.1. Shark species covered in management measures implemented by regional fisheries management organizations (RFMOs). (Source: Chou 2015).

SPECIES	IATTC	ICCAT	IOTC	WCPFC
Bigeye thresher		2009		
Oceanic whitetip	2011	2010	2013	2012
Hammerheads		2010		
Silky sharks		2011		2013
Whale sharks	2013 (no setting)			2012 (no setting)
Thresher sharks			2010	
General		2010		2014 Wire leader/ shark line ban

hammerheads (*Sphyrnidae*), and thresher sharks (*Alopiidae spp*.). None of these measures involved total prohibition of shark catches (Chou, 2015; see Table 5.1). Management measures proposed and/or being implemented by Western Central Pacific Fisheries Commission (WCPFC), to which the Philippines is a member, are discussed under the Regional Treaties section (Section 5.2).

5.1.2 Convention on International Trade in Endangered Species of Wild Flora and Fauna

CITES is a binding international agreement that regulates international trade of wildlife under a system of permits and certificates. Established in 1975, its objective is to ensure that international trade of wild flora and fauna does not threaten their survival. Species are afforded different levels or types of protection from over-exploitation through three listings in CITES appendices, defined as:

- Appendix I: Species that are threatened with extinction and for which international trade is allowed only in exceptional circumstances or when the purpose of the import is not commercial (e.g., scientific research). In these exceptional cases, trade may take place provided it is authorized by the granting of both an import permit and an export permit (or re-export certificate). For sharks, all species under the family Pristidae (sawfishes) is listed in Appendix I.
- Appendix II: Species that are subject to strict regulation and monitoring to ensure that their trade is not detrimental to the status of the listed species. These species are not necessarily as yet threatened with extinction but may become so unless trade is closely controlled. It also includes so-called "look-alike species," i.e., species whose specimens in trade look like those of species listed for conservation reasons. International trade in specimens of these species may be authorized by the granting of an export permit or re-export certificate **but only if** relevant authorities are satisfied that certain conditions are met, above all that trade will not be detrimental to the survival of the species in the wild. No import permit is necessary for these species under CITES except in some countries with stricter measures than CITES. Most shark species are in CITES Appendices II (see Table 5.2). Newly additions during CITES CoP17 (October 2016) are: *Carcharhinus falciformis* (Silky sharks), *Alopias* spp. (thresher sharks), and *Mobula* spp. (devil rays).
- Appendix III: Species included at the request of a Party that already regulates trade in the species and needs the cooperation of other countries to prevent unsustainable or illegal exploitation. International trade in specimens of these species is allowed only on presentation of the appropriate permits or certificates.

In 1994, CITES adopted the landmark resolution (9.17) entitled "*The Status of International Trade in Shark Species.*" This resulted in an increase in the amount of information available on elasmobranch trade useful in future management. This resolution prompted the UN FAO's Committee on Fisheries to organize an expert consultation on the conservation and management of sharks, which culminated in the agreement for the IPOA-Sharks in October 1998. This was formally adopted by UN FAO's 23rd Committee on Fisheries in February 1999 (refer to Chapter 1).

Currently, there are 22 species belonging to nine families and five orders that are in the CITES appendices (see list in Table 5.2). Only the sawfishes (Family Pristidae) are listed under Appendix I while 12 other shark species are listed under Appendix II. The entries into effect of the listing of three are delayed for 6–12 months (i.e., devil rays *Mobula* spp., for 6 months or on April 4, 2017; thresher sharks *Alopias* spp. and the Silky shark *Carcharhinus falciformis*, for 12 months or on October 4, 2017).

The Philippines signed on to this convention on March 3, 1973, ratified on August 19, 1981 and entered into force on November 16, 1981. Provisions of this convention have been translated into law through the Philippine Fisheries Code (RA 8550, as amended by RA 10654), and the Philippine Wildlife Act (RA 9147). These laws are discussed separately in Section 5.3.

5.1.3 Convention on Biological Diversity

The CBD is an international treaty negotiated under the auspices of the United Nations Environment Programme (UNEP). It was opened for signature at Rio de Janeiro, Brazil in the June 1992 UN Conference on Environment and

Table 5.2. Cartilaginous fishes (Class Chondrichthyes) in the CITES Appendices.
(Source: https://cites.org/eng/app/appendices.php).

CLASS ELASMOBRANCHII (SHARKS)	Appendices	Remarks
CARCHARHINIFORMES		
Carcharhinidae Requiem sharks		
Carcharhinus falciformis	II	entry into effect delayed by 12 months, i.e. until 4 October 2017
Carcharhinus longimanus	II	
Sphyrnidae Hammerhead sharks		
Sphyrna lewini	II	
Sphyrna mokarran	II	
Sphyrna zygaena	II	
LAMNIFORMES		
Alopiidae Thresher sharks		
Alopias spp.	II	entry into effect delayed by 12 months, i.e. until 4 October 2017
Cetorhinidae Basking sharks		
Cetorhinus maximus	II	
Lamnidae Mackerel sharks		
Carcharodoncarcharias	II	
Lamnanasus	II	
MYLIOBATIFORMES		
Myliobatidae Eagle and mobulid rays		
Manta spp.	II	
Mobula spp.	II	entry into effect delayed by 6 months, i.e. until 4 April 2017
Potamotrygonidae Freshwater stingrays		
Paratrygonaiereba	III	(Colombia)
Potamotrygon spp.	III	population of Brazil (Brazil)
Potamotrygon constellata	III	(Colombia)
Potamotrygon magdalenae	III	(Colombia)
Potamotrygon motoro	III	(Colombia)
Potamotrygon orbignyi	III	(Colombia)
Potamotrygon schroederi	III	(Colombia)
Potamotrygon scobina	III	(Colombia)
Potamotrygon yepezi	III	(Colombia)
ORECTOLOBIFORMES		
Rhincodontidae Whale sharks		
Rhincodon typus	II	
PRISTIFORMES		
Pristidae Sawfishes		
Pristidae spp.	I	

Development (UNCED) and entered into force on 29 December 1993, ninety days after the 30th ratification. The CBD, along with the Convention on Climate Change adoption of the Agenda 21, were the major outputs of the UNCED. As of October 1998, more than 170 countries had become parties to the CBD. The Philippines signed the convention on 12 June 1992 and ratified it on October 8, 1993.

The three goals of the CBD are to promote the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilization of genetic resources. The CBD identifies protected areas as an integral part of initiatives to conserve and use biodiversity resources in a sustainable way. One approach is to establish a system of protected areas or areas where special measures need to be taken to conserve biodiversity.

The CBD has a fully developed funding mechanism which can be tapped to implement initiatives on biodiversity conservation for the benefit of local and global communities. Many parties are developing national strategies for the conservation of their biodiversity. In 2002, the Philippines produced the Philippine Biodiversity Conservation Priority-setting Program (PBCPP) report which identified priority conservation areas and was the first version of the country's national biodiversity conservation strategy.

5.1.4 Convention on the Conservation of Migratory Species of Wild Animals (CMS)

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) is an intergovernmental treaty concluded under the aegis of UNEP and is concerned with the conservation of wildlife and habitats on a global scale. Signed in 1979 and ratified into effect in 1983, CMS is a framework convention, wherein agreements may range from legally binding treaties (i.e., agreements) to less formal instruments (e.g., memoranda of understanding or MOUs). Since its entry into force, CMS membership has grown to 124 parties. The Philippines signed the convention on June 20, 1980, ratified on March 20, 1993 and entered into force on February 1, 1994. A number of countries also participate in regional agreements and MOUs despite of not being parties to the parent convention.

CMS is cognizant that species do not recognize political borders. As such, CMS brings range states (states through which migratory animals pass) to cooperate for the sustainable management of migratory species that move across national boundaries and whose life histories make them vulnerable to exploitation in more than one country. It lays the legal foundation for internationally coordinated conservation measures throughout the migratory range of a species. CMS has defined species listings under two appendices:

- Appendix I: Migratory species threatened with extinction. CMS parties strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration, and controlling other factors that might endanger them.
- Appendix II: Migratory species that need or would significantly benefit from international cooperation. CMS encourages the range states to conclude global or regional agreements in protecting species habitats and migratory routes through the implementation of a species conservation plan.

In 2007–2010, discussions and negotiations for the development of the MOU on the Conservation of Migratory Sharks[7] were conducted by CMS Signatories. The final document, initially covering seven species, opened for signature in 2010 in Manila, Philippines. With amendments in 2014 and 2016, additional species are added to the MOU, which now covers 29 chondrichthyan species (see list in Table 4.2) and is signed by 41 States (which includes the Philippines) and 8 Co-operating Partners.

The MOU is the first global instrument for the conservation of migratory species of sharks. It aims to achieve and maintain a favourable conservation status for migratory sharks based on the best available scientific information and taking into account the socioeconomic value of these species for the people in various countries. The objectives of the Migratory Sharks Conservation Plan (or the Conservation Plan) as adopted under this MOU include:

- Improving the understanding of migratory shark populations through research, monitoring and information exchange
- Ensuring that directed and non-directed fisheries for sharks are sustainable
- Ensuring to the extent practicable the protection of critical habitats and migratory corridors and critical life stages of sharks
- Increasing public awareness of threats to sharks and their habitats, and enhancing public participation in conservation activities
- Enhancing national, regional, and international cooperation

The MOU is a legally **non-binding** international instrument and is open for signature by all range states of migratory sharks and states and regional economic integration organizations, flag vessels of which are engaged outside its national jurisdictional limits in taking, or which have the potential to take, migratory sharks. Signatories are urged to cooperate through RFMOs, the UN FAO, regional seas conventions, and biodiversity-related multilateral environmental agreements.

[7] http://www.cms.int/sharks/en/legalinstrument/sharks-mou

Table 5.3. List of cartilaginous fishes in the CMS Appendices 1 and II and inclusion in the CMS MOU Sharks (Source: http://www.cms.int/sharks/en/legalinstrument/sharks-mou).

Scientific name	Common name	CMS Appendix I	CMS Appendix II	CMS Instruments
Alopias pelagicus	Pelagic Thresher Shark		2014	CMS, Sharks 2016
Alopias superciliosus	Bigeye Thresher Shark		2014	CMS, Sharks 2016
Alopias vulpinus	Common Thresher Shark		2014	CMS, Sharks 2016
Anoxypristiscuspidata	Narrow Sawfish	2014	2014	CMS, Sharks 2016
Carcharhinus falciformis	Silky Shark		2014	CMS, Sharks 2016
Carcharodoncarcharias	Great White Shark	2002	2002	CMS, Sharks 2010
Cetorhinus maximus	Basking Shark	2005	2005	CMS, Sharks 2010
Isurus oxyrinchus	Shortfin Mako Shark		2008	CMS, Sharks 2010
Isurus paucus	Longfin Mako Shark		2008	CMS, Sharks 2010
Lamnanasus	Porbeagle		2008	CMS, Sharks 2010
Manta alfredi	Reef Manta Ray, Prince Alfred's Ray, Inshore Manta Ray, Coastal Manta Ray, Resident Manta Ray	2014	2014	CMS, Sharks 2016
Manta birostris	Manta Ray	2011	2011	CMS, Sharks 2016
Mobula eregoodootenkee	Pygmy Devil Ray, Longhorned Devil Ray	2014	2014	CMS, Sharks 2016
Mobula hypostoma	Atlantic Devil Ray, Lesser Devil Ray	2014	2014	CMS, Sharks 2016
Mobula japanica	Spinetail Mobula, Spinetail Devil Ray, Japanese Devil Ray	2014	2014	CMS, Sharks 2016
Mobula kuhlii	Shortfin Devil Ray, Lesser Devil Ray	2014	2014	CMS, Sharks 2016
Mobula mobular	Giant Devil Ray	2014	2014	CMS, Sharks 2016
Mobula munkiana	Munk's Devil Ray, Pygmy Devil Ray, Smoothtail Mobula	2014	2014	CMS, Sharks 2016
Mobula rochebrunei	Lesser Guinean Devil Ray	2014	2014	CMS, Sharks 2016
Mobula tarapacana	Box Ray, Chilean Devil Ray, Devil Ray, Greater Guinean Mobula, Sicklefin Devil Ray, Spiny Mobula	2014	2014	CMS, Sharks 2016
Mobula thurstoni	Bentfin Devil Ray, Lesser Devil Ray, Smoothtail Devil Ray, Smoothtail Mobula, Thurton's Devil Ray	2014	2014	CMS, Sharks 2016
Pristisclavata	Dwarf Sawfish	2014	2014	CMS, Sharks 2016
Pristispectinata	Smalltooth Sawfish	2014	2014	CMS, Sharks 2016
Pristispristis	Largetooth Sawfish	2014	2014	CMS, Sharks 2016
Pristiszijsron	Green Sawfish	2014	2014	CMS, Sharks 2016
Rhincodon typus	Whale Shark		1999	CMS, Sharks 2010
Sphyrna lewini	Scalloped hammerhead shark		2014	CMS, Sharks 2016
Sphyrna mokarran	Great hammerhead shark		2014	CMS, Sharks 2016
Squalus acanthias	Spiny Dogfish		2008	CMS, Sharks 2010

5.1.5 The Convention on Wetlands of International Importance (Ramsar Convention)

The Convention on Wetlands of 1971, popularly known as the Ramsar Convention, commits to protect wetlands in recognition of their function as regulators of water regimes and habitats supporting a characteristic flora and fauna.

Wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters (Art. 1 of the Ramsar Convention). These areas perform a wide range of critical and valuable services, such as serving as breeding and feeding grounds for various marine life and other forms of biodiversity, providing food and water supply, protecting coasts, and providing other opportunities for livelihood and ecotourism activities. Maintaining the integrity of wetlands will ensure the continuity of providing these services for human wellbeing.

The convention entered into force in the Philippines on 8 November 1994. The Philippines currently has 7 sites designated as Wetlands of International Importance (Ramsar Sites), with a surface area of 244,017 hectares (www.ramsar.org/wetland/philippines). The Ramsar sites in the Philippines are: Las Piñas-Parañaque Critical Habitat and Ecotourism Area (in Manila Bay), Naujan Lake National Park (Oriental Mindoro), Puerto Princesa Subterranean River National Park (Palawan), Tubbataha Reefs Natural Park (Palawan), Olango Island Wildlife Sanctuary (Cebu), Agusan Marsh Wildlife Sanctuary (Agusan, del Sur), Negros Occidental Coastal Wetlands Conservation Area (Negros Occidental).Ramsar sites in the Philippines are primarily monitored for migratory birds. At least one, i.e., Tubbataha Reefs, has research and monitoring for sharks (see Section 5.3.1).

5.1.6 The International Union for Conservation of Nature

The International Union for Conservation of Nature (IUCN)—through the Species Survival Commission (SSC) which is a volunteer network of scientists, field researchers, government officials and conservation leaders from almost every country in the world—has been assessing the conservation status of species, subspecies, and populations on a global scale to highlight those threatened with extinction, and therefore promote their conservation using the IUCN Red List Categories and Criteria.

The SSC works through its specialist groups, including the Shark Specialist Group (SSG). The SSG was established by the SSC in 1991 to provide leadership for the conservation of threatened species and populations of all chondrichthyan fishes. It aims to promote the long-term conservation of the world's sharks and related species, effective management of their fisheries and habitats, and where necessary, the recovery of their populations. The SSG assesses extinction risks of species using the IUCN Red List Categories and Criteria, identify major threats, and propose actions to achieve sustainable exploitation.

The IUCN Red List of Threatened Species is the world's most authoritative and objective system for classifying species' extinction risk. It is developed at global and sub-global levels and are integral to meeting CBD commitments.

Structure of the IUCN Red List Categories illustrates the process that needs to be followed to assess taxa in one of the nine IUCN Categories, three of which are categories of threat: Critically Endangered (CR), Endangered (EN), and Vulnerable (VU). A discussion of Philippine sharks and batoid species in the IUCN Red List is presented in Chapter 6.

5.2 REGIONAL TREATIES/REGIONAL MANAGEMENT BODIES

5.2.1 Western Central Pacific Fisheries Commission

The WCPFC was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPF Convention) which entered into force on 19 June 2004.[8] In 2005, during the First Regular Session of the Scientific Committee of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, the Ecosystem & Bycatch Specialist Working Group reported that among the non-targeted species groups (e.g., sharks, sea turtles, seabirds, and mammals), sharks had total annual catches much higher than for the other taxa (sea turtles and seabirds), with increasing catches in recent years. Shark catches are assumed to result in mortalities (and not released) due to the existence of dedicated shark longline fisheries and opportunistic catches of sharks and finning.

Observers recorded more than 40 shark taxa, with Blue sharks (*Prionace glauca*), Silky sharks (*Carcharhinus falciformis*), Oceanic whitetip sharks (*Carcharhinus longimanus*), and Pelagic stingrays dominating catches. Other oceanic species include the Bluntnose sixgill sharks (*Hexanchus griseus*), Basking shark (*Cetorhinus maximus*), Whale shark (*Rhincodon typus*), thresher sharks (Alopiidae spp.), requiem sharks (Carcharinidae spp.), hammerhead sharks (Sphyrnidae), and mackerel sharks (Lamnidae).

Since then, WCPFC, to which the Philippines is a member country, has recommended the development of a dedicated shark research program to support stock assessment of shark species that rank highly in the Ecological Risk Assessment (i.e., key shark species), in cooperation with other RFMOs

[8] https://www.wcpfc.int/

(Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean 2006). There are now 14 key shark species designated under the WCPFC Criteria; at least six have preliminary assessment done, to include: Oceanic whitetip (*Carcharhinus longimanus*) (2012), Silky shark (*Carcharhinus falciformis*) (2013), North Pacific blue shark (*Prionace glauca*) (2014), South Pacific blue shark (*Prionace glauca*), North Pacific shortfin mako (*Isurus oxyrinchus*) (2015), and Pacific bigeye thresher shark (*Alopias superciliosus*) (2016).

Except for the South Pacific blue shark population (where stock status for shark assessments using traditionally assessed relative to maximum sustainable yield (or MSY) based reference points has been presented to the Scientific Committee) and the Pacific bigeye thresher shark (where initial chapters of a stock assessment was reported to be in preparation during the 12th Regular Session of the Scientific Committee of the WCPFC or SC12), updated information on catches for all the other key species were not compiled for and reviewed by SC12.

For the South Pacific blue shark population, the 2015 catch data showed a decline by about 26% from 2014 values and by about 34% from the average for 2010–2014. In spite of these numbers, there are no management advice provided for the South Pacific blue shark population and all other key Western and Central Pacific Ocean (WCPO) shark species and populations (Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean 2016) (See Annex T: WCPO Sharks).

Data analyses and stock assessments reports of these species (to also include hammerheads and whale sharks) are proposed to be done from 2017 to 2020 under the WCPFC Shark Research Plan. Additional species, such as the Giant manta (*Manta birostris*) and the devil rays (*Mobula* spp.), were proposed to be designated as key sharks by the WCPFC at SC12 but which were not carried largely due to limited resources and capacity to carry out the research.

The Scientific Committee encourages members and observers to address the following priority research items for ecosystems and by-catch: a) ecological modeling and indicators; b) stock assessments for shark and billfish (particularly Silky shark and Oceanic white tips); c) increase in observer coverage rates, including the centralization and expansion of observer data collection and reporting and identification of species to support data collection by observer; and d) production of material to facilitate the identification of species by fishermen, observers, etc. with the objective of improving data quality.

5.2.2 ASEAN Agreement on the Conservation of Nature and Natural Resources

Based on the objectives of the World Conservation Strategy, this 1985 agreement requires parties to give special protection to threatened and endemic species and to preserve those areas which constitute critical habitats of endangered or rare species, of species that are endemic to a small area, and of migratory species. Fowler (1999) suggested that this could be useful for the conservation of threatened or migratory species, such as the elasmobranchs.

5.2.3 Association of Southeast Asian Nations–Southeast Asian Fisheries Development Center

The Association of Southeast Asian Nations (ASEAN), formed in 1967 by Indonesia, Malaysia, the Philippines, Singapore, and Thailand, is composed of ten member countries in Southeast Asia that also include Brunei, Vietnam, Lao PDR, Myanmar (Burma), and Cambodia (www.state.gov/p/eap/regional/asean/). The ASEAN Declaration in 1967, considered ASEAN's founding document, formalized the principles of peace and cooperation to which ASEAN is dedicated. The ASEAN Charter entered into force on 15 December 2008. With its entry, ASEAN established its legal identity as an international organization and took a major step in its community-building process.

The Southeast Asian Fisheries Development Center (SEAFDEC) is an autonomous intergovernmental body established as a regional treaty organization in 1967 to promote fisheries development in Southeast Asia (http://www.seafdec.org/). SEAFDEC is currently made up of 11 member countries, ten of which are the member countries of ASEAN and Japan. SEFADEC has the Council of Directors, composed of nominees from Member Countries, as policy-making body to provide directives and guidance on activities of the Center. It aims specifically to develop the fishery potentials in the region through training, research and information services to improve the food supply by rational utilization and development of the fisheries resources. Its services cover the broad areas of fishing gear technology, marine engineering, fishing ground surveys and stock assessment, post-harvest technology as well as development and improvement of aquaculture techniques.

As mentioned in Chapter 1, discussions on the sustainability of regional shark fisheries were initiated at the ASEAN-SEAFDEC Millennium Conference, Fish for the People, held in Bangkok. Member countries acknowledged the potential threats to shark populations and the need to comprehensively address species management-related issues, but also recognized the difficulty and challenges considering the lack of available information on shark catches, utilization, and trade in the region. As a regional fisheries management organization, provided a forum for the member countries to discuss and build a common stand on the issue of the management of sharks.

SEAFDEC also facilitated the collection and analysis of data on sharks and its fisheries at the level of member-countries as basis for the development of appropriate fisheries management policy and actions. Member countries made commitments to produce their respective NPOA-Sharks. Since the Millennium Conference in 2001, ASEAN member countries including the Philippines have taken several actions toward the formulation of the NPOA-Sharks. Project goal was to assist ASEAN member countries in the development of their respective NPOA-Sharks and to support the formulation of a regional policy and management mechanisms for fisheries catching sharks in Southeast Asia.

Box 5.1: Key Result Areas (KRAs) and Activities for Sharks under SSME-CAP

KRA 1: Develop and promote options and new conservation and management agreements for whale sharks and other CITES-listed species in the SSME.

Activity 1: Produce the status of whale sharks and other CITES-listed sharks and rays in the SSME that includes, but is not limited to (i) existing data on population, distribution, habitat, utilization; (ii) information on the trade in specimens; (iii) previous and existing legislation on the conservation and management of the species; (iv) gap identification and technical recommendations for adaptation and adoption of the best conservation and management practices; and (v) collaborative research in aid of policy development for conservation and management.

KRA 2: Develop and promote options and new conservation and management agreements for whale sharks and other CITES-listed species in the SSME.

Activity 2: Produce country status report on threatened pelagic migratory sharks and rays.

Activity 3: Draft SSME plan of action pursuant to The Conservation Status of Pelagic Sharks and Rays (Camhi et al. 2009) and the International Plan of Action for Conservation and Management of Sharks (FAO 2010–2011), including national on-board observer program to monitor and report bycatch, coordination arrangements with fisheries management organizations, and precautionary catch limits for sharks and rays.

Activity 4: Establish alternative livelihoods that are capable of weaning people away from unsustainable resource extraction and ensuring ecosystem integrity.

KRA 3: Promote conservation and management of endemic cartilaginous species (sharks and rays).

Activity 6: Collate and review existing information on endemic sharks and rays.

Activity 7: Identify and quantify threats to the populations of endemic sharks and rays.

Activity 8: Identify gaps in conservation and management, develop recommendations to fill gaps, and promote conservation of endemic sharks and rays.

5.2.4 Sulu–Sulawesi Marine Ecoregion

The Sulu–Sulawesi Marine Ecoregion (SSME) is a highly biodiverse, globally significant biogeographic unit in the heart of the Coral Triangle—the center of the world's highest concentration of marine biodiversity. The SSME covers an area of about 1 million square kilometers and straddles three countries: Indonesia, Malaysia, and the Philippines. Its global significance in terms of marine biodiversity and contribution to the economies of the three countries, and to the global economy, has been well documented.

During the 7th meeting of the Conference of the Parties to the Convention on Biological Diversity held in Kuala Lumpur, Malaysia, the governments of Indonesia, Malaysia, and the Philippines entered into a memorandum of understanding on 13 February 2004 to ensure the effective protection and sustainable development of the SSME. The three countries agreed to adopt the ecoregion approach to the conservation of coastal and marine resources, as embodied in the Ecoregion Conservation Plan (ECP) with four fundamental biodiversity conservation goals: **representation**, **sustainability** of ecological and evolutionary processes, **viability** of species and populations, and **resiliency**. The ECP for the SSME is a product of region-wide consultations across the three countries involving stakeholders and various experts—from resource users, managers, and academe to policy makers—initiated in 2001. It involves 10 objectives in alignment with its 50-year vision, which in part reads, "*a marine ecoregion that remains to be globally unique and a center of diversity with vibrant ecological integrity, harboring representative species assemblages, communities, habitats, and ecological processes.*"

The Tri-National SSME committee had its first meeting on 1 March 2006 in East Kalimantan, Indonesia and created three subcommittees: the Threatened, Charismatic, and Migratory Species Subcommittee; the Sustainable Fisheries Subcommittee; and the Marine Protected Areas and Networks Subcommittee. In 2007, the terms of reference and work plans for the implementation of the ECP under the three subcommittees were developed. The work plans covered a four-year period, from 2009–2012.

The SSME Subcommittee on the Threatened, Charismatic, and Migratory Species (TCM Species), identified its Targeted Conservation Outcome as: "*Protected and managed threatened, charismatic, and migratory species and their habitats in order to maintain the full range of biodiversity and provide for the long-term socioeconomic and cultural needs of human communities in the SSME*." Its short-term goal is to "*Facilitate effective management of feeding grounds, migratory routes, and protection of target species from overfishing and as bycatch; design MPAs and MPA networks in relation to the protection and management of target species and their habitat; and promote implementation of best practices in habitat conservation and management*".

One of four indicators under its short-term goals focused on shark conservation, particularly whale sharks, endemic species and CITES-listed species, by identifying three strategies or key results areas (KRA) and seven target activities (see Box 5.1).

It was not until 2010, however, that the subcommittees' work plans were translated into a comprehensive action plan, which also contained the implementation costs of the three member countries. Based on the 2011 SSME Comprehensive Plan of Action (CAP), the total cost of implementing the KRAs/strategies and corresponding activities for the Subcommittee on Threatened, Charismatic, and Migratory Species is estimated at US$53.72 million for a period of four years. For Philippines alone, the estimated cost of implementation on the Species outcome under the Subcommittee is US$23.31 million.

In 2010, the three subcommittees developed a regional proposal for the implementation of the priority actions under the SSME CAP. This was later approved under the BMUB-SSME project implemented by GIZ from 2013 to 2017. The updating of the Philippine NPOA-Sharks (this report) is one of the target outputs of the Project.

Box 5.2: CTI-CFF Regional Plan of Action relevant to Sharks

Building on existing regional plans and efforts, and on National Plans of Action for Shark Fisheries (as recommended by UN FAO for its members), The CTI-CFF countries (CT6) planned to jointly adopt and implement a region-wide Sharks Conservation Action Plan based on solid scientific information that identifies the most important measures needed (at the regional and national levels) to improve the status of sharks across the CT Implementation Area—with a particular focus on the following multilateral dimensions:

- Standards/mechanisms for reporting and monitoring, to assess levels and extent of shark harvest (i.e., directed catch and bycatch) at the species level;
- Finning export industry and needed reforms, including addressing supply side issues (shark finning industry) and demand side issues (consumer markets);
- Targeted collaborative research;
- Incidental by-catch in other fisheries (e.g., longline tuna), including legislative reforms and practical modifications of fishing gear;
- Shark fisheries for broader consumption, particularly spurred by international trade (i.e., establishment of the status of shark fishery and utilization, imports, and exports in CT6 countries);
- Enforcement legislation and action on shark fishing, including reducing incidence of IUU catch;
- Support needed to strengthen capacity to implement key policy frameworks across all CT countries; and
- Science-based management measures for sharks, particularly pelagic and migratory species.

5.2.5 The Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security

The Coral Triangle (CT) region is located along the equator at the confluence of the Western Pacific and Indian Oceans and covers the exclusive economic zones of six countries: Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands and Timor-Leste. Its boundaries were determined based on two major criteria—coral and reef fish diversity. It is only 1.6% of the planet's oceanic area, but it represents the global epicenter of marine life abundance and diversity. The region contains 76% of all known coral species, 37% of all known coral reef fish species, 53% of the world's coral reefs, the greatest extent of mangrove forests in the world, and spawning and juvenile growth areas for the world's largest tuna fishery.

The Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security is a multilateral partnership among the six countries (referred to as CT6) to help safeguard the marine and coastal biological resources of the region from overfishing, destructive fishing practices, unsustainable coastal development, pollution, and impacts of climate change.

The Regional Plan of Action of the Philippines. The CTI had developed a Regional Plan of Action (RPOA) and a National Plan of Action (NPOA) for each of the CT6. It had also issued a Leaders' Declaration which affirms the commitment of the CT6 countries to promote the sustainable management of the Coral Triangle, and mobilize resources from development partners and respective government agencies to support the implementation of the plan of action. The RPOA-CTI identified five major goals, on 1) seascapes (Priority seascapes designated and effectively managed), 2) fisheries (Ecosystem approach to management of fisheries and other marine resources fully applied), 3) marine protected areas (Marine protected areas established and effectively managed), 4) climate change (Climate change adaptation measures achieved), and 5) species (Threatened species status improving).

Goal 5, on species, has one target: "*improved status of sharks, sea turtles, seabirds, marine mammals, corals, seagrass, mangroves and other identified threatened species.*" Populations of sharks, sea turtles, marine mammals, corals, seagrass, mangroves and other threatened marine species on the IUCN Red List of Threatened Species (or listed under CITES) will no longer be declining (by 2015), followed by a clear trend towards an improved status (by 2020), as key steps are implemented for preventing their extinction and supporting healthier overall marine ecosystems. Shark conservation and management is primarily identified under Regional Action 2, which is the completion and implementation of a region-wide Sharks Conservation Action Plan (see Box 5.2).

The National Plan of Action of the Philippines. Following the goals and principles of the RPOA-CTI, the Philippine NPOA CTI was adopted on May 6, 2009 by virtue of Executive Order No. 797. The Philippine NPOA CTI is a product of multi-stakeholders consultations initiated by the Department of Environment and Natural Resources (DENR) and DA in collaboration with the development partners (between 2007 and 2009), and follows the integrated coastal management (ICM) framework.

ICM, a dynamic process of planning and management involving stakeholders, requires the analysis of the environmental and socioeconomic implications of development, the ecosystem processes, and the inter-relationships among land-based and marine-based activities and jurisdictions. ICM is declared as the national management policy framework to promote sustainable development of the country's coastal and marine resources in order to achieve food security, sustainable livelihood, poverty alleviation, and reduction of vulnerability to hazards, while preserving ecological integrity. It takes into account the following: an interagency, multi-sectoral mechanism; coastal strategies and action plans; public awareness programs; mainstreaming ICM; capacity building programs; integrated environmental monitoring; and investment opportunities and sustainable financing mechanisms.

Shark conservation and management is primarily identified in one of seven actions under Goal 5 (Threatened species status improving), which is Action 2: "Endorse and implement the National Plan of Action for the Conservation and Management of Sharks and other Cartilaginous Fishes." Relevant action points under the species target that may also reference sharks and other cartilaginous fishes under the NPOA-CTI are:

- Conduct red list assessments of priority marine species in the Philippines under Global Marine Species Assessment (Action 1)
- Conduct stock assessments, evaluate catch trends of commercially important species, and propose management recommendations for over-exploited fish species/populations by BFAR/NFRDI/ NSAP (Action 6).

5.3 NATIONAL LAWS AND POLICIES APPLICABLE TO SHARK MANAGEMENT

The Philippines' legal and policy framework recognizes the importance of wildlife species, among them sharks and related species, in promoting ecological balance and enhancing biological diversity. Pertinent laws include the National Integrated Protected Areas System (NIPAS) Act of 1992 (Republic Act No. 7586), the Wildlife Resources Conservation and Protection Act of 2001 (Republic Act No. 9147), and the Philippine Fisheries Code of 1998 (Republic Act No. 8550, as amended in 2016 by Republic Act No. 10654).

5.3.1 The National Integrated Protected Areas System Act of 1992 (RA 7586)

The NIPAS Act of 1992 provides for the establishment and management of a national integrated protected areas system which encompass outstanding remarkable areas and biologically important public lands that are habitats of rare and endangered species of plants and animals, bio-geographic zones, and related ecosystems, whether terrestrial, wetland, or marine.

Some of the marine protected areas established under the NIPAS Act include: Agusan Marsh Wildlife Sanctuary (in Butuan), Olango Island Wildlife Sanctuary (in Cebu), Tubbataha Reefs Natural Park (in Palawan), Turtle Island Wildlife Sanctuary (in Tawi-Tawi), and Apo Island Protected Landscape and Seascape (in Negros Oriental). The first three marine NIPAS areas are also registered as Wetlands of International Importance under the Ramsar Convention (see 5.1.5).

Tubbataha Reefs, situated in the center of the Sulu Sea, is the largest marine protected area (MPA) in the Philippines, with a total area of about 93,000 hectares established under Republic Act No. 10067 (also known as the Tubbataha Act). It is the only nationally established MPA with explicit protection of sharks and related species within its boundaries. Park management has implemented a shark biodiversity research and monitoring plan, initiated in 2010 and continued in 2015 and 2016 in collaboration with nongovernment organizations and research institutions, including WWF-Philippines, Conservation International (CI) Philippines, University of the Philippines-Marine Science Institute, and LAMAVE.

5.3.2 Philippine Fisheries Code of 1998 (RA 8550)

Republic Act 8550 (also known as Philippine Fisheries Code of 1998) sets the primary mandate for the management of aquatic and marine resources under the DA. The Code aims for food security through development, management, and conservation of the aquatic resources. RA 8550 potentially protects all fishery resources under the "precautionary approach" to management.

BFAR, an agency of the Philippine government under the DA, is responsible for the development, improvement, management, and conservation of Philippine fisheries and aquatic resources. The Fisheries Code provided for the reconstitution of BFAR as a line bureau and the creation of the DA Undersecretary for Fisheries and Aquatic Resources to address the needs of the fishing industry. Among others, BFAR aims to "*conserve, protect and sustain management of the country's fishery and aquatic resources.*"

RA 8550 mandates the DA-BFAR to take conservation and rehabilitation measures for rare, threatened, and endangered species, and ban the fishing or taking of such species (Sec. 11). It also prohibits the fishing or taking of aquatic wildlife species that are listed in any of the three CITES Appendices (Sec. 97). This section of the law is deemed stricter than the CITES in that it automatically bans fishery and trade of species listed under Appendix II and III.

The Fisheries Code also clarified issues pertaining to the extent of local government jurisdiction in municipal waters (i.e., within 15 km from shore) and the operation of commercial vessels (beyond 15 km). BFAR has to work with local government units (LGUs), particularly in the implementation of RA 8550 in municipal waters. The LGUs have the power to plan, legislate, regulate, generate revenue, enforce laws and ordinances, relate with government agencies, POs and NGOs, and provide extension and technical assistance within their areas of jurisdiction.

5.3.3 Amended Philippine Fisheries Code (RA 10654)

Several sections of implementing rules and regulations (IRR) of RA 8550 as amended by RA 10654 are responsive to sharks.

Section 65 states that the functions of the BFAR include the formulation and implementation of "rules and regulations for the conservation and management of straddling fish stocks, highly migratory fish stocks and threatened living marine resources such as sharks, rays and *ludong*, inter alia, in the Philippine Exclusive Economic Zone, territorial sea, archipelagic and internal waters, in coordination with LGUs and integrated/municipal/city Fisheries and Aquatic Resources Management Councils."

Sec. 102 of RA 8550 as amended by RA 10654 prohibits fishing and takes, among others, of CITES Appendix I-listed species or those categorized as threatened under the IUCN Red List and as determined by the DA. Penalties are much higher, equivalent to five times the value of the species or PhP500,000.00–Php5,000,000.00, whichever is higher, plus imprisonment of at least 12 years plus 1 day to 20 years, a fine equivalent to twice the administrative fine, forfeiture of the species, and the cancellation of fishing permit.

Fishing and takes, among others, of CITES Appendix II- and III-listed species are prohibited only if scientific assessments show that the population of the species in the wild cannot remain viable under pressure of collection and trade. Collection from the wild for scientific research, or conservation breeding simultaneous with commercial breeding, however, may be allowed. Penalties may range from three times the value of the species or PhP300,000.00–PhP3,000,000.00 whichever is higher, plus imprisonment of at least 5–8 years, and a fine equivalent to twice the administrative fine, forfeiture of the species, and the cancellation of fishing permit.

It must be noted that in Sec. 97 of RA 8550, all species listed in the CITES Appendices are afforded full protection from international and domestic utilization and trade. This provision counters the intention of CITES for Appendix II- and III-listed species. Sec. 102 of RA 8550 as amended by RA 10654 is now compliant to the purpose and intentions of CITES Appendix listing.

The prohibition in Section 102 applies to parts and derivatives of the species (Rule 102.1 of the IRR). The list of Rare, Threatened and Endangered Species (pursuant to Fisheries Administrative Order [FAO] 208 Series of 2001) is shown in the Annex I of the IRR. There are currently no shark species in this list. Whale sharks and mantas are covered in a separate legislation (i.e., FAO 193) while CITES-listed species are covered in specific sections of the Fisheries Code (i.e., Sec 97 of RA 8550) and as amended in RA 10564 (i.e., Section 10).

Other species may be added to the list upon recommendation of the Philippine Aquatic Red List Committee (PARLC) created pursuant to RA 9147, its IRR, and Section 4 of FAO 233, Series of 2010, subject to the consultation process stated in Rule 65.2. This provision is inclusive of captive-bred species that have been transplanted to the wild (Rule 102.4).

Pursuant to Sections 65 and 107 of RA 8550, the DA issued FAO 193 banning the taking, catching selling, purchasing, possessing, transporting or exporting of whale sharks and manta rays "*whether dead or alive, in any state or form whether raw or processed.*" The order also stated that when the banned species are accidentally taken (i.e., by-catch) in gear targeting other species, their immediate release unharmed in the sea is required. Stranded individuals, however, need to be surrendered to the nearest DA Regional Field Unit or BFAR regional or provincial fishery offices for proper disposition. Violators are subject to a fine of PhP500.00–PhP5,000.00 or imprisonment from six months to four years or both, upon the discretion of the court, as well as related administrative penalties.

The ban, however, was not fully enforced. Poaching occurred in many areas of the country, particularly for whale sharks during the early years following the ban (e.g., in Bohol, Sorsogon, and Palawan; Alava et al. 1998). Challenges were posed not only because of meager government resources to impose the ban but also of the increasing importance of the species in the international market, the value of which was estimated at US$10,000 per individual at that time. There were a number of shipments (e.g., Manila, Palawan) where whale sharks were cut up and packaged for export under a different commodity name. At least one such export was intercepted in Taiwan, which at that time was strictly monitoring imports. Anecdotal reports were also received that whale sharks, though still targeted, were no longer landed in local landing and/or market sites but loaded offshore in foreign fishing vessels.

For mantas, there was a de facto lifting of the ban in favour of local manta/mobulid fisheries in the Bohol Sea. Only the Giant manta, *Manta birostris* is listed as a protected species under FAO 193. There are no provisions for look-alike species. The difficulty in the implementation was more on the inadequacy of law enforcers to accurately identify species on site, especially since the individuals would already be cut up to marketable chunks. Initial stock assessment data showed that there were at least three other non-manta species targeted in Bohol Sea which are not covered under the ban. Mantas and devil rays (*Mobula* spp.) fisheries still occur in the Bohol Sea and in many parts of the country.

At CITES CoP 10 in 1997, the Philippines was successful in its proposal to list whale sharks under Appendix II. With the listing, higher penalties are afforded under the RA 8850 and the RA 9147, which may have deterred poachers from continuing the fishery. At the recent CITES CoP 17 in 2016, however, the mobulids, along with other globally threatened species, have been listed under Appendix II (see Table 5.2). As with whale sharks, the listing of mobulid species will have its associated challenges in terms of implementation, particularly in areas with artisanal mobulid fisheries.

5.3.4 The Wildlife Resources Conservation and Protection Act of 2001 (RA 9147)

Also known as the Wildlife Act, RA 9147 governs the protection and conservation of the country's wildlife resources and their habitats. Issued in 2001, the Wildlife Act applies to all wildlife species found in all areas of the country as well as exotic species which are subject to trade, are cultured, maintained and/or bred in captivity or propagated in the country.

The law recognizes the importance of wildlife species (including sharks) and their habitats in ensuring sustainability (Section 2). It has the following objectives: a) to conserve and protect wildlife species and their habitats to promote ecological balance and enhance biological diversity; b) to regulate the collection and trade of wildlife; c) to pursue, with due regard to the national interest, the Philippine commitment to international conventions, protection of wildlife and their habitats; and d) to initiate or support scientific studies on the conservation of biological diversity. Relevant sections to elasmobranch management referred to the collection, possession, exportation and/or importation, and transport of wildlife, its by-products and derivatives; scientific research; economically important species; implementation of CITES; and identification and protection of threatened species, to name a few.

DENR has jurisdiction over all terrestrial plant and animal species, all turtles and tortoises and wetland species, including but not limited to crocodiles, waterbirds and all amphibians (including sea/marine turtles), and Dugong. DA has jurisdiction over all declared aquatic critical habitats, all aquatic resources including all fishes, aquatic plants, invertebrates, and all marine mammals except Dugong. In the Province of Palawan, jurisdiction over wildlife is vested to the Palawan Council for Sustainable Development pursuant to Republic Act No. 7611 (see 5.3.6, this report).

To provide scientific basis for the protection and conservation of wildlife, the DENR and the DA Secretaries are both mandated to classify wildlife species into critically endangered, endangered, vulnerable, or other accepted categories based on the best available data (Sec. 22, RA 9147). The Joint Administrative Order (JAO) 1 series of 2004, provides for the creation of a Philippine Red List Committee (PRLC) for Plants and Animals by both the DENR and the DA to develop the criteria for the determination of threatened species and their classification, based on the best scientific and commercial data available and with due regard to internationally accepted criteria and additionally by disease or predation.

The DENR Department Administrative Order (DAO) 2004-15 also provides that the DENR Secretary, in consultation with scientific authorities, the academe and other stakeholders, shall regularly review and update its list of wild fauna and flora, with an addendum that a species listed as threatened shall not be removed therefrom within three years following its initial listing (Sec. 6).

Pursuant to RA 9147 (Wildlife Act) and complementary to DAO 2004-15, the DA issued FAO 208 listing all marine and aquatic wildlife species under protection. It provides a blanket prohibition for any person, natural or juridical, to take or catch or cause to be taken or caught the listed species (Sec. 2). The DA also issued FAO 233 and FAO 233-1 (Aquatic Wildlife Conservation) which defines "aquatic wildlife" as species living in aquatic environment including microbial species, its products and derivatives, and those in captivity or are being bred or farmed (Sec. 1). FAO 233 also provides for the creation of a Philippine Aquatic Red List Committee (PARLC) to develop the criteria for the determination of threatened aquatic wildlife and their classification as critically endangered, endangered, vulnerable or other internationally accepted categories (Sec. 4), based on the criteria in Section 22 of RA 9147, and those developed by the International Union for the Conservation of Nature (IUCN). PARLC is also tasked to develop criteria for the determination of critical habitats, and identify critical habitats to be declared by the Secretary of Agriculture. Appropriate regulatory intervention shall be formulated for wildlife species when classified according to threat category.

The Fisheries Quarantine and Wildlife Regulations Section (FQWRS) under the Fisheries Regulatory and Quarantine Division (FRQD) is the DA's lead entity in the implementation of R.A. No 9147 and its implementing rules, FAO No. 233 and 233-1 (Aquatic Wildlife Conservation). FQWRS submitted a proposal, and approved by DA for implementation, for the establishment of the Philippine Aquatic Wildlife Resources and Regulatory Services (PAWRRES) Center for 2014–2019. It aims at promoting and facilitating aquatic wildlife conservation and management within the country in the areas of decision-making and policy formulation and foster international cooperation in the areas of research, law enforcement, technology transfer, training and capacity building, and repatriation of information obtained from collaborative research conducted by foreign institutions. It also seeks to join a globally accessible mechanism for exchanging and integrating information on aquatic biodiversity and develop the necessary human and technological capacities.

Figure 5.1. Signage in San Remegio Public Market, Cebu on PB Ordinance No. 2015-21 or the total shark ban.

5.3.5 Local Government Code of 1991 (RA 7160)

Most of the functions and services of the national government, including fisheries, are devolved to the local government units (LGUs) with the passage of the RA 7160 or the Local Government Code. LGUs include the provinces, municipalities and cities, and the *barangays* (which is the smallest unit of government). Functions devolved to local governments include the inherent functions and responsibilities to manage local resources within their territorial jurisdictions. LGUs are authorized to pass local resolutions and enact ordinances that would strengthen implementation of national laws (see Annex W). They are also authorized to issue licenses and collect fees from any activities within their municipal jurisdiction.

An example of a local government level ordinance protecting marine and aquatic species in general and sharks species in particular is the **Cebu Provincial Ordinance 2012-05** or **"The Provincial Fisheries and Aquatic Resources Ordinance of Cebu**." Salient Points of PB Ordinance No. 2015-21 are Sections 4 and 10. Section 4 prohibits "fishing or taking, possessing, transporting, dealing, selling or disposing of any shark species to include body parts and derivatives thereof." Section 10 identifies the prohibited acts and penalties based on the provisions of the Fisheries Code and the Wildlife Act. Fines and penalties, however, are lower than what is provided for in the national laws.

The devolution of power is viewed as a positive development in the context of marine resources management. The LGUs have jurisdiction over water within 15 km offshore, including the foreshore and marine areas such as over beaches, mangroves and estuaries, seagrass beds and coral reefs, sharing management responsibility with the DENR and BFAR. LGUs are mandated to establish MPAs such as marine reserves, marine sanctuaries, marine parks, and variation thereof. Under RA 8550, LGUs are mandated to establish at least 10%–15% of their municipal waters as MPAs. To date, close to 2,000 small

MPAs have been established nationwide aimed at biodiversity conservation and food security gained from spill-over effects (refer to Chapter 6 for a discussion on MPAs established for sharks).

As an example, in Cebu, the provincial LGU strengthened its commitment to protect shark and ray species by supporting the establishment of the country's first shark and ray sanctuary, located close to Malapascua Island, in the Municipality of Daanbantayan under an Executive Order (EO) 2015-16. Malapascua has become a tourist destination particularly for thresher sharks. The protection of the area is seen as a protection for the species that bring in tourism revenues for the local community. The EO was signed almost a year after the Cebu Province hosted the first Philippine Shark Summit in 2014. The new EO was welcomed by environmentalists, marine conservationists, tourism executives, and local government agencies alike (V. Cinches, personal communication).

Implementation of the Local Government Code, however, has been wrought with challenges. In the case of BFAR, which is expected to provide extension services to support fisheries management capacity-building efforts for local governments, it may not be able to do so unless invited by the LGUs. Fisheries extension services may thus be rendered as relatively ineffective. Some of LGUs do not consider aquatic resources management important, and thus do not request extension support. In a number of situations, support has come from NGOs and private organizations (e.g., Malapascua).

5.4 CONCLUSIONS AND RECOMMENDATIONS

Multilateral environmental agreements allow countries to work together on global environmental issues such as the conservation of marine wildlife and fisheries resources, and resource conservation and management. Most of these instruments are legally binding to parties or member-countries/ signatories (e.g., CITES) which are mandated to implement the provisions of the various instruments through national legislations, while others are non-binding (e.g., CMS) but still allow member countries to highlight and/or incorporate global concerns in the domestic scene or national priorities (e.g., IUCN).

Increasing fisheries and utilization of sharks and shark products has led to global initiatives for shark conservation and management, particularly through the UN FAO IPOA-Sharks. Legal and management instruments, however, are largely dependent on fisheries-related data (e.g., the catch, effort, discards, and trade) as well as information on the biological parameters of many species.

While the need to collect this information through conduct of stock assessments has been recognized by RFMOs such as the WCPFC, the process is riddled with challenges. In WCPO, key sharks species (e.g., Oceanic whitetip, Silky sharks) have been identified and stock assessments of some populations have been conducted but no major decisions have been made to reduce catches and mortalities of individuals, not even for populations where stock declines have been recorded (e.g., South Pacific blue shark *Prionace glauca*). Stock assessment of this species is still considered preliminary and a work in progress. Problems highlighted in the assessment is the difficulty in getting realistic estimates of equilibrium unexploited recruitment and spawning biomass due to the lack of available data, conflicting catch per unit effort time series, and uncertainty in the estimated stock recruitment relationship.

These same challenges are faced by member countries, even for species factoring in domestic fisheries. Additional complications are posed in the absence or lack of resources available as well as expertise in the conduct of stock assessments and ecosystem research, the results of which will feed into decision-making and improved management of fisheries stocks.

Where international trade of the species occurs, more binding instruments such as CITES may be called on to regulate takes and trade of the species of concern. Provisions of this convention has been translated into law under the Philippine Fisheries Code (RA 8550) and as amended by the RA 10654, and the Philippine Wildlife Act (RA 9147). Conduct of threat assessments of shark species using the IUCN Red List Categories and Criteria to update rare and endangered species list (i.e., FAO 208/FAO 233) pursuant to new policies and laws (e.g., RA 8550 as amended by RA 10564) are thus welcome, if not long overdue.

Much has been said in terms of the need to harmonize national policies. A case in point is the Sharks and Rays Conservation Act (Senate Bill 905, see Annex U). The bill is pending as of August 16, 2016; however, concerns are raised in view of the socioeconomic (and political) impacts of the ban given there are artisanal fisheries for the shark species and groups. Additionally, a total ban may not be necessary because some species may be sustainably fished.

RA 10654's amendments to the Fisheries Code set higher penalties for illegal fishing activities. Under RA 7160 or the Local Government Code, however, LGUs are authorized to enact ordinances that would strengthen implementation of national laws, and sometimes LGUs set penalties that are much lower than those set by the national laws. Better collaboration and planning among local governments and the concerned national agencies is recommended to address limitations and potential conflicts in implementation and interpretation of the laws. Whether legislations and policies are national or local in scope, budgets along with human resources and expertise must be appropriated for its implementation.

Human resources and capacity development is strongly recommended, focusing on the ecosystem, approach to fisheries management (EAFM). EAFM is defined as a way of managing fisheries that balance the different objectives of society (e.g., environmental, economic, and social). It encourages a planning focus not just on the species in need of conservation and management (e.g., sharks), but on the wider impacts of the fishery on the environment, as well as the social, economic, institutional and governance support systems for said fishery. Current policies and ordinances need to be reviewed using the EAFM lens so that strategies are developed to maximize effectiveness.

CHAPTER 6: CONSERVATION STATUS OF PHILIPPINE SHARKS

Shark populations are being impacted by a wide range of human activities that threaten their survival. Two of the major threats are: 1) interaction with various fishing operations, as target species to supply the growing demand and trade in shark products (e.g., shark meat, fins, liver oil) and as by-catch to other fisheries, such as tuna; and 2) degradation of important breeding and nursery grounds and other critical coastal, estuarine, and freshwater habitats from development, alteration, destructive fishing practices, and pollution.

Given their life history traits as k-strategists (see Box 6.1), sharks are thus highly susceptible to overexploitation and unable to recover once populations are depleted. To assess the threat status of sharks, global assessments have been conducted using the IUCN Red List Categories and Criteria (www.iucnredlist.org).

6.1 SPECIES PROTECTION

Globally, the IUCN Red List of Threatened Species is considered the most authoritative and objective system for classifying species' extinction risk. It is developed at sub-global levels and is integral to meeting CBD commitments (e.g., Article 7; Annex 1), particularly for the target of reducing biodiversity loss. Biodiversity conservation policies are most often implemented at national (e.g., state, province) and regional (e.g., EU) levels, and accurate extinction risk assessment is a vital part of this process.

Box 6.1: Sharks as K-strategists

An understanding of the biological parameters of a species is important to accurately assess its productivity and thus make inferences concerning its vulnerability to fisheries.

Sharks and other cartilaginous fishes generally exhibit a K-selected life history strategy: they are generally slow growing, long-lived, have late sexual maturity, long reproductive cycles of about 3–24 months (averaging at 10–11 months), and low fecundity, producing very limited numbers of live young or eggs (i.e., 35% of sharks and batoids are egg laying while 65% are live-bearing). Sharks invest heavily in a small number of well-developed young. As such, they have low reproductive potential and low capacity for population increase.

Some species also have complex spatial structures: they segregate by sex and size, have seasonal migration, and have separate breeding and/or nursery grounds from the rest of the population, among others. Fisheries operations that target either female or male groups will negatively impact breeding populations by lowering sex ratio and chances for reproduction. Some shark breeders also give birth in nursery areas which are separated from the rest of the population. Threats to these nursery grounds also threaten the new recruits.

These life history characteristics place sharks at risk of overexploitation and population depletion. Sharks often have a low stock-to-recruitment values and long stock recovery times, with an inability to recover from reduced population levels once depleted (Hoenig and Gruber 1990; Pratt and Casey 1990; Last and Stevens 1994; Camhi et al. 1998).

The structure of the IUCN Red List Categories illustrates the process that needs to be followed to assess taxa in one of the nine IUCN categories (see Figure 6.1). Of the nine categories, three are categories of threat: Critically Endangered (CR), Endangered (EN), and Vulnerable (VU).

Most of the Philippine cartilaginous fishes have been assessed for Red Listing as part of an ongoing IUCN Species Survival Commission (SSC) project conducted by the IUCN Shark Specialist Group (SSG). One of the regional assessments was done in 2007 in the Philippines by the IUCN SSG in collaboration with the IUCN/SSC's Global Marine Species Assessment (GMSA) and CI-Philippines. The global threat status for cartilaginous species assessed is downloadable from the IUCN Red List website (www.iucnredlist.org).

In the 2006 IUCN Red List of Threatened Species, about 547 species were globally assessed, about 20% of which were placed under the threatened categories (i.e., CR, EN, VU), showing susceptibility of sharks and batoids from overexploitation in global fisheries. Declines in some of the freshwater and marine shark fisheries have been documented (e.g., Herre 1953; Compagno & Cook 1995), the first reports of which were noted for sawfishes and other freshwater elasmobranch populations under pressure from human activities.

Out of the 547 species assessed, 56 species (10%) are also reported to occur in the Philippines. Of these, at least 23 species (about 41%) had threatened status.

The number of species assessed nearly tripled in the last 10 years. For this report, the number of species nominally listed for the Philippines increased to about 204 species from about 160+ species listed in Compagno et al. 2005 (see Annex D. Note: a number of species still need confirmation; about 20% may be potentially new species which needs further taxonomic description/validation). Of the 204 species, close to 80% (or 157 species) were evaluated using the IUCN Red List Assessment (RLA) process, 28% (or 57 species) were assessed as threatened (see Table 6.2 and Annex D).

There are four species under the Critically Endangered list: one shark, the Pondicherry shark (*Carcharhinus hemiodon*); and three batoids, namely, the Largetooth or Freshwater sawfish (*Pristis microdon*), Smalltooth sawfish (*Pristis pectinate*), and the Green sawfish (*Pristis zijsron*). The four species comprised about 3% of the total number of species assessed and about 2% of total species reported to occur in the country.

Under the Endangered category, 11 species are listed (8 sharks and 3 batoids) which comprised about 7% of total species

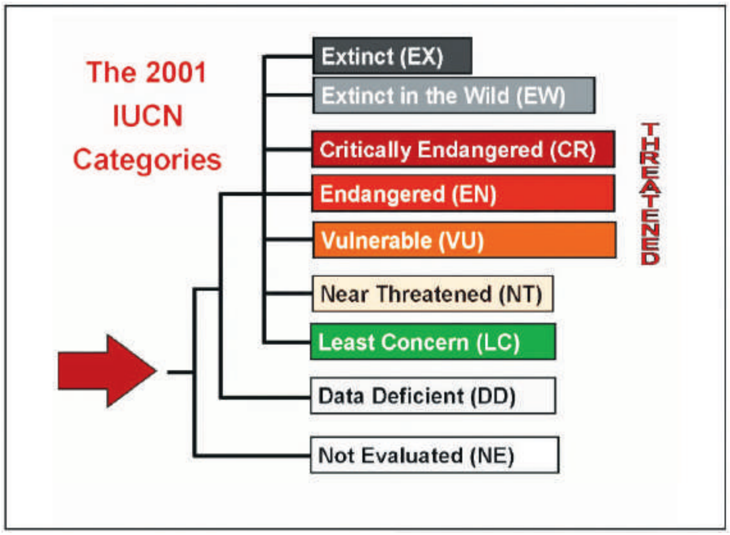


Figure 6.1. The IUCN Red List Categories. The threatened categories (i.e., Critically Endangered, Endangered, and Vulnerable) are intended to serve as a means of setting priority measures for biodiversity conservation. (Source: www.iucnredlist.org).

assessed and 6% of total known. Shark species include: Zebra shark (*Stegostoma fasciatum*); Whale shark (*Rhincodon typus*); Scalloped hammerhead (*Sphyrna lewini*); Great hammerhead (*Sphyrna mokarran*); Winghead shark (*Eusphyra blochii*); Taiwan angelshark (*Squatina formosa*); Whitefin tope (*Hemitriakis leucopteriptera*); and Borneo shark (*Carcharhinus borneensis*). Endangered batoid species are: Knifetooth sawfish (*Anoxypristis cuspidata*); Ornate eagle ray (*Aetomylaeus vespertilio*); and Ocellate eagle ray (*Aetomylaeus milvus*).

Under the Vulnerable category, 5 species (or 21% of total species assessed and 6% of total known) are listed, which includes 18 sharks and 24 batoids. On the whole, there seems to be a 1:1 ratio of threatened sharks to batoids, but at 27 sharks species and 30 batoid species with threatened status, batoids are increasingly becoming more vulnerable to overexploitation.

About 64% of the species evaluated (i.e., at least 100 species) belong to the non-threatened categories: 21% are Near Threatened (NT), 17% are of Least Concern. Near Threatened species are less urgent priorities for conservation, as they are at lower risk of extinction. Additionally, there is a greater degree of uncertainty associated with their estimated extinction risk, as the guidelines for their identification on the IUCN Red List are not explicitly quantitative and may be less consistently applied between taxa. Least Concern species are those that have been assessed as not globally threatened.

More than a fourth (or 26% of the species listed), however, are considered Data Deficient and cannot be evaluated using the RLA process. The major problem is inadequate data on the population biology of most sharks and shark-like fishes, which makes it difficult to make a species assessment of extinctions risks. Species under the Data Deficient category, by definition, becomes a priority for research rather than for conservation. However, since most if not all of the species that are reported to occur in Philippines factor primarily in various fishing operations, a precautionary approach to management is recommended.

Most habitats in the Philippines, including rivers and lakes, are not adequately investigated for their cartilaginous fish faunas before overfishing and habitat modification took their toll. Although knowledge of the Philippine fauna is still in a stage of discovery and growth, the fauna itself faces serious conservation problems.

6.2 HABITAT PROTECTION AND MANAGEMENT

6.2.1 Philippine Priority Conservation Areas for whale sharks and other elasmobranchs.

In 2001, priority conservation areas (PCA) for whale sharks and elasmobranchs in the Philippines were identified during the Philippine Biodiversity Conservation Priority-setting Program initiated by CI-Philippines in collaboration with the DENR and civil society organizations in the Philippines (See Figures 6.2 and 6.3).

Whale shark ecological baselines were initiated in Donsol, Sorsogon (e.g., Boncodin and Alava 1999), Honda Bay, Puerto Princesa (e.g., D. Torres, personal communication); Zambales (Mudjie Santos, personal communication); Mati, Davao (Ruel Uy, personal communication); Bohol Sea; and Sogod Bay, Leyte (Alava et al. 1997b; Alava 2002). Though data are patchy, seasonal aggregations of whale sharks in these areas led to the identification of these sites as important aggregation sites and feeding grounds of the species (see Figure 6.2). Additional whale shark PCAs were identified based on reported fishing grounds for the species as well as important corridors based on satellite telemetry reports (Eckert et al. 2000; Eckert et al. 2001; Eckert et al. 2002). About 12 areas have been identified as PCAs for whale sharks based on the above information (see Figure 6.2)

Table 6.1. Summary of the global Red List status of shark and batoid species also known to occur in the Philippines.

IUCN Red List Category	SHARKS			BATOIDS			CHIMAERAS			TOTAL	
	No. spp.	% of Shark spp.	% of Total spp.	No. spp.	% of Shark spp.	% of Total spp.	No. spp.	% of Shark spp.	% of Total spp.	No. spp.	% of Total spp.
Critically Endangered	1	0.5%	0.5%	3	1.5%	1.5%				4	2.0%
Endangered	8	3.9%	3.9%	3	1.5%	1.5%				11	5.4%
Vulnerable	18	8.8%	8.8%	24	11.8%	11.9%				42	20.6%
Near Threatened	23	11.3%	11.3%	9	4.4%	4.5%				32	15.7%
Least Concern	21	10.3%	10.3%	5	2.5%	2.5%				26	12.7%
Data Deficient	20	9.8%	9.8%	20	9.8%	10.0%	2	1.0%	1.0%	42	20.6%
Subtotal	**91**	**45%**	**45%**	**64**	**31%**	**32%**	**2**	**1%**	**1%**	**157**	**77%**
Not Evaluated	6	5.2%	2.9%	6	7.1%	3.0%				12	5.9%
Potentially new species (still to be described)	19	16.4%	9.3%	15	17.6%	7.4%	1	0.5%	0.5%	35	17.2%
Subtotal	**25**	**22%**	**12%**	**21**	**25%**	**10%**	**1**	**0%**	**0%**	**47**	**23%**
TOTAL	**116**	**66%**	**57%**	**85**	**56%**	**42%**	**3**	**1%**	**1%**	**204**	**100%**

Table 6.2. Shark species in the Philippines in the 2016 IUCN Red List of Threatened Species (Source: www.iucnredlist.org).

	SPECIES	IUCN Red List Category&Criteria
	CRITICALLY ENDANGERED	
1.	*Carcharhinus hemiodon* (Valenciennes, 1839). Pondicherry shark.	CR A2acd; C2a(i)
	ENDANGERED	
2.	*Carcharhinus borneensis* (Bleeker, 1858-1859). Borneo shark.	EN C2a(ii)
3.	*Eusphyrablochii* (Cuvier, 1816). Winghead shark.	EN A2d+3d
4.	*Hemitriakisleucopteriptera* Herre, 1923. Whitefin tope.	EN B1ab(iii,v); C2a(ii)
5.	*Rhincodon typus* (Smith, 1828). Whale shark.	EN A2bd+4bd
6.	*Sphyrna lewini* (Griffith & Smith, 1834). Scalloped Hammerhead.	EN A2bd+4bd
7.	*Sphyrna mokarran* (Rüppell, 1837). Great hammerhead.	EN A2bd+4bd
8.	*Squatinaformosa* Shen & Ting, 1972. Taiwan angelshark.	EN A2d+4d
9.	*Stegostomafasciatum* (Hermann, 1783). Zebra shark.	EN A2bd+3bd
	VULNERABLE	
10.	*Alopias pelagicus* Nakamura, 1935. Pelagic thresher	VU A2d+4d
11.	*Alopias superciliosus* (Lowe, 1839). Bigeye thresher.	VU A2bd
12.	*Alopias vulpinus* (Bonnaterre, 1788). Thresher shark.	VU A2bd+3bd+4bd
13.	*Carcharhinus albimarginatus* (Rüppell, 1837). Silvertip Shark.	VU A2bd
14.	*Carcharhinus longimanus* (Poey, 1861). Oceanic whitetip shark.	VU A2ad+3d+4ad
15.	*Carcharodoncarcharias* (Linnaeus, 1758). White shark.	VU A2cd+3cd
16.	*Centrophoruslusitanicus* Bocage&Capello, 1864. Lowfin gulper shark.	VU A2bd+4bd
17.	*Centrophorussquamosus* (Bonnaterre, 1788). Leafscale gulper shark.	VU A2bd+3bd+4bd

	SPECIES	IUCN Red List Category&Criteria
18.	*Cetorhinus maximus* (Gunnerus, 1765). Basking shark.	VU A2ad+3d
19.	*Hemigaleusmicrostoma* Bleeker, 1852. Sicklefin weasel shark.	VU A2d+3d+4d
20.	*Hemipristiselongatus* = *H. elongata* (Klunzinger, 1871). Snaggletooth shark, fossil shark.	VU A2bd+3bd
21.	*Isurus oxyrinchus* Rafinesque, 1810. Shortfin mako.	VU A2abd+3bd+4abd
22.	*Isurus paucus* GuitartManday, 1966. Longfin mako.	VU A2bd+3d+4bd
23.	*Nebriusferrugineus* (Lesson, 1830). Tawny nurse shark.	VU A2abcd+3cd+4abcd
24.	*Negaprionacutidens* (Rüppell, 1837). Sharptooth lemon shark.	VU A2abcd+3bcd+4abcd
25.	*Sphyrna zygaena* (Linnaeus, 1758). Smooth hammerhead.	VU A2bd+3bd+4bd
26.	*Squalus montalbani* Whitley, 1931. Indonesian greeneyespurdog, Philippine spurdog.	VU A2bd+4bd

Table 6.3. Batoidspecies in the Philippines in the 2016 IUCN Red List of Threatened Species (Source: www.iucnredlist.org).

	SPECIES	IUCN Red List Category&Criteria
	CRITICALLY ENDANGERED	
1.	*Pristismicrodon* Latham, 1794. Largetooth or freshwater sawfish.	CR A2acd
2.	*Pristispectinata* Latham, 1794. Smalltooth sawfish.	CR A2acd
3.	*Pristiszijsron* Bleeker, 1851. Green sawfish.	CR A2acd
	ENDANGERED	
4.	*Anoxypristiscuspidata* (Latham, 1794). Knifetooth sawfish.	EN A2cd
5.	*Aetomylaeusvespertilio* (Bleeker, 1852). Ornate eagle ray.	EN A2d
6.	*Aetomylaeusmaculatus* (Gray, 1834). Mottled eagle ray	ENA2d+3d+4d
	VULNERABLE	
7.	*Manta alfredi*(Krefft, 1868). Reef manta ray.	VU A2abd+3bd+4abd
8.	*Aetobatusocellatus* White, Last, Naylor, Jensen &Caira, 2010. Ocellated eagle ray.	VU A2bd
9.	*Aetomylaeusniehofii* (Bloch & Schneider, 1801). Banded eagle ray.	VU A2bd
10.	*Aetoplateazonurus* Bleeker, 1852. Zonetail butterfly ray.	VU A2d+3d+4d
11.	*Glaucostegusgranulatus* (Cuvier, 1829). Sharpnose guitarfish.	VU A2bd+3d+4d
12.	*Glaucostegus typus* (Bennett, 1830). Giant shovelnose ray.	VU A2bd+3bd+4bd
13.	*Himanturafai* Jordan & Seale, 1906. Pink whipray.	VU A2bd
14.	*Himanturagerrardi* (Gray, 1851). Sharpnosewhipray.	VU A2bd+3bd
15.	*Himanturagranulata* (Macleay, 1882). Mangrove whipray.	VU A2bd
16.	*Himanturajenkinsii* (Annandale, 1909). Golden whipray.	VU A2bd
17.	*HimanturaleopardaManjaji-*Matsumoto & Last, 2008. Leopard whipray.	VU A2bd
18.	*Himanturauarnacoides* = Pateobatisuarnacoides (Bleeker, 1852). Bleeker'swhipray, whitenosewhipray.	VU A2bcd+3bcd+4bcd
19.	*Himanturauarnak* (Forsskål, 1775). Spotted whipray, marbled stingray.	VU A2bd
20.	*Himanturaundulata* (Bleeker, 1852). Leopard whipray, honeycomb stingray or whipray.	VU A2cd+3cd+4cd
21.	*Manta birostris* (Walbaum, 1792). Manta.	VU A2abd+3bd+4abd
22.	*Mobula tarapacana* (Philippi, 1892). Chilean devil ray.	VU A2bd
23.	*Platyrhinasinensis* (Bloch & Schneider, 1801). Fanray.	VU A4bcd
24.	*Rhinaancylostomus* Bloch & Schneider, 1801. Shark ray.	VU A2bd+3bd+4bd

	SPECIES	IUCN Red List Category&Criteria
25.	*Rhinopterajavanica* Müller & Henle, 1841. Javanese cownose ray, flapnose ray, cow-nosed ray, Palimanok, Ogaog, Banogan.	VU A2d+3cd+4cd
26.	*Rhynchobatusaustraliae* Whitley, 1939. Whitespottedwedgefish.	VU A2bd+3bd+4bd
27.	*Rhynchobatuslaevis* (Bloch & Schneider, 1801). Smoothnosewedgefish.	VU A2bd+3bd+4bd
28.	*Taeniura meyeni* Müller & Henle, 1841. Round ribbontail ray.	VU A2d
29.	*Temerahardwickii* (Bloch & Schneider, 1801). Finless sleeper ray.	VU A4d
30.	*Urogymnusasperrimus* (Bloch & Schneider, 1801). Porcupine ray, thorny ray.	VU A2bd

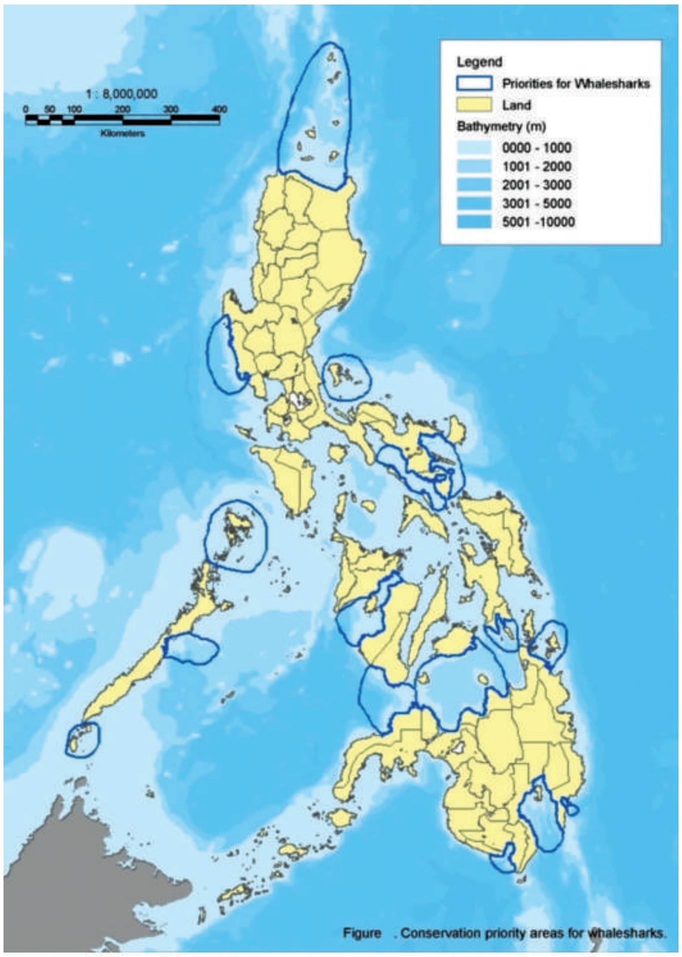


Figure 6.2. Whale shark priority conservation areas of the Philippines. (Source: DENR 2001).

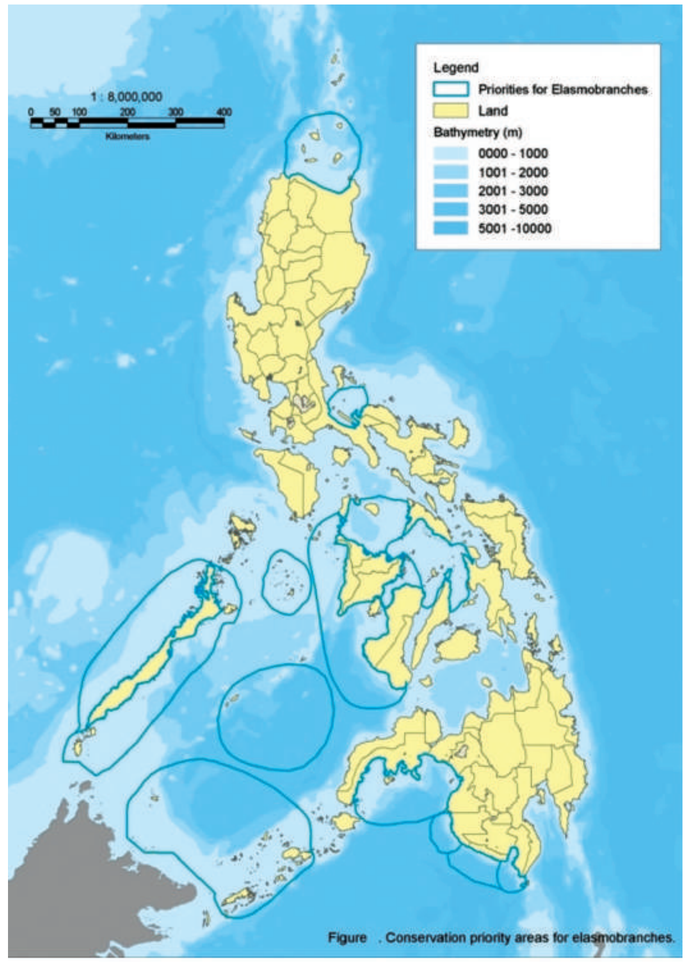


Figure 6.3. Elasmobranch priority conservation Areas of the Philippines. (Source: DENR 2001).

For lack of fishery-independent data on other elasmobranch species, PCAs for other species of elasmobranchs were based mostly on historical shark fisheries information (i.e., productivity in captured fisheries, whether direct or by-catch). Productive fishing grounds with reported commercial sharks and batoids fisheries and identified as PCAs are: west Sulu Sea, Lamon Bay, Babuyan Channel and Cuyo Pass in Luzon; Visayan Sea, east Sulu Sea, Guimaras Strait, and Sibuyan Sea in Visayas; and South Sulu Sea and Moro Gulf in Mindanao (see Figure 6.3).

6.2.2 Marine Key Biodiversity Areas with Globally Threatened Sharks

A similar spatial mapping and site prioritization process was conducted in 2006 by the DENR Biodiversity Management Bureau (BMB; formerly the Protected Areas and Wildlife Bureau), Conservation International-Philippines, and the Haribon Foundation to delineate terrestrial key biodiversity areas (KBAs). This was supplemented by the identification of marine priority conservation areas in 2009, in collaboration with DA-BFAR.[9] A total of 228 KBAs were identified in the Philippines, integrating a selection of 128 terrestrial and 123 marine KBAs delineated in 2006 and 2009, respectively. These KBAs cover over 106,000 square kilometers and are home to 855 species, including 396 globally threatened, 398 restricted range, and 61 congregatory species.

The KBA process relied on two criteria: a) vulnerability and b) irreplaceability of "trigger species" under global threat category. The recommended thresholds for the vulnerability criterion depend on the IUCN threat category of the species (i.e., CR, EN, VU). For species classified as Critically Endangered or Endangered (i.e., highly threatened species), a lower threshold is recommended, and the presence of just one individual is regarded as sufficient to "trigger" the site identification and designation process. For species classified as Vulnerable, the provisional threshold of 10 pairs or 30 individuals has been proposed (Edgar et al. 2008). However, due to the absence of population data for most marine species found in the Philippines, confirmed presence of the species in the area was sufficient to designate the site as marine KBAs (mKBAs).

Irreplaceability, on the other hand, is determined through the presence of geographically concentrated species that maintains a globally significant proportion of its total population at the site at some point of the trigger species' life. This criterion covers any of the four sub-criterion of irreplaceability such as species that may (i) have restricted ranges, (ii) possess highly clumped distributions within large ranges, (iii) congregate in large numbers, (iv) have source populations on which significant proportions of the global population depend, or (v) are restricted to particular biomes or bioregions.

At least 24 globally threatened or endemic elasmobranchs were applied as trigger species in the preliminary mKBA identification process, which yielded at least 15 elasmobranch mKBAs and 12 candidate mKBAs (see Table 6.2).

Nine out of the 25 elasmobranch species factored in at least 14 mKBAs out of 70 mKBAs in the country: Bigeye thresher *Alopias superciliosus* (VU), Great hammerhead shark *Sphyrna mokarran* (EN), Leopard shark *Stegostoma fasciatum* (VU), Pelagic thresher *Alopias pelagicus* (VU), Pondicherry shark *Carcharhinus hemiodon* (CR), Porcupine ray *Urogymnus asperrimus* (VU), Whale shark *Rhincodon typus* (VU), Whitefin topeshark *Hemitriakis leucoperiptera* (EN), and White-spotted guitarfish *Rhynchobatus australiae* (VU) (see Table 2.5; Figure 2.3).

Although additional information is still needed to refine the resolution of the boundaries, the mKBA identification process is considered as one of the first steps in highlighting the much needed site-level interventions for the protection and management of important habitats of globally threatened species in the country. Although recognized as priority conservation areas, not all of the mKBAs are covered by proper legislative measures. Most of them remain unprotected or at least only partially protected.

6.2.3 Marine Protected Areas for Sharks.

MPA establishment is a conservation and fisheries management tool for the protection and increased productivity of critical marine and coastal habitats such as coral reefs, mangrove forests, and seagrass. A number of national and local legislations have been created for or in support of MPA establishment and management, such as NIPAS Act of 1992 (RA 7586, see Section 5.3.1); Philippine Fisheries Code of 1998 (RA 8550, see Section 5.3.2); and Local Government Code (RA 7160, see Section 5.3.2).

At least one of the whale shark PCAs was established as a locally managed MPA—Donsol, Sorsogon, whose municipal waters became the first whale shark sanctuary by virtue of a local ordinance passed in 1997. At the time, the area was the only known aggregation site and critical feeding ground of whale sharks that had little or no fishery threat. The protection has benefited not only the whale shark population that seasonally migrate to the area, but also the local community who are making livelihood and earning revenues from whale shark interaction tourism established in the site since its protection. In addition, the whale shark was accorded protection as a species with the passage of the national ban under FAO 193 in 1997, and its listing under CITES Appendix II in CoP12 in 2001.

In additional to Donsol which was both a PCA and an mKBA, at least one mKBA was established as a locally managed MPA—Malapascua in Cebu Province. In 2015, Monad Shoal and Gato Island of Malapascua, northern Cebu had been identified and established as a protected area for sharks and rays. Current management initiatives conducted in the area include strengthening local capacity for MPA management and the enforcement of other fishery related laws. With strong community effort, the thresher sharks and other species were accorded additional protection with the listing under CITES Appendix II in CoP 17 in 2016.

Recently, the municipality of Cagayancillo in Palawan passed a local ordinance (Cagayancillo Sangguniang Bayan Resolution No. 14 Series 2016, dated 7 September 2016) establishing a multiple use MPA covering an area of 1,013,340 ha. In addition to the existing marine reserves managed as no take areas (i.e., 500 ha), the Arena Reef (in the middle of Sulu Sea) is being proposed as a Shark Sanctuary with 120.71 ha core zone (the lagoon) and 997.6 ha buffer zone (the surrounding reef and shallow water). With technical assistance from WWF-Philippines, the LGU-Cagayancillo will target the formulation of the MPA management/business plan in 2017.

There is an increasing interest in MPAs as ecotourism destinations, with marine megafauna as ecotourism products. The MPAs mentioned above (i.e., Donsol, Malapascua,

[9] http://www.conservation.org/archive/philippines/publications/Pages/Integrated-Marine-Key-Biodiversity-Areas-of-the-Philippines-(map).aspx

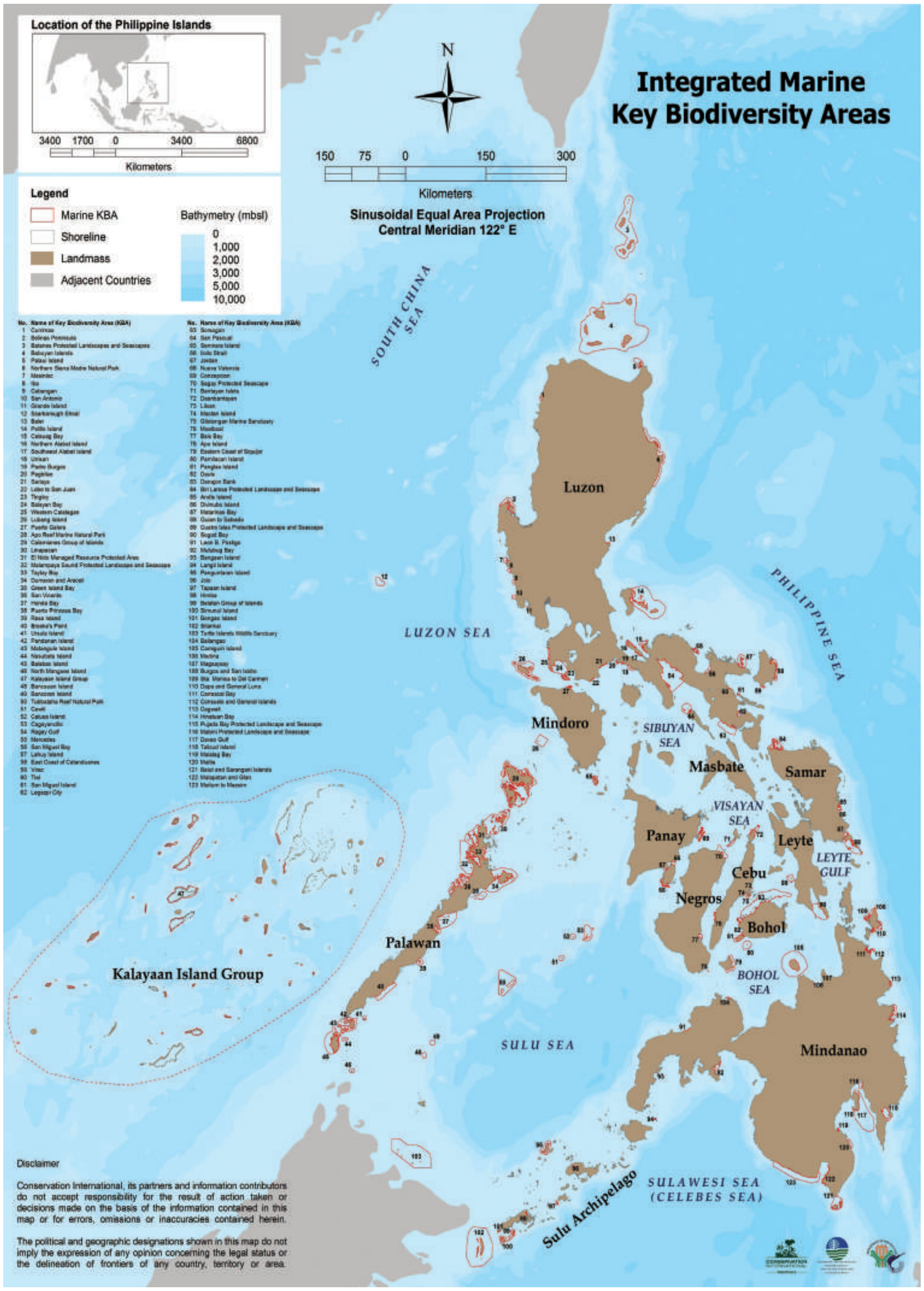


Figure 6.4. Marine key biodiversity areas of the Philippines. (Source: DENR/CI/Haribon undated).

Cagayancillo) are just three of the more than 1000+ MPAs established in the Philippines which use sharks as their iconic species and thus are the target tourism products themselves. The presumption is that protection and management of these areas, which represent or form part of the species habitats, will result in maintaining and improving the health of the ecosystem over time. Through ecotourism, communities within and near the MPA—whose income might have been negatively affected by the MPA establishment through loss of fishing grounds and subsequent loss of income or of revenues from fishing activities—will have an alternative way of generating income. Ecotourism initiatives that are deeply rooted in the conservation movement have been proven as highly strategic revenue sources for natural areas that need protection.

6.3 CONCLUSIONS AND RECOMMENDATIONS

Species. The methodology of the IUCN Red Listing is applicable to sharks and shark-like fishes, but it comes with some difficulties. The process is data-dependent, and with sharks catches generally unmonitored and underreported in various fishing operations, there is very limited information to base species evaluations on. When data is available, it is often disjointed.

Secondly, sharks as a group are undergoing taxonomic and systematic changes that make identification and monitoring more difficult. There are also data collection challenges. For instance, field enumerators and data collectors are undertrained

Table 6.4. Philippine marine key biodiversity areas (mKBAs) and candidate mKBAs identified using globally threatened elasmobranch species as trigger species. (Sources: CI-Philippines/Haribon Foundation/DENR/DA Priority Conservation Sites in the Philippines: Marine and Terrestrial Key Biodiversity Areas 2012; Ambal et al. 2012).

ID	Name	Location					Estimated Area (has)	Trigger species
		Region	Province	Municipality	Long	Lat		
MARINE KBAs								
1.	Bolinao Peninsula	I	Pangasinan	Bolinao	119.84710	16.37484	946.0	*Rhinopterajavanica* (VU)
2.	Linapacan	IV	Palawan	Gaudencio E. Abordo, El Nido	119.71197	11.40300	106,234.0	*Stegostomafasciatum* (VU)
3.	Taytay Bay	IV	Palawan	Taytay	119.51959	10.92951	7,666.0	*Rhinaancylostoma* (VU)
4.	Araceli	IV	Palawan	Araceli	119.74774	10.61555	3,008.0	*Rhynchobatusaustraliae* (VU)
5.	Dumaran	IV	Palawan	Dumaran	119.75488	10.39999	3,887.0	*Rhynchobatusaustraliae* (VU)
6.	Green Island	IV	Palawan	Roxas	119.49926	10.26227	9,242.0	*Stegostomafasciatum* (VU)
7.	Honda Bay	IV	Palawan	Puerto Princesa City	118.89730	9.87783	66,716.0	*Rhincodon typus* (VU) *Mobula eregoodootenkee* (CT) *Mobula kuhlii* (CT) *Manta birostris* (CT)
8.	Puerto Princesa Bay	IV	Palawan	Puerto Princesa City	118.74228	9.71771	7,264.0	*Rhinopterajavanica* (VU) *Himanturauarnak* (CT)
9.	Sorsogon	V	Sorsogon	Donsol, Pilar	123.59670	12.86696	36,285.0	*Rhinchodon typus* (VU) *Mobula eregoodootenkee* (CT) *Mobula kuhlii* (CT) *Manta birostris* (CT)
10.	Jordan	VI	Guimaras	Jordan, Buenavista	122.56925	10.66730	1,820.0	*Rhynchobatusaustraliae* (VU)
11.	Sagay Protected Seascape	VII	Negros Occidental	Sagay, Escalante	123.50374	10.93810	16,541.0	*Rhynchobatusaustraliae* (VU) *Aetoplateazonurus* (VU) *Hemitriakisleucoperiptera* (EN) - *historical data* *Carcharhinus sorrah* (CT) *Himanturauarnak* (CT)

ID	Name	Location					Estimated Area (has)	Trigger species
		Region	Province	Municipality	Long	Lat		
12.	Bantayan Islets	VII	Cebu	Bantayan	123.66609	11.07439	6,034.0	*Aetomylaeusvespertilio* (EN) *Urogymnusasperrimus* (VU) *Taeniura meyeni* (VU) *Rhynchobatusaustraliae* (VU)
13.	Daanbantayan	VII	Cebu	Daanbantayan	124.06175	11.26981	9,277.0	*Rhinaancylostoma* (VU) *Rhynchobatusaustraliae* (VU)
14.	Sogod Bay	VIII	Southern Leyte	Padre Burgos, San Francisco, Pintuyan	125.12714	9.99996	41,290.0	*Rhinchodon typus* (VU) *Mobula eregoodootenkee* (CT) *Mobula kuhlii* (CT) *Manta birostris* (CT)
15.	Pujada Bay Protected Landscape and Seascape	XI	Davao Oriental	Mati	126.24284	6.85220	20,589.0	*Rhinchodon typus* (VU) *Mobula eregoodootenkee* (CT) *Mobula kuhlii* (CT) *Manta birostris* (CT)
CANDIDATE MARINE KBAs								
c1.	Manila Bay	III/ NCR/ IV	Bataan; Manila; Bulacan; Cavite	Mariveles, Limay, Orion, Pilar, Balanga, Abucay, Samal, Orani; Lubao, Sasmuan, Masantol; Hagonoy, Paombong, Malolos, Bulacan, Obando; Metro Manila; Bacoor, Kawit, Cavite City, Noveleta, Rosario, Tanza, Naic	120.75591	14.58216	154,805.0	*Sphyrna mokarran* (EN)*

ID	Name	Location					Estimated Area (has)	Trigger species
		Region	Province	Municipality	Long	Lat		
c2.	Wawa	IV	Batangas	Nasugbu	120.60980	14.08639	641.0	*Alopias pelagicus* (CT)
								Alopias superciliosus (CT)
c3.	Brgy. Talaga	IV	Batangas	Mabini	120.94260	13.72409	595.0	*Alopias pelagicus* (CT)
								Alopias superciliosus (CT)
c4.	Pagkilatan and Mabacong	IV	Batangas	Batangas City	121.03109	13.64207	853.0	*Alopias pelagicus* (CT)
								Alopias superciliosus (CT)
c5.	Malampaya Sound Protected Landscape and Seascape	IV	Palawan	Taytay, San Vincente	119.24305	10.84760	113,190.0	*Carcharhinus hemiodon* (CR)*
								Carcharhinus borneensis (EN)*
								Carcharodoncarcharias (VU)*
								Urogymnusasperrimus (VU)*
								Himanturauarnak (CT)
c6.	Bantayan Island	VII	Cebu	Madridejos, Bantayan, Sta. Fe	123.68424	11.18453	37,895.0	*Hemitriakisleucoperiptera* (EN)*
c7.	Monad Shoal	VII	Cebu					*Alopias pelagicus* (CT)
c8.	Danajon Bank	VII	Bohol	Calape, Tubigon, Clarin, Inabanga, Buenavista, Jetafe	123.97725	10.07053	27,164.0	*Sphyrna mokarran*(EN)*
c9.	Dumaguete City	VII	Negros Oriental	Dumaguete City	123.31256	9.29281	840.0	*Hemitriakisleucoperiptera* (EN)*
								Himanturauarnak (CT)
c10.	Dipolog	IX/X	Zambanga del Norte; Misamis Occidental	Dipolog City, Dapitan City, Sibutad, Rizal; SapangDalaga, Baliangao	123.40524	8.75488	64,835.0	*Carcharinushemiodon* (CR)*
c11.	Sindangan Bay	IX	Zamboanga del Norte	Liloy, Salug, Bacungan, Sindangan	122.83316	8.20045	46,881.0	*Sphyrna mokarran* (EN)*
c12.	Camiguin Island	X	Camiguin	Mambajao, Mahinog, Guinsiliban, Sagay, Catarman	124.70738	9.18970	134,348.0	*Carcharinusborneensis* (EN)*
								Charcharodoncarcharias (VU)*

Legend: CR - Critically Endangered; EN - Endangered; VU - Vulnerable; CT- Candidate Threatened; * - historical data to correctly identify species and conduct biological studies to get data needed for evaluation of species. A lot of backtracking and fact checking are needed not only to validate or correct species identification but to also quantify the threats. A number of species belonging to species complexes is a concern; some have now been identified as separate species (e.g., members of the Family Dasyatidae) and as separate species, the threat status may now differ, given that initial estimates on the population and of the threats to the population may no longer apply.

Thirdly, there is not much known on the biology and ecology of species reported to occur in the Philippines. There are some isolated data available (e.g., from SEAFDEC-sponsored stock assessments; isolated NSAP regional shark fisheries monitoring) which need to be analyzed. As a group, sharks' life history strategy (i.e., k-selected) make them susceptible to overexploitation and impede recovery of depleted populations.

The growing shark fisheries in the Philippines are a concern. Catch landings data from the regions need to be reviewed and analyzed to get a better characterization of local fisheries and thus estimation of the threats from fisheries, whether targeted or as by-catch.

A plan to conduct national-level RLA of all shark species has gained traction during the second Napoleon Wrasse-Shark consultation workshop in Palawan (October 2016), and is targeted to be conducted within 2017. Site-based data thus need to be reviewed and structured for use in this process. With national and subnational evaluation of the threat status of shark species and populations, better management options may be developed (e.g., fisheries ban for threatened species, recovery plan for critically endangered or endangered species, catch limits for others).

Habitats. As with the IUCN Red Listing process, the PCA and KBA identification processes are also data-dependent. Subnational or regional data, to the scale of sites or fishing grounds, are useful in the identification, delineation, and prioritization of areas for site-based management. These areas are globally significant for biodiversity conservation and are considered actually or potentially manageable for conservation.

The output of the national and subnational RLA of shark species will be useful in the refinement of PCAs and mKBAs. Data used, however, need to be validated at the site-level, and in collaboration with the local government units and stakeholders, appropriate management strategies can be done to protect the species and the critical habitats.

Site-level management responses include MPA establishment (e.g., Malapascua, Cebu; Donsol, Sorsogon) or temporary closure of fishing grounds (e.g., Visayan Sea, for sardines). Greater collaboration needs to happen among government agencies such as DA-BFAR, DENR-BMB and the local government units for the establishment of such species-based MPAs (see Local Government Code of 1991 or RA 7160; Section 5.3.5).

In existing marine protected areas, be it nationally established under NIPAS or locally established by a barangay or municipal ordinance, monitoring and evaluation of protection or regulation efforts need to be done. Data is needed to assess status of the species and its habitats, and changes in the status of the species or populations should have concomitant changes in the management responses for said populations.

***

CHAPTER 7: GAPS, ISSUES AND CONCERNS

A number of initiatives for shark conservation and management have been done by the government and civil society organizations (e.g., WWF-Silliman-BFAR Elasmobranch Biodiversity Research, NSAP monitoring of shark catch and effort in various landing sites, ad hoc research on certain shark populations and habitats). However, in spite of the growing information on shark and shark fishery resources in the Philippines, much still needs to be done to fully understand and characterize the fisheries and improve on current conservation and management practices.

Discussion on gaps, issues, and concerns are shown in earlier chapters, with recommendations for inclusion in the action planning process. It is noted that a lot of the issues have already been identified in the 2009 SAR/NPOA-Shark. During the 2016 writeshops for the updating of the NPOA-Sharks, these issues were reviewed and refined based on currently available information and relatively larger datasets.

These issues are grouped into the following: 1) Monitoring; 2) Data Collection and Analysis; 3) Research; 4) Capacity-building; and 5) Conservation and Management (further sub-grouped into Policy, Institutional Arrangements, IEC, Compliance and Enforcement).

7.1 SUMMARY: GAPS, ISSUES AND CONCERNS

7.1.1 Monitoring:

ISSUES	2009 NPOA-Sharks	2016/2017 NPOA-Sharks(this report)
• Lack of routine and non-routine mechanisms to improve shark and ray fisheries statistics • Need for regular and sustained monitoring to assess status and trends of shark and ray stocks • Lack of validation programs across some fisheries • Lack of information on the scale, impact, and management of commercial versus municipal fisheries	1.1 Lack of routine and non-routine mechanisms to improve shark and ray fisheries statistics 1.2 Lack of regular and sustained monitoring to assess status and trends of shark and ray stocks	1.1 Insufficient mechanisms to collect and report data for sharks, batoids, and chimaeras fisheries under NSAP Framework 1.2 Insufficient data sharing and reporting for non-routine mechanisms to improve sharks, rays, and chimaeras fisheries statistics

7.1.2 Data Collection/Compilation/Reporting/Analysis:

ISSUES	2009 NPOA-Sharks	2016/2017 NPOA-Sharks(this report)
• Mis-identification of species and other taxonomic concerns • Presence of new, unknown, and still undescribed species • Lack of voucher specimens to validate initial identification of species reported • Lack of species identification, quantification and reporting of all species of sharks and rays taken in some target and non-target/by-catch shark fisheries and other sources; • Difficulty in species identification and collection of biological data of incomplete (headless, finless or gutted) sharks landed • Lumping of data into general groupings such as sharks or rays	2.1 Limited understanding on shark, batoids, and chimaeras fisheries	2.1 Lack of standard forms specifically for sharks, batoids and chimaeras fisheries

ISSUES	2009 NPOA-Sharks	2016/2017 NPOA-Sharks(this report)
• Lack of consistency and compatibility in recording, compilation, and reporting across fisheries • Lack of recording and database of all shark and ray catches • Need to establish minimum standards, guidelines, and protocol for data collection • Lack of information on stock structure, abundance, life history, or reproductive rate of most species of sharks and rays • Lack of quality information available for stock assessment and effective management • Present statistical data collection does not record landings by species. This does not indicate the status of the resources either by abundance nor vulnerability or threats • Need to identify methods in quantification and estimation of shark by-catch in numerous fisheries and gear types in which different species are caught • Standardized data collection and reporting methods, for comparison of trends, between regions and over time • Lack of participation and/or involvement of fishing industry and other stakeholders in shark/ray fisheries data collection and management • Need to develop conversion factors to determine weight and other relevant information of sharks with missing body parts • Lack of socioeconomic data on shark fisheries, including fleet and vessel size, gears used, areas fished, and numbers of fishers, • Need for demographic profile, fisheries profile, fishing operation practices, problems, and fishery systems. • Need to evaluate socio-economic importance on elasmobranch resources, such as data on markets and values for different products, and the structure of trade • Limited information on marketing mechanisms and trade flows including credit facilities and postharvest processing	2.2 Limited ecological information on shark, batoids, and chimaeras 2.3 Limited understanding on shark, batoids, and chimaeras utilization and trade 2.4 Limited cooperation with industry 2.5 Lack of information/ understanding of the socio-economic importance of shark, batoids, and chimaeras fisheries	2.2 Limited ecological information on species and populations of sharks, batoids and chimaeras 2.3 Limited knowledge and understanding on sharks, batoids and chimaeras fisheries 2.4 Limited species-specific information needed for management

7.1.3 Research:

ISSUES	2009 NPOA-Sharks	2016/2017 NPOA-Sharks(this report)
• Lack of information on the volume and extent of shark finning and its impacts • Incomplete reporting of trade statistics and routes • Lack of information on utilization of shark/ray by-products, marketing channels, and trade routes • Lack of information on the impact of market demand on shark populations • Lack of scientifically defensible stock assessments for some targeted and important by-product species • Need for fishery-independent surveys to assess relative abundance • Need to develop cost-efficient techniques in stock assessment (e.g., rapid assessment technique) • Need to understand dynamics of exploited stocks. • Lack of understanding on ecosystem effects of shark and ray fisheries and management practices • Lack of risk assessment analysis for targeted and important stocks	3.1 Limited information on the biology and ecology of species, including taxonomy 3.2 Limited facilitation and encouragement for research on little known shark species 3.3 Limited information and understanding on current utilization of sharks and shark products 3.4 Threat assessment of shark populations and habitats and , protection of critical habitats	3.1 Limited technical information on the status of Philippine sharks, batoids, and chimaeras fisheries from NSAP areas 3.2 Limited information on the biology and ecology of sharks species, including taxonomy

7.1.4 Capacity-building

ISSUES	2009 NPOA-Sharks	2016/2017 NPOA-Sharks(this report)
• Lack of knowledge on the use of appropriate management and conservation measures to promote effective utilization of shark catches • Insufficient knowledge and experience in data collection, particularly in conduct of biology research including taxonomy and determination of maturity • Lack of capacity and capability to identify and monitor headless, finless, gutless and/or dried catches and/or landings (e.g., training on species identification of sharks by observation of denticles, molecular/genetic identification) • Lack of skill to define the processes for identification of threatened species from various sources of threats (e.g. IUCN Red Listing) or from trade (e.g., CITES)	4.1 Limited capacity for species identification 4.2 Limited capacity for data collection 4.3 Limited knowledge/ understanding on conservation and management needs of threatened species 4.4 Lack of technical expertise on sharks* 4.5 Limited knowledge and appreciation for shark* and shark* resources	4.1 Limited technical capability of existing field enumerators to identify Philippine sharks, batoids, and chimaeras 4.2 Limited expertise on Philippine sharks, batoids, and chimaeras to respond to court cases

7.1.5 Conservation and Management (Policy, IEC, Compliance and Enforcement)

ISSUES	2009 NPOA-Sharks	2016/2017 NPOA-Sharks(this report)
• Insufficient policies and legal mechanisms to manage shark stocks, including pelagic/shared stocks, deep water, demersal, and/or endemic species • Insufficient policies and legal mechanisms to regulate/ protect globally, regionally and/or nationally threatened populations • Absence of national controls on shark finning, including international trade • Lack of field guides to identify species at the national and regional levels (e.g., sharks, batoids, and chimaeras catalogue; waterproof field guides for species identification) • Lack of awareness on shark resource management • Insufficient awareness building materials and products to promote shark/ray conservation and management • Lack of program for compliance and enforcement of policies and laws for the protection and management of sharks/rays • Lack of logistic and financial resources to sustain data collection and management initiatives • Lack of program for shark by-catch reduction and/or mitigation measures	5.1 No definite conservation and management policies on shark and rays 5.2 Inconsistencies in existing laws on conservation, e.g. Wildlife Act 5.3 Lack of information on shark fisheries 5.4 Lack of information on trade and marketing 5.5 Lack of enforcement for the conservation and management of threatened and endangered shark and ray species	5.1 Lack of information on the importance of sharks, batoids, and chimaeras 5.2 Inadequate policies for conservation and management of sharks, rays, and chimaeras 5.3 Lack of enforcement for the conservation and management of sharks, batoids, and chimaeras

7.2 RATIONALE: RECAP OF GAPS, ISSUES, AND CONCERNS

7.2.1 On Shark Resources

Same concerns are raised here as in the 2009 SAR: limited local knowledge, capacity, and skill to identify shark and ray catches to the species level which leads to misidentification of species, recording of synonyms, misspellings, general inconsistencies and absence of standards in terms of recording and reporting, and insufficient evidence-based identification process (e.g., lack of reliable photos, voucher specimens, tissue samples to validate or confirm species reported). The fact that there are now more shark species that factor in fisheries, a good percentage of which is still new to science, and that shark species groups are also undergoing taxonomic changes make monitoring more complicated than usual. The same gaps are also identified to include: lack of biological and environmental data limited information on transboundary, highly migratory and high seas stocks; and limited information or lack of data analysis on demersal and near-shore stocks.

As in the 2009 SAR, it has been recommended that a basic standard identification/field guide as well as data collection and monitoring protocols be developed, with a training of new field personnel on basic taxonomy, data collection, and analysis to better equip them in research and monitoring. Although some field personnel have undergone basic training in taxonomy, local capacity needs to be regularly evaluated and strengthened to correct identification lapses.

Shark catch monitoring and reporting is recommended to be an integral part of the National Stock Assessment Program. Capacity to gather information as well as the capability for scientific analysis needs to be strengthened. A newer and younger set of field data collectors and monitoring team needs to be trained to sustain the process and an enabling environment and system of support (e.g., policies and budgets in place) put in place for them to effectively implement their roles.

The shark field guide (i.e., *Pating Ka Ba?*), which was produced only in 2014, is now in need of a revision based on the taxonomic changes of the shark species and groups in the past couple of years alone. It also needs to be updated based on new information on species resulting from field monitoring and research. The checklist provided by the regions need to be reviewed and validated so that an updated list can be produced and circulated for use in field monitoring. Regional catch data also need to be analyzed so that it can be effectively used for species-specific threat assessment and eventual protection, regulation and/or management.

7.2.2 On Shark Fisheries

Philippine shark fisheries data and information collection and analysis system is generally weak. Technical skills for species-level identification and data collection, along with the capacity for record-keeping and reporting are still relatively low. Current information available on sharks is, thus, of limited value to management. A preliminary clean-up of the list was done to edit out misspellings, double reporting, non-shark species (e.g., Napoleon wrasse, other labrids or bonyfishes) and segregation of unidentified species listed under their local names, common names, genus or family collective. Additional review is needed to validate and confirm species list for synonyms and/or recent taxonomic changes. Collection and proper documentation of voucher specimens and/or photos per fishing ground or landing site is recommended to increase species-level identification, data collection, and reporting. Field enumerators need to be trained on taxonomy and systematics, especially since they are the first liners in data collection and thus must maintain data integrity. Sharks are undergoing taxonomic changes, and as such, data collectors need to develop their own species guide based on locally landed catches from which future monitoring can be validated. Misidentifications can lead to missed opportunities to identify newer species in fisheries as well as mask underlying serial depletion of individual stocks or populations.

Sharks are considered as non-priority commodities, thus, stock assessments of shark populations are not prioritized. Stock assessments, monitoring and management relies heavily on fisheries data (referred to as fishery-dependent data) from which informed decisions are made to help in conserving exploited shark populations and avoid socioeconomic and ecological problems. A variety of stock assessment methods, each requiring certain types of data, have been used to assess status of shark populations worldwide. Basic fisheries data needs are shark fishing mortality by species, gear type, and region, including current and historical records on the following: commercial, artisanal, and recreational catches; size, length-weight, age structure and sex composition of catch; landings (number and volume); by-catch, discards and discard mortalities; catch per unit effort; exploitation rates. Much of this information is not readily available for sharks.

A standardized data collection and reporting system has been recommended to enable better analysis and comparison of fisheries trends for certain shark species, between and among regions and over time. Mechanisms and support systems to collect and enhance the reliability of the reporting and monitoring system as well as improve the accuracy of stock assessment is needed. While NSAP data management base and information system is currently being upgraded and improved to accommodate increasingly complex analysis of commercially important stocks (e.g., pelagic fisheries), it needs to be reviewed and evaluated with the goal of strengthening it so as to accommodate shark fisheries data collection, monitoring and reporting, and as well as to improve information accessibility and timeliness.

NSAP may hold more than 10 years of shark fisheries data collected on-site but data is raw for use in management. Accurate quantification and/or estimation of direct catches vis-à-vis by-catch in the numerous fisheries and gear types in which different species are caught still needs to be done. Production data at the local/regional levels is also not readily accessible. NSAP data needs to be analyzed to better characterize shark fisheries from which appropriate and site-based management measures can be developed and implemented. Fisheries information will help determine whether a decrease or increase in the shark production data in one area is a reflection of declines/inclines in shark populations, fishing effort, shift in fishing grounds, or even monitoring effort.

Photo from: Commercial area, Aparri, Philippines

Additional data gaps are on the socioeconomic aspects of shark fisheries such as demographic profiles, fisheries profile, fishing operation practices including fleet and vessel size, gear used, areas fished, numbers of fishers, markets and values for different products, and the structure and flow of trade, problems, and fishery systems.

7.2.3 On Shark Utilization & Trade

Available information on fisheries, trade, and utilization of sharks and shark products is generally poor. There is thus difficulty in getting estimates and correlation of trade and shark catches, and the total volume of shark fisheries that the country is contributing to the global market. Available data collected thus far, though needing further review and analysis, show that fisheries is increasing locally, and, presumably, so does the volume of traded shark products. Current data and information management system of fisheries in general and shark/shark products in particular is somehow counterintuitive to the increasing demand for shark products.

When sharks are already cut up into preferred body parts (e.g., fins, meat, liver) before they are brought to the landing and/or market sites, challenges are posed not only in species identification but also in the estimation of numbers and sizes of animals taken. The precautionary approach to fisheries dictates that fisheries management needs to be in place in spite of these uncertainties. A certain level of estimation is still needed which can then be translated into closer estimates in number of shark individuals taken, or the so called "conversion factor" which needs to be arrived at from these landings to better inform management of the fisheries.

A conversion factor for Philippines shark fisheries still needs to be done to get a better estimate of the relationship between the volume of shark products traded and the quantities of sharks originally taken by fisheries. Conversion factors are important for the regulation of fisheries, for use in the calculation and enforcement of fishing quotas and/or bans on shark finning.

Shark fisheries and trade data collection and information management still remains a systematic issue. Production data on shark meat, fins, and other products/by-products (e.g., skins and leather, jaws, liver oil, cartilage, offals, fishmeal, and fertilizer) is still not available, or readily accessible. Reporting systems are also inconsistent while categories and classifications in trade statistics are not standardized.

In the case of shark fins, imports may be reported but these are not necessarily accurate since import permits are applied for in advance and not validated on-site. Reports of outgoing trade are not also reported consistently. There are different government offices responsible for handling import permits (i.e., BFAR Central Office and regional offices in major cities with international ports) and another office for exports (i.e. Bureau of Customs). Trade data (to include imports and exports) as presented does not capture all shark trade statistics, and is disjointed at best.

A primary and prevalent data gap is species-level identification and reporting. Most traded products, which are not of whole individual sharks but of parts and by-products or commodities, are not identified to species level. Big volumes of fins, possibly belonging to various species of sharks, are often lumped as a single species recorded as a single commodity.

The standard six-digit customs tariff headings adopted under the Harmonized System of classification are specific for meat, categories used being "dogfish" and "other sharks," which even then are often combined into a single category. There are also no validation protocols. Monitoring and reporting data, particularly of species and populations that are protected or regulated (e.g., species listed under CITES Appendices), are thus largely unreliable.

Analysis of the trade and utilization of shark and shark products is thus highly recommended. Though some of the recommendations for improving knowledge on trade and utilization identified during the 2009 SAR have been addressed (e.g., development of field ID guides for sharks and shark products), more still need to be implemented, regularly monitored, and evaluated for effectiveness:

- Include shark scientific names in the Harmonized System Code
- Develop a suitable export permitting system for visiting boats buying shark products
- Develop capability of fisheries quarantine personnel and the local government units in shark identification at the species level (e.g., taxonomy)

Photo by: Lilibeth Abina

- Develop identification guide for sharks and shark products
- Enhance current export permitting system by requiring exporters to provide scientific name of shark products to be exported
- Enact policy to regulate shark species listed as endangered and critically endangered under the IUCN Red List
- Define and standardize data collection system and establish database for fisheries quarantine personnel
- Develop and implement a bar coding system (i.e., genetic/molecular identification) to identify shark commodities (fins, jaws, meat, gills, bones, others) to species level
- Establish monitoring system for foreign vessels poaching in national waters that are trading fish and fishery products in "blind spots" such as Palawan and Tawi-Tawi or exporting such through the country's back door to Malaysia and other countries.

7.2.4 Legal & *Management Status*

Multilateral environmental agreements allow countries to work together on global environmental issues such as the conservation of marine wildlife and fisheries resources, and resource conservation and management. Most of these instruments are legally binding to parties or member-countries/signatories (e.g., CITES) which are mandated to implement the provisions of the various instruments through national legislations, while others are non-binding (e.g., CMS) but still allow member countries to highlight and/or incorporate global concerns in the domestic scene or national priorities (e.g., IUCN).

Increasing fisheries and utilization of sharks and shark products has led to global initiatives for shark conservation and management, particularly through the UN FAO IPOA-Sharks. Legal and management instruments, however, are largely dependent on fisheries-related data (e.g., the catch, effort, discards, and trade) as well as information on the biological parameters of many species.

While the need to collect this information through conduct of stock assessments has been recognized by RFMOs such as the WCPFC, the process is riddled with challenges. In WCPO, key sharks species (e.g., oceanic whitetip, silky sharks) have been identified and stock assessments of some populations have been conducted but no major decisions have been made to reduce catches and mortalities of individuals, not even for populations where stock declines have been recorded (e.g., South Pacific blue shark *Prionace glauca*). Stock assessment of this species is still considered preliminary and a work in progress. Problems highlighted in the assessment is the difficulty in getting realistic estimates of equilibrium unexploited recruitment and spawning biomass due to the lack of available data, conflicting CPUE time series, and uncertainty in the estimated stock recruitment relationship.

These same challenges are faced by member countries, even for species factoring in domestic fisheries. Additional complications are posed in the absence or lack of resources available as well as expertise in the conduct of stock assessments and ecosystem research, the results of which will feed into decision-making and improved management of fisheries stocks.

Where international trade of the species occurs, more binding instruments such as CITES may be called on to regulate takes and trade of the species of concern. Provisions of this convention has been translated into law under the Philippine Fisheries Code (RA 8550) and as amended by the RA 10654, and the Philippine Wildlife Act (RA 9147). Conduct of threat assessments of shark species using the IUCN Red List Categories and Criteria to update rare and endangered species list (i.e., FAO 208/FAO 233) pursuant to new policies and laws (e.g., RA 8550 as amended by RA 10564) are thus welcome, if not long overdue.

Much has been said in terms of the need to harmonize national policies. A case in point is the Sharks and Rays Conservation Act (Senate Bill 905). The bill is pending as of August 16, 2016; however, concerns are raised in view of the socioeconomic (and political) impacts of the ban given there are artisanal fisheries for the shark species and groups. Additionally, a total ban may not be necessary because some species may be sustainably fished.

RA 10654's amendments to the Fisheries Code set higher penalties for illegal fishing activities. Under RA 7160 or the Local Government Code, however, LGUs are authorized to enact ordinances that would strengthen implementation of national laws, and sometimes LGUs set penalties that are much lower than those set by the national laws. Better collaboration and planning among local governments and the concerned national agencies is recommended to address limitations and potential conflicts in implementation and interpretation of the laws. Whether legislations and policies are national or local in scope, budgets along with human resources and expertise must be appropriated for its implementation.

Human resources and capacity development is strongly recommended, focusing on the ecosystem approach to fisheries management (EAFM). EAFM is defined as a way of managing fisheries that balance the different objectives of society (e.g., environmental, economic, and social). It encourages a planning focus not just on the species in need of conservation and management (e.g., sharks), but on the wider impacts of the fishery on the environment, as well as the social, economic, institutional and governance support systems for said fishery. Current policies and ordinances need to be reviewed using the EAFM lens so that strategies are developed to maximize effectiveness.

7.2.5 Conservation Status

Species. The methodology of the IUCN Red Listing is applicable to sharks and shark-like fishes, but it comes with some difficulties. The process is data-dependent, and with sharks catches generally unmonitored and underreported in various fishing operations, there is very limited information to base species evaluations on. When data is available, it is often disjointed.

Secondly, sharks as a group are undergoing taxonomic and systematic changes that make identification and monitoring more difficult. There are also data collection challenges. For instance, field enumerators and data collectors are undertrained to correctly identify species and conduct biological studies to get data needed for evaluation of species. A lot of backtracking and fact checking is needed not only to validate or correct species identification but to also quantify the threats. A number of species belonging to species complexes is a concern; some have now been identified as separate species (e.g., members of the Family Dasyatidae) and as separate species, the threat status that may now differ, given that initial estimates on the population and of the threats to the population may no longer apply.

Thirdly, there is not much known on the biology and ecology of species reported to occur in the Philippines. There are some isolated data available (e.g., from SEAFDEC-sponsored stock assessments; isolated NSAP regional shark fisheries monitoring) which need to be analyzed. As a group, sharks' life history strategy (i.e., k-selected) make them susceptible to overexploitation and impede recovery of depleted populations.

The growing shark fisheries in the Philippines are a concern. Catch landings data from the regions need to be reviewed and analyzed to get a better characterization of local fisheries and thus estimation of the threats from fisheries, whether targeted or as bycatch.

A plan to conduct national-level Red List Assessment of all shark species has gained traction during the second

Photo from: Taiwan, Fish port

Napoleon wrasse-Shark consultation workshop in Palawan (October 2016), and is targeted to be conducted within 2017. Site-based data thus need to be reviewed and structured for use in this process. With national and subnational evaluation of the threat status of shark species and populations, better management options may be developed (e.g., fisheries ban for threatened species, recovery plan for critically endangered or endangered species, catch limits for others).

Habitats. As with the IUCN Red listing process, the PCA and KBA identification processes are also data-dependent. Subnational or regional data, to the scale of sites or fishing grounds, are useful in the identification, delineation and prioritization of areas for site-based management. These areas are globally significant for biodiversity conservation and are considered actually or potentially manageable for conservation.

The output of the national and subnational RLA of shark species will be useful in the refinement of PCAs and mKBAs. Data used, however, need to be validated at the site-level, and in collaboration with the local government units and stakeholders, appropriate management strategies can be done to protect the species and the critical habitats.

Site-level management responses include MPA establishment (e.g., Malapascua, Cebu; Donsol, Sorsogon) or temporary closure of fishing grounds (e.g., Visayan Sea, for sardines). Greater collaboration needs to happen among government agencies such as DA-BFAR, DENR-BMB and the local government units for the establishment of such species-based MPAs (see Local Government Code of 1991 or RA 7160; Section 5.3.5).

In existing marine protected areas, be it nationally established under NIPAS or locally established by a barangay or municipal ordinance, monitoring and evaluation of protection or regulation efforts need to be done. Data is needed to assess status of the species and its habitats, and changes in the status of the species or populations should have concomitant changes in the management responses for said populations.

***

CHAPTER 8: PHILIPPINE NPOA-SHARKS 2017-2022

Discussion on gaps, issues and concerns are shown in earlier chapters, with recommendations for inclusion in the action planning process. It is noted that, a lot of the issues have already been identified in the 2009 SAR/NPOA-Shark. During the 2016 writeshops for the updating of the NPOA-Sharks, these issues were reviewed and refined based on currently available information and relatively larger datasets.

These issues are grouped into the following: 1) Monitoring; 2) Data Collection and Analysis; 3) Research; 4) Capacity-building; and 5) Conservation and Management (further sub-grouped into Policy, Institutional Arrangements, IEC, Compliance and Enforcement).

The Philippine NPOA-Sharks is presented in a matrix following the same grouping, and showing priority issues, objectives, action points, timelines, agencies responsible, strategic partners, performance indicators, budgetary requirements, and remarks.

1.0 MONITORING

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
1.0 MONITORING							
Issue 1.1	Insufficient mechanisms to collect and report data for sharks, batoids, and chimaeras fisheries under NSAP Framework.						
Objective 1.1a	Enhance data collection and information management systems on sharks, batoids, and rays by through capacity development programs for the National Stock Assessment Program (NSAP) within 5 years (2018–2022).						
	1. Review existing NSAP and Fisheries Observers Program (FOP methodologies particularly on shark data collection to comply with official requirements of Food and Agriculture Organization and the regional fisheries management organizations	2017	National Fisheries Research and Development Institute (NFRDI) and Bureau of Fisheries and Aquatic Resources (BFAR)	state universities and colleges (SUCs)	NSAP form: shark responsive	50,000.00/ Writeshop/ fishing ground	small meeting
	2. Develop training program for the implementation of enhanced methods for the collection of sharks, batoids and chimaeras fisheries data	2017-2018	NFRDI and BFAR RFOs	SUCs, civil society organizations (CSOs)	No. of trainings conducted; training report; # of trained individuals	500,000/region	

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
	3. Train enumerators on proper species identification	2017	BFAR-NSAP (Regions), NFRDI	SUCs, CSOs	No. trainings conducted; training report; # of trained individuals	800,000.00/ fishing ground	
	4. Reproduce and distribute sharks, batoids, and chimaeras field guides (i.e. Pating Ka Ba?)	2017-2018	BFAR-NSAP (Regions)		No. of copies produced/ reproduced; # of distribution areas	1,000,000.00	
Objective 1.1b	Develop a regulatory mechanism on the Philippines sharks catch per region within 5 years (2018–2022).						
	5. Implement documentation scheme for sharks, batoids, and chimaeras	2019	BFAR, NFRDI, BFAR-NSAP (Regions)	local government units (LGUs), SUCs, CSOs	Heat maps/ advisory on sharks, batoids, chimaeras		
	6. Upgrade database system to accommodate sharks, batoids, and rays photo-database	2017-2022				100,000.00	Also in Ob. 2.2a. (#19), Ob. 2.2b. (#23)
Issue 1.2	Insufficient data sharing and reporting for non-routine mechanisms to improve sharks, rays, and chimaeras fisheries statistics						
Objective 1.2a	Establish information on sharks, rays, and chimaeras per fishing ground for non-NSAP sites within 5 years (2018–2022).						
	7. Review and adopt Snapshot Assessment Protocol (SnAP) for small-scale and artisanal fisheries (Whitty et al. 2013)	2017	CITES Scientific Authorities (NFRDI, Silliman University, University of the Philippines, University of Visayas, Philippine National Museum	academe, BFAR, non-government organizations (NGOs)	2 SnAP tools adopted	100,000.00	
	8. Coordinate and collaborate with other institutions for additional information on sharks, rays, and chimaeras			academe, NGOs	1 local small-scale and artisanal fisheries research network piloted		

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
	9. Activity proposal to conduct focus group discussions (FGDs) w/ fisherfolk & enumerators at non-NSAP landing sites using adopted SnAP tools for sharks, rays, and chimaeras	2017	BFAR, NFRDI	academe, NGOs, FARMCs, CSOs	Proposal Prepared and Approved		
	10. Conduct FGDs w/ fisherfolk & enumerators at non-NSAP landing sites using adopted SnAP tools for sharks, rays, and chimaeras	2017			Number of FGDs conducted	50,000.00/ landing center	
Objective 1.2b	Establish information on fishing communities engaged in sharks, rays, and chimaeras fisheries through conduct of value chain analysis in NSAP sites within 5 years (2018–2022).						
	11. Proposal for the conduct of value chain analysis (VCA)	2017	Scientific Authorities and other SUCs	BFAR, academe, and CSOs	Proposal prepared and approved		
	12. Conduct interview and survey which focus on the following aspects: 1. Socioeconomic profile (supply chain, activities of traders or buying stations and fishers profile and fishing expenses; prices; all fishing actions; and other source of income/ livelihood) 2. Analysis of VCA by consultants	2018-2022			Number of fisherfolks interviewed	70,000.00/ LC/month (2 enumerator)	

2.0 DATA COLLECTION AND ANALYSIS

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
2.0 DATA COLLECTION AND ANALYSIS							
Issue 2.1	Lack of standard forms specifically for sharks and groups						
Objective 2.1	Develop standard forms for data gathering on sharks to be used by NSAP enumerators by 2018.						
	1. Draft and finalize the standard forms	Q2-Q3 2017	NFRDI, NSAP project leaders	GIZ, WWF Philippines, Greenpeace, academe	Developed standard forms	135,000.00	(revisit the available forms i.e. by-catch form)
	2. Disseminate finalized standard forms	Q4 2017				c/o regional offices	
	3. Implement the standard forms for data gathering	Q1 2018					
Issue 2.2	Limited knowledge and understanding on sharks, batoids, and chimaeras fisheries						
Objective 2.2a	Establish system of reporting to update NSAP data on sharks, batoids, and chimaeras on regular basis.						
	4. Standardize data collection (sharks, batoids, and chimaeras) including photo documentation	2017	NFRDI, BFAR-NSAP	SUCs, CSOs	Status report; value chain analysis (VCA); report on utilization and trade	500,000.00 (including consultation and validation to stakeholders and LGUs)	
	5. Gather catch and effort data, types of fishing gear used	2017-2022	BFAR-RFOs, NSAP	LGU, FARMCs/POs		1,000,000.00/ fishing ground	
	6. Segregate shark, batoids, and chimaeras species from other fisheries data	2017-2022	BFAR-NSAP	LGU, FARMCs/POs	Template Report		
	7. Upgrade database system to accommodate sharks, batoids, and rays photo-database	2017-2022				100,000.00	Also in Obj. 1.1 (Action #6); Obj. 2.2b (Action #23)
Objective 2.2b	Establish field monitoring and evaluation system to validate field data on species identification, distribution, and occurrence within 5 years (2018–2022).						
	8. Conduct field visits/ monitoring in landing centers	2017-2022	NSAP-NFRDI (Regions)	LGU, FARMCs/POs	Number of field visits conducted; monitoring report	500,000.00	

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
	9. Develop species photo-database	2017-2022	BFAR NSAP, NFRDI	LGU, BFAR, academe, Fisheries and Aquatic Resources Management Council (FARMC)	Species photo-guide/fishing ground	100.00/fishing ground	
	10. Continuously orient, train, or provide refresher courses on sharks, rays, and chimaeras for enumerators	2017-2022	BFAR NSAP, NFRDI		Number of trainings conducted; training report	1,000,000.00	
	11. Upgrade database system to accommodate sharks, batoids, and rays photo-database	2017-2022					Also in Obj. 1.1 (Action #6); Obj. 2.2a (Action #19)
Objective 2.1c	Increased engagement of local stakeholders in participatory data collection within 5 years (2018–2022).						
	12. Facilitate Participatory Coastal Resource Assessment (PCRA)/focus group discussion on shark fisheries	2017-2022	LGU, BFAR, Academe, FARMC		PCRA Report	800,000.00	
Issue 2.3	Limited ecological information on shark species						
Objective 2.3a	Establish priority shark areas for the conduct of ecological research to determine species distribution and habitat suitability in partnership with academic and research institutions within 5 years (2018–2022).						
	13. Develop grid maps for use by enumerators (as part of data collection)	2016	BFAR-NSAP, National Mapping and Resource Information Authority (NAMRIA)		Number of grid maps provided	3000.00/Map/ FG	
	14. Collaborate with SUCs and other experts to conduct ecological research	2017					
	15. Conduct ecological research in priority shark areas	2018-2020	SUCs				
Objective 2.3b	Establish reproductive data and trends of priority species for management within the next 5 years (2018–2022).						

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
	16. Develop proposal for the conduct of Training on Repro Bio	2018	Scientific Authorities and other SUCs	Coastal Conservation and Education Foundation (CCEF) and other NGOs	Proposal prepared and approved		
	17. Conduct Repro Bio Training	2018			Training conducted	700,000.00	
	18. Conduct reproductive biology studies on sharks, rays, and chimaeras		2019–2022	2019–2022	Reproductive data of priority species used in stock assessment	1.5 M/site	
Objective 2.3c	Develop a web-based database and repository of literature and articles on Philippine sharks starting 2017.						
	19. Establish shark e-library and secondary reference sources on sharks	start in 2017	BFAR Library	SUCs, CSOs	1 web-based repository of literature on Philippine sharks	750,000.00	accessible to NSAP people and students
	20. Upload secondary publications in separate platforms from NSAP (e.g., IT infrastructure of NFRDI)	2018	NFRDI				
Issue 2.4	Limited species-specific information needed for management						
Objective 2.4	Establish structure and processes for the regular assessment of species (sharks, batoids, and chimaeras) by 2017.						
	21. Create a technical working group (TWG) for aquatic wildlife management	2016	BFAR Fisheries Regulatory and Quarantine Division (FRQD)	CCEF, Marine Wildlife Watch of the Philippines (MWWP), GIZ, Conservation International (CI), WWF	Special Order		
	22. Convene National Aquatic Wildlife Council (NAWMC)	2016	BFAR, NFRDI	CCEF, MWWP, GIZ, CI, WWF	Agenda/ agreements/ minutes of meetings		

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
	23. Conduct training on IUCN Red List Assessment process	2017	BFAR FRQD	Academe, IUCN-Shark Specialist Group, NGOs (CCEF, MWWP, etc.)	Training design/report	500,000/ workshop	
	24. Convene Philippine Aquatic Red List Committee (PARLC)	2017	BFAR FRQD		Agenda/ agreements/ minutes of meetings		
	25. Develop proposal for national species-specific assessment workshops/writeshops	2017	BFAR, NFRDI		PhP budget approved		
	26. Conduct series of species-specific assessment using the IUCN Red List Categories and Criteria	2017	BFAR, NFRDI		Number of Red List Assessments (RLA) workshops/ writeshops conducted; number species assessed	500,000/ workshop	

3.0 RESEARCH

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
3. RESEARCH							
Issue 3.1	Limited technical information on the status of Philippine sharks, batoids, and chimaeras fisheries from NSAP areas						
Objective 3.1	Enhance capacities of government personnel to develop and publish papers on Philippine sharks, batoids, and chimaeras fisheries by 2017.						
	1. Conduct writeshops on technical writing of Philippine sharks, batoids, and chimaeras fisheries statistics	2017	NFRDI, NSAP Project Leaders	SUCs, CSOs	# of regional technical reports on sharks, batoids, and chimaeras fisheries assessment	500,000.00	Regional fisheries data on shark, batoids, and chimaeras to be written into a technical paper for publication in TPJF (draft done in 2009 for sharks only; to incorporate batoids data)
	2. Technical review of regional reports on Philippine sharks, batoids, and chimaeras fisheries statistics	2017	NFRDI, The Philippine Fisheries Journal (TPFJ) editorial board	SUCs, CSOs	# of regional technical reports on sharks, batoids, chimaeras fisheries assessment	500,000.00	
Issue 3.2	Limited information on the biology and ecology of sharks species, including taxonomy						
Objective 3.2a	Support research on the reproductive biology of at least 5 Philippine sharks species within 3 years (2017–2019)						
	3. Develop proposals on biology/ ecology of specific species of sharks, batoids, or chimaeras	(Q2-3) 2017 (by 2019)	Scientific Authorities; SUCs	SUCs, CSOs	at least 5 published research on the reproductive biology of sharks	280,000.00	
	4. Conduct research on the reproductive biology of Philippine species of sharks, batoids, or chimaeras	(Q2-3) 2017 (by 2019)					

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
3. RESEARCH							
	5. Conduct capability building workshops and training on the identification on maturity of species of sharks, batoids, or chimaeras	Q4 2017 (by 2019)			Conduct training for NSAP enumerators by region	2,000.00/ participant (food, accommodation, training materials)	
	6. Data collection on the maturity of species of sharks, batoids, or chimaeras	Q1 2018 (by 2019)			Consolidated data on the maturity of shark species	c/o DA-BFAR Regional Offices	
Objective 3.2b	Support research on the migratory paths of at least 5 Philippines shark species within 3 years (2017–2018)						
	7. Conduct research on the migration of Philippine species of sharks, batoids, or chimaeras	Q1 2018	Scientific Authorities; SUCs	academe, GIZ, FISHBASE, WWF, other NGOs	5 published research on the migration of Philippine shark species	1,000,000.00	
Objective 3.2b	Develop platform for information exchange specific on shark scientific research and/or management within 6 years (2017–2022)						
	8. Conduct regular symposia/ conferences on Philippine sharks, batoids and/ or chimaeras (e.g., Shark Summit)	2017-2022	CSOs	NFRDI, BFAR, Academe, DENR BMB, LGUs	1 published compilation of the research abstracts during the symposium/ conference	750,000.00	

4. BUILDING HUMAN CAPACITY

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
4. BUILDING HUMAN CAPACITY							
Issue 3.1	Limited technical capability of existing field enumerators to identify Philippine sharks, batoids & chimaeras						
Objective 3.1	Strengthen technical capability of BFAR regional and field staff on the identification of Philippine sharks, batoids & chimaeras within 2 years (2017–2018).						
	1. Develop training program for BFAR-NSAP personnel (FRQD personnel, quarantine officers), law enforcers, enumerators)	2016	NSAP project leaders	SUCs, CSO (CCEF)	1 Proposal Approved		Add: training for other relevant partners
	2. Develop proposal for GA/ GoP funding (with counterpart funding)	2017	NSAP Project Leader	SUCs, CSO (CCEF)	1 Training Module Published	10,000.00	
	3. Reproduce and distribute sharks, batoids, and chimaeras field guides (i.e. Pating Ka Ba?)	2017-2018	BFAR-NSAP (Regions)		No. of copies produced/ reproduced; # of distribution areas	1,000,000.00	Mainstream Philippine Aquatic Wildlife Rescue and response (PAWSRR) manual
	4. Conduct taxonomy training in the region	2017	NSAP, Regional Fisheries Training and Fisherfolk Coordination Center (RFTFCC)	SUCs, CSO (CCEF)	3 provincial trainings with 20 participants each	100,000.00	
	5. Develop local photo ID Guide (electronic or printed copies)	2017	NSAP	CCEF, MWWP, Oceana, CI, WWF, GIZ, Greenpeace, Silliman University, other SUCs	3 local photo ID guides developed	150,000.00	

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
4. BUILDING HUMAN CAPACITY							
Issue 3.1	Limited expertise on Philippine sharks, batoids & chimaeras to respond to court cases						
Objective 3.1	Create a pool of experts within BFAR that may stand witness in court cases within 6 years (2017–2022).						
	6. Identify in-house candidates, criteria to be nominated: licensed fisheries technician	Q1 2017	BFAR	NFRDI	Special order including the list of candidates and criteria		
	7. Conduct training for pool of experts	2018-2022	BFAR, NFRDI	SUCs, NGOs	Number of trainings conducted; Certificate of Proficiency (fish examiner);	1,000,000.00	
	8. Access possible sources of funding support	2018-2022	BFAR, NFRDI	SUCs, NGOs, scholarship funding institutions (Department of Science and Technology , Bureau of Agricultural Research (BAR) , Commission on Higher Education)	At least 2 Scholarship granted	1,000,000.00	

5.0 CONSERVATION AND MANAGEMENT

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
5.0 CONSERVATION AND MANAGEMENT							
Issue 5.1	Lack of information on the importance of sharks, batoids and chimaeras						
Objective 5.1	Develop communication plan to increase the awareness on the significance of sharks, batoids and chimaeras within 2 years (2017-2018).						
	1. Produce information, education, and communication (IEC) materials and conduct IEC campaigns on importance of sharks, batoids, and chimaeras through various media (e.g., layman's term radio, TV, and social media)	Q4 2017	BFAR	LGU, DENR, academe, NGO's	200 pcs. IEC materials developed; frequency of radio and TV program (once a week for 6 months)	96,000.00	
	2. Conduct consultation on IEC awareness materials on sharks, batoids and chimaeras with all stakeholders (commercial and municipal fisheries operators, local councils)	2017 and 2018	BFAR, NFRDI	BFAR, LGU's	At least 5 IEC materials/ campaigns produced/ developed	1,000,000.00	
	3. Present the management measures and policy developed (50 pax by province)	2018	BFAR-FRQD, NFRDI	LGU's, Stakeholders	Management measures presented	187,000.00	
Issue 5.2	Inadequate policies for conservation and management of sharks, rays and chimaeras						
Objective 5.2a	Develop policies to improve conservation measures for sharks, rays, and chimaeras by 2017.						
	4. Draft FAOs especially for newly CITES-listed species	Q3 2017					
	5. Review and amend of FAO 208	Q2 2017					
Objective 5.2b	Review Senate Bill 251 (Shark Bill) and develop policy document to align with sustainable management of sharks, rays, and chimaeras by 2017.						

Issues/ Objectives	Actions	Timelines	Agency Responsible	Strategic Partners	Performance Indicators	Budgetary Requirements (PhP)	Remarks
5.0 CONSERVATION AND MANAGEMENT							
	6. Create TWG to review Shark Bill	05 Oct 2016)	BFAR (Central: Luvi Labe, Sandy Arcamo,); Greenpeace (Vince Cinches),				Circulate copy of Shark Bill; include in SAR annexes
	7. Review of Shark Bill during Shark Summit	November 11, 2016	TWG & Shark Network				
	8. Conduct policy RTDs in Senate	Q4 2016					
Issue 5.3	Lack of enforcement for the conservation and management of sharks, batoids and chimaeras						
Objective 5.3a	Strengthen coastal law enforcement for improved conservation and management harks, batoids, and chimaeras at the regional levels within 6 years (2018–2022).						
	9. Organize regional task forces	2017	BFAR regions		Memorandum of understanding among partner agencies, law enforcement groups, and CSOs (NGOs, people's organizations, academe)		
Objective 5.3b	Develop sharks, batoids, and chimaeras conservation and management guidelines for inclusion in fisheries law enforcement under the administrative powers of BFAR by 2017.						
	10. Regional representation to the technical working group tasked to develop conservation and management guidelines	2017	BFAR, NFRDI		Establishment of guidelines		

ANNEXES

Annex A.
The UN FAO International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks)

Food and Agricultural Organization of the United Nations Rome, 26-30 October 1998

The International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks)

Introduction

1. For centuries artisanal fishermen have conducted fishing for sharks sustainably in coastal waters, and some still do. However, during recent decades, modern technology in combination with access to distant markets have caused an increase in effort and yield of shark catches, as well as an expansion of the areas fished.

2. There is concern over the increase of shark catches and the consequences which this has for the populations of some shark species in several areas of the world's oceans. This is because sharks often have a close stock-recruitment relationship, long recovery times in response to over-fishing (low biological productivity because of late sexual maturity; few off-spring, albeit with low natural mortality) and complex spatial structures (size/sex segregation and seasonal migration).

3. The current state of knowledge of sharks and the practices employed in shark fisheries cause problems in the conservation and management of sharks due to lack of available catch, effort, landings and trade data, as well as limited information on the biological parameters of many species and their identification. In order to improve knowledge on the state of shark stocks and facilitate the collection of the necessary information, adequate funds are required for research and management.

4. The prevailing view is that it is necessary to better manage directed shark catches and certain multispecies fisheries in which sharks constitute a significant bycatch. In some cases the need for management may be urgent.

5. A few countries have specific management plans for their shark catches and their plans include control of access, technical measures including strategies for reduction of shark bycatches and support for full use of sharks. However, given the wide-ranging distribution of sharks, including on the high seas, and the long migration of many species, it is increasingly important to have international cooperation and coordination of shark management plans. At the present time there are few international management mechanisms effectively addressing the capture of sharks.

6. The Inter-American Tropical Tuna Commission, the International Council for the Exploration of the Sea, the International Commission for the Conservation of Atlantic Tunas, the Northwest Atlantic Fisheries Organization, the Sub-regional Fisheries Commission of West African States, the Latin American Organization for Fishery Development, the Indian Ocean Tuna Commission, the Commission for the Conservation of Southern Bluefin Tuna and the Oceanic Fisheries Programme of the Pacific Community have initiated efforts encouraging member countries to collect information about sharks, and in some cases developed regional databases for the purpose of stock assessment.

7. Noting the increased concern about the expanding catches of sharks and their potential negative impacts on shark populations, a proposal was made at the Twenty-second Session of the FAO Committee on Fisheries (COFI) in March 1997 that FAO organise an expert consultation, using extra - budgetary funds, to develop Guidelines leading to a Plan of Action to be submitted at the next Session of the Committee aimed at improved conservation and management of sharks.

8. This International Plan of Action for Conservation and Management of Sharks (IPOA-Sharks) has been developed through the meeting of the Technical Working Group on the Conservation and Management of Sharks in Tokyo from 23 to 27 April 19981 and the Consultation on Management of Fishing Capacity, Shark Fisheries and Incidental Catch of Seabirds in Longline Fisheries held in Rome from 26 to 30 October 1998 and its preparatory meeting held in Rome from 22 to 24 July 19982.

9. The IPOA-Sharks consists of the nature and scope, principles, objective and procedures for implementation (including attachments) specified in this document.

Nature and Scope

10. The IPOA-Sharks is voluntary. It has been elaborated within the framework of the Code of Conduct for Responsible Fisheries as envisaged by Article 2(d). The provisions of Article 3 of the Code of Conduct apply to the interpretation and application of this document and its relationship with other international instruments. All concerned States3 are encouraged to implement it.

11. For the purposes of this document, the term "shark" is taken to include all species of sharks, skates, rays and chimaeras (Class *Chondrichtyes*), and the term "shark catch" is taken to include directed, bycatch, commercial, recreational and other forms of taking sharks.

12. The IPOA-Sharks encompasses both target and non-target catches.

Guiding principles

13. *Participation.* States that contribute to fishing mortality on a species or stock should participate in its management.

14. *Sustaining stocks.* Management and conservation strategies should aim to keep total fishing mortality for each stock within sustainable levels by applying the precautionary approach.

15. *Nutritional and socio-economic considerations.* Management and conservation objectives and strategies should recognise that in some low-income food-deficit regions and/or countries, shark catches are a traditional and important source of food, employment and/or income. Such catches should be managed on a sustainable basis to provide a continued source of food, employment and income to local communities.

Objective

16. The objective of the IPOA-Sharks is to ensure the conservation and management of sharks and their long-term sustainable use.

Implementation

17. The IPOA-Sharks applies to States in the waters of which sharks are caught by their own or foreign vessels and to States the vessels of which catch sharks on the high seas.

18. States should adopt a national plan of action for conservation and management of shark stocks (*Shark-plan*) if their vessels conduct directed fisheries for sharks or if their vessels regularly catch sharks in non-directed fisheries. Suggested contents of the *Shark-plan* are found in Appendix A. When developing a *Shark-plan*, experience of subregional and regional fisheries management organizations should be taken into account, as appropriate.

19. Each State is responsible for developing, implementing and monitoring its *Shark-plan.*

20. States should strive to have a *Shark-plan* by the COFI Session in 2001.

21. States should carry out a regular assessment of the status of shark stocks subject to fishing so as to determine if there is a need for development of a shark plan. This assessment should be guided by article 6.13 of the Code of Conduct for Responsible Fisheries. The assessment should be reported as a part of each relevant State's *Shark-plan*. Suggested contents of a shark assessment report are found in Appendix B. The assessment would necessitate consistent collection of data, including *inter alia* commercial data and data leading to improved species identification and, ultimately, the establishment of abundance indices. Data collected by States should, where appropriate, be made available to, and discussed within the framework of, relevant subregional and regional fisheries organisations and FAO. International collaboration on data collection and data sharing systems for stock assessments is particularly important in relation to transboundary, straddling, highly migratory and high seas shark stocks.

22. The *Shark-plan* should aim to:

a) Ensure that shark catches from directed and non-directed fisheries are sustainable;

b) Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use;

c) Identify and provide special attention, in particular to vulnerable or threatened shark stocks;

d) Improve and develop frameworks for establishing and co-ordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States;

e) Minimise unutilized incidental catches of sharks;

f) Contribute to the protection of biodiversity and ecosystem structure and function;

g) Minimise waste and discards from shark 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);

h) Encourage full use of dead sharks;

i) Facilitate improved species-specific catch and landings data and monitoring of shark catches; and

j) Facilitate the identification and reporting of species-specific biological and trade data.

23. States which implement the *Shark-plan* should regularly, at least every four years, assess its implementation for the purpose of identifying cost-effective strategies for increasing its effectiveness.

24. States which determine that a *Shark-plan* is not necessary should review that decision on a regular basis taking into account changes in their fisheries, but as a minimum, data on catches, landings and trade should be collected.

25. States, within the framework of their respective competencies and consistent with international law, should strive to cooperate through regional and sub-regional fisheries organisations or arrangements, and other forms of cooperation, with a view to ensuring the sustainability of shark stocks, including, where appropriate, the development of subregional or regional shark plans.

26. Where transboundary, straddling, highly migratory and high seas stocks of sharks are exploited by two or more States, the States concerned should strive to ensure effective conservation and management of the stocks.

27. States should strive to collaborate through FAO and through international arrangements in research, training and the production of information and educational material.

28. States should report on the progress of the assessment, development and implementation of their *Shark-plans* as part

of their biennial reporting to FAO on the Code of Conduct for Responsible Fisheries.

Role of FAO

29. FAO will, as and to the extent directed by its Conference, and as part of its Regular Programme activities, support States in the implementation of the IPOA-Sharks, including the preparation of *Shark-plans.*

30. FAO will, as and to the extent directed by its Conference, support development and implementation of *Shark-plans* through specific, in-country technical assistance projects with Regular Programme funds and by use of extra-budgetary funds made available to the Organization for this purpose. FAO will provide a list of experts and a mechanism of technical assistance to countries in connection with development of *Shark-plans.*

31. FAO will, through COFI, report biennially on the state of progress in the implementation of the IPOA-Sharks.

Appendix A: Suggested Contents of a *Shark-plan*

I. Background. When managing fisheries for sharks, it is important to consider that the state of knowledge of sharks and the practices employed in shark catches may cause problems in the conservation and management of sharks, in particular:

- Taxonomic problems;
- Inadequate available data on catches, effort and landings for sharks;
- Difficulties in identifying species after landing;
- Insufficient biological and environmental data;
- Lack of funds for research and management of sharks;
- Little coordination on the collection of information on transboundary, straddling, highly;
- Migratory and high seas stocks of sharks; and
- Difficulty in achieving shark management goals in multispecies fisheries in which sharks are caught.

II. Content of the Shark-plan. The Technical Guidelines on the Conservation and Management of Sharks, under development by FAO, provide detailed technical guidance, both on the development and the implementation of the *Sharkplan*.

Guidance will be provided on:

- Monitoring;
- Data collection and analysis;
- Research;
- Building of human capacity; and
- Implementation of management measures.

The *Shark-plan* should contain:

A. Description of the prevailing state of:

- Shark stocks, populations;
- Associated fisheries; and
- Management framework and its enforcement.

B. The objective of the Shark-plan.

C. Strategies for achieving objectives. The following are illustrative examples of what could be included:

- Ascertain control over access of fishing vessels to shark stocks;
- Decrease fishing effort in any shark where catch is unsustainable;
- Improve the utilization of sharks caught;
- Improve data collection and monitoring of shark fisheries;
- Train all concerned in identification of shark species;
- Facilitate and encourage research on little known shark species; and
- Obtain utilization and trade data on shark species.

Appendix B: Suggested contents of a shark assessment report

A shark assessment report should *inter alia* contain the following information:

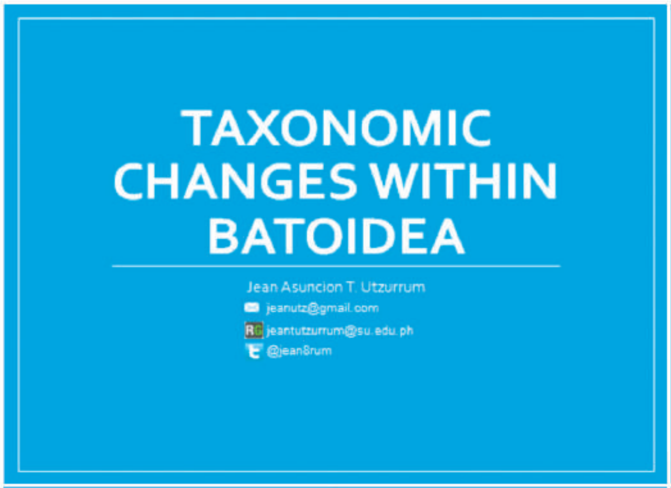
- Past and present trends for:
  - o Effort: directed and non-directed fisheries; all types of fisheries;
  - o Yield: physical and economic; and
  - o Status of stocks.
- Existing management measures:
  - o Control of access to fishing grounds; and
  - o Technical measures (including by-catch reduction measures, the existence of sanctuaries
  - o and closed seasons).
- Others
  - o Monitoring, control and surveillance;
  - o Effectiveness of management measures; and
  - o Possible modifications of management measures.

Annex B.

Philippine SAR/NPOA-Shark Technical Working Group

NAME	DESIGNATION, AGENCY/INSTITUTION	W1*	W2**
Maureen Laroco	NSAP Project Leader, BFAR Region I	X	
Melanie Calicdan	NSAP 2 Asst. Project Leader, BFAR Region II	X	
Rachelle Mendoza	NSAP Data Analyst , BFAR Region III	X	
Maribeth H. Ramos	ACCII/ NSAP Project Leader, BFAR Region IVA	X	
Ailyn Del Castillo	NSAPData Analyst, BFAR Region IVB (MIMAROPA)	X	
Noemi Lanzuela	NSAP Project Leader, BFAR Region V	X	
Sheryl Mesa	NSAP Project Leader, BFAR Region VI	X	
Bruna Abrenica	NSAP Assistant Project Leader, BFAR Region VII	X	
Virgelio Exclamador, Jr.	NSAP Data Analyst, BFAR Region VII	X	
Ruth Rosaceňa	NSAP Data Analyst, BFAR Region VII	X	
Matt Alcantara	NSAP Assistant Project Leader, BFAR Region VIII	X	
Pedling Munap	NSAP Project Leader, BFAR Region IX	X	
Vianney Anthony Gapuz	NSAP Project Leader, BFAR Region X	X	
Jose Villanueva	NSAP Project Leader, BFAR Region XI	X	
Emelyn Donia	NSAP 12 Data Analyst, BFAR Region XII	X	
Joyce Baclayo	NSAP Asst. Project Leader, BFAR CARAGA	X	
Macmod Mamalangkap	NSAP Project Leader, BFAR ARMM	X	
Nilo Katada	Officer-In-Charge, FLEQRT, BFAR Central Office	X	
Mudjekeewis D. Santos	Scientist II/Officer-In-Charge, READ, NFRDI	X	
Francisco Torres Jr.	[ ], NFRDI	X	
Roselyn Aguila	Science Research Specialist II, NFRDI	X	
Maria Aron Alcantara	Administrative Aide V, NFRDI	X	
Lilibeth Abina	Administrative Aide V, NFRDI	X	
Mercedita Tan	Aquaculturist II, BFAR-Central Office	X	
Janice Tuante	[ ], BFAR-Central Office	X	
Moonyeen Nida R. Alava	Executive Director, CCEF/Shark Specialist, GIZ-SSME/SSS Project	X	
Vince Cinches	Oceans Campaigns, Greenpeace Southeast Asia	X	
Arnel Andrew S.P. Yaptinchay	Director, MWWP	X	
Jean Asuncion T. Utzurrum	Graduate Student, SU--IEMS/Shark Specialist, MWP	X	
Lovella Nakayama	Admin. Officer Designate, PENRO-CEBU	X	
Marion Daclan	Senior Technical Adviser, GIZ-SSME/SSS Project	X	
Joarlyn Morano	Junior Technical Adviser, GIZ-SSME/SSS Project	X	
Davelyn Pastor	[ ], Conservation International - Philippines	X	

*W1: First Writeshop on 2016 Country Status Report for Napoleon Wrasse and Sharks under Sulu Sulawesi Seascapes (SSS) Project, Hagnaya Beach Resort & Restaurant, San Remigio, Cebu, August 21-27, 2016.
**W2: Second Writeshop on 2016 Country Status Report for Napoleon Wrasse and Sharks under Sulu Sulawesi Seascapes (SSS) Project, Puerto Princesa, Palawan, October 3-8, 2016.


TAXONOMIC CHANGES WITHIN BATOIDEA
Jean Asuncion T. Utzurrum
jeanutz@gmail.com
jeantutzurrum@su.edu.ph
@jean8rum


Taxonomy/Taxinomie
Multiple cryptic species in the blue-spotted maskray (Myliobatoidei: Dasyatidae: Neotrygon spp.): An update
Espèces cryptiques multiples chez la pastenague masquée à points bleus (Myliobatoidei : Dasyatidae : Neotrygon spp.) : actualisation
Philippe Borsa, Kang-Ning Shen, Irma S. Arlyza, Thierry B. Hoareau
ARTICLE INFO
ABSTRACT


Article
ZOOTAXA
Taxonomic status of maskrays of the Neotrygon kuhlii species complex (Myliobatoidei: Dasyatidae) with the description of three new species from the Indo-West Pacific
PETER R. LAST, WILLIAM T. WHITE & BERNARD SÉRET
Abstract


Article
ZOOTAXA
Taxonomic status of maskrays of the Neotrygon kuhlii species complex (Myliobatoidei: Dasyatidae) with the description of three new species from the Indo-West Pacific
PETER R. LAST, WILLIAM T. WHITE & BERNARD SÉRET
Abstract


Zootaxa. 2016 Jul 21;4139(3):345-68. doi: 10.11646/zootaxa.4139.3.2.
A revised classification of the family Dasyatidae (Chondrichthyes: Myliobatiformes) based on new morphological and molecular insights.
Chondrichthyan Tree of Life Project
Introducing Telatrygon biasa from SE Asia - previously known as T. zugei in this area.
Chondrichthyan Tree of Life Project
Introducing Taeniura lessoni n.sp. from the Oceania region. Taeniura is no longer a monotypic genus!
Taeniura lessoni is immediately distinguishable from T. lymma in the field by the absence of a pair of blue stripes along the sides of the tail, and the ventral fold is uniformly pale #FlatSharkFriday
Dasyatis zugei in Alava et al. 2014


Zootaxa
Resurrection of the family Aetobatidae (Myliobatiformes) for the pelagic eagle rays, genus Aetobatus
Abstract

Annex D.

Nominal List of Cartilaginous Fishes in the Philippines and their Red List Status

Sources: Column A: Compagno et al. 2005; Column B: Alava et al. 2014 (+ to include current taxonomic changes). Legend: Blue font shows species with recen taxonomic changes.

	A	B+	IUCN
Class Chondrichthyes Huxley, 1880. Cartilaginous fishes.			
Subclass Holocephalii Müller, 1835. Chimaeroids and their relatives.			
Order Chimaeriformes Garman, 1877. Modern chimaeras or silver sharks.			
Family Chimaeridae Rafinesque, 1815. Shortnose chimaeras.			
Genus Chimaera Linnaeus, 1758	*Chimaera phantasma Jordan & Snyder, 1900. Silver Chimaera.*	*Chimaera phantasma Jordan & Snyder, 1900. Silver chimaera.*	Data Deficient
Genus Hydrolagus Gill, 1863.	*Hydrolagus mitsukurii (Dean, in Jordan & Snyder, 1904). Mitsukurii's chimaera.*	*Hydrolagus mitsukurii (Jordan & Snyder, 1904) Mitsukurii's chimaera.*	Data Deficient
	Hydrolagus sp. Philippines reticulate chimaera.	*Hydrolagus sp. Philippines reticulate chimaera.*	
Subclass Elasmobranchii Müller, 1845. Sharklike fishes.			
Superorder Galeomorphii Compagno, 1973. Galeomorph sharks.			
Order Heterodontiformes Garman, 1885. Bullhead sharks.			
Family Heterodontidae Gray, 1851. Bullhead sharks.			
Genus Heterodontus Blainville, 1816. Bullhead sharks.	*Heterodontus zebra (Gray, 1831). Zebra bullhead shark.*	*Heterodontus zebra (Gray, 1831). Zebra bullhead shark.*	Least Concern
Order Lamniformes Garman, 1885. Mackerel sharks.			
Family Pseudocarchariidae Compagno, 1973. Crocodile sharks.			
Genus Pseudocarcharias Cadenat, 1963. Crocodile sharks.	*?Pseudocarcharias kamoharai (Matsubara, 1936). Crocodile shark.*	*Pseudocarcharias kamoharai (Matsubara, 1936). Crocodile shark.*	Near Threatened
Family Megachasmidae Taylor, Compagno & Struhsaker, 1983. Megamouth sharks.			
Genus Megachasma Taylor, Compagno & Struhsaker, 1983. Megamouth sharks.	*Megachasma pelagios Taylor, Compagno & Struhsaker, 1983. Megamouth shark.*	*Megachasma pelagios Taylor, Compagno & Struhsaker, 1983. Megamouth shark.*	Least Concern
Family Alopiidae Bonaparte, 1838. Thresher sharks.			
Genus Alopias Rafinesque, 1810. Thresher sharks.	*Alopias pelagicus Nakamura, 1935. Pelagic thresher*	*Alopias pelagicus Nakamura, 1935. Pelagic thresher.*	Vulnerable A2d+4d

	Alopias superciliosus (Lowe, 1839). Bigeye thresher.	*Alopias superciliosus (Lowe, 1839). Bigeye thresher.*	Vulnerable A2bd
	Alopias vulpinus (Bonnaterre, 1788). Thresher shark.	*Alopias vulpinus (Bonnaterre, 1788). Common thresher.*	Vulnerable A2bd+3bd+4bd
Family Cetorhinidae Gill, 1862. Basking sharks.			
Genus Cetorhinus Blainville, 1816. Basking sharks.	*Cetorhinus maximus (Gunnerus, 1765). Basking shark.*	*Cetorhinus maximus (Gunnerus, 1765). Basking shark.*	Vulnerable A2ad+3d
Family Lamnidae Müller & Henle, 1838. Mackerel sharks, Pating, Chacon.			
Genus Carcharodon Smith, 1838. White sharks.	*Carcharodon carcharias (Linnaeus, 1758). White shark.*	*Carcharodon carcharias (Linnaeus, 1758). White shark.*	Vulnerable A2cd+3cd
Genus Isurus Rafinesque, 1810. Mako sharks.	*Isurus oxyrinchus Rafinesque, 1810. Shortfin mako.*	*Isurus oxyrinchus Rafinesque, 1810. Shortfin mako.*	Vulnerable A2abd+3bd+4abd
	?Isurus paucus Guitart Manday, 1966. Longfin mako.	*Isurus paucus Guitart Manday, 1966. Longfin mako.*	Vulnerable A2bd+3d+4bd
Order Orectolobiformes Compagno, 1973. Carpet sharks.			
Family Parascylliidae Gill, 1862. Collared carpetsharks.			
Genus Cirrhoscyllium Smith & Radcliffe In Smith, 1913. Barbelthroat carpetsharks.	*Cirrhoscyllium expolitum Smith & Radcliffe In Smith, 1913. Barbelthroat carpetshark.*	*Cirrhoscyllium expolitum Smith & Radcliffe, 1913. Barbelthroat carpetshark.*	Data Deficient
Family Orectolobidae Gill, 1896. Wobbegongs.			
Genus Orectolobus Bonaparte, 1834. Beardless wobbegongs	*?Orectolobus japonicus Regan, 1906. Japanese wobbegong.*	*Orectolobus japonicus Regan, 1906. Japanese wobbegong.*	Data Deficient
		Orectolobus leptolineatus Last, Pogonoski & White, 2010. Indonesian wobbegong.	Not Evaluated
	Orectolobus sp. near ornatus. Philippine wobbegong.	*Orectolobus cf. ornatus Philippine wobbegong.*	
		Orectolobus ornatus (De Vis, 1883). Ornate wobbegong.	Least Concern
Family Hemiscylliidae Gill, 1862. Longtailed Carpetsharks.			

Genus Chiloscyllium Müller and Henle, 1837. Bamboosharks.	*?Chiloscyllium griseum Müller & Henle, 1838. Gray bambooshark.*	*Chiloscyllium griseum Müller & Henle, 1838. Gray bambooshark.*	Near Threatened
	?Chiloscyllium indicum (Gmelin, 1788). Slender bambooshark.	*Chiloscyllium indicum (Gmelin, 1788). Slender bambooshark, ridgebacked bambooshark.*	Near Threatened
	Chiloscyllium plagiosum (Bennett, 1830). Whitespotted bambooshark.	*Chiloscyllium plagiosum (Bennett, 1830). Whitespotted bambooshark.*	Near Threatened
	Chiloscyllium punctatum Müller& Henle, 1838. Brownbanded bambooshark.	*Chiloscyllium punctatum Müller & Henle, 1838. Brownbanded bambooshark, grey carpetshark.*	Near Threatened
Family Stegostomatidae Gill, 1862. Zebra sharks.			
Genus Stegostoma Müller & Henle, 1837. Zebra sharks.	*Stegostoma fasciatum (Hermann, 1783). Zebra shark, tiger shark, Butanding.*	*Stegostoma fasciatum (Hermann, 1783). Zebra shark, leopard shark.*	Endangered A2bd+3bd
Family Ginglymostomatidae Gill, 1862. Nurse sharks.			
Genus Nebrius Rüppell, 1837. Tawny nurse sharks.	*Nebrius ferrugineus (Lesson, 1830). Tawny nurse shark.*	*Nebrius ferrugineus (Lesson, 1830). Tawny nurse shark.*	Vulnerable A2abcd+3cd+4abcd
Family Rhincodontidae Müller & Henle, 1839. Whale sharks.			
Genus Rhincodon Smith, 1829. Whale sharks.	*Rhincodon typus (Smith, 1828). Whale shark.*	*Rhincodon typus (Smith, 1828). Whale shark.*	Endangered A2bd+4bd
Order Carcharhiniformes Garman, 1913. Ground sharks			
Family Scyliorhinidae Gill, 1862. Cat sharks.			
Genus Apristurus Garman, 1913. Demon catsharks.	*Apristurus herklotsi(Fowler, 1934). Longfin catshark.*	*Apristurus herklotsi (Fowler, 1934). Longfin catshark.*	Data Deficient
		Apristurus longicephalus Nakaya, 1975. Longhead catshark.	Least Concern
		Apristurus platyrhynchus (Tanaka, 1990). Borneo catshark.	Least Concern
Genus Atelomycterus Garman, 1913. Coral catsharks.	*Atelomycterus marmoratus (Bennett, 1830). Coral catshark, marbled cat-shark.*	*Atelomycterus marmoratus (Bennett, 1830). Coral catshark, marbled catshark.*	Near Threatened

Genus Cephaloscyllium Gill, 1862. Swellsharks.		*Cephaloscyllium fasciatum Chan, 1966. Reticulated swellshark.*	Data Deficient
		Cephaloscyllium isabellum (Bonnaterre, 1788). Draughtboard shark.	Least Concern
	Cephaloscyllium sp. nov. Philippines swellshark.	*Cephaloscyllium sp. 1 nov. Philippines swellshark.*	
Genus Galeus Rafinesque, 1810. Sawtail catsharks.		*Galeus eastmani (Jordan & Snyder, 1904). Gecko catshark.*	Least Concern
	Galeus sauteri (Jordan & Richardson, 1909). Taiwan sawtail catshark.	*Galeus sauteri (Jordan & Richardson, 1909). Blacktip sawtail catshark.*	Data Deficient
	Galeus schultzi Springer, 1979. Dwarf sawtail catshark.	*Galeus schultzi Springer, 1979. Dwarf sawtail catshark.*	Data Deficient
	Galeus sp. nov. near G. nipponensis Nakaya, 1979.	*Galeus sp. 1 nov. near G. nipponensis Nakaya, 1979.*	
Genus Halaelurus Gill, 1862. Tiger catsharks	*?Halaelurus cf. boesemani Springer & D'Aubrey, 1972. Speckled catshark.*	*Halaelurus cf. boesemani Springer & D'Aubrey, 1972. Speckled catshark.*	
	Halaelurus cf. buergeri (Müller & Henle, 1838). Blackspotted catshark.	*Halaelurus cf. buergeri (Müller & Henle, 1838). Blackspotted catshark.*	
		Halaelurus maculosus White, Last & Stevens, 2007. Indonesian speckled catshark.	Least Concern
Genus Parmaturus Garman, 1906		*Parmaturus melanobranchus (Chan, 1966). Blackgill catshark.*	Data Deficient
Genus Pentanchus Smith & Radcliffe, in Smith, 1912. Onefin catsharks.	*Pentanchus profundicolus Smith & Radcliffe, 1912. Onefin catshark.*	*Pentanchus profundicolus Smith & Radcliffe, 1912. Onefin catshark.*	Data Deficient
Genus Scyliorhinus Blainville, 1816. Spotted catsharks.	*?Scyliorhinus garmani (Fowler, 1934). Brownspotted catshark.*	*Scyliorhinus garmani (Fowler, 1934). Brownspotted catshark.*	Data Deficient
	?Scyliorhinus torazame (Tanaka, 1908). Cloudy catshark.	*Scyliorhinus torazame (Tanaka, 1908). Cloudy catshark.*	Least Concern
Family Proscylliidae Fowler, 1941. Finback catsharks.			

Genus Eridacnis Smith, 1913. Ribbontail catsharks.	*Eridacnis radcliffei Smith, 1913. Pygmy ribbontail catshark.*	*Eridacnis radcliffei Smith, 1913. Pygmy ribbontail catshark.*	Least Concern
	?Eridacnis sp.: Philippine ribbontail catshark.	*Eridacnis sp. 1 Philippine ribbontail catshark.*	
Family Pseudotriakidae Gill, 1893. False catsharks.			
Genus Gollum Compagno, 1973. Gollumsharks.	*Gollum sp. nov. Sulu gollumshark.*	*Gollum sp. nov. (Sulu gollumshark) = Gollum suluensis Last & Gaudiano, 2011. Sulu gollumshark.*	Not Evaluated
Family Triakidae Gray, 1851. Houndsharks.			
Genus Hemitriakis Herre, 1923. Combtooth houndsharks.	*Hemitriakis leucopteriptera Herre, 1923. Whitefin tope.*	*Hemitriakis leucoperiptera Herre, 1923. Whitefin topeshark.*	Endangered B1ab(iii,v); C2a(ii)
	Hemitriakis sp. Ocellate topeshark.	*Hemitriakis sp. Ocellate topeshark. = Hemitriakis sp. near H. complicofasciata Takashi & Nakaya, 2004. Ocellate topeshark.*	Least Concern
Genus Iago Compagno & Springer, 1971	*Iago garricki Fourmanoir, 1979. Longnosed houndshark.*	*Iago garricki Fourmanoir, 1979. Longnosed houndshark.*	
Genus Mustelus Linck, 1790. Smooth-hounds.		*Mustelus manazo Bleeker, 1855. Star-spotted smooth-hound.*	
	Mustelus 1 cf. manazo Bleeker, 1854. Philippine white-spotted smoothhound.	*Mustelus cf. manazo Bleeker, 1854. Philippine white-spotted smooth-hound.*	
		Mustelus griseus Pietschmann, 1908. Spotless smooth-hound.	
	Mustelus 2 cf. griseus Pietschmann, 1908. Philippine brown smoothhound.	*Mustelus 2 cf. griseus Pietschmann, 1908. Philippine brown smoothhound. = Mustelus sp. 1 Pietschmann, 1908. Philippine brown smooth-hound.*	
	Mustelus 3 cf. griseus Pietschmann, 1908. Philippine gray smoothhound.	*Mustelus cf. griseus Pietschmann, 1908. Philippine grey smooth-hound.*	

?GenusTriakis Müller & Henle, 1838. Leopard sharks.	*?Triakis scyllium Müller & Henle, 1839. Banded houndshark*	*Triakis scyllium Müller & Henle, 1839. Banded houndshark.*	Least Concern
Family Hemigaleidae Hasse, 1879. Weasel sharks.			
Genus Hemigaleus Bleeker, 1852. Weasel Sharks.	*Hemigaleus microstoma Bleeker, 1852. Sicklefin weasel shark.*	*Hemigaleus microstoma Bleeker, 1852. Sicklefin weasel shark.*	Vulnerable A2d+3d+4d
Genus Hemipristis Agassiz, 1843. Snaggletooth sharks.	*Hemipristis elongatus (Klunzinger, 1871). Snaggletooth shark.*	*Hemipristis elongatus = Hemipristis elongata (Klunzinger, 1871). Snaggletooth shark, fossil shark.*	Vulnerable A2bd+3bd
Family Carcharhinidae Jordan & Evermann, 1896. Requiem sharks, gray sharks, Pating.			
Genus Carcharhinus Blainville, 1816. Gray sharks, Pating.	*Carcharhinus albimarginatus (Rüppell, 1837). Silvertip Shark.*	*Carcharhinus albimarginatus (Rüppell, 1837). Silvertip shark.*	Vulnerable A2bd
	Carcharhinus altimus (Springer, 1950). Bignose shark.	*Carcharhinus altimus (Springer, 1950). Bignose shark.*	Data Deficient
	Carcharhinus amblyrhynchoides (Whitley, 1934). Graceful shark.	*Carcharhinus amblyrhynchoides (Whitley, 1934). Graceful shark.*	Near Threatened
	Carcharhinus amblyrhynchos (Bleeker, 1856). Gray reef shark.	*Carcharhinus amblyrhynchos (Bleeker, 1856). Gray reef shark.*	Near Threatened
	?Carcharhinus borneensis (Bleeker, 1858-1859). Borneo shark.	*Carcharhinus borneensis (Bleeker, 1858). Borneo shark.*	Endangered C2a(ii)
	Carcharhinus brevipinna (Müller & Henle, 1839). Spinner shark.	*Carcharhinus brevipinna (Müller & Henle, 1839). Spinner shark.*	Near Threatened
	?Carcharhinus dussumieri (Valenciennes, 1839). Whitecheek shark.	*Carcharhinus dussumieri (Valenciennes, 1839). Whitecheek shark.*	Near Threatened
	Carcharhinus falciformis (Bibron, 1839). Silky shark.	*Carcharhinus falciformis (Bibron, 1839). Silky shark.*	Near Threatened
	Carcharhinus hemiodon (Valenciennes, 1839). Pondicherry shark.	*Carcharhinus hemiodon (Valenciennes, 1839). Pondicherry shark.*	Critically Endangered A2acd; C2a(i)
	Carcharhinus leucas (Valenciennes, 1839). Bull shark.	*Carcharhinus leucas (Valenciennes, 1839). Bull shark.*	Near Threatened

	Carcharhinus limbatus (Valenciennes, 1839). Blacktip shark.	*Carcharhinus limbatus (Valenciennes, 1839). Blacktip shark.*	Near Threatened
	Carcharhinus longimanus (Poey, 1861). Oceanic whitetip shark.	*Carcharhinus longimanus (Poey, 1861). Oceanic whitetip shark.*	Vulnerable A2ad+3d+4ad
	?Carcharhinus macloti (Müller & Henle, 1839). Hardnose shark.	*Carcharhinus macloti (Müller & Henle, 1839). Hardnose shark.*	Near Threatened
	Carcharhinus melanopterus (Quoy & Gaimard, 1824). Blacktip reef shark, black-finned shark.	*Carcharhinus melanopterus (Quoy & Gaimard, 1824). Blacktip reef shark, black-finned shark.*	Near Threatened
	Carcharhinus sealei (Pietschmann, 1913). Blackspot shark.	*Carcharhinus sealei (Pietschmann, 1913). Blackspot shark.*	Near Threatened
	Carcharhinus sorrah (Valenciennes, 1839). Spot-tail shark.	*Carcharhinus sorrah (Valenciennes, 1839). Spot-tail shark.*	Near Threatened
Genus Galeocerdo Müller & Henle, 1837. Tiger sharks.	*Galeocerdo cuvier (Peron & Lesueur, 1822). Tiger shark, spotted shark.*	*Galeocerdo cuvier (Peron & Lesueur, 1822). Tiger shark.*	Near Threatened
?Genus Glyphis Agassiz, 1843. River sharks.	*?Glyphis sp. River shark.*	*Glyphis sp. River shark.*	
Genus Loxodon Müller & Henle, 1838. Sliteye sharks.	*Loxodon macrorhinus Müller& Henle, 1838. Sliteye shark.*	*Loxodon macrorhinus Müller & Henle, 1838. Sliteye shark, slender dogshark.*	Least Concern
Genus Negaprion Whitley, 1940. Lemon sharks.	*Negaprion acutidens (Rüppell, 1837). Sharptooth lemon shark.*	*Negaprion acutidens (Rüppell, 1837). Sharptooth lemon shark.*	Vulnerable A2abcd+3bcd+4abcd
Genus Prionace Cantor, 1849. Blue sharks.	*Prionace glauca (Linnaeus, 1758). Blue shark.*	*Prionace glauca (Linnaeus, 1758). Blue shark.*	Near Threatened
Genus Rhizoprionodon Whitley, 1929. Sharpnose sharks.	*Rhizoprionodon acutus (Rüppell, 1835). Milk shark, Bongalonon.*	*Rhizoprionodon acutus (Rüppell, 1835). Milk shark.*	Least Concern
?GenusScoliodon Müller & Henle, 1837. Spadenose sharks	*?Scoliodon laticaudus Müller & Henle, 1838. Spadenose shark.*	*?Scoliodon laticaudus Müller & Henle, 1838. Spadenose shark = Scoliodon macrorhynchos (Bleeker, 1852). Pacific spadenose shark.*	Not Evaluated
Genus Triaenodon Müller & Henle, 1837. Whitetip reef sharks.	*Triaenodon obesus (Rüppell, 1837). Whitetip reef shark.*	*Trianeodon obesus (Rüppell, 1837). Whitetip reef shark.*	Near Threatened

Family Sphyrnidae Gill, 1872. Hammerhead sharks.			
Genus Eusphyra Gill, 1862. Winghead sharks.	*Eusphyra blochii (Cuvier, 1816). Winghead shark.*	*Eusphyra blochii (Cuvier, 1816). Winghead shark.*	Endangered A2d+3d
Genus Sphyrna Rafinesque, 1810. Hammerhead sharks. Awal, Codosan, Binkungan, Balagbagan, Krosan, Ros (Herre, 1953, Philippine names for Sphyrna zygaena, presumably applying to other species of Sphyrna)	*Sphyrna lewini (Griffith & Smith, 1834). Scalloped Hammerhead.*	*Sphyrna lewini (Griffith & Smith, 1834). Scalloped hammerhead.*	Endangered A2bd+4bd
	Sphyrna mokarran (Rüppell, 1837). Great hammerhead.	*Sphyrna mokarran (Rüppell, 1837). Great hammerhead.*	Endangered A2bd+4bd
	Sphyrna zygaena (Linnaeus, 1758). Smooth hammerhead.	*Sphyrna zygaena (Linnaeus, 1758). Smooth hammerhead.*	Vulnerable A2bd+3bd+4bd
	?Sphyrna tiburo (Linnaeus, 1758). Bonnethead shark.	*Sphyrna tiburo (Linnaeus, 1758). Bonnethead shark.*	Least Concern
Superorder Squalomorphii Compagno, 1973. Squalomorph sharks and batoids.			
Order Hexanchiformes Garman, 1913. Cow and frilled sharks.			
Family Hexanchidae Gray, 1851. Sixgill and sevengill sharks.			
Genus Heptranchias Rafinesque, 1810. Sharpnose sevengill sharks.	*Heptranchias perlo (Bonnaterre, 1788). Sharpnose sevengill shark.*	*Heptranchias perlo (Bonnaterre, 1788). Sharpnose sevengill shark.*	Near Threatened
Genus Hexanchus Rafinesque, 1810. Sixgill sharks.	*Hexanchus griseus (Bonnaterre, 1788). Bluntnose sixgill shark, cow shark.*	*Hexanchus griseus (Bonnaterre, 1788). Bluntnose sixgill shark.*	Near Threatened
	Hexanchus nakamurai Teng, 1962. Bigeyed sixgill shark.	*Hexanchus nakamurai Teng, 1962. Bigeyed sixgill shark.*	Data Deficient
Order Squaliformes Gill, 1862. Dogfish sharks.			
Family Echinorhinidae Gill, 1862. Bramble sharks.			
Genus Echinorhinus Blainville, 1816. Bramble sharks.	*?Echinorhinus cookei Pietschmann, 1928. Prickly shark.*	*Echinorhinus cookei Pietschmann, 1928. Prickly shark.*	Near Threatened
Family Squalidae Blainville, 1816. Dogfish sharks, spurdogs, spiny dogfishes.			

Genus Squalus Linnaeus, 1758. Spurdogs		*Squalus japonicus Ishikawa, 1908. Japanese spurdog.*	Data Deficient
		Squalus megalops Macleay, 1881. Shortnose spurdog.	Data Deficient
	Squalus cf. megalops Macleay, 1881. Philippines shortnose spurdog.	*Squalus cf. megalops Macleay, 1881. not in original table but in Alava et al. 2014.*	
		Squalus mitsukurii Jordan & Snyder, 1903. Shortspine spurdog.	Data Deficient
	Squalus cf. mitsukurii Jordan & Snyder, 1903. Philippines shortspine dogfish.	*Squalus cf. mitsukurii Jordan & Snyder, 1903. Philippines shortspine dogfish*	
		Squalus montalbani Whitley, 1931. Indonesian greeneye spurdog, Philippine spurdog.	Vulnerable A2bd+4bd
		Squalus nasutus Last, Marshall & White, 2007. Western longnose spurdog.	Data Deficient
	Squalus sp. Philippine fatspined dogfish.	*Squalus sp. 1 Philippine fatspined dogfish.*	
	Squalus sp. Philippine longnose spurdog.	*Squalus sp. 2 Philippine longnose spurdog.*	
Family Centrophoridae Bleeker, 1859. Gulper sharks.			
Genus Centrophorus Müller & Henle, 1837. Gulper sharks.		*Centrophorus granulosus (Bloch & Schneider, 1880). Gulper shark.*	Not Evaluated
	Centrophorus isodon (Zhu, Meng, & Liu, 1981). Black gulper shark.	*Centrophorus isodon (Zhu, Meng & Liu, 1981). Black gulper shark, blackfin gulper shark, longnose gulper shark.*	Data Deficient

	Centrophorus lusitanicus Bocage & Capello, 1864. Lowfin gulper shark.	*Centrophorus lusitanicus Bocage & Capello, 1864. Lowfin gulper shark.*	Vulnerable A2bd+4bd
		Centrophorus moluccensis Bleeker, 1860. Smallfin gulper shark.	Data Deficient
	Centrophorus cf. moluccensis Bleeker, 1860. Philippine smallfin gulper shark.	*Centrophorus cf. moluccensis Bleeker, 1860. Philippine smallfin gulper shark.*	
	Centrophorus ?squamosus (Bonnaterre, 1788). Leafscale gulper shark. ? = C. acus Garman, 1906	*Centrophorus squamosus (Bonnaterre, 1788). Leafscale gulper shark.*	Vulnerable A2bd+3bd+4bd
Genus Deania Jordan & Snyder, 1902. Birdbeak dogfishes.		*Deania calcea (Lowe, 1839). Birdbeak dogfish.*	Least Concern
	?Deania cf rostrata Garman, 1906.	*Deania cf. rostrata (Lowe, 1839). Birdbeak dogfish.*	
	Deania profundorum (Smith & Radcliffe, 1912). Arrowhead dogfish.	*Deania profundorum (Smith & Radcliffe, 1912). Arrowhead dogfish.*	Least Concern
Family Etmopteridae Fowler, 1934. Lantern sharks.			
Genus Centroscyllium Müller & Henle, 1841. Combtooth dogfishes.	*Centroscyllium cf. kamoharai Abe, 1966. Bareskin dogfish.*	*Centroscyllium cf. kamoharai Abe, 1966. Bareskin dogfish*	
Genus Etmopterus Rafinesque, 1810. Lantern sharks.	*Etmopterus brachyurus Smith & Radcliffe, 1912. Shorttail lanternshark.*	*Etmopterus brachyurus Smith & Radcliffe, 1913. Shorttail lanternshark.*	Data Deficient
	Etmopterus lucifer Jordan & Snyder, 1902. Blackbelly lanternshark.	*Etmopterus lucifer Jordan & Snyder, 1902. Blackbelly lanternshark.*	Least Concern
Family Dalatiidae Gray, 1851. Kitefin sharks.			
Genus Isistius Gill, 1865. Cookiecutter sharks.	*Isistius brasiliensis (Cuvier, In Quoy & Gaimard, 1824). Cookiecutter shark.*	*Isistius brasiliensis (Quoy & Gaimard, 1824). Cookie-cutter shark.*	Least Concern
Genus Squaliolus Smith & Radcliffe, 1912. Spined pygmy sharks.	*Squaliolus aliae Teng, 1959. Smalleye pigmy shark.*	*Squaliolus aliae Teng, 1959. Smalleye pygmy shark.*	Least Concern

	Squaliolus laticaudus Smith & Radcliffe, 1912. Spined pigmy shark.	*Squaliolus laticaudus Smith & Radcliffe, 1912. Spined pygmy shark, big-eye dwarf shark.*	Least Concern
Order Squatiniformes Jordan, 1923. Angel sharks.			
Family Squatinidae Bonaparte, 1838. Angel sharks.			
Genus Squatina Dumeril, 1806. Angel Sharks.		*Squatina caillieti sp.nov. Walsh, Ebert & Compagno, 2011. Philippine angelshark.*	Not Evaluated
	Squatina formosa Shen & Ting, 1972. Taiwan angelshark.	*Squatina formosa Shen & Ting, 1972. Taiwan angelshark.*	Endangered A2d+4d
		Squatina japonica Bleeker, 1858. Japanese angelshark.	Vulnerable A2d+4d
Order Pristiophoriformes White, 1936. Saw sharks.			
Family Pristiophoridae Bleeker, 1859. Saw sharks.			
Genus Pristiophorus Müller & Henle, 1837. Fivegilled sawsharks.		*Pristiophorus lanae Ebert & Wilms, 2013. Lana's sawshark.*	Not Evaluated
	Pristiophorus sp. C [Compagno & Niem, 1998]. Philippine sawshark.	*Pristiophorus sp. C Compagno & Niem, 1998. Philippine sawshark.*	
Order Rajiformes Müller & Henle, 1841. Batoids.			
Suborder Pristoidei Gill, 1893. Sawfishes.			
Family Pristidae Bonaparte, 1838. Modern sawfishes.			
Genus Anoxypristis White & Moy-Thomas, 1941. Knifetooth sawfishes.	*Anoxypristis cuspidata (Latham, 1794). Knifetooth sawfish.*	*Anoxypristis cuspidata (Latham, 1794). Knifetooth sawfish, narrow sawfish.*	Endangered A2cd
	Pristis microdon Latham, 1794. Largetooth or freshwater sawfish, sawfish, Tagan.	*Pristis microdon = Pristis pristis (Linnaeus, 1758). Largetooth sawfish, common sawfish.*	Critically Endangered A2acd
	Pristis pectinata Latham, 1794. Smalltooth sawfish.	*Pristis pectinata Latham, 1794. Smalltooth sawfish.*	Critically Endangered A2acd
	Pristis zijsron Bleeker, 1851. Green sawfish.	*Pristis zijsron Bleeker, 1851. Green sawfish.*	Critically Endangered A2acd
Suborder Rhinoidei McEachran, Dunn& Miyake, 1996. Sharkrays.			
Family Rhinidae Müller & Henle, 1841. Sharkrays.			

Genus Rhina Bloch & Schneider, 1801. Sharkrays.	*Rhina ancylostomus Bloch & Schneider, 1801. Shark ray.*	*Rhina ancylostomus = Rhina ancylostoma Bloch & Schneider, 1801. Shark ray, bowmouth guitarfish.*	Vulnerable A2bd+3bd+4bd

Suborder Rhynchobatoidei McEachran, Dunn & Miyake, 1996. Wedgefishes.

Family Rhynchobatidae Garman, 1913. Wedgefishes.

Genus Rhynchobatus Müller & Henle, 1837. Wedgefishes. Spotted guitarfish, Arado, Barewan, Immaradu, Pating sodsod (Herre, 1953, Philippine names for R. djiddensis, probably applying to R. australiae and other species).	*Rhynchobatus australiae Whitley, 1939. Whitespotted wedgefish.*	*Rhynchobatus australiae Whitley, 1939. Whitespotted wedgefish.*	Vulnerable A2bd+3bd+4bd
	?Rhynchobatus cf. laevis (Bloch & Schneider, 1801). Smoothnose wedgefish.	*Rhynchobatus cf. laevis (Bloch & Schneider, 1801). Smoothnose wedgefish.*	
		Rhynchobatus laevis (Bloch & Schneider, 1801). Smoothnose wedgefish.	Vulnerable A2bd+3bd+4bd
	Rhynchobatus sp. 2 Compagno & Last (1999). Broadnose wedgefish.	*Rhynchobatus sp. 2 Last & Compagno, 1999. Broadnose wedgefish.*	

Suborder Rhinobatoidei Garman, 1913. Guitarfishes.

Family Rhinobatidae Müller & Henle, 1837. Guitarfishes.

Genus Glaucostegus Bonaparte, 1846. Rough guitarfishes.	*?Glaucostegus granulatus (Cuvier, 1829). Sharpnose guitarfish.*	*Glaucostegus granulatus (Cuvier, 1829). Sharpnose guitarfish.*	Vulnerable A2bd+3d+4d
	?Glaucostegus halavi (Forsskål, 1775). Halavi guitarfish.	*Glaucostegus halavi (Forsskål, 1775) Halavi guitarfish.*	Data Deficient
		Glaucostegus microphthalmus = Rhinobatos microphthalmus (Teng, 1959). Smalleyed guitarfish.	Not Evaluated
	Glaucostegus typus (Bennett, 1830). Giant shovelnose ray.	*Glaucostegus typus (Bennett, 1830). Giant shovelnose ray.*	Vulnerable A2bd+3bd+4bd
Genus Rhinobatos Linck, 1790. Guitarfishes.	*?Rhinobatos formosensis Norman, 1926. Taiwan guitarfish.*	*Rhinobatos formosensis Norman, 1926. Taiwan guitarfish.*	Not Evaluated
		Rhinobatos schlegelii Müller & Henle, 1841. Brown guitarfish.	Data Deficient

	Rhinobatos cf. schlegelii Müller & Henle, 1841. Philippine guitarfish.	*Rhinobatos cf. schlegelii = Rhinobatos whitei Last, Corrigan & Naylor, 2014. Philippine guitarfish.*	Not Evaluated
?Suborder Platyrhinoidei: McEachran, Dunn & Miyake, 1996. Fanrays and thornbacks.			
?Family Platyrhinidae Jordan, 1923. Fanrays and thornbacks.			
?GenusPlatyrhina Müller & Henle, 1838. Fanrays.	*?Platyrhina sinensis (Bloch & Schneider, 1801). Fanray.*	*Platyrhina sinensis (Bloch & Schneider, 1801). Fanray.*	Vulnerable A4bcd
Suborder Torpedinoidei Gill, 1893. Electric rays.			
Family Narcinidae Gill, 1862. Numbfishes.			
Genus Narcine Henle, 1834. Numbfishes.		*Narcine lingula Richardson, 1846. Chinese numbfish.*	Data Deficient
		Narcine maculata (Shaw, 1804). Darkfinned numbfish, darkspotted electric ray.	Data Deficient
		Narcine sp. nov. H de Carvalho, 1999. Darkfin numbfish.	
	Narcine timlei (Bloch & Schneider, 1801). Blackspotted numbfish.	*Narcine timlei (Bloch & Schneider, 1801). Blackspotted numbfish.*	Data Deficient
Family Narkidae Fowler, 1934. Sleeper Rays.			
Genus Narke Kaup, 1826. Onefin sleeper rays.	*?Narke dipterygia (Bloch & Schneider, 1801). Spottail sleeper ray.*	*Narke dipterygia (Bloch & Schneider, 1801). Spottail sleeper ray.*	
Genus Temera Gray, 1831. Finless sleeper rays.	*?Temera hardwickii (Bloch & Schneider, 1801). Finless sleeper ray.*	*Temera hardwickii (Bloch & Schneider, 1801). Finless sleeper ray.*	
Family Torpedinidae Bonaparte, 1838. Torpedo rays.			
Genus Torpedo Houttuyn, 1764. Torpedo rays.	*Torpedo sp. Philippine spotted torpedo.*	*Torpedo sp. Philippine spotted torpedo. = Torpedo sp. 1 Philippine spotted torpedo.*	
	Torpedo sp. Philippine offshore torpedo.	*Torpedo sp. Philippine offshore torpedo.= Torpedo sp. 2 Philippine offshore torpedo.*	
		Torpedo marmorata Risso, 1810. Spotted torpedo, marbled electric ray.	Data Deficient
Suborder Rajoidei Garman, 1913. Skates.			
Family Arhynchobatidae Fowler, 1934. Softnose skates.			

Genus Insentiraja Yearsley & Last, 1992. Looseskin skates.	*Insentiraja cf. subtilispinosa (Stehmann, 1989). Philippine looseskin skate.*		*Insentiraja cf. subtilispinosa = Insentiraja subtilispinosa (Stehmann, 1989). Western looseskin skate, velvet skate.*	Least Concern

Family Rajidae Blainville, 1816. Hardnose skates, skates, rays, Pagi.

Genus Dipturus Rafinesque, 1810. Longnose skates.	*Dipturus gigas Ishiyama, 1958. Giant skate.*		*Dipturus gigas Ishiyama, 1958. Giant skate.*	Data Deficient
	Dipturus tengu (Jordan & Fowler, 1903). Goblin skate, tengu skate, acutenose skate.		*Dipturus tengu (Jordan & Fowler, 1903). Goblin skate, tengu skate, acutenose skate.*	Data Deficient
	Dipturus sp. 1. Philippine longnose skate.			
	Dipturus sp. 2.		*Dipturus sp. 2 Philippine skate*	
	Dipturus sp. [Seret] (Philippines)		*Dipturus sp.3 [Seret] (Philippines) Seret's Philippine skate.*	
	Dipturus sp. Tilted thorn skate.		*Dipturus sp. 1. (Philippine longnose skate) = Dipturus amphispinus (Ridgeback skate) Last & Alava, 2013. Ridgeback skate.*	Not Evaluated
Genus Okamejei Ishiyama, 1958.	*?Okamejei boesemani (Ishihara, 1987). Black sand skate.*		*Okamejei boesemani (Ishihara, 1987). Black sand skate, Boeseman's skate.*	Data Deficient
	?Okamejei hollandi (Jordan & Richardson, 1909). Yellow-spotted skate.		*Okamejei hollandi (Jordan & Richardson, 1909). Yellow-spotted skate.*	Data Deficient
	?Okamejei kenojei (Müller & Henle, 1841). Spiny rasp skate.		*Okamejei konojei (= O. kenojei) (Müller & Henle, 1841). Spiny rasp skate, ocellate spot skate.*	Data Deficient
	Okamejei sp. nov. Philippine ocellate skate.		*Okamejei sp. nov. Philippine ocellate skate = Okamejei jensenae Last & Lim, 2010. Sulu Sea skate.*	Not Evaluated
			Okamejei meerdervoortii (Bleeker, 1860). Bigeye skate.	Data Deficient

Genus Anacanthobatis von Bonde &Swart, 1924. Smooth legskates.	*Anacanthobatis cf. borneensis Chan, 1965. Philippine legskate.*		*Anacanthobatis borneensis = Sinobatis borneensis Chan, 1965. Borneo legskate*	Least Concern
Suborder Myliobatoidei Fowler, 1941. Stingrays.				
Family Plesiobatididae Nishida, 1990. Giant stingarees.				
Genus Plesiobatis Nishida, 1990. Giant stingarees.	*Plesiobatis daviesi (Wallace, 1967). Deepwater stingray, giant stingaree.*		*Plesiobatis daviesi (Wallace, 1967). Deepwater stingray, giant stingaree.*	Least Concern
	Family Hexatrygonidae Heemstra & Smith, 1980. Sixgill stingrays.			
Genus Hexatrygon Heemstra & Smith, 1980. Sixgill stingrays.	*Hexatrygon bickelli Heemstra & Smith, 1980. Sixgill stingray.*		*Hexatrygon bickelli Heemstra & Smith, 1980. Sixgill stingray.*	Least Concern
	Family Dasyatidae Jordan, 1888. Whiptail stingrays, sting rays, Pagi.			
Genus Brevitrygon Last, Naylor & Manjaji-Matsumoto, 2016				
Genus Dasyatis Rafinesque, 1810. Fringetailed stingrays.	*Dasyatis cf. akajei (Bürger In Müller & Henle, 1841). Philippine red stingray.*	Genus Hemitrygon Müller & Henle, 1838	*Dasyatis cf. akajei = Hemitrygon cf. akajei*	Near Threatened
			Dasyatis akajei = Hemitrygon akajei (Müller & Henle, 1841). Red stingray.	Data Deficient
	Dasyatis bennettii (Müller & Henle, 1841). Bennett's cowtail or frilltailed ray.		*Dasyatis bennettii = Hemitrygon bennetti (Müller & Henle, 1841). Bennet's stingray.*	Not Evaluated
	Dasyatis kuhlii (Müller & Henle, 1841). Bluespotted stingray or maskray, Kuhl's stingray, Dahonan, Doragon, Kiampao, Perisan.		*Dasyatis kuhlii = Neotrygon kuhlii (Müller & Henle, 1841) = Neotrygon orientale sp. nov. Last, White & Seret, 2016. Bluespotted stingray, bluespotted maskray.*	Near Threatened
	Dasyatis zugei (Bürger In Müller & Henle, 1841). Pale-edged stingray.		*Dasyatis zugei = Telatrygon zugei (Müller & Henle, 1841). Sharpnose stingray, pale-edged stingray.*	
	Dasyatis sp. Adon's maskray.		*Dasyatis sp. (Adon's maskray) = Neotrygon sp. (Adon's maskray) Adon's maskray.*	Near Threatened

Genus Himantura Müller & Henle, 1837. Whiprays.	*Himantura bleekeri (Blyth, 1860). Longtail whipray.*	*Himantura bleekeri = Pateobatis bleekeri Blyth, 1860. Bleeker's whipray.*	Not Evaluated
	Himantura fai Jordan & Seale, 1906. Pink whipray.	*Himantura fai = Pateobatis fai (Jordan & Seale, 1906). Pink whipray.*	Vulnerable A2bd
	Himantura gerrardi (Gray, 1851). Sharpnose whipray.	*Himantura gerrardi = Maculabatis gerrardi (Gray, 1851). Whitespotted whipray.*	Vulnerable A2bd+3bd
	Himantura granulata (Macleay, 1882). Mangrove whipray.	*Himantura granulata =Urogymnus granulatus (Macleay, 1883). Mangrove whipray.*	Vulnerable A2bd
	Himantura imbricata (Bloch & Schneider, 1801). Scaly whipray.	*Himantura imbricata = Brevitrygon imbricata (Bloch & Schneider, 1801). Scaly whipray.*	Data Deficient
	Himantura jenkinsii (Annandale, 1909). Golden whipray.	*Himantura jenkinsii = Pateobatis jenkinsii (Annandale, 1909). Jenkin's whipray.*	Vulnerable A2bd
		Himantura leoparda Manjaji-Matsumoto & Last, 2008. Leopard whipray.	Vulnerable A2bd
	Himantura uarnak (Forsskål, 1775). Spotted whipray, marbled stingray, ring-tailed ray, whip-tailed ray, whip ray, Paging bulik, Paging sulatan.	*Himantura uarnak (Forsskål, 1775) Reticulate whipray, marbled stingray, leopard stingray, honeycomb stingray.*	Vulnerable A2bd
		Himantura uarnacoides = Pateobatis uarnacoides (Bleeker, 1852). Bleeker's whipray, whitenose whipray.	Vulnerable A2bcd+3bcd+4bcd
	Himantura undulata (Bleeker, 1852). Leopard whipray, honeycomb stingray or whipray.	*Himantura undulata (Bleeker, 1852). Leopard whipray, ocellate whipray, Bleeker's variegated whipray.*	Vulnerable A2cd+3cd+4cd
		Himantura cf. undulata (Bleeker, 1852	
	Himantura walga (Müller & Henle, 1841). Dwarf whipray.	*Himantura walga = Brevitrygon walga (Müller & Henle, 1841). Dwarf whipray.*	Near Threatened
Genus Maculabatis Last, Naylor & Manjaji-Matsumoto, 2016			

Genus Neotrygon Last and White 2008				
Genus Pastinachus Rüppell, 1829. Cowtail stingrays.			*Pastinachus atrus = Pastinachus ater (Macleay, 1883). Cowtail stingray, fantail ray, banana-tail ray, bull ray, feathertail ray.*	Least Concern
			Pastinachus cf. sephen (Forsskål, 1775). Cowtail stingray.	
	Pastinachus sephen (Forsskål, 1775). Cowtail stingray, feathertail stingray, frill-tailed Pagi.		*Pastinachus sephen (Forsskål, 1775) Cowtail stingray.*	Data Deficient
Genus Pateobatis Last, Naylor & Manjaji-Matsumoto, 2016				
Genus Taeniura Müller & Henle, 1837. Ribbontail stingrays.	*Taeniura lymma (Forsskål, 1775). Bluespotted ribbontail ray, bluespotted fantail ray, blue-spotted stingray, blue-spotted Pagi, ribbontailed stingray.*		*Taeniura lymma (Forsskål, 1775). Bluespotted ribbontail ray, fantail ray, blue-spotted stingray, ribbontailed stingray.*	Near Threatened
	Taeniura meyeni Müller & Henle, 1841. Round ribbontail ray.		*Taeniura meyeni = Taeniurops meyeni Müller & Henle, 1841. Round ribbontail ray, blotched fantail ray.*	Vulnerable A2d
Genus Telatrygon Last, Naylor & Manjaji-Matsumoto, 2016				
Genus Urogymnus	*Urogymnus asperrimus (Bloch & Schneider, 1801). Porcupine ray, thorny ray.*		*Urogymnus asperrimus (Bloch & Schneider, 1801). Porcupine ray, thorny ray.*	Vulnerable A2bd
Family Gymnuridae Fowler, 1934. Butterfly rays.				
Genus Aetoplatea Valenciennes, In Müller & Henle, 1841. Finned butterfly rays.	*Aetoplatea zonurus Bleeker, 1852. Zonetail butterfly ray.*		*Aetoplatea zonurus = Gymnura zonura (Bleeker, 1852). Zonetail butterfly ray.*	Vulnerable A2d+3d+4d

Genus Gymnura Kuhl In Van Hasselt, 1823. Butterfly rays.	*Gymnura cf. micrura (Bloch & Schneider, 1801). Smooth butterfly ray.*	*Gymnura cf. micrura (Bloch & Schneider, 1801). Smooth butterfly ray.*	
		Gymnura micrura (Bloch & Schneider, 1801). Smooth butterfly ray.	Data Deficient
	Gymnura poecilura (Shaw, 1804). Longtail butterfly ray.	*Gymnura poecilura (Shaw, 1804). Longtail butterfly ray.*	Near Threatened
	Family Myliobatidae Bonaparte, 1838. Eagle rays, Pagi Manok.		
Genus Aetobatus Blainville, 1816. Spotted eagle rays.	*Aetobatus cf. narinari (Euphrasen, 1790). Spotted eagle ray, bonnetray, eagle ray, Pagi Manok, Paol, Banogan, Taligmanok.*	*Aetobatus cf. narinari (Euphrasen, 1790). Spotted eagle ray.*	
		Aetobatus narinari (Euphrasen, 1790). Spotted eagle ray.	Near Threatened
	Aetobatus cf. guttatus (Shaw, 1804). Indian eagle ray	*Aetobatus cf. guttatus (Shaw, 1804). Indian eagle ray.*	
		Aetobatus ocellatus White, Last, Naylor, Jensen & Caira, 2010. Ocellated eagle ray.	
Genus Aetomylaeus Garman, 1908.	*?Aetomylaeus milvus (Valenciennes, 1841). Ocellate eagle ray.*	*?Aetomylaeus milvus = Aetomylaeus maculatus (Gray, 1834). Mottled eagle ray*	Vulnerable A2bd
	?Aetomylaeus niehofii (Bloch & Schneider, 1801). Banded eagle ray.	*?Aetomylaeus niehofii = Aetomylaeus nichofii (Bloch & Schneider, 1801). Banded eagle ray.*	Endangered A2d+3d+4d
	Aetomylaeus vespertilio (Bleeker, 1852). Ornate eagle ray.	*Aetomylaeus vespertilio (Bleeker, 1852). Ornate eagle ray.*	Vulnerable A2bd
Genus Myliobatis Cuvier, 1816. Eagle rays.	*Myliobatis cf. tobijei Bleeker, 1854. Philippine kite ray.*	*Myliobatis cf. tobijei Bleeker, 1854. Philippine kite ray.*	Endangered A2d
		Myliobatis tobijei Bleeker, 1854. Japanese eagle ray, kite ray.	Data Deficient
	Family Rhinopteridae Jordan & Evermann, 1896. Cownose rays.		

Genus Rhinoptera Kuhl in Cuvier, 1829. Cownose rays.	*Rhinoptera javanica Müller & Henle, 1841. Javanese cownose ray, flapnose ray, cow-nosed ray, Palimanok, Ogaog, Banogan.*	*Rhinoptera javanica Müller & Henle, 1841. Javanese cownose ray, flapnose ray.*	Vulnerable A2d+3cd+4cd
Family Mobulidae Gill, 1893. Devil rays.			
Genus Manta Bancroft, 1828. Mantas.	*Manta birostris (Walbaum, 1792). Manta.*	*Manta birostris (Walbaum, 1792). Giant manta ray.*	Vulnerable A2abd+3bd+4abd
		Manta alfredi (Krefft, 1868). Reef manta ray.	Vulnerable A2abd+3bd+4abd
Genus Mobula Rafinesque, 1810. Devil rays, Salanga, Safiga, Sarafigan.	*Mobula eregoodootenkee (Bleeker, 1859). Longfin devilray.*	*Mobula eregoodootenkee (Bleeker, 1859). Longhorned mobula, pygmy devilray.*	Near Threatened
		Mobula japanica (Müller & Henle, 1841). Spinetail mobula, spinetail devil ray, Japanese devil ray.	Near Threatened
	Mobula kuhlii (Valenciennes, In Müller & Henle, 1841). Shortfin devilray.	*Mobula kuhlii (Müller & Henle, 1841). Shortfin devil ray.*	Data Deficient
	Mobula thurstoni (Lloyd, 1908). Bentfin devilray.	*Mobula thurstoni (Lloyd, 1908). Bentfin devil ray, smoothtail mobula.*	Near Threatened
		Mobula tarapacana (Philippi, 1892). Chilean devil ray.	Vulnerable A2bd

Annex E.

Fishing Grounds and Landing Sites Monitored with ElasmobranchCatchesin 15 Coastal Regions of the Philippines, as of 2016.

Source: NSAP Regional Data, 1998-2016.

PROVINCE	FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
			Sharks only	Batoids only	Both
Region I					
Ilocos Norte	Bangui Bay	POB - Poblacion,Pagudpud			Elasmo
		SLA - San Lorenzo/Abaca,Bangui			Elasmo
Pangasinan	Dasol Bay	PDA - Petal,Dasol			Elasmo
Ilocos Sur	Ilocos Coast/ Northwest Philippine Sea	ASE - Apatot, San Esteban		Batoids	
		CPI - Caruan,Pasuquin			Elasmo
		DSC - Dili,Santa Cruz	Sharks		
		GCI - Gaang,Currimao			Elasmo
		LPL - La Paz, Laoag		Batoids	
		LTI - Libtong,Tagudin			Elasmo
		NSL - Nangalisan,Sta.Lucia	Sharks		
		PMI -Puro,Magsingal	Sharks		
		PSC - Pilar,Santa Cruz	Sharks		
		SBC - Sabang, Cabugao		Batoids	
		SPN - San Pedro,Narvacan			Elasmo
		SPV - San Pedro,Vigan		Batoids	
		TSI - Teppeng,Sinait		Batoids	
		VCI - Victoria,Currimao			Elasmo
		VCS - Villamar,Caoayan		Batoids	
Pangasinan	Lingayen Gulf	BBL - Baroro,Bacnotan		Batoids	
		DST - Damortis, Sto. Tomas		Batoids	
		LAP - Lucap,Alaminos			Elasmo
		TST - Tubod, Sto. Tomas		Batoids	
		VAP - Victoria,Alaminos		Batoids	
Ilocos Norte	Pasaleng Bay	BGP - Balaoi,Pagudpud,IN			Elasmo
		PNP - Pancian,Pagudpud			Elasmo
		PPI - Pasaleng,Pagudpud			Elasmo
Palawan	West Philippine Sea	D1P - Sitio Nagabungan, Davila 1, Pasuquin		Batoids	
		DSB - Dacap Sur, Bani	Sharks		
		PBU - Paraoir,Balaoan		Batoids	
6	6	29	5	12	12
Region II					

PROVINCE	FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
			Sharks only	Batoids only	Both
Aparri	Babuyan Channel	Bagu Abulug		Batoids	
		Batangan Gonzaga			Elasmo
		Baua Gonzaga			Elasmo
		Cabaritan Ballesteros			Elasmo
		Centro Abulug			Elasmo
		Centro Aparri			Elasmo
		Centro Buguey		Batoids	
		Centro Sta. Ana	Sharks		
		Dodan Aparri			Elasmo
		Minanga Buguey			Elasmo
		Minanga Gonzaga			Elasmo
		Paddaya Buguey		Batoids	
		Palawig Sta. Ana			Elasmo
		Punta Aparri			Elasmo
		Siguiran Abulug		Batoids	
Batanes	Batanes Waters	Baluarte Port			Elasmo
		Chinapoliran	Sharks		
		Diura Port	Sharks		
		Ivana Port	Sharks		
		Mahatao Centro Port	Sharks		
		Paganamman Port	Sharks		
		Radiwan Port	Sharks		
		San Vicente Port	Sharks		
		Sumnanga Port	Sharks		
		Valugan Port			Elasmo
2	2	25	9	4	12
Region III					
Baler	Baler Bay	Baler, Fishport, Baler			Elasmo
		Borlongon, Dipaculao			Elasmo
		Dinadawan, Dipaculao			Elasmo
		Sabang Baler			Elasmo
	Casiguran Sound	Dibacong, Casiguran		Batoids	
		Dilud, Casiguran	Sharks		
		Esteves, Casiguran			Elasmo
		Mapalad, Dinalungan		Batoids	
		Poblacion, Dinalungan		Batoids	
	Pacific Ocean	Borlongon, Dipaculao			Elasmo
		Dingalan, Fishport		Batoids	
	Manila Bay	Batangas II, Mariveles	Sharks		
			Sharks		

PROVINCE	FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
			Sharks only	Batoids only	Both
Zambales	Zambales Coast	Amungan, Iba			Elasmo
		Poblacion Masinloc		Batoids	
		Sitio Luan, Palauig	Sharks		
		Sto. Niño, San Felipe	Sharks		
		Sto. Rasario, Iba			Elasmo
		Subic Fish port			Elasmo
		Uacon, Candelaria		Batoids	
2	5	20	5	6	9
Region IV-A					
	Calatagan/Balayan Bay	Brgy. 10, Balayan - M			Elasmo
		Palikpikan, Balayan - M		Batoids	
	Lamon Bay	Atimonan			Elasmo
		Brgy. Kisusuyo			Elasmo
		Brgy. Libjo			Elasmo
		Dinahican			Elasmo
		Mauban			Elasmo
		Talisoy, Jomalig			Elasmo
	Ragay Gulf	Echeneis naucrates	Sharks		
		Guinayangan Brgy. Poblacion - M		Batoids	
		Kalwit, San Narciso - M		Batoids	
		Manlana, Buenavista - M		Batoids	
		Sabang Piris, Buenavista - M			Elasmo
		Tagkawayan	Sharks		
		Tagkawayan - M			Elasmo
	Tayabas Bay	Catanauan			Elasmo
		Dalahican			Elasmo
		Mulanay		Batoids	
				Batoids	
	4	19	2	6	11
Region IV-B					
	Romblon	Pangulo			Elasmo
		Poblacion			Elasmo
	Bacuit Bay	Buena Suerte			Elasmo
		El Nido			Elasmo
		Purok 3, Bebeladan			Elasmo
		Villa Libertad			Elasmo

PROVINCE	FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
			Sharks only	Batoids only	Both
	Balabac Strait	Balabac(Bgy.Bancalan, So.Marabon			Elasmo
		Balabac(Bgy.Catagupan, So.Sigumay			Elasmo
		Balabac(Bgy.Mangsee)			Elasmo
		Balabac(Bgy.Melville)			Elasmo
		Balabac(Bgy.Rabor)			Elasmo
		Balabac(Bgy.Ramos)			Elasmo
		Balabac(Bgy.Salang)			Elasmo
	Coron Bay	Bgy. Poblacion II			Elasmo
		Coron	Sharks		
	Green Island Bay	Bgy. I (Tandol)			Elasmo
		Bgy. IV			Elasmo
		Bgy. New Barbacan (retac)			Elasmo
		Johnson Island			Elasmo
		Bgy. Caramay			Elasmo
	Honda Bay	Babuyan			Elasmo
		Lucbuan			Elasmo
		Bgy. Tagburos			Elasmo
		Salvacion			Elasmo
		Manalo			Elasmo
	Imuruan Bay	Bgy. Binga			Elasmo
		Alimanguan			Elasmo
		Bgy. Sto. Niño			Elasmo
		Sitio Cauban			Elasmo
		Alimanguan-Municipal			Elasmo
		Imuruan(Bgy.Agutaya)			Elasmo
	Malanut Bay	Bgy. Tabon			Elasmo
		Fish port/Maritime port, Bgy. Alfonso XIII			Elasmo
		Quezon			Elasmo
		Sitio Cauban			Elasmo
		Bgy. Binga			Elasmo
		Alimanguan			Elasmo
		Bgy. Sto. Niño			Elasmo
		Sitio Cauban			Elasmo
		Alimanguan-Municipal			Elasmo
		Imuruan(Bgy.Agutaya)			Elasmo

PROVINCE	FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
			Sharks only	Batoids only	Both
	Mindoro Strait	Bgy. 7, Mamburao			Elasmo
		Bgy.Buenavista, Sablayan,Occ. Mindoro			Elasmo
		Caminawit, San Jose			Elasmo
		Pag asa, San Jose			Elasmo
		Mamburao			Elasmo
	Rizal Bay	Purok Malapandig (Iraan)			Elasmo
	San Antonio Bay	So. Saippodin			Elasmo
	Sulu Sea (Brooke's Point)	Bgy. Poblacion			Elasmo
		Bgy. Pangobilian			Elasmo
		Bgy. Poblacion District I			Elasmo
	Sulu Sea (Narra)	Bgy. Panacan			Elasmo
		Bgy. Calategas			Elasmo
		Narra			Elasmo
	Tablas Strait	Pangulo, Calatrava, Romblon			Elasmo
		Poblacion, Calatrava, Romblon			Elasmo
		(Calatrava) Bgy. San Roque			Elasmo
		Mansalay(Bgy.San Miguel)			Elasmo
		(Calatrava) Bgy. Balogo			Elasmo
		San Andres(Bgy.Mabini)			Elasmo
		San Andres(Bgy.Poblacion)			Elasmo
		San Andres(Bgy.Calunacon)			Elasmo
		San Andres(Bgy.Linawan)			Elasmo
		San Andres(Tan-agan)			Elasmo
		Gabawan, Odiongan, Romblon			Elasmo
	Taytay Bay	Purok 1, 2 & 4			Elasmo
		Sitio Pamulot, Brgy. Bantulan			Elasmo
		Purok 1,2& 4 Bgy. Poblacion			Elasmo
		Taytay Bay Palawan			Elasmo
	Ulugan Bay	Bgy. Bahile			Elasmo
		Bahile			Elasmo
		Bgy.Tagabinet			Elasmo
		Bgy.Buenavista			Elasmo
	West Philippine Sea(Rizal)	Purok Malapandig (Iraan)			Elasmo
		Rizal(bgy.bunog)			Elasmo
		Rizal(Iraan)			Elasmo
		Rizal(Campung Ulay)			Elasmo
		Rizal(Candawaga)			Elasmo
		Rizal(Culasian)			Elasmo
		Rizal(Taburi)			Elasmo
		Rizal(Latud)			Elasmo

PROVINCE	FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
			Sharks only	Batoids only	Both
0	18	81	1	0	80
Region V					
Region VI					
Antique	Cuyo East Pass	not indicated			Elasmo
Guimaras	Guimaras Strait				Elasmo
Panay	Panay Gulf				Elasmo
Aklan	Sibuyan Sea				Elasmo
	Visayan Sea				Elasmo
Palawan	West Philippine Sea				Elasmo
5	6		0	0	6
Region VII					
Cebu	Visayan Sea	Hagnayan, San Remigio			Elasmo
		Maya, Daanbantayan	Sharks		
		Minglanilla, Cebu	Sharks		
		Pasil, Cebu Fish Port			Elasmo
		Poblacion, Daanbantayan	Sharks		
		Tapilon, Daanbantayan			Elasmo
	Visayan Sea	Coastway, Tagbilaran City		Batoids	
		Guiwanon, Maribojoc	Sharks		
	Camotes Sea	Cataban, Talibon			Elasmo
		Cuya, Ubay	Sharks		
		Pangpang, Ubay	Sharks		
		Puerto San Pedro, Bien Unido			Elasmo
Bohol	Bohol Sea	Baybayon, Mabini		Batoids	
		Bunga Mar, Jagna			Elasmo
		Cawayanan, Mabini		Batoids	
		Cogtong, Candijay			Elasmo
Negros Oriental	Sulu Sea	Bonawon, Siaton			Elasmo
		Maloh, Siaton		Batoids	
	Tanon Strait	Canibol Port, Bais City	Sharks		
		Capinahan, Bais City		Batoids	
		Poblacion, Sibulan	Sharks		
3	6	21	8	5	8
Region VIII					

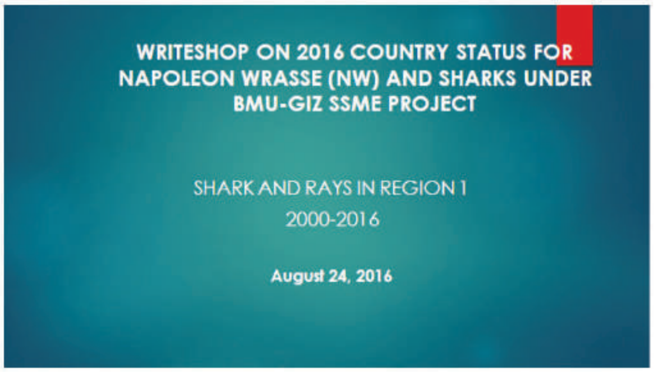
PROVINCE	FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
			Sharks only	Batoids only	Both
Leyte Guiuan Eastern Samar	Leyte Gulf	Brgy. Bislig Tanauan Leyte			Elasmo
		Brgy. Bulusao, Lawaan, E. Samar			Elasmo
		Brgy. Lupok, Guiuan Eastern Samar			Elasmo
		Brgy. Rizal Dulag, Leyte	Sharks		
		Brgy. San Jose, Tacloban City			Elasmo
		Brgy. San Miguel Dulag, Leyte	Sharks		
		Brgy. San Roque Tanauan, Leyte			Elasmo
		Brgy. Sto. Nino, Abuyog, Leyte			Elasmo
		Brgy. Sto. Nino, Quinapondan Eastern Samar			Elasmo
		Guiuan Public Market			Elasmo
		Palanas Salcedo Eastern Samar			Elasmo
		Poblacion Salcedo, Eastern Samar	Sharks		
		Public Market, Balangiga E. Samar			Elasmo
		Rizal Dulag Leyte	Sharks		
		Salcedo Eastern Samar			Elasmo
		San Jose Dulag , Leyte	Sharks		
		San Miguel Dulag Leyte	Sharks		
		Sto Niño, Abuyog Leyte			Elasmo
		Taraguna Beach, MacArthur Leyte	Sharks		
3	1	19	7	0	12
Region IX					
Region X					
	Gingoog Bay		Sharks		
	Macajalar Bay				Elasmo
	Murcielagos Bay			Batoids	
	Iligan Bay				Elasmo
	Panguil Bay			Batoids	
	5	0	1	2	2
Region XI					

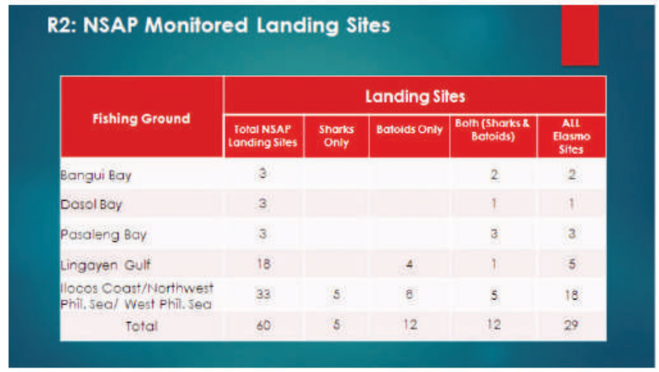
PROVINCE	FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
			Sharks only	Batoids only	Both
	Davao Gulf	Aroma, Lupon			Elasmo
		Bucana, Davao City		Batoids	
		Caburan Small	Sharks		
		Jamboree A			Elasmo
		Jamboree B, Gov Gen			Elasmo
		Kinanga, Don Marcelino		Batoids	
		Lawis, Davao City		Batoids	
		Lidao, Kaputian, IGACOS		Batoids	
		Mabuhay, Gov Gen			Elasmo
		Mandalihan, Lupon			Elasmo
		Matina Aplaya, Davao City		Batoids	
		Piape, Padada		Batoids	
		Talucanga, Malita			Elasmo
		Tibanban, Gov Gen		Batoids	
	Philippine Sea	Jamboree A	Sharks		
			Sharks		
	2	16	3	7	6
Region XII					
	Sarangani Bay	Pangyan, Glan	Sharks		
		Suli, Kiamba		Batoids	
	Moro Gulf	Pag-asa, Kalamansig			Elasmo
		Poblacion, Kalamansig			Elasmo
		Poral, Kalamansig		Batoids	
		Sta. Clara, Kalamansig			Elasmo
	Celebes Sea	Old Poblacion, Maitum		Batoids	
	3	7	1	3	3
CARAGA					
	Butuan Bay	Calibunan, Cabadbaran City, Agusan del Norte			Elasmo
		La Union, Cabadbaran City, Agusan del Norte			Elasmo
		Manapa, Buenavista, Agusan del Norte			Elasmo
	Dinagat sound	Cabungbungan, Cagdianao, PDI			Elasmo
		Poblacion, Cagdianao, PDI		Batoids	
		Rizal, Sta. Monica, SDN		Batoids	
		T-Arlan, Santa Monica, SDN		Batoids	
	Hinatuan Bay	Aquino, Hinatuan, SDS			Elasmo
		Brgy. Sto Niño & Brgy. Lacasa, Hinatuan, SDS		Batoids	

PROVINCE	FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
			Sharks only	Batoids only	Both
	Hinatuan Passage	Brgy 12 & Kawit, Dapa SDN		Batoids	
		Brgy 13, Pob., Dapa SDN		Batoids	
		Taruc, Socorro, SDN		Batoids	
	Lanuza Bay	Magosilom, Cantilan, SDS			Elasmo
		Poblacion, Cortes, SDS		Batoids	
	Lianga Bay	Barobo, Surigao del Sur		Batoids	
		Lianga, Surigao del Sur		Batoids	
	Surigao Sea	Barobo, Surigao del Sur		Batoids	
		Kalipayan, Bungtod, Tandag City	Sharks		
	Surigao Strait	Escolta, Dinagat, PD		Batoids	
		Ferdinand, Basilisa, PDI		Batoids	
				Batoids	
	8	21	1	14	6
ARMM					
	Illana Bay	Sarmiento, Parang, Maguindanao	Sharks		
	Sulu Sea	Serrantes, Jolo, Sulu	Sharks		
		Sitangkai, Tawi-Tawi	Sharks		
				Batoids	
	2	4	3	1	0

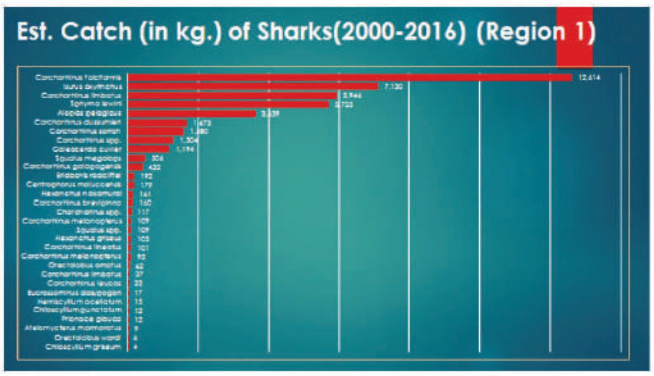
Annex F.

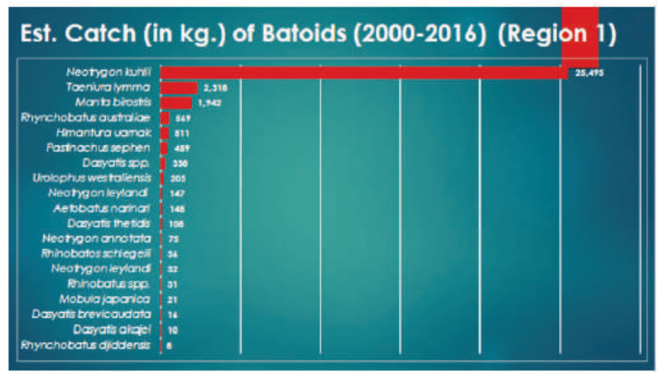
Highlights: Elasmobranch Fisheries in Region 1 (2000-2016)

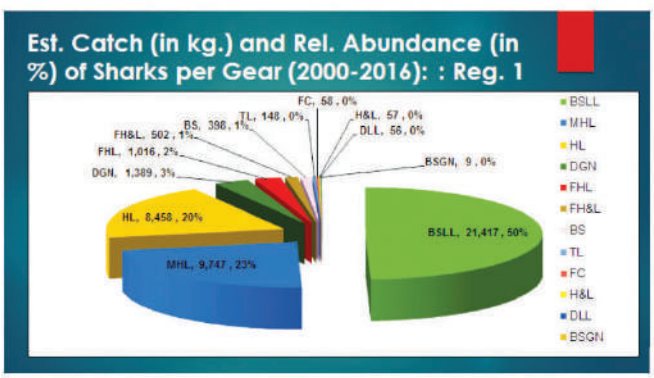


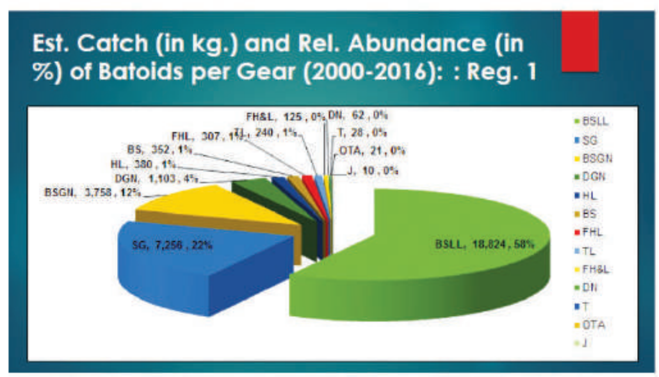


Fishing Ground	Landing Sites				
	Total NSAP Landing Sites	Sharks Only	Batoids Only	Both (Sharks & Batoids)	ALL Elasmo Sites
Bangui Bay	3			2	2
Dasol Bay	3			1	1
Pasaleng Bay	3			3	3
Lingayen Gulf	18		4	1	5
Ilocos Coast/Northwest Phil. Sea/ West Phil. Sea	33	5	8	5	18
Total	60	5	12	12	29



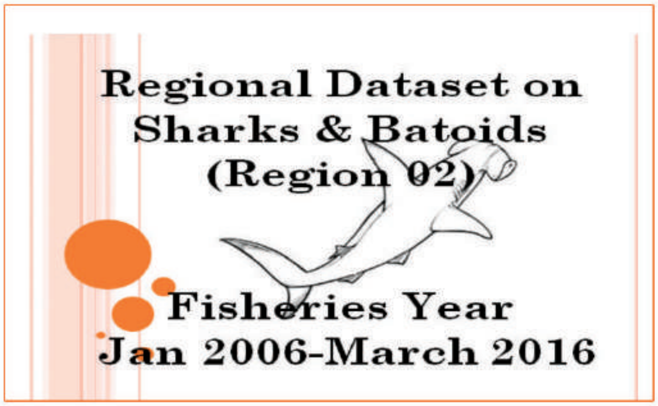






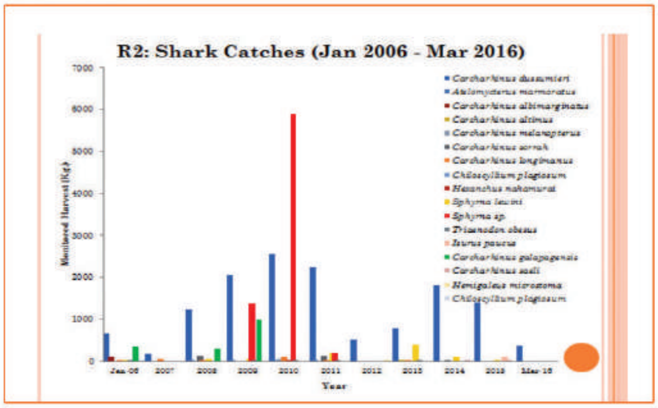
Annex G.

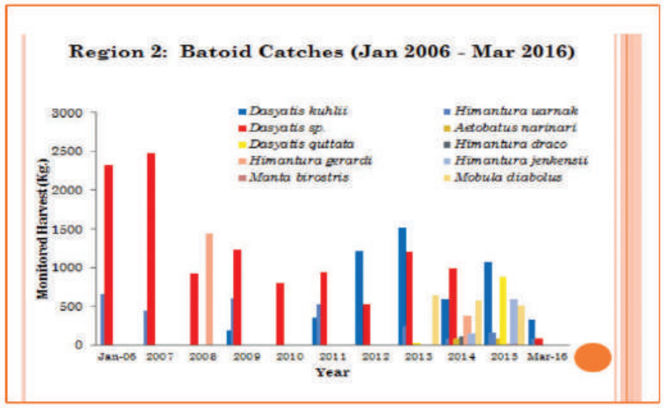
Highlights: Elasmobranch Fisheries in Region 2 (2006-2016)

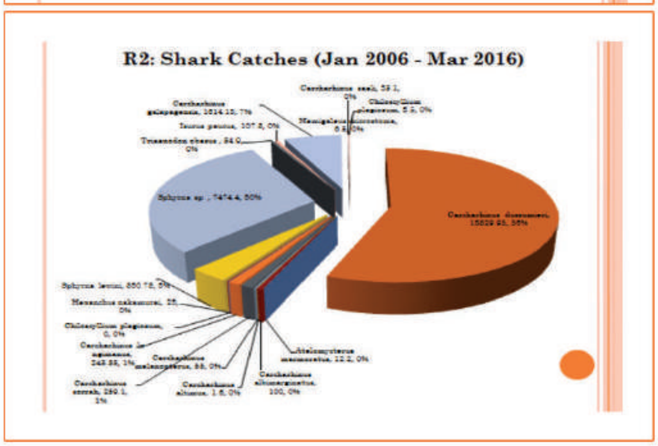


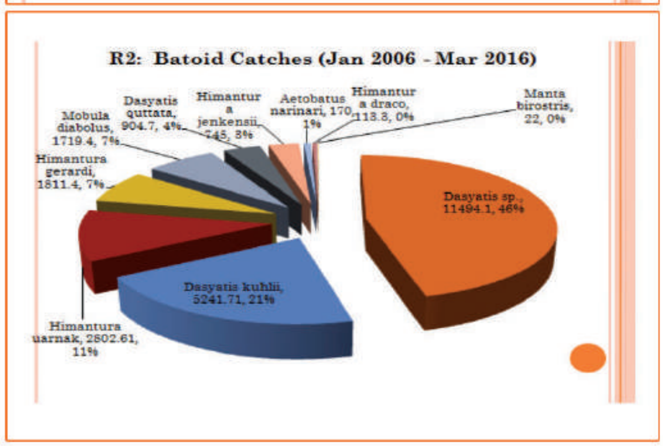
R2: NSAP MONITORED LANDING SITES

Fishing Ground	Landing Sites				
	Total NSAP Landing Sites	Sharks Only	Batoids Only	Both (Sharks & Batoids)	ALL Elasmo Sites
Babuyan Channel		1	4	2	15
Batanes Waters		8		1	10
Total		9	4	3	25









STATUS OF SHARKS AND RAYS IN REGION 3

R3: NSAP MONITORED LANDING SITES

Fishing Ground	Landing Sites				
	Total NSAP Landing Sites	Sharks Only	Batoids Only	Both (Sharks & Batoids)	ALL Elasmo Sites
Baler Bay				4	4
Casiguran Sound		1	3	1	5
Pacific Ocean			1	1	2
Manila Bay		2			2
Zambales Coast		2	2	3	7
Total		5	6	9	20

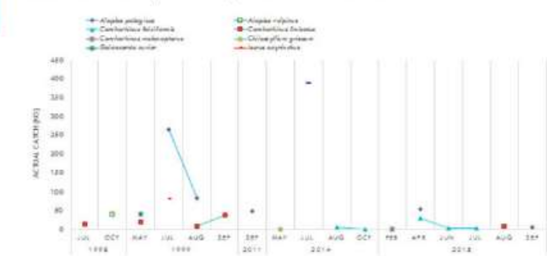
SHARK FISHING GROUNDS (REGION 3)

Fishing Grounds	Gear used	No. Sharks Species	Catch (kg)	No. of individual
Zambales Coast	BGN, HL, MHL, SG, TN	9	1155.05	26
Baler Bay	GN, HL, MHL	7	133.07	44
Casiguran Sound	SGN, HL	2	4.3	2
Pacific Ocean	GN, HL, MHL	3	101.95	16
Manila Bay	GN, TN	2	2.65	2

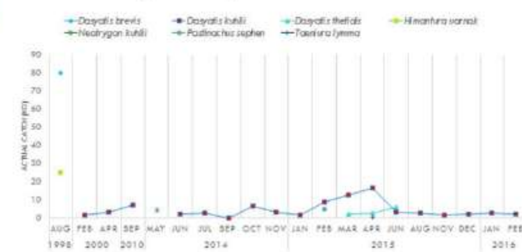
BATOID FISHING GROUNDS (REGION 3)

Fishing Grounds	Gear used	No. Sharks Species	Catch (kg)	No. of individual
Zambales Coast	BGN, HL, MHL, SG	5	207.13	38
Baler Bay	BGN, GN, HL, MHL, SG	3	58.27	31
Casiguran Sound	BSLL, DGN, GN, HL, MHL, SG, SGN, TL	2	185.13	43
Pacific Ocean	GN, MHL	3	224.1	34
Manila Bay				

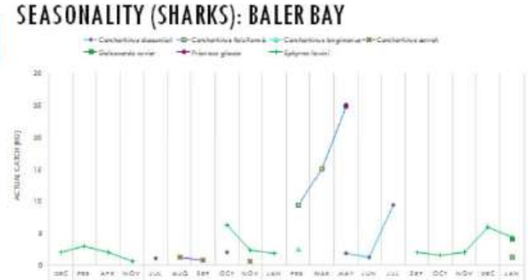
SEASONALITY (SHARKS): ZAMBALES COAST



SEASONALITY (BATOIDS): ZAMBALES COAST

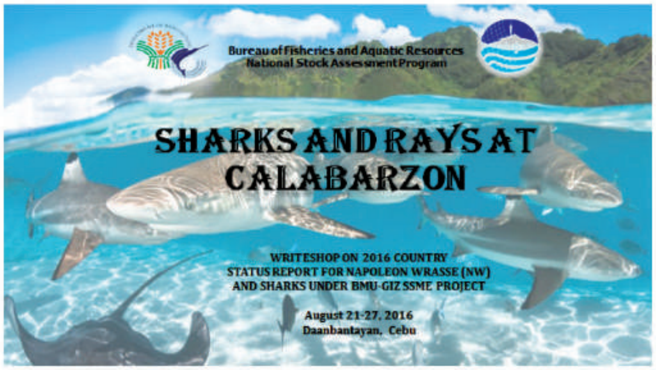


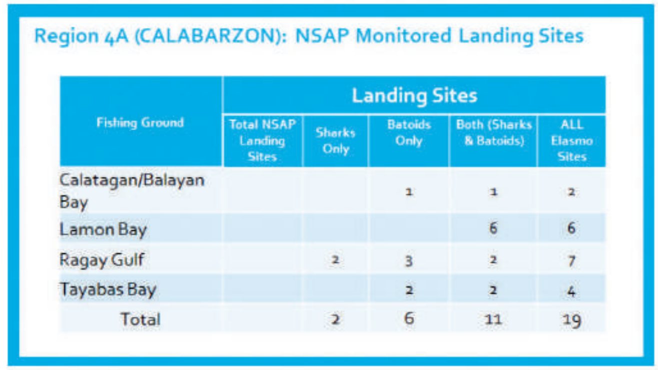
SEASONALITY (SHARKS): BALER BAY



SEASONALITY: BALER BAY

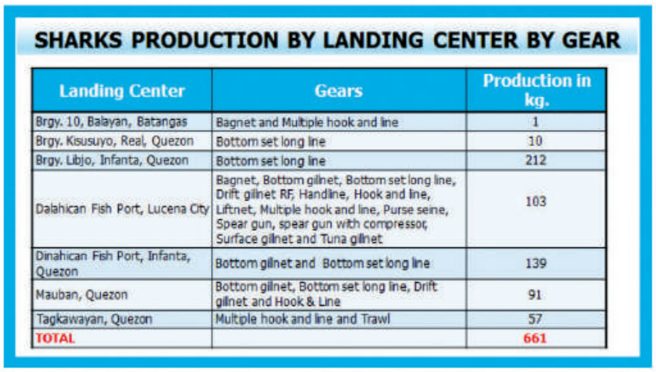
Annex I.
Highlights: Elasmobranch Fisheries in Region 4A – CALABARZON





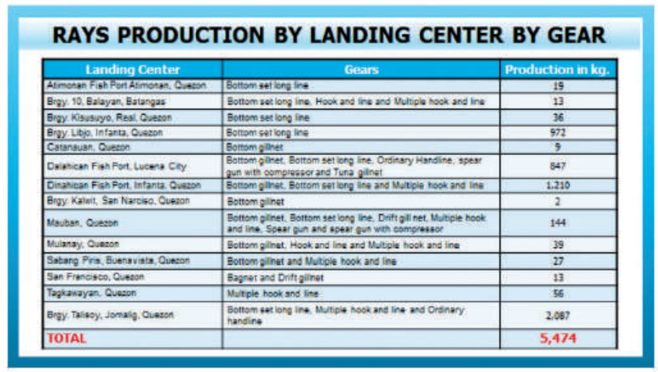
Region 4A (CALABARZON): NSAP Monitored Landing Sites

Fishing Ground	Landing Sites				
	Total NSAP Landing Sites	Sharks Only	Batoids Only	Both (Sharks & Batoids)	ALL Elasmo Sites
Calatagan/Balayan Bay			1	1	2
Lamon Bay				6	6
Ragay Gulf		2	3	2	7
Tayabas Bay			2	2	4
Total		2	6	11	19



SHARKS PRODUCTION BY LANDING CENTER BY GEAR

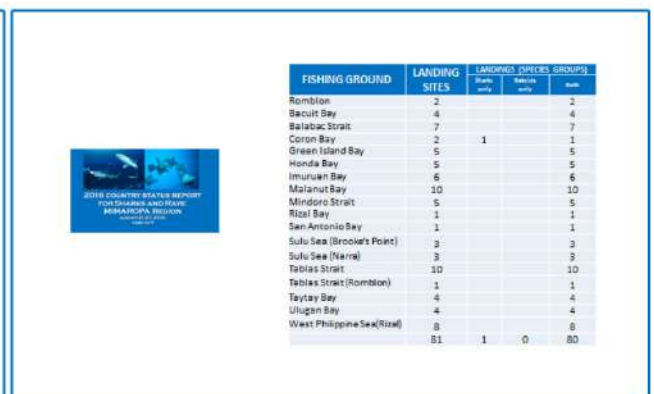
Landing Center	Gears	Production in kg.
Brgy. 10, Balayan, Batangas	Bagnet and Multiple hook and line	1
Brgy. Kisusuyo, Real, Quezon	Bottom set long line	10
Brgy. Libjo, Infanta, Quezon	Bottom set long line	212
Dalahican Fish Port, Lucena City	Bagnet, Bottom gillnet, Bottom set long line, Drift gillnet RF, Handline, Hook and line, Liftnet, Multiple hook and line, Purse seine, Spear gun, spear gun with compressor, Surface gillnet and Tuna gillnet	103
Dinahican Fish Port, Infanta, Quezon	Bottom gillnet and Bottom set long line	139
Mauban, Quezon	Bottom gillnet, Bottom set long line, Drift gillnet and Hook & Line	91
Tagkawayan, Quezon	Multiple hook and line and Trawl	57
TOTAL		661



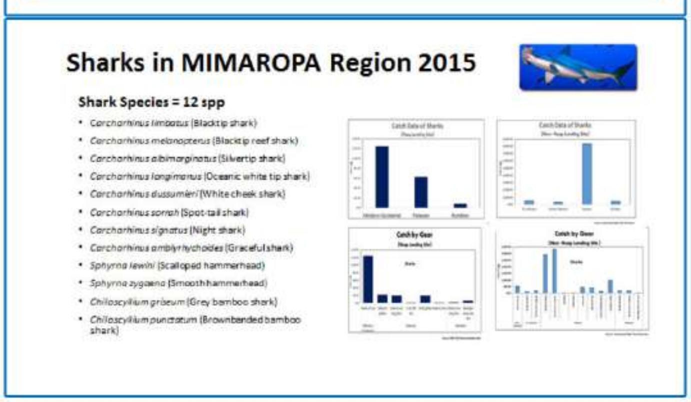
RAYS PRODUCTION BY LANDING CENTER BY GEAR

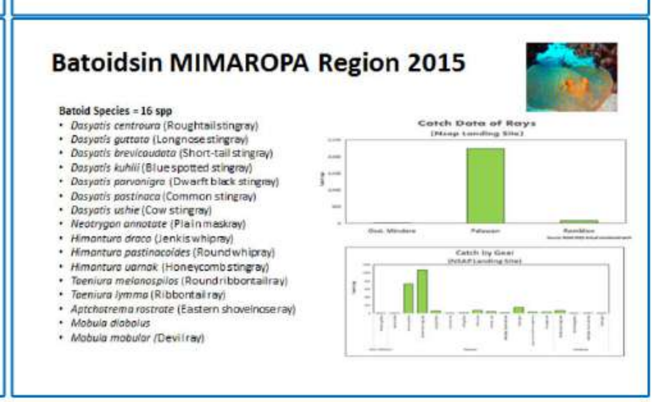
Landing Center	Gears	Production in kg.
Atimonan Fish Port Atimonan, Quezon	Bottom set long line	19
Brgy. 10, Balayan, Batangas	Bottom set long line, Hook and line and Multiple hook and line	13
Brgy. Kisusuyo, Real, Quezon	Bottom set long line	36
Brgy. Libjo, Infanta, Quezon	Bottom set long line	972
Catanauan, Quezon	Bottom gillnet	9
Dalahican Fish Port, Lucena City	Bottom gillnet, Bottom set long line, Ordinary Handline, spear gun with compressor and Tuna gillnet	847
Dinahican Fish Port, Infanta, Quezon	Bottom gillnet, Bottom set long line and Multiple hook and line	1,210
Brgy. Kalwit, San Narciso, Quezon	Bottom gillnet	2
Mauban, Quezon	Bottom gillnet, Bottom set long line, Drift gill net, Multiple hook and line, Spear gun and spear gun with compressor	144
Mulanay, Quezon	Bottom gillnet, Hook and line and Multiple hook and line	39
Sabang Piris, Buenavista, Quezon	Bottom gillnet and Multiple hook and line	27
San Francisco, Quezon	Bagnet and Drift gillnet	13
Tagkawayan, Quezon	Multiple hook and line	56
Brgy. Talisoy, Jomalig, Quezon	Bottom set long line, Multiple hook and line and Ordinary handline	2,087
TOTAL		5,474

Annex J.
Highlights: Elasmobranch Fisheries in Region 4B – MiMaRoPa (2015)



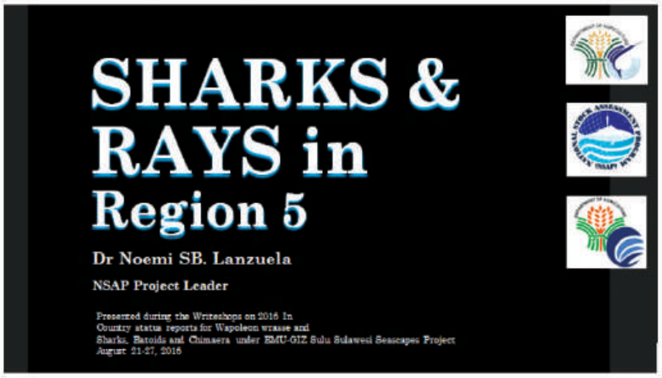
FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
		[illegible]	[illegible]	[illegible]
Romblon	2			2
Bacuit Bay	4			4
Balabac Strait	7			7
Coron Bay	2	1		1
Green Island Bay	5			5
Honda Bay	5			5
Imuruan Bay	6			6
Malanut Bay	10			10
Mindoro Strait	5			5
Rizal Bay	1			1
San Antonio Bay	1			1
Sulu Sea (Brooke's Point)	3			3
Sulu Sea (Narra)	3			3
Tablas Strait	10			10
Tablas Strait (Romblon)	1			1
Taytay Bay	4			4
Ulugan Bay	4			4
West Philippine Sea (Rizal)	8			8
	81	1	0	80

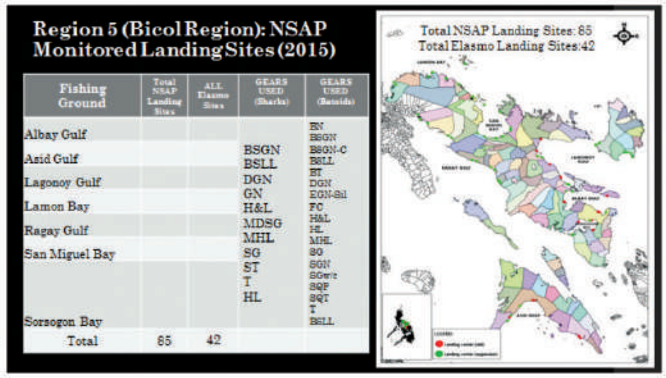


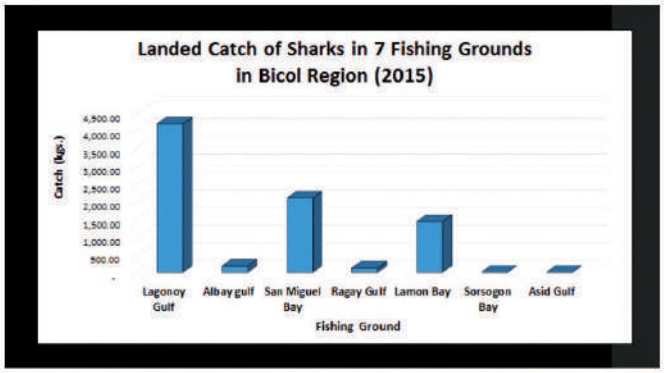


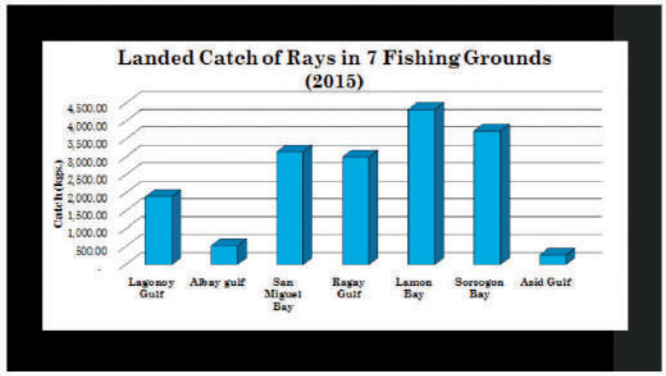
Annex K.

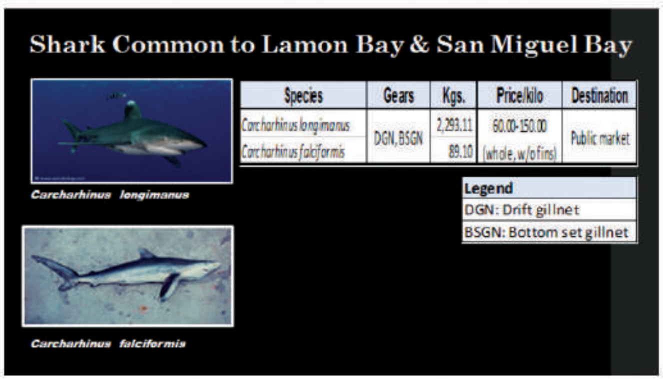
Highlights: Elasmobranch Fisheries in Region 5 – Bicol Region (2015)

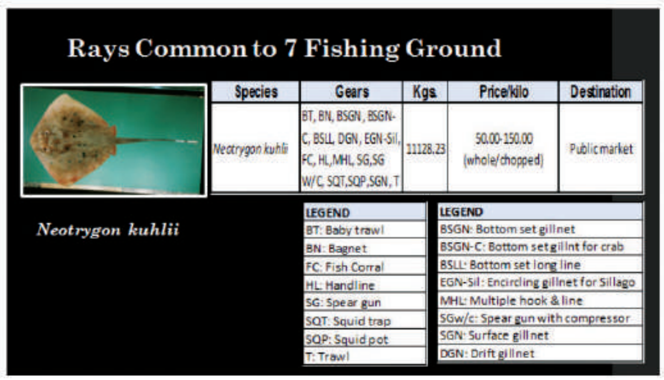






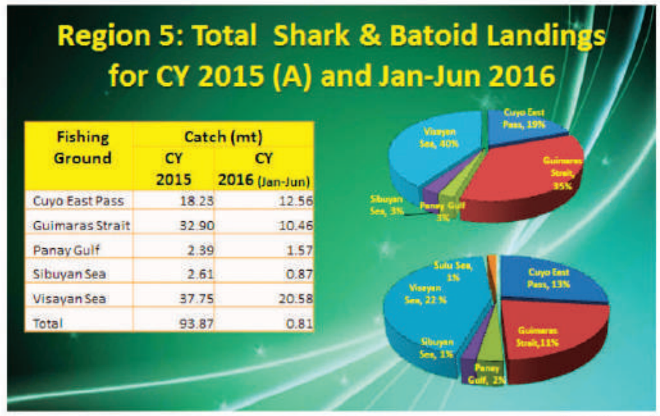


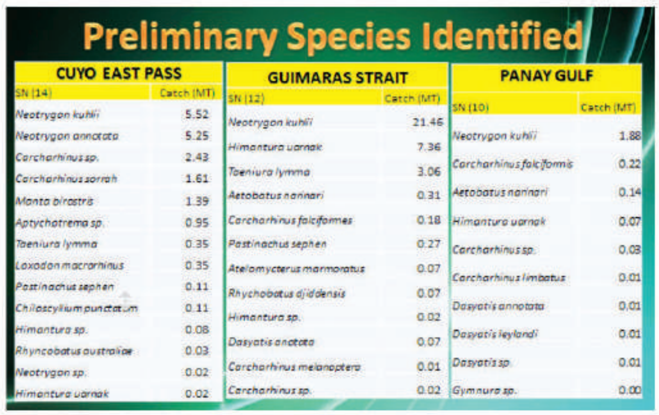


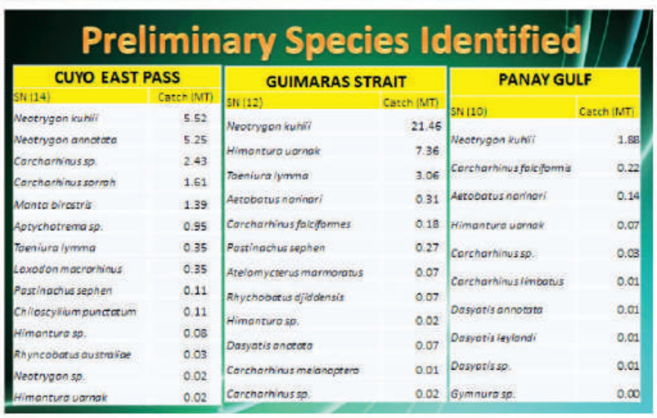


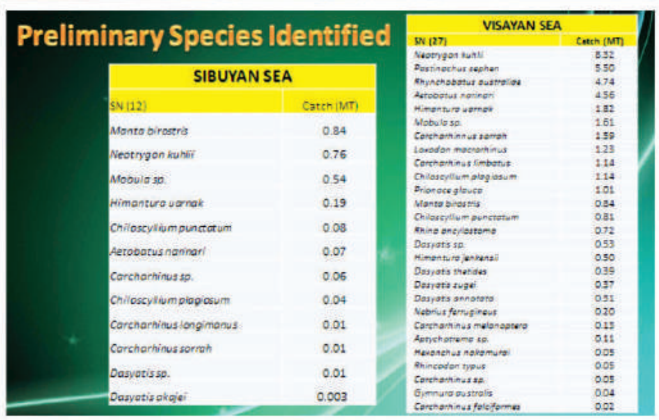
Annex L.

Highlights: Elasmobranch Fisheries in Region 6 – Western Visayas (2015-2016)



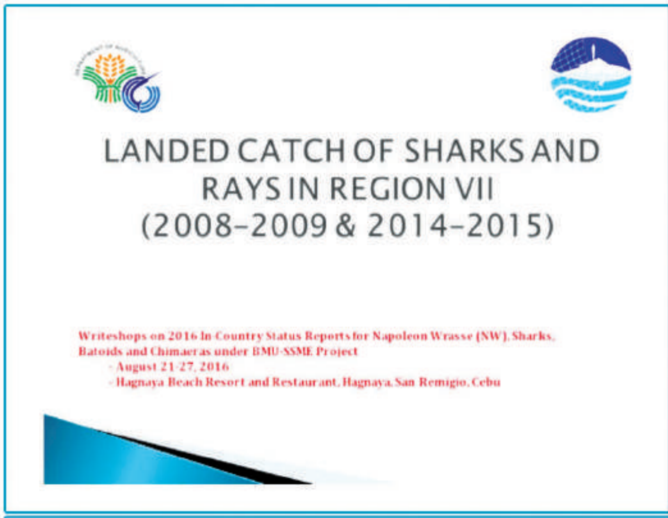


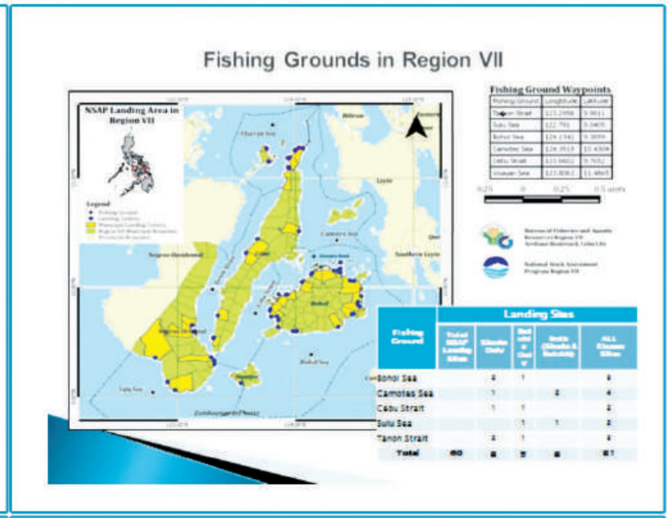


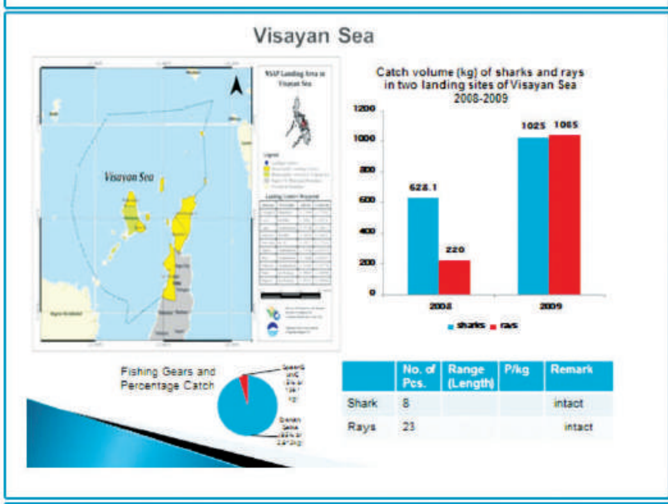


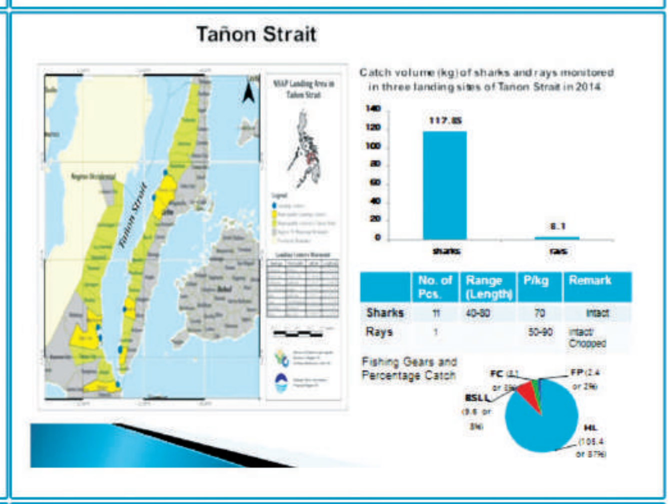
Annex M.

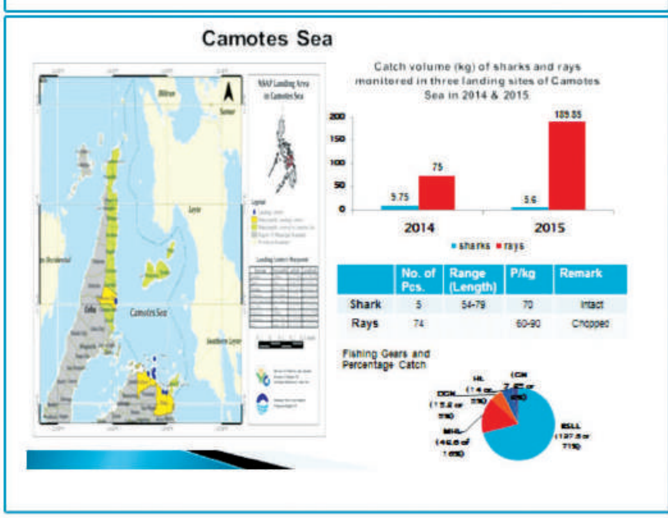
Highlights: Elasmobranch Fisheries in Region 7 (2008-2009, 2014-2015)

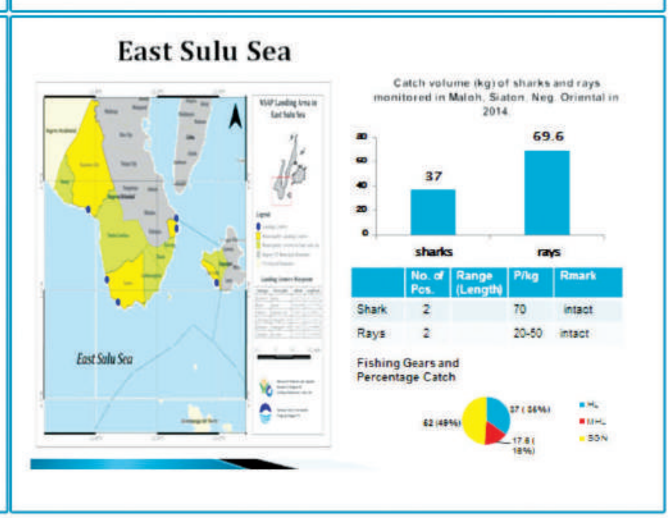


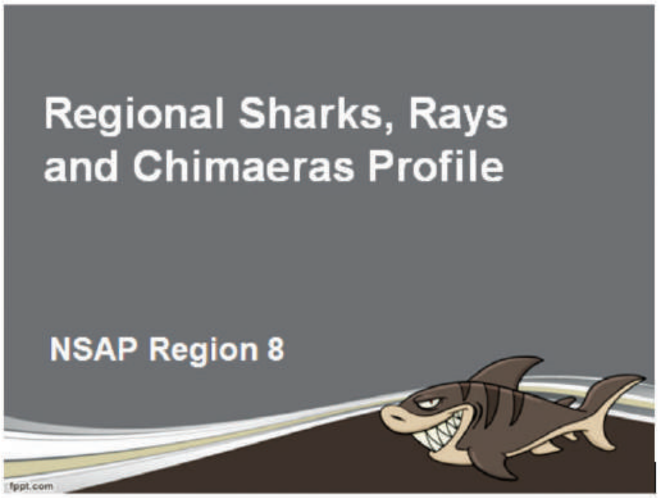


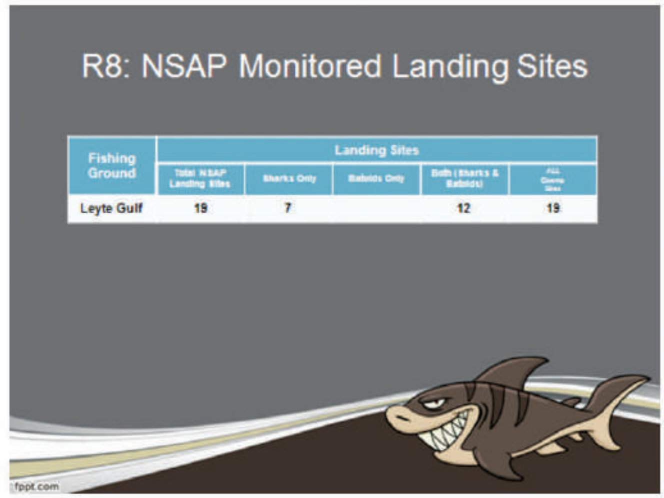


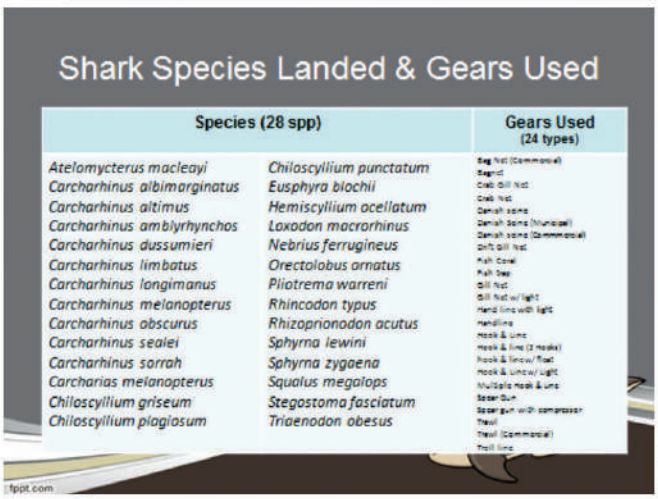






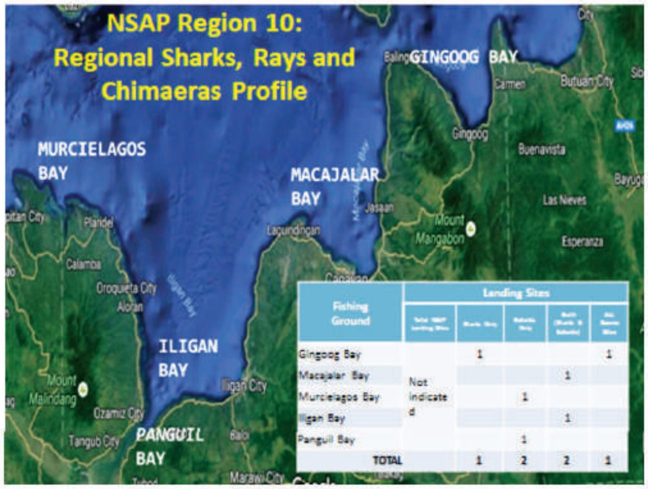

Regional Sharks, Rays and Chimaeras Profile
NSAP Region 8
fppt.com


R8: NSAP Monitored Landing Sites
Fishing Ground
Landing Sites
Total NSAP Landing Sites
Sharks Only
Batoids Only
Both (Sharks & Batoids)
Leyte Gulf 19 7 12 19
fppt.com


Shark Species Landed & Gears Used
Species (28 spp)
Atelomycterus macleayi
Carcharhinus albimarginatus
Carcharhinus altimus
Carcharhinus amblyrhynchos
Carcharhinus dussumieri
Carcharhinus limbatus
Carcharhinus longimanus
Carcharhinus melanopterus
Carcharhinus obscurus
Carcharhinus sealei
Carcharhinus sorrah
Carcharias melanopterus
Chiloscyllium griseum
Chiloscyllium plagiosum
Chiloscyllium punctatum
Eusphyra blochii
Hemiscyllium ocellatum
Loxodon macrorhinus
Nebrius ferrugineus
Orectolobus ornatus
Pliotrema warreni
Rhincodon typus
Rhizoprionodon acutus
Sphyrna lewini
Sphyrna zygaena
Squalus megalops
Stegostoma fasciatum
Triaenodon obesus
Gears Used (24 types)
Bag Net (Commercial)
Bagnet
Crab Gill Net
Crab Net
Danish seine
Danish Seine (Municipal)
Danish seine (Commercial)
Drift Gill Net
Fish Coral
Fish Trap
Gill Net
Gill Net w/ light
Hand line with light
Handline
Hook & Line
Hook & line (2 hooks)
hook & line w/ float
Hook & Line w/ Light
Multiple Hook & Line
Spear Gun
Speargun with compressor
Trawl
Trawl (Commercial)
Troll line
fppt.com


Batoid Species Landed & Gears Used
Species (4 spp)
Manta birostris
Mobula diabola
Taeniura lymmna
Taeuniura meyeni
Gears (12 types)
Crabnet
Danish seine
Drift gillnet
Fish corral
Fish trap
Gillnet
Hook and line
Multiple hook and line
Multiple handline
Spear gun
Spear gun w/ light
Trawl commercial
fppt.com


SHARKS AND RAYS
in Region 9
ZAMBOANGA PENINSULA
Sharks (August 2016)
Sharks and Rays (September 2016)
Sharks and Rays (September 2016)
Sharks Export
Whale Shark (November 22, 2014)
Confiscated Manta Ray and White-spotted Eagle Ray (April 18, 2013)
Confiscated Live (Cheilinus sp.) know as "Mameng" at Zamboanga International Airport (March 20, 2013)
Thank You
Thank You



Fishing Ground	Lending Sites				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Gingoog Bay		1			1
Macajalar Bay	Not indicate d			1	
Murcielagos Bay			1		
Iligan Bay				1	
Panguil Bay			1		
TOTAL		1	2	2	1

NSAP Region 10: Species and Numbers of Individuals Landed

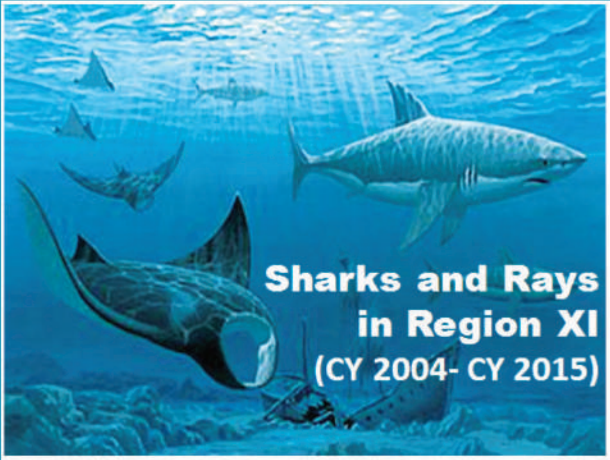
BATOIDS (6 spp.)	Gingoog Bay	Macajalar Bay	Murcielagos Bay	Iligan Bay	Panguil Bay
Himantura granulata					46
Mobula eregoodootenkee		1			
Mobula kuhlii		20			
Neotrygon kuhlii			25	8	
Rhynchobatus djiddensis		2			
Taeniura lymma		6			2
TOTAL		29	25	6	48
SHARKS (9 spp.)	**Gingoog Bay**	**Macajalar Bay**	**Murcielagos Bay**	**Iligan Bay**	**Panguil Bay**
Alopias pelagicus	1	1		1	
Alopias superciliosus				3	
Carcharhinus limbatus				1	
Carcharhinus sealei				2	
Carcharhinus sorrah				1	
Pristiophorus cirratus		1			
Squalus acanthias		2			
Squatina californica		1			
Squatina tergocellata	4				
TOTAL	5	5	0	8	0

NSAP Region 10: Gears used for Batoids

Batoids	BSGN	BSLL	DGN	GN	H&L	MH&L	Total
Himantura granulata	26			19		1	46
Mobula eregoodootenkee					1		1
Mobula kuhlii	19					1	20
Neotrygon kuhlii		25	5			3	33
Rhynchobatus djiddensis						2	2
Taeniura lymma	7					1	8
	52	25	5	19	1	8	110

NSAP Region 10: Gears used for Sharks

Sharks	BSGN	DGN	H&L	MH&L	RN	Total
Alopias pelagicus		1	1		1	3
Alopias superciliosus			3			3
Carcharhinus limbatus			1			1
Carcharhinus sealei				2		2
Carcharhinus sorrah				1		1
Pristiophorus cirratus	1					1
Squalus acanthias	2					2
Squatina californica	1					1
Squatina tergocellata				4		4
	4	1	5	7	1	18



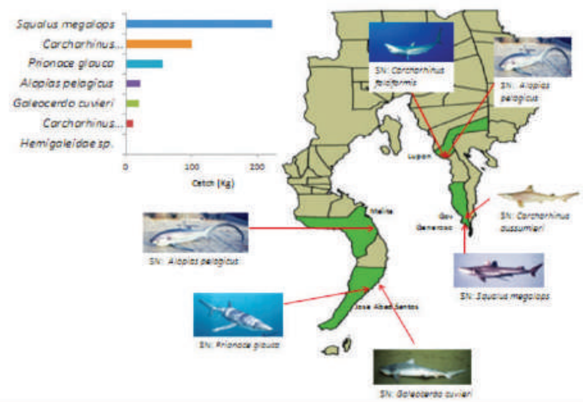
NSAP XI: MONITORED LANDING SITES

FISHING GROUND	LANDING SITES	LANDINGS (SPECIES GROUPS)		
		Sharks only	Batoids only	Both
Davao Gulf	Aroma, Lupon			Elasmo
	Bucana, Davao City		Batoids	
	Caburan Small	Sharks		
	Jamboree A			Elasmo
	Jamboree B, Gov Gen			Elasmo
	Kinanga, Don Marcelino		Batoids	
	Lawis, Davao City		Batoids	
	Lidao, Kaputian, IGACOS		Batoids	
	Mabuhay, Gov Gen			Elasmo
	Mandalihan, Lupon			Elasmo
	Matina Aplaya, Davao City		Batoids	
	Piape, Padada		Batoids	
	Talucanga, Malita			Elasmo
	Tibanban, Gov Gen		Batoids	
Philippine Sea	Jamboree A	Sharks		
	Jamboree B	Sharks		
2	16	3	7	6

Sharks Species Caught in Region XI (CY 2004- CY 2015)

Fishing Ground	Shark Species (7 spp.)	Gears Used (4 types0	Volume (kg)
Davao Gulf	*Alopias pelagicus* *Carcharhinus dussumieri* *Carcharhinus falciformis* *Galeocerdo cuvieri* *Hemigaleidae sp.* *Prionace glauca* *Squalus megalops*	Bottom Set Gill Net Handline Hook & Line Multiple Hand-line	218.29
Philippine Sea	*Squalus megalops*	Multiple Hand-line	215.90

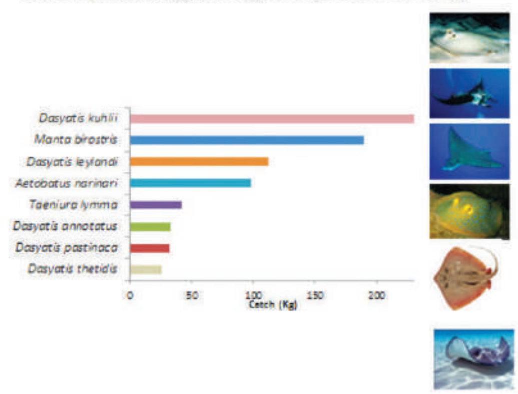
Sharks Species Caught in Region XI (CY 2004- CY 2015)



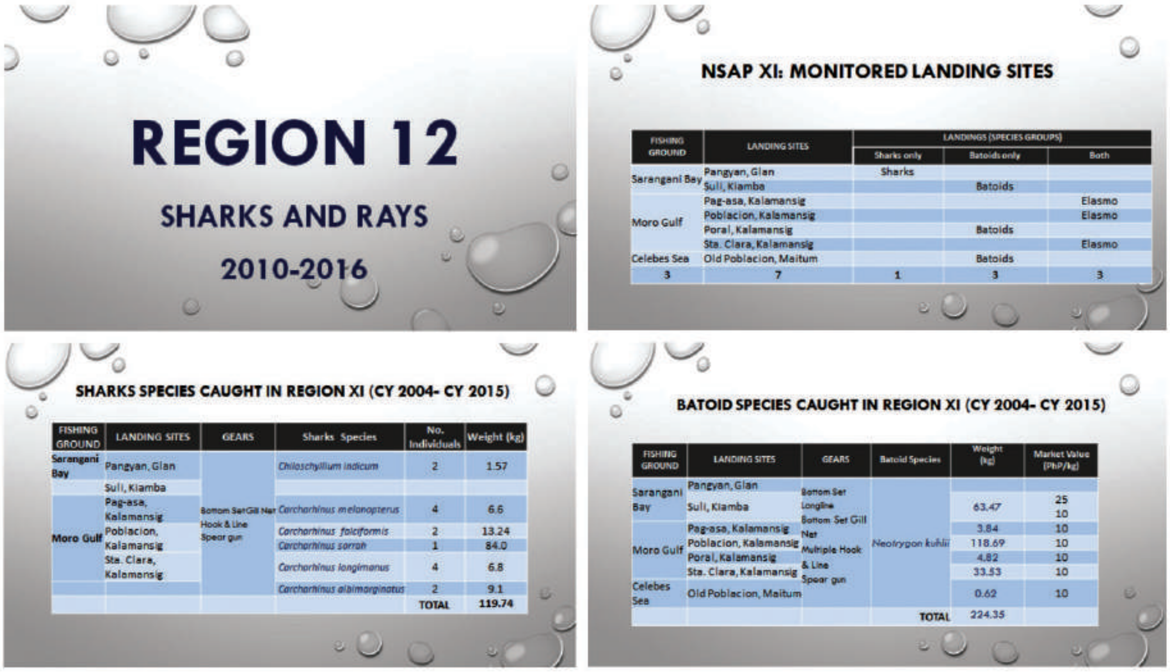
Sharks & Batoid Species Caught in Region XI (CY 2004- CY 2015)

Fishing Ground	Batoid Species (7 spp.)	Gears Used (8 types)	Volume (kg)
Davao Gulf	*Aetobatus narinari* *Dasyatis kuhlii* *Dasyatis leylandi* *Dasyatis pastinaca* Dasyatis thetidis *Manta birostris* *Taeniura lymma*	Bottom Set longline Bottom Set Gill Net Hand-line Hook & Line Multiple Handline Ringnet with Payao Spear Gun Trammel Net	10,516.05
		TOTAL (Batoids))	10,516.05

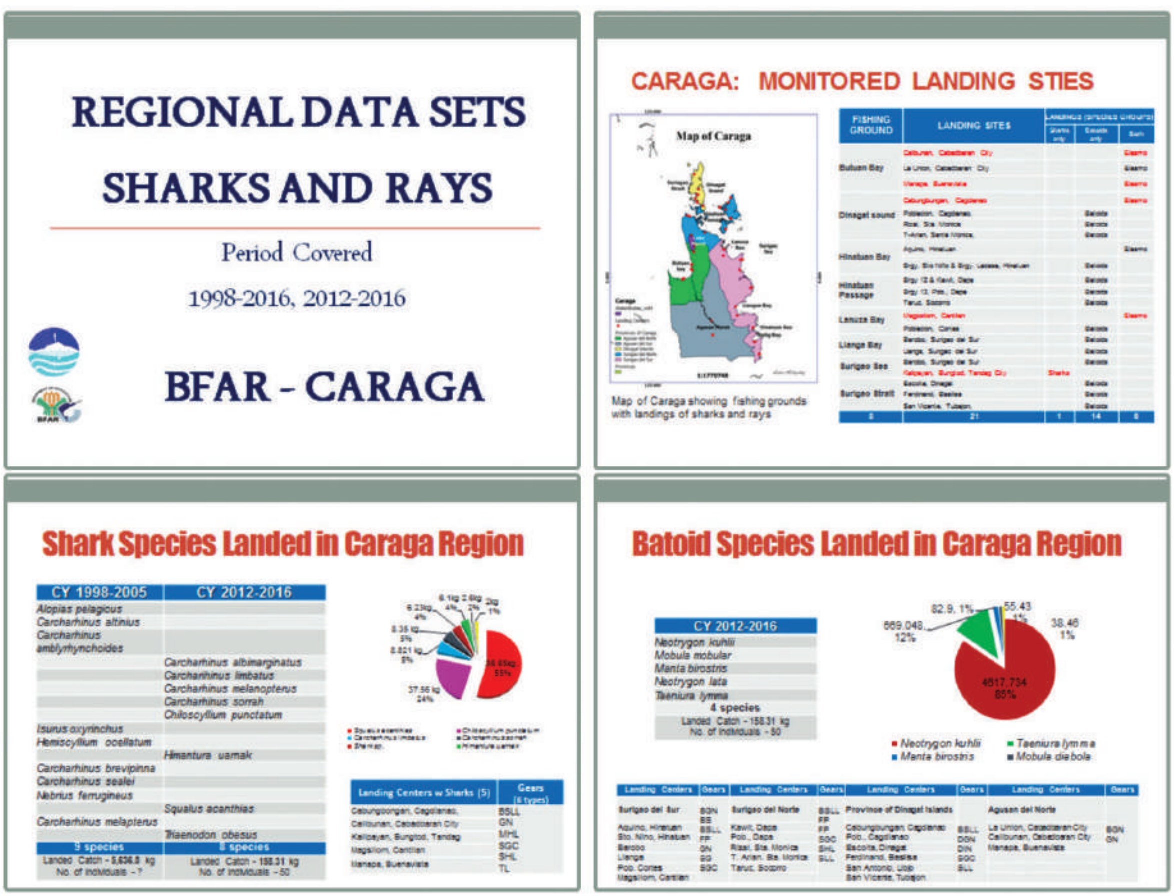
Batoid Species Caught in Region XI (CY 2004- CY 2015)



Annex R.
Highlights: Elasmobranch Fisheries in Region 12 (2000-2016)



Annex S.
Highlights: Elasmobranch Fisheries in Region CARAGA (2000-2016)



(Excerpt from the Twelfth Regular Session of the Scientific Committee of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, Bali, Indonesia, 3-11 August 2016)

4.3 WCPO SHARKS

4.3.0 Stock status indicators for key shark species

1. (Par. 73) No new information was provided on stock status indicators for all key shark species.

4.3.1 Oceanic whitetip shark (Carcharhinus longimanus)

Stock status and trends

2. (Par. 74) SC12 noted that no stock assessments were conducted for these shark species in 2016. Therefore, the stock status descriptions from SC8, SC9, and SC10 are still current for oceanic whitetip shark, silky shark, and North Pacific blue shark respectively. Updated information on catches was not compiled for and reviewed by SC12.

3.

Management advice and implications

4. (Par. 75) SC12 noted that no management advice has been provided since SC8, SC9, and SC10 for oceanic whitetip shark, silky shark, and North Pacific blue shark, respectively. Therefore, previous advice should be maintained, pending a new assessment or other new information.

4.3.2 Silky shark (Carcharhinus falciformis)

Stock status and trends

5. (Par. 76) SC12 noted that no stock assessments were conducted for these shark species in 2016. Therefore, the stock status descriptions from SC8, SC9, and SC10 are still current for oceanic whitetip shark, silky shark, and North Pacific blue shark respectively. Updated information on catches was not compiled for and reviewed by SC12.

Management advice and implications

6. (Par. 77) SC12 noted that no management advice has been provided since SC8, SC9, and SC10 for oceanic whitetip shark, silky shark, and North Pacific blue shark, respectively. Therefore, previous advice should be maintained, pending a new assessment or other new information.

7.

4.3.3 South Pacific blue shark (Prionace glauca)

Stock status and trends

8. (Par. 78) SC12 noted that WCPFC has not yet determined limit biological reference points for South Pacific blue shark.

9. (Par. 79) SC12 noted that the stock status for shark assessments presented to the Scientific Committee have been traditionally assessed relative to MSY-based reference points. It was also noted that realistic estimates of equilibrium unexploited recruitment and spawning biomass could not be obtained in the 2016 South Pacific blue shark assessment due to the lack of available data, conflicting CPUE time series, and uncertainty in the estimated stock recruitment relationship.

10. (Par. 80) SC12 noted that the 2015 catch of south Pacific blue shark provided within aggregate 5-degree square catch data was 26% lower than in 2014, and a 34% reduction over the average for 2010-14.

11. (Par. 81) SC12 noted that the 2016 South Pacific blue shark assessment is preliminary and is considered to be a work in progress. As a result, it cannot be used to determine stock status and form the basis of management advice.

12. (Par. 82) SC12 noted that there are a number of data uncertainties within the South Pacific blue shark assessment, especially with regard to historical and contemporary longline catch and CPUE estimates. The data-poor nature of the South Pacific blue shark assessment indicates that an improvement in the amount and quality of available biological and fishery information will be required in order to develop a useful integrated stock assessment model.

13.(Par. 83) SC12 noted the recommendations in the working papers (SC12-SA-WP-08 and SC12-SA-WP-09) for data improvements and other analytical work needed to improve the assessment for South Pacific blue shark, and recommends prioritizing such work.

Management advice and implications

14. (Par. 84) SC12 noted that no management advice has been provided for South Pacific blue shark.

4.3.4 North Pacific blue shark (Prionace glauca)

Stock status and trends

15. (Par. 85) SC12 noted that no stock assessments were conducted for these shark species in 2016. Therefore, the stock status descriptions from SC8, SC9, and SC10 are still current for oceanic whitetip shark, silky shark, and North Pacific blue shark respectively. Updated information on catches was not compiled for and reviewed by SC12.

Management advice and implications

16. (Par. 86) SC12 noted that no management advice has been provided since SC8, SC9, and SC10 for oceanic whitetip shark, silky shark, and North Pacific blue shark, respectively. Therefore, previous advice should be maintained, pending a new assessment or other new information.

17.

4.3.5 North Pacific shortfin mako (Isurus oxyrinchus)

Stock status and trends

18. (Par. 87) SC12 noted that there is no existing stock assessment for North Pacific shortfin mako shark.

Management advice and implications

19. (Par. 88) SC12 noted that no management advice has been provided for North Pacific shortfin mako shark.

20.

4.3.6 Pacific bigeye thresher shark (Alopias superciliosus)

Stock status and trends

21. (Par. 89) SC12 noted that there is no existing stock assessment for Pacific bigeye thresher shark but acknowledged the submission of SC12-SA-IP-17 which represents the initial chapters of a stock assessment currently in preparation.

22. (Par. 90) SC12 noted that, although it was planned that the bigeye thresher shark assessment would be presented to and reviewed by SC12, the full assessment report could not be completed in time and is currently being finalized by the consultants, the WCPFC Secretariat, the SPC (on behalf of some of their members), the United States and Japan. SC12 understands that the finalized bigeye thresher assessment report will be posted on the ABNJ Tuna Project website when ready, and then provided to SC13 for discussion.

Management advice and implications

23. (Par. 91) SC12 noted that no management advice has been provided for Pacific bigeye thresher shark

Annex U.

Senate Bill 905: An Act Banning the Catching, Sale, Purchase, Possession, Transportation, Importation, and Exportation of all Sharks and Rays or Any Part Thereof in the Country

---

SEVENTEENTH CONGRESS OF THE REPUBLIC OF THE PHILIPPINES
First Regular Session

Senate
Office of the Secretary

'16 JUL 28 A11 :02

RECEIVED BY:

SENATE
S.B. No. 905

Introduced by SEN. WIN GATCHALIAN

AN ACT
BANNING THE CATCHING, SALE, PURCHASE, POSSESSION, TRANSPORTATION, IMPORTATION, AND EXPORTATION OF ALL SHARKS AND RAYS OR ANY PART THEREOF IN THE COUNTRY

EXPLANATORY NOTE

The Philippines is known as the center of marine biodiversity, having about two-thirds of the known marine species of the Pacific living in its coastal waters. Sharks, as predators of the sea, play a vital role in regulating the ecological balance, particularly the health of important commercial fish species, population balance, and protection of coral reefs. As such, our country plays a crucial role in protecting these marine species.

Despite their importance, these sea creatures have been hunted by humans for their meat and fins. CNN and a conservation group called Shark Savers state that, "up to 100 million sharks are killed annually, with some shark populations declining by as much as 90 percent."

Numerous laws have been put in place to protect our environment and its flora and fauna. The 1987 Constitution provides that, "[t]he State shall protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature."

Similarly, Republic Act 9146 or the Wildlife Resources Conservation and Protection Act states that "it shall be the policy of the State to conserve the country's wildlife resources, their habitats and sustainability," and shall work towards and initiate scientific studies towards enhancement of biological diversity. Said law also recognizes our commitment to the Convention on International Trade on Endangered Species of Wild Flora and Fauna, which seeks to ensure that the survival of wild animals and plants are not threatened due to international trade. It also designates flora and fauna in separate appendices according to the threat of extinction, shark species being described as either threatened with extinction or those whose trade must be controlled in order to avoid utilization that is incompatible with their survival.

Republic Act No. 8550 or The Fisheries Code also declares it the policy of the State to achieve "conservation, protection and sustained management of the country's fishery and aquatic resources" while Executive Order No. 578 makes it a policy to protect and conserve biodiversity of ecosystems, species, and genes.

Although sharks and rays have not been officially declared endangered, their population has drastically declined over the years, not only because of environmental decline but more importantly, over-fishing for human consumption. As they reproduce slowly, they are in danger of becoming extinct if we do not proactively protect them. As such, I urge that this measure be passed with dispatch.

WIN GATCHALIAN

SEVENTEENTH CONGRESS OF THE REPUBLIC OF THE PHILIPPINES
First Regular Session

Senate
Office of the Secretary

'16 JUL 28 A11 :02

RECEIVED BY:

SENATE
S.B. No. 905

Introduced by SEN. WIN GATCHALIAN

AN ACT
BANNING THE CATCHING, SALE, PURCHASE, POSSESSION, TRANSPORTATION, IMPORTATION, AND EXPORTATION OF ALL SHARKS AND RAYS OR ANY PART THEREOF IN THE COUNTRY

Be it enacted by the Senate and the House of Representatives of the Philippines in Congress assembled:

SECTION 1. ***Short Title.*** - This Act shall be known as the *"Sharks and Rays Conservation Act"*

SEC. 2. ***Declaration of Policy.*** - Pursuant to the objectives of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, it is the declared policy of the State to conserve, protect, and sustain the management of the country's shark and ray population. Thus, the State shall ensure the maintenance of ecological balance and marine biodiversity for the benefit of present and future generations of Filipinos.

SEC. 3. ***Prohibited Acts and Penalties.*** - It shall be unlawful to catch sharks and rays in Philippine waters or to sell, purchase, possess, transport, import, or export the same, in any state, condition or form, or any part thereof.

It shall also be unlawful to harm or to kill sharks and rays in the course of catching other species of fish. Sharks and rays, which are accidentally included in the

catch in the course of catching other species of fish, shall be immediately released unharmed to the sea.

To eliminate the demand that result in the massive killing of sharks and rays, the selling and serving of sharks in soup and all food menus with sharks and rays by-products shall likewise be prohibited.

Specifically, the following illegal acts shall be prohibited and shall be punished with the corresponding penalties:

a) Killing, destroying, or inflicting injury on sharks and rays shall be punished with a fine of One Hundred Thousand Pesos (P100,000.00) to One Million Pesos (P1,000,000.00) or imprisonment of a minimum of six (6) years and one (1) day to twelve (12) years, or both such fine and imprisonment;

b) Catching, selling, purchasing, and possessing of sharks and rays, and their by-products and derivatives shall be punished with a fine of Fifty Thousand Pesos (P50,000.00) to Five Hundred Thousand Pesos (P500,000.00) or imprisonment of a minimum of four (4) years and one (l) day to twelve (12) years, or both such fine and imprisonment; and

c) Transporting, importing, and exporting of sharks and rays, and their by-products and derivatives shall be punished with a fine of Thirty Thousand Pesos (P30,000.00) to Three Hundred Thousand Pesos (P300,000.00) or imprisonment of a minimum of two (2) years and one (1) day to twelve (12) years, or both such fine and imprisonment.

If the violation is committed by a juridical person or government entity, the head of office and the person responsible for the violation shall be held liable, without prejudice to any further liability for violation of any provision of other applicable laws.

SEC. 4. ***Implementation.*** - The Bureau of Fisheries and Aquatic Resources (BFAR) of the Department of Agriculture (DA) shall be the lead agency in the implementation of this Act. The Department of Trade and Industry (DTI), the Philippine Coast Guard, the Philippine National Police, other law enforcement agencies, and LGUs shall likewise assist in the implementation of this Act.

The BFAR, in coordination with the Department of Environment and Natural Resources (DENR), shall issue the necessary orders to list all sharks and rays as endangered species. The Department of Tourism (DOT) and the Philippine Commission on Sports Scuba Diving (PCSSD) shall provide the necessary assistance to the BFAR, the DENR, and the LGUs in identifying the habitats and feeding grounds of sharks and rays and declare the same as protected.

Following the identification of the habitats and fishing grounds of these marine species, the BFAR shall recommend to the Secretary of the DENR, the issuance of an order declaring these areas as protected areas and pursuant thereto, shall ensure that all local governments and the media, among others, are appropriately informed.

SEC. 5. ***Information and Education.*** - The BFAR, the DENR, the DOT, the DTI, the LGUs and other academic institutions shall undertake a nationwide information and education campaign to adequately inform the populace of the value of sharks and rays in the marine ecosystem, and of the importance of preserving their respective habitats and feeding grounds.

SEC. 6. ***Implementing Rules and Regulations.*** - Within sixty (60) days after the effectivity of this Act, the BFAR, in coordination with the DENR, the DOT, and the DTI shall issue the necessary rules and regulations for the effective implementation of this Act.

SEC. 7. ***Separability Clause.*** - If any section or provision of this Act is held unconstitutional or invalid, the remaining sections or provisions not affected thereby shall continue to be in full force and effect.

SEC. 8. ***Repealing Clause.*** - All laws, decrees, executive orders, rules and regulations, issuances or parts thereof inconsistent with the provisions of this Act are hereby repealed or modified accordingly.

SEC. 9. ***Effectivity Clause.*** - This Act shall take effect fifteen (15) days from its publication in the *Official Gazette* or in a newspaper of general circulation.

Approved,

Annex V.
Sangguniang Panlalawigan Resolution No. 1559-2014

Republic of the Philippines
Province of Cebu
SANGGUNIANG PANLALAWIGAN
Cebu Capitol, Cebu City

9/12/14
3pm

13th SP **30th** **Session**

EXCERPT FROM THE MINUTES OF THE 28th REGULAR SESSION HELD BY THE SANGGUNIANG PANLALAWIGAN OF CEBU, AT THE SESSION HALL, LEGISLATIVE BUILDING, CAPITOL COMPOUND, CEBU CITY ON AUGUST 18, 2014.

PRESENT:

Hon. Agnes A. Magpale	Vice-Governor/Presiding Officer
Hon. Julian B. Daan	Presiding Officer Pro Tempore
Hon. Arleigh Jay C. Sitoy	Majority Floor Leader
Hon. Jude Thaddeus Durano Sybico	Assistant Majority Floor Leader
Hon. Raul D. Alcoseba	Sanggunian Member
Hon. Peter John D. Calderon	Sanggunian Member
Hon. Christopher R. Baricuatro	Sanggunian Member
Hon. Alex S. Binghay	Sanggunian Member
Hon. Grecilda P. Sanchez	Sanggunian Member
Hon. Joven J. Mondigo, Jr.	Sanggunian Member
Hon. Sun J. Shimura	Sanggunian Member
Hon. Miguel Antonio A. Magpale	Sanggunian Member
Hon. Thadeo Z. Ouano	Sanggunian Member
Hon. Carmen Remedios Durano-Meca	Sanggunian Member (PCL)

ABSENT:

Hon. Celestino A. Martinez III	Sanggunian Member (FABC)

RESOLUTION NO. 1559-2014

AUTHOR : HON. THADEO Z. OUANO

REQUESTING THE PHILIPPINE SENATE AND HOUSE OF REPRESENTATIVES, ALL THE PROVINCIAL GOVERNMENT UNITS OF THE PHILIPPINE ARCHIPELAGO AND ALL MUNICIPALITIES AND COMPONENT CITIES OF THE PROVINCE OF CEBU TO FORMULATE LEGISLATIONS AND ACTIVITIES FOR THE PROTECTION AND CONSERVATION OF SHARKS WITHIN THEIR RESPECTIVE JURISDICTION.

WHEREAS, Section 16, Article II of the Philippine Constitution vests in the State the ultimate responsibility to preserve and protect the environment and the Local Government Code of 1991 (R.A. No. 7160) empowers Local Government Units to adopt measures to enhance the right of the people to a balanced ecology and devolved the management, utilization, development and conservation of the municipal waters and its coastial and fishery resources to the Local Government Units;

Res. No. 1559-2014 Page 2

WHEREAS, sharks are a group of fish characterized by a cartilaginous skeleton, five to seven gill slits on the sides of the head, and pectoral fins that are not fused to the head. Modern sharks are classified within the clade Selachimorpha (or Selachii) and are the sister group to the rays;

WHEREAS, according to studies, sharks have ruled the oceans for more than 400 million years and historically sharks were not considered important species to fisheries managers and conservationists because they were not economically important and very little was known about them. They are even considered as threat to human lives as they are often reported to have attacked swimmers and fishermen;

WHEREAS, as data became available, it became clearer that shark populations were declining, the removal of such large numbers from the ecosystem can have irreversible effects on every species in the marine web, since sharks are top predators and their decimation creates a ripple effect throughout the marine food web, impairing the balance of the ocean ecosystem;

WHEREAS, based on 2010 records, it is estimated that 100 million sharks are killed by people every year, due to commercial and recreational fishing and shark finning tops the list of reasons why shark population is declining, they are often killed for shark fin soup. Shark fin including shark meat has become a major trade within black markets all over the world and shark fin soup has become a status symbol in Asian countries;

WHEREAS, at present, conservation measures are needed for many species of sharks. Currently, there are several conservation and management initiatives and plans that operate on many levels from international conventions to local laws from different countries and so it is time for the Philippines to contribute its share in the protection and conservation of sharks;

WHEREAS, there is a need to join other countries and the international organizations call and activities through programs and legislations directed to the protection and conservation of sharks; We can do our share by legislating on banning shark fishing, regulating the sale of shark fin and products and educating our constituents on the importance of sharks and its present population;

WHEREAS, the very first Shark Summit was conducted in the Province of Cebu, as one of the highlights of Provincial Government's Celebration of its 445th founding anniversary, organized by environmental rights committed to a common purpose for the protection of the sharks to let the world know that we are one with them in protecting and conserving sharks;

WHEREAS, there is a need for all of the local government units to unite and join hands to make our conservation efforts more effective hence this call by the Province of Cebu in the unity of purpose in legislation and conduct of activities towards protection of sharks;

NOW, THEREFORE, on motion of Majority Floor Leader, **Hon. ARLEIGH JAY C. SITOY,** duly seconded by Presiding Officer Pro Tempore, **Hon. JULIAN B. DAAN** for the approval of the resolution authored by Member, **Hon. THADEO Z. OUANO**, be it

Res. No. 1559-2014 Page 3

RESOLVED, as it is hereby **RESOLVED,** to request the Philippine Senate and House of Representatives, all the Provincial Government Units of the Philippine Archipelago and all municipalities and component cities of the Province of Cebu to formulate legislations and activities for the protection and conservation of sharks within their respective jurisdiction;

RESOLVED FURTHER, that copies of this resolution be furnished to Senate President Franklin M. Drilon, House Speaker Feliciano "Sonny" Belmonte, Jr., Governor Hilario P. Davide III, Governors of all Provincial Government Units of the entire Philippines, all City/Municipal Mayors in the Province of Cebu, Department of Interior and Local Government - VII (DILG), Bureau of Fisheries and Aquatic Resources (BFAR - VII), Greenpeace, Save Philippine Seas, Marine Wildlife Watch of the Philippines and Ecofish Philippines, for their information and appropriate action.

CARRIED UNANIMOUSLY.

-o0o-

I hereby certify to the correctness of the afore-quoted resolution.

EUGIDIA D. ANDRINO
Board Secretary V
OIC-Secretary to the Sangguniang Panlalawigan

APPROVED:

AGNES A. MAGPALE
Vice-Governor/ Presiding Officer

Date: SEP 02 2014

COPY FOR:

Senate President Franklin M. Drilon
House Speaker Feliciano "Sonny" Belmonte, Jr.
Governor Hilario P. Davide III
Governors of all Provincial Government Units of the entire Philippines
All City/Municipal Mayors in the Province of Cebu
Department of Interior and Local Government - VII (DILG)
Bureau of Fisheries and Aquatic Resources (BFAR – VII)
Greenpeace
Save Philippine Seas
Marine Wildlife Watch of the Philippines
Ecofish Philippines

COPY FURNISHED:

Hon. Vice-Gov. Agnes A. Magpale
Hon. Thadeo Z. Ouano
EDA/lts/ecna

BIBLIOGRAPHY

Acebes, J. M. V., and M. Tull. 2016. The History and Characteristics of the Mobulid Ray Fishery in the Bohol Sea, Philippines. PLoS ONE 11. doi:10.1371/journal.pone.0161444.

Alava, M. N. R. 2002. “Elasmobranchs” and “Whale Sharks.” *In Philippine Biodiversity Conservation Priorities: A Second Iteration of the National Biodiversity Strategy and Action Plan*, ed. P. S. Ong, L. E. Afuang, and R. G. Rosell-Amball. Quezon City, Philippines: DENR=PAWB/CI-Philippines/BCP/UP-CIDS/FPE.

Alava, M. N. R. 2005. *National Biodiversity Indicator Profile for Endangered Sharks and Shark-like Species in the Philippines: A Case Study on Whale Shark.* DA-NFRDI/DENR-PAWB/UNEP-WCMC-RIVM Biodiversity Indicators for National Use: Marine and Coastal Ecosystem Component.

Alava, M. N. R., and A. A. S. P. Yaptinchay. 2000. Whale sharks in the Philippines (abstract). In . Honolulu, HI, USA.

Alava, M. N. R., A. A. S. P. Yaptinchay, G. Acogido, M. L. L. Dolar, C. J. Wood, and S. Leatherwood. 1997a. Fishery and trade of whale shark (*Rhincodon typus*) in the Philippines presented at the 13th American Elasmobranch Society (AES) Annual Meeting, Seattle, WA, USA.

Alava, M. N. R., A. A. S. P. Yaptinchay, R. B. Trono, and E. R. Dolumbal. 1997b. Fishery and trade of whale sharks and manta rays in the Bohol Sea, Philippines presented at the International Seminar and Workshop on Sharks and Rays Biodiversity, Conservation and Management, July, Tuaran, Sabah, Malaysia.

Alava, M. N. R., J. P. A. Gaudiano, J. A. Utzurrum, E. E. C. Capuli, M. T. R. Aquino, M. M. A. Luchavez-Maypa, and M. D. Santos. 2014. *Pating Ka Ba? An identification guide to sharks, batoids and chimaeras of the Philippines.* Department of Agriculture, Bureau of Fisheries and Aquatic Resources-National Fisheries Research and Development Institute and Marine Wildlife Watch of the Philippines.

Ambal, R. G. R., M. V. Duya, M. A. Cruz, O. G. Coroza, S. G. Vergara, N. de Silva, N. Molinyawe, and B. Tabaranza. 2012. Key Biodiversity Areas in the Philippines: Priorities for Conservation. *Journal of Threatened* Taxa 4: 2788–2796.

Aquino, M. T. R., A. M. Songco, and R. C. Alarcon. 2015. Notes on the presence of *Manta alfredi* in the Tubbataha Reefs Natural Park, Cagayancillo, Palawan, Philippines. The Palawan Scientist 7: 1–11.

Araujo, G., A. Ponzo, D. Geary, S. Craven, S. J. Snow, and A. R. Lucey. 2013. *Describing the population structure of Rhincodon typus occurring in the waters of Oslob – Cebu, Philippines – between March 2012 and June 2013, during the provisioning interaction hours.* e70v1. PeerJ PrePrints. doi:10.7287/peerj.preprints.70v1.

Barratt, P., R. D. Cavanagh, and P. M. Kyne. 2003. *Chiloscyllium indicum*. The IUCN Red List of Threatened Species 2003: e.T41791A10547620. March.

Barut, N. C. 2006. Landed catch and effort monitoring and biological study of sharks in selected landing sites in the Philippines. In *Report on the Study on Shark Production, Utilization and Management in the ASEAN Region (2003–2004),* 107–110. Bangkok, Thailand: Southeast Asian Fisheries Development Center (SEAFDEC).

Barut, N. C., and J. S. Zartiaga. 1997. Shark fisheries in the Philippines presented at the International Seminar and Workshop on Sharks and Rays Biodiversity, Conservation and Management, July, Tuaran, Sabah, Malaysia.

Boncodin, E., and M. N. R. Alava. 1999. *Ecological data collection in Donsol, Sorsogon: Final Report (February–July 1999).* Unpublished data.

Bonfil, R. 1994. *Overview of world elasmobranch fisheries*. 341. Fisheries Technical Paper. Rome, Italy: Food and Agricultural Organization of the United Nations (UN-FAO).

Bray, D. J. 2017. *Urogymnus asperrimus* in Fishes of Australia. Fishes of Australia.

Camhi, M., S. Fowler, J. Musick, A. Barutigam, and S. Fordham. 1998. *Sharks and their relatives: ecology and conservation.* 20. Occasional Paper of the IUCN Species Survival Commission.

Camhi, M. D., S. V. Valenti, S. V. Fordham, S. L. Fowler, and C. Gibson. 2009. *The conservation status of pelagic sharks and rays: Report of the IUCN Shark Specialist Group Pelagic Shark Red List Workshop, Tubney House, University of Oxford, UK, 19-23 February 2007.*

Cartamil, D. P., J. J. Vaudo, C. G. Lowe, B. M. Wetherbee, and K. N. Holland. 2003. Diel movement patterns of the Hawaiian stingray, *Dasyatis lata*: implications for ecological interactions between sympatric elasmobranch species. *Marine Biology* 142: 841–847.

Chen, H. K., ed. 1996. *Shark fisheries and the trade in sharks and shark products of Southeast Asia*. Petaling Jaya, Selangor, Malaysia: TRAFFIC Southeast Asia.

Chou, P. D. 2015. Regional Capacity Building Workshop for CMS Non-Parties of South-East Asia (Powerpoint Presentation) Quezon City and Balanga City, Philippines.

Compagno, L. J. V. 1984. *FAO species catalogue Vol. 4. Sharks of the world. An annotated and illustrated catalogue of shark species known to date. Parts 1 and 2.* 125. FAO Fisheries Synopsis.

Compagno, L. J. V. 1990. Shark exploitation and conservation. In *Elasmobranchs as Living Resources: Advances in the Biology, Ecology, Systematics, and the Status of the Fisheries: Proceedings of the Second United States-Japan Workshop, East-West Center, Honolulu, Hawaii, 9-14 December 1987*, ed. H. L. Pratt, S. H. Gruber, and T. Taniuchi, 391–414. NOAA Technical Report NMFS 90. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Compagno, L. J. V. 1995. Through a glass darkly: a troubled future for freshwater elasmobranchs. Chondrias: 9–11.

Compagno, L. J. V. 2009. *Carcharhinus borneensis.* The IUCN Red List of Threatened Species 2009: e.T39367A10182233. doi:10.2305/IUCN.UK.2009-2. RLTS.T39367A10182233.en.

Compagno, L. J. V., and H. Ishihara. 2009. *Rhinobatos schlegelii.* The IUCN Red List of Threatened Species 2009: e.T161713A5486603.

Compagno, L. J. V., and R. B. McAuley. 2016. *Rhynchobatus laevis*. The IUCN Red List of Threatened Species 2016: e.T41854A68643153.

Compagno, L. J. V., and V. H. Niem. 1998. Part Sharks: Hexanchidae, Echinorhinidae, Squalidae, Squatinidae, Heterodontidae, Parascyllidae, Bracheluridae, Orectolobidae, Hemiscyllidae, Odontaspididae, Scyliorhinidae, Proscyllidae, Triakidae. In *FAO Identification Guide for Fishery Purposes. The Living Marine Resources of the Western Central Pacific*, ed. K. E. Carpenter and V. H. Niem, 1195–1232, 1235–1259, 1264–1267, 1279–1295, 1297–1304, 1312–136. Food and Agriculture Organization, Rome.

Compagno, L. J. V., P. R. Last, J. D. Stevens, and M. N. R. Alava. 2005. Checklist of Philippine chondrichthyes. *CSIRO Marine Laboratories Report* 243: 1–103.

Cook, S. F., and L. J. V. Compagno. 2005. *Hexanchus griseus.* The IUCN Red List of Threatened Species 2005: e.T10030A3155348.

Dagit, D. D. 2006. *Hydrolagus mitsukurii*. The IUCN Red List of Threatened Species 2006: e.T60194A12308291.

Dudgeon, C. L., M. B. Bennett, and P. M. Kyne. 2016. *Chiloscyllium punctatum*. The IUCN Red List of Threatened Species 2016: e.T41872A68616745.

Duffy, C. A. J., L. J. Paul, and A. Chin. 2016. *Dasyatis brevicaudata*. The IUCN Red List of Threatened Species 2016: e.T41796A68618154. doi:10.2305/IUCN.UK.2016-1. RLTS.T41796A68618154.en.

Ebert, D. A., and H. A. Wilms. 2013. *Pristiophorus lanae* sp. nov., a new sawshark species from the western North Pacific, with comments on the genus *Pristiophorus* Müller & Henle, 1837 (Chondrichthyes: Pristiophoridae). Zootaxa 3752: 86–100.

Ebert, D. A., W. T. White, K. J. Goldman, L. J. V. Compagno, T. S. Daly-Engel, and R. D. Ward. 2010. Resurrection and redescription of *Squalus suckleyi* (Girard, 1854) from the North Pacific, with comments on the *Squalus acanthia*s subgroup (Squaliformes: Squalidae). Zootaxa: 22–40.

Ebert, D. A., H.-C. Ho, W. T. White, and M. R. De Carvalho. 2013. Introduction to the systematics and biodiversity of sharks, rays, and chimaeras (Chondrichthyes) of Taiwan. Zootaxa 3752: 5–19. doi:10.11646/zootaxa.3752.1.3.

Ebert, D. A., D. A. Vidthayanon, and B. Samiengo. 2016. *Bathytoshia lata.* The IUCN Red List of Threatened Species 2016: e.T161386A104066775.

Eckert, S. A., and B. S. Stewart. 1998. Telemetry, and the satellite tracking of whale sharks, *Rhincodon typus* in the Sea of Cortez, Mexico. presented at the International Seminar and Workshop on Sharks and Rays Biodiversity, Conservation and Management, July 7, Tuaran, Sabah, Malaysia.

Eckert, S. A., and B. S. Stewart. 2001. Telemetry and Satellite Tracking of Whale Sharks, *Rhincodon Typus*, in the Sea of Cortez, Mexico, and the North Pacific Ocean. *Environmental Biology of Fishes* 60: 299–308. doi:10.1023/A:1007674716437.

Eckert, S. A., L. L. Dolar, G. L. Kooyman, W. Perrin, and R. A. Rahman. 2000. Are the whale sharks (*Rhincodon typus*) of Southeast Asia resident or migratory? Abstract presented at the American Elasmobranch Society 16th Annual Meeting, July 14, La Paz, Mexico.

Eckert, S. A., L. L. Dolar, G. L. Kooyman, W. Perrin, and R. A. Rahman. 2002. Movements of whale sharks (*Rhincodon typus*) in South-east Asian waters as determined by satellite telemetry. *Journal of Zoology* 257: 111–115. doi:10.1017/S0952836902000705.

Encina, V. B. 1977. The discovery and distribution of the spiny dogfish shark resource in the Philippines. *The Philippine Journal of Fisheries* 11: 127–139.

Eschmeyer, W. N., R. Fricke, and R. Van der Laan, ed. 2016. Catalog of Fishes: genera, species, references. Updated 31 March 2016.

FAO. 1995. *Code of Conduct for Responsible Fisheries.* Rome, Italy: Food and Agriculture Organization of the United Nations.

Faria, V. V., M. T. McDavitt, P. Charvet, T. R. Wiley, C. A. Simpfendorfer, and G. J. P. Naylor. 2013. Species delineation and global population structure of Critically Endangered sawfishes (Pristidae). *Zoological Journal of the Linnean Society* 167: 136–164. doi:10.1111/j.1096-3642.2012.00872.x.

Fowler, H. W. 1941. *Contributions to the Biology of the Philippine Archipelago and Adjacent Waters: The fishes of the groups Elasmobranchii, Holocephali, Isospondyli, and Ostarophysi obtained by the United States Bureau of Fisheries Steamer "Albatross" in 1907 to 1910, chiefly in the Philippine Islands and Adjacent Seas.* Washington: United States Government Printing Office.

Fowler, S. 1999. *The role of non-governmental organisations in the international conservation of elasmobranchs*. FAO Fisheries Technical Paper 378/2. Case Studies of the Management of Elasmobranch Fisheries.

Fowler, S. L., and T. J. Lisney. 2003. A*ulohalaelurus kanakorum*. The IUCN Red List of Threatened Species 2003: e.T41870A10581635. March.

Freeman, A., D. M. Verdote, J. M. V. Acebes, and A. Ponzo. 2014. *Mobulidae fishery in the Bohol Sea: A first extensive assessment of its sustainability*.

Gaudiano, J. P. A., and M. N. R. Alava. 2003. *Resource utilization and exploitation of dogshark resources in Butuan and Gingoog bays, northern Mindanao, Philippines.* Unpublished report submitted to WWF-Philippines as part of the Cetacean Fishery Interaction Assessment Project.

Goldman, K. J., J. Baum, G. M. Cailliet, E. Cortés, S. Kohin, D. Macías, P. Megalofonou, M. Perez, et al. 2009. Alopias vulpinus. The IUCN Red List of Threatened Species 2009: e.T39339A10205317.

Grubbs, R. D., and D. S. Ha. 2006. *Gymnura micrura*. The IUCN Red List of Threatened Species 2006: e.T60115A12305055.

Herre, A. W. 1953. *Checklist of Philippine Fishes*. United States Government Printing Office.

Hoenig, J. M., and S. H. Gruber. 1990. Life-history patterns in elasmobranchs: implications for fisheries management. In *Elasmobranchs as Living Resources: Advances in the Biology, Ecology, Systematics, and the Status of the Fisheries: Proceedings of the Second United States-Japan Workshop, East-West Center, Honolulu, Hawaii, 9–14 December 1987*, ed. H. L. Pratt Jr, S. H. Gruber, and T. Taniuchi, 1–16. NOAA Technical Report NMFS 90. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Hong Kong Imports and Exports Classification List (Harmonized System) 2016 Edition, Volume One: Commodity Section I–X. 2016. Hong Kong SAR: Census and Statistics Department.

Iglésias, S., and K. Nakaya. 2009. *Galeus sauteri*. The IUCN Red List of Threatened Species 2009: e.T161406A5416990.

Jacobsen, I. P. 2007. The Biology of Five Benthic Elasmobranch Species from Northern and North-East Australia, Incorporating a Taxonomic Review of the Indo-West Pacific Gymnuridae. PhD Thesis, University of Queensland.

Jacobsen, I. P., P. M. Kyne, and P. R. Last. 2015. *Neotrygon annotata.* The IUCN Red List of Threatened Species 2015: e.T60150A68636040.

Kreuzer, R., and R. Ahmed. 1978. *Shark Utilization and Marketing*. Rome, Italy: Food and Agriculture Organization of the United Nations.

Kyne, P. M., and W. T. White. 2015. *Taeniurops meyeni.* The IUCN Red List of Threatened Species 2015: e.T60162A68646736.

Kyne, P. M., T. I. Walker, and M. B. Bennett. 2016. *Squatina tergocellata*. The IUCN Red List of Threatened Species 2016: e.T41863A68645801.

Last, P. R., and J. D. Stevens. 1994. *Sharks and Rays of Australia*. CSIRO Australia.

Last, P. R., and W. T. White. 2008. Resurrection of the genus *Neotrygon Castelnau* (Myliobatoidei: Dasyatidae) with the description of *Neotrygon picta* sp. nov., a new species from northern Australia. In *Descriptions of New Australian Chondrichthyans*, ed. P. R. Last, W. T. White, and J. J. Pogonoski, 315–325. Hobart, Tasmania, Australia: CSIRO Marine and Atmospheric Research.

Last, P. R., W. T. White, J. J. Pogonoski, D. C. Gledhill, B. Ward, and G. K. Yearsley. 2007. Part 1 — Application of a rapid taxonomic approach to the genus *Squalus*. In *Descriptions of new dogfishes of the genus Squalus (Squaloidea: Squalidae), CSIRO Marine and*

Atmospheric Research Paper 014, ed. P. R. Last, W. T. White, and J. J. Pogonoski, 1–10. CSIRO Australia.

Last, P. R., G. J. P. Naylor, and B. M. Manjaji-Matsumoto. 2016a. A revised classification of the family Dasyatidae (Chondrichthyes: Myliobatiformes) based on new morphological and molecular insights. *Zootaxa* 4139: 345–368. doi:10.11646/zootaxa.4139.3.2.

Last, P. R., W. White, B. Séret, G. Naylor, M. de Carvalho, and M. Stehmann. 2016b. *Rays of the World.* CSIRO Publishing.

Luchavez-Maypa, M. L., J. P. Gaudiano, A. B. R. Uypitching, M. N. R. Alava, P. Last, J. Stevens, and L. J. V. Compagno. 2001. *Elasmobranch species confirmed from Philippine waters: The WWF Elasmobranch Collection.* Terminal Report submitted to WWF Elasmobranch Biodiversity and Conservation Project (1998-2001). WWF Philippines.

Manjaji Matsumoto, B. M., W. T. White, Fahmi, and A. N. Gutteridge. 2016a. *Pateobatis fai*. The IUCN Red List of Threatened Species 2016: e.T161615A104219816.

Manjaji Matsumoto, B. M., Fahmi, and W. . White. 2016b. *Pateobatis jenkinsii*. The IUCN Red List of Threatened Species 2016: e.T161744A104229717.

Manjaji Matsumoto, B. M., W. T. White, Fahmi, H. Ishihara, and D. L. Morgan. 2016c. *Urogymnus granulatus*. The IUCN Red List of Threatened Species 2016: e.T161431A104280437.

Marshall, A. D., L. J. V. Compagno, and M. B. Bennett. 2009. Redescription of the genus *Manta* with resurrection of *Manta alfredi* (Krefft, 1868) (Chondrichthyes; Myliobatoidei; Mobulidae). Zootaxa 2301: 1–28. doi:10.5281/zenodo.191734.

Menni, R. C., and L. O. Lucifora. 2007. *Condrictios de la Argentina y Uruguay.* Serie Técnica-Didáctica 11. ProBiota. La Plata, Argentina: FCNyM, UNLP.

Morgan, D. L., W. T. White, and B. M. Manjaji Matsumoto. 2016. *Pastinachus ater*: The IUCN Red List of Threatened Species 2016: e.T70682232A70708697.

Naylor, G. J. P., J. N. Caira, K. Jensen, K. A. M. Rosana, W. T. White, and P. R. Last. 2012. A DNA sequence-based approach to the identification of shark and ray species and its implications for global elasmobranch diversity and parasitology. (Bulletin of the American Museum of Natural History, no. 367). *Bulletin of the American Museum of Natural History*: 1–263.

Nishida, K., and K. Nakaya. 1990. Taxonomy of the genus *Dasyatis* (Elasmobranchia, Dasyatidae) from the North Pacific. In *Elasmobranchs as Living Resources: Advances in the Biology, Ecology, Systematics, and the Status of the Fisheries: Proceedings of the Second United States-Japan Workshop, East-West Center, Honolulu, Hawaii, 9-14 December 1987*, ed. H. L. Pratt, S. H. Gruber, and T. Taniuchi, 327–346. NOAA Technical Report NMFS 90. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Oliver, A., G. Sant, and S. Fowler. 1998. International Plan of Action for the Conservation of Sharks.

Parry-Jones, R. 1996. TRAFFIC Report on Shark Fisheries and Trade in Hong Kong. In *TRAFFIC report on shark fisheries in the East Asian region*, ed. M. J. Phipps. Taipei: TRAFFIC East Asia.

Pierce, S. J., and P. M. Kyne. 2015. *Neotrygon leylandi*. The IUCN Red List of Threatened Species 2015: e.T60156A68636690.

Pratt, H. L., and J. G. Casey. 1990. Shark reproductive strategies as a limiting factor in directed fisheries, with a review of Holden's method of estimating growth-parameters. In *Elasmobranchs as Living Resources: Advances in the Biology, Ecology, Systematics, and the Status of the Fisheries: Proceedings of the Second United States-Japan Workshop, East-West Center, Honolulu, Hawaii, 9-14 December 1987*, ed. H. L. Pratt, S. H. Gruber, and T. Taniuchi, 97–109. NOAA Technical Report NMFS 90. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Rambahiniarison, J. M., G. Araujo, M. J. Lamoste, J. Labaja, S. Snow, and A. Ponzo. 2016. First records of the reef manta ray *Manta alfredi* in the Bohol Sea, Philippines, and its implication for conservation. *Journal of Asia-Pacific Biodiversity* 9: 489–493. doi:10.1016/j.japb.2016.07.002.

Rayos, J. C. C., M. D. Santos, and N. C. Barut. 2012. Devil Ray Resources in Bohol Sea, Philippines. *Fish for the People.*

Rigby, C., A. Moore, and D. Rowat. 2016. *Himantura leoparda*. The IUCN Red List of Threatened Species 2016: e.T195456A68628645.

Rose, D. 1996. *An overview of world trade in sharks and other cartilaginous fishes*. Cambridge, UK: TRAFFIC International.

Samaniego, B. R., and M. R. Cruz. 1996. *Data on shark fisheries of Zamboanga Philippines (April 1996).* Report submitted to WWF Philippines Program for TRAFFIC SEA.

SEAFDEC. 1988. Fisheries statistical bulletin for the South China Sea area 1986. Southeast Asian Fisheries Development Center.

SEAFDEC. 2006. *Report on the Study on Shark Production, Utilization and Management in the ASEAN Region 2003–2004.* Bangkok, Thailand: Southeast Asian

Fisheries Development Center.

Séret, B. 2003. Dasyatidae. In *The fresh and brackish water fishes of West Africa Volume 1. Collection Faune et Flore Tropicales 40*, ed. D. Paugy, C. Lévêque, and G. G. Teugels, 81–96. Tervuren, Belgium: Institut de recherche de développement, Paris, France, Muséum national d'histoire naturelle, Paris, France and Musée royal de l'Afrique Central.

Shotton, R., ed. 1999. *Case studies of the management of elasmobranch fisheries*. FAO Fisheries Technical Paper 378/1 and 378/2. Rome, Italy: Food and Agricultural Organization of the United Nations (UN-FAO).

Silliman University. 1999. *Elasmobranch Biodiversity in the Philippines (Phase 1: December 28, 1998–June, 1999)*. Terminal Report Submitted to WWF-Philippines.

Snow, S. J., G. Araujo, J. Labaja, C. L. So, A. Lucey, and A. Ponzo. 2014. Describing a new aggregation of whale sharks, Rhincodon typus, in the waters surrounding Panaon Island, Southern Leyte, Philippines, between February 8th and July 9th 2013 (Abstract). In *Programme and Abstracts of Shark International, Durban 2014*, 165.

So, C. L., S. J. Snow, G. Araujo, J. Labaja, A. Lucey, and A. Ponzo. 2014. Whale shark pathway: Using photo-identification to track the movement of the largest fish in the world (Abstract). In *Programme and Abstracts of Shark International, Durban 2014,* 120.

Subasinghe, S. 1992. *Shark Fin, Sea Cucumber and Jelly Fish: A Processor's Guide*. *Infofish Technical Handbook 6*. Kuala Lumpur, Malaysia: Infofish.

Torres, D. S., I. A. Lim, C. T. J. Reyes, and E. Narida. 2000. Notes on the characteristics of whale sharks (*Rhincodon typus*) in Honda Bay and some management implications presented at the 9th Annual Philippine Vertebrate Symposium of the Wildlife Conservation Society of the Philippines (WCSP), April 10, Tagaytay City.

Trono, R. B. 1996. *Whale shark fishery in the Bohol Sea*. Programme Report. WWF-Philippines.

Walsh, J. H., D. A. Ebert, and L. J. V. Compagno. 2011. *Squatina caillieti* sp. nov., a new species of angel shark (Chondrichthyes: Squatiniformes: Squatinidae) from the Philippine Islands. Zootaxa 2759: 49–59.

White, W. T. 2006a. *Aetomylaeus maculatus*. The IUCN Red List of Threatened Species 2006: e.T60120A12307534.

White, W. T. 2006b. *Gymnura zonura*. The IUCN Red List of Threatened Species 2006: e.T60113A12304400.

White, W. T. 2009. *Squalus montalbani*. The IUCN Red List of Threatened Species 2009: e.T161404A5416602. doi:10.2305/IUCN.UK.2009-2.RLTS.T161404A5416602.en.

White, W. T., and G. J. P. Naylor. 2016. Resurrection of the family Aetobatidae (Myliobatiformes) for the pelagic eagle rays, genus *Aetobatus*. *Zootaxa* 4139: 435–438. doi:10.11646/zootaxa.4139.3.10.

White, W. T., and C. Simpfendorfer. 2016. H*emipristis elongata*. The IUCN Red List of Threatened Species 2016: e.T41874A68625034.

White, W. T., B. M. Manjaji Matsumoto, and Fahmi. 2004. *Pateobatis uarnacoides*. The IUCN Red List of Threatened Species 2016: e.T161547A104234006. September 10.

White, W. T., P. R. Last, G. J. P. Naylor, K. Jensen, and J. N. Caira. 2010. Clarification of *Aetobatus ocellatus* (Kuhl, 1823) as a valid species, and a comparison with *Aetobatus narinari* (Euphrasen, 1790) (Rajiformes: Myliobatidae). *CSIRO Marine and Atmospheric Research Paper*: 141–164.

White, W. T., P. R. Last, J. D. Stevens, G. K. Yearsley, Fahmi, and Dharmadi. 2016. *Economically Important Sharks and Rays of Indonesia*. Canberra, Australia: Australian Centre for International Agricultural Research.

Yaptinchay, A. A. S. P., R. Uy, and M. N. R. Alava. 1998. Catch and effort data of whale sharks in the Philippines presented at the 14th Annual American Elasmobranch Meeting, July 16, University of Guelph, Ontario, Canada.

SHARKS AND RAYS "PATING" AT "PAGI" PHILIPPINE STATUS REPORT AND NATIONAL PLAN OF ACTION 2017-2022

Special Issue of The Philippine Journal of Fisheries

Bureau of Fisheries and Aquatic Resources
National Fisheries Research and Development Institute
Quezon City, Metro Manila
Philippines