NATIONAL PLAN OF ACTION FOR THE CONSERVATION AND MANAGEMENT OF SHARKS IN THE PHILIPPINES
(Philippine NPOA-Sharks[1])

DEPARTMENT OF AGRICULTURE
BUREAU OF FISHERIES AND AQUATIC RESOURCES

2009

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

CHAPTER 1

CHAPTER 1: INTRODUCTION

1.1 Background

On a global basis, shark fisheries belong to the unmonitored, unregulated and unmanaged (IUU) resources. In recognition of the expanding global catch of sharks and the potential negative impacts on shark populations, an *International Plan of Action for the Conservation and Management of Sharks* (IPOA-Sharks) was adopted by the 23rd session of the UN FAO Committee on Fisheries (COFI) in 1999 (Oliver et al. 1998).

The IPOA-Shark is a voluntary international instrument developed so that nations can take positive action to ensure the conservation and management of shark and their long-term sustainable use. The IPOA Sharks suggests that member States of the FAO (such as the Philippines) should adopt a National Plan of Action (NPOA-Sharks or Shark Plan) if their vessels conduct directed fisheries for sharks or their vessels regularly catch sharks in non-directed fisheries. The IPOA Sharks requires each member nation that takes sharks in their fisheries to prepare a shark assessment report (SAR) with the aim of identifying conservation, management and any other issues associated with the shark catch, which may be possibly addressed in a NPOA- Sharks. The NPOA-Sharks requires collection and ongoing synthesis of compatible data at the appropriate resolution, including *inter alia* commercial data and data leading to improved species identification and, eventually, abundance indices. States are also encouraged to cooperate and, where appropriate, develop regional Shark-Plans through regional and sub-regional fisheries management organizations or arrangements, and other forms of cooperation. States are further requested to have a Shark-Plan in place by the 24th COFI Session in 2001 (Oliver et al. 1998).

In Southeast Asia, there had been indications of the vast trade of shark resources brought out largely by the high profitability of shark and shark products (such as fins, cartilage and live oil) (Chen 1996). Although the ASEAN-SEAFDEC member countries have a common position that the management of commercial fisheries, including shark fisheries, should come under the purview of FAO, they nonetheless endorsed the FAO IPOA-Shark. At the ASEAN-SEAFDEC Millennium Conference, Fish for the People, held in Bangkok in November 2001, discussions on the sustainability of regional fisheries were initiated. 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). Since the Millennium Conference in 2001, ASEAN member countries have taken several actions toward the formulation of the NPOA-Sharks. 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 agreed and endorsed the collection and analysis of data on sharks and its fisheries as basis for the development of appropriate fisheries management policy and actions.

The Philippines is not a major shark fishing nation but as a member of the UN FAO, it is committed to produce its own National Plan of Action for Shark as also agreed upon during the second ASEAN-SEAFDEC Regional Technical Consultation on Sharks Fisheries, held in Phuket, Thailand from 13 to 15 July 2004.

1.2 Definitions

The term "shark" is often used as a generic term for all shark and shark-like species under the Class Chondrichthyes, as applied by UN-FAO in IPOA-Sharks. 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 (i.e., batoids) belong, and the Subclass Holocephalii to which the silversharks (or chimaeras) belong.

The "true sharks" technically belongs 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" refers 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.

In this document, the term "sharks" will be used in a generic sense to refer to all cartilaginous species, as applied by IPOA-Sharks of the UN-FAO. "Shark-plan" is also used interchangeably with NPOA-Sharks.

1.3 Purpose and Need

Historically considered as having low economic value to large-scale commercial fisheries, sharks have been often neglected by fishery management agencies. In recent years, sharks have gained commercial importance and are increasingly targeted for its meat, skin, cartilage, teeth, jaws, liver and other internal organs (Rose 1996). They are increasingly taken in by-catch fisheries which target other more commercially important bony fishes (Camhi *et al.* 1998). Increasing demands for shark and shark products in the past 30 years have led to a considerable number of species threatened with extinction due to a combination of factors including degradation of important habitats (*i.e.*, nursery and breeding grounds) from development and pollution. Consequently, concerns have increased also about the rise in shark catches and the results this has for some shark species populations in several areas of the world's oceans.

Sharks are characterized by K-selected life history traits such as slow growth, late sexual maturity, low fecundity and long life, resulting in low rates of population increase, highly vulnerable to overexploitation and stock collapse, and slow recovery once the population is depleted. Sharks often have a low stock-recruitment relationship and long stock recovery times when overfished due to their late sexual maturity, low fecundity, albeit with low natural mortality, and complex spatial structures (size/sex segregation and seasonal migration) (Hoenig and Gruber 1990; Pratt and Casey 1990; Last and Stevens 1994; Camhi *et al.* 1998). Such complex life history traits make them highly vulnerable to overexploitation. As shark has a relatively low market value (excluding fins), countries may not manage their shark fisheries as effectively as those for higher valued species. There is a need to improve the management of directed shark fisheries and certain multispecies fisheries in which sharks constitute a significant bycatch.

In the Philippines, inventory studies in market and landing sites show that most, if not all, of these species are taken in various fisheries operation (Compagno *et al.* 2005; Maypa *et al.* 2000; Barut 2006; NSAP regional reports, in prep.). There is a need to balance fishing efforts and resource exploitation with conservation and management to attain sustainability marine fishery resources. The current limitation on knowledge of sharks and the practices employed in shark fisheries in many areas is causing problems for their conservation and management. Largely there is a lack of available catch, effort, landings and trade data, as well as limited information on the biological parameters of many species and their identification. Further, to improve knowledge on the state of shark stocks and facilitate the collection of the necessary information, adequate funds and support system for research and management is sorely lacking.

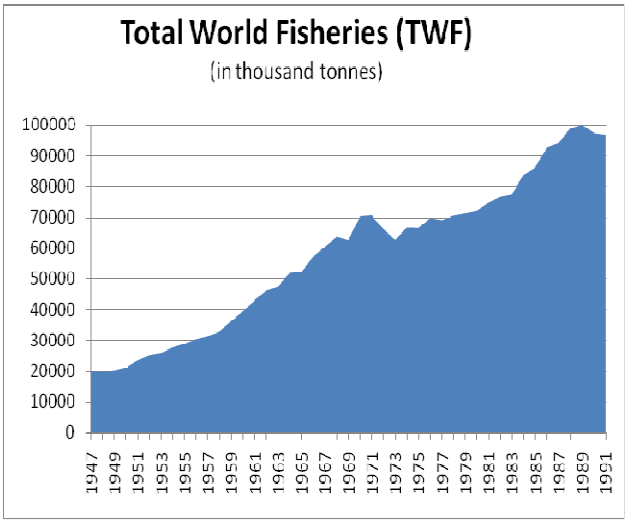


Figure 1.1. World reported catch of elasmobranch fishes (1947-1991). 1946 = 200 thousand tones; 1991 = 714 thousand tones, equivalent to an estimated 71 million animals. (Source: Bonfil 1994).

The NPOA-Sharks addresses the importance of shark resources in the conservation of marine biodiversity and sustainable use of the resources for future generation. The success of the plan depends on the close cooperation between the implementing agencies and stakeholders. It requires collection and ongoing synthesis of compatible data at the appropriate resolution, including inter alia commercial data and data leading to improved species identification and, eventually, abundance indices.

1.4 Overall Objective of NPOA-Shark

As prescribed by the UN-FAO IPOA-Shark, the overall objective of the National Plan of Action for the Conservation and Management of Sharks (Shark Plan) is to ensure the conservation and management of sharks and their long-term sustainable use. The Philippine Shark Plan aims to:

(a) Review existing knowledge of general biology (including distribution and ecology), fisheries, and trade of sharks in the Philippines;
(b) Review existing shark conservation measures and legislation at the subnational and national levels;
(c) Identify significant gaps in scientific knowledge, problems/ issues/concerns related to shark conservation and management.
(d) Contribute to IPOA Shark Action Plan by targeting minimum requirements of a National Shark Plan, as follows:
    1. Ensure that shark catches from directed and non-directed fisheries are sustainable.
    2. 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.
    3. Identify and pay attention, in particular, to vulnerable or threatened species.

4. Improve and develop frameworks for establishing and coordinating effective consultation involving stakeholders in research, management and educational initiatives within and between States.
5. Minimize unutilized incidental catches of sharks
6. Contribute to the protection of biodiversity and ecosystem structure and function.
7. Minimize waste and discards from shark fisheries in accordance with paragraph 7.2.2g of the Code of Conduct for Responsible Fisheries (e.g., requiring the retention of sharks from which fins are removed).
8. Encourage full use of dead sharks.
9. Facilitate improved species-specific catch and landings data and monitoring of shark fisheries.
10. Facilitate the identification and reporting of species biological and trade data.

(e) Develop recommendations, guidelines for sustainable management of sharks in the Philippines, priorities for action, institutional responsibilities for such actions and resources needed for the implementation of these actions.
(f) Promote the widespread use of these guidelines in the country.

1.5 Issues and Concern

Lack of available catch, effort, landings and trade data as well as limited information on biological parameters and difficulties with species identification has led to poor state of knowledge of shark and shark fishery practices and problems in the conservation and management of sharks. Emphasis, therefore, is on greater understanding on shark and shark fishery practices through improved fishery monitoring, establishment of biological research and positive management action ensuring their sustainable use in fisheries.

As in most other developing countries in the region, there is no dedicated stock assessment of shark fisheries in the country. Intermittent research on diversity and/or fisheries have been conducted in the past, either initiated independently by academic/research institutions or non-government organizations (e.g. Silliman University, WWF-Philippines), or in collaboration with BFAR-NFRDI and the NSAP. These studies are collated and used as a baseline document for a Philippine Shark Assessment Report (SAR). Major issues pertaining to the conservation and management of sharks emerged from these few studies, as reported in this document. These issues are grouped into the following: Monitoring; Data Collection and Analysis; Research; Capacity-building; and Conservation and Management, further subgrouped into Policy, Institutional Arrangements, IEC, Compliance and Enforcement.

1.6 Monitoring and Evaluation

The lead agency in the development and review of the Philippine Shark Plan is the Department of Agriculture – Bureau of Fisheries and Aquatic Resource (DA-BFAR).

The Shark-plan is based on research results and findings of the NPOA-Shark Technical Working Group composed of national and regional shark specialists, fisheries scientists, and conservationists, managers or 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

- Conservation groups (Conservation International-Philippines, First Philippine Conservation Incorporated, World Wide Fund for Nature - Philippines, FishBase/WorldFish, and USAID BFAR FiSH Project)

The Shark-plan underwent a series of consultation and review by other agencies and stakeholders with relevant interest in shark conservation and management, comprising of representatives from the:

- Relevant Philippine government agencies
- Commercial fishing industry
- Recreational fishing groups
- Indigenous groups
- Conservation groups
- Scientific agencies

CHAPTER 2

CHAPTER 2: PHILIPPINE SHARK RESOURCES

2.1 Overview

Cartilaginous fishes belong to an ancient group of fishes that evolved for over 400 million years. Living representatives are grouped into two main subclasses, namely, **Holocephalii** (silver sharks = chimaeras, ratfishes and elephant fishes), with representatives from deep cool water environment; and the **Elasmobranchii**, a large, diverse group (including sharks and batoids) with representatives in all types of environments, from fresh waters to the bottom of marine trenches. Subclass Holocephalii have three families and about 37-50 species. The classification of Subclass Elasmobranchii is still a subject of continuous debate but they are generally divided into two superorders, i.e., galeomorphs and squalomorphs, which include the sharks composed of 30 families and approximately 368-488 species and the batoids composed of rays, skates, torpedoes, guitarfishes, and sawfishes, embracing 14-21 families and about 470-627 species (Compagno 1997, 1984, and 2000).

Diversity of cartilaginous fishes in the Philippines is easily seen from records of various landing and markets sites in the country. Compagno et al. 2005 report at least 163 species present or possibly present in the Philippine waters: Subclass Holocephalii is represented by at least three species; Subclass Elasmobranchii represented by at least 160 species (i.e., 94 true shark species; 66 batoids/ winged sharks) (see Appendix A; Table 2.1). At least two more species have been confirmed to be present since the 2005 checklist while over 60 more species have been reported from various sources (e.g., results of fishers' interviews of fishers; review of literature; species checklists of from NSAP catch landings from the regions) which needs further validation.

All of these species factor in Philippine fisheries, either in directed/targeted catch or incidental by-catch of commercial and/or municipal fisheries. However, there has been limited information and reporting records on each of these species nationwide. Opportunistic inventory studies in the past made it possible to come up with a species list for the country. However, since knowledge and capacity for shark biodiversity assessment is generally lacking, problems in relation to species identification, catch reporting and monitoring abound. There is, thus, great difficulty in assessing status of populations and in providing appropriate management measures.

2.2 Taxonomy and Research

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. Compagno et al. (2005) discuss in detail the historical account on ichthyofaunal research in the Philippines. Apparently, the earliest publication on Philippine marine fishes was as early as 1706. Linnaeus' 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 (founded in 1611) had also accumulated a considerable collection of fishes, including a

stuffed whale shark acquired about 1840, while the Ateneo de Manila University also started their own collection in 1865, which purportedly exceeded that in the UST holdings after ten years.

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. Some other ichthyologists, including Alvin Seale, also conducted their own collections around the same time. Albert Herre made extensive visits in Philippine waters between 1920 - 1948 and deposited major collections of fishes at Stanford University and at various Philippine institutions (i.e., the Philippine Bureau of Sciences and Silliman University). Herre's checklist of Philippine fishes in 1953 listed 2145 species which included new species of sharks. The collections at the Philippine Bureau of Sciences, however, were completely destroyed by the Japanese during the war and 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 conducted was between 1998-2001, by the WWF through Silliman University, in collaboration with CSIRO and the South African Museum which 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.

2.3 Species Occurrence

Little is known about the species composition of elasmobranch catches in the Philippines in previous years. Warfel and Clague (1950) report tiger sharks to be the major catch of shark longlines around the Philippines from exploratory fishing. Other sharks reported in the survey include at least six species corresponding to the genus *Carcharhinus,* plus *Sphyrna zygaena, Scyliorhinus torazame, Hexanchus griseus* and an unidentified nurse shark. The species taken by gillnets were *Pristis cuspidatus* and *Rhynchobatus djiddensis.*

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 of the species (i.e., *S. acanthias*), however is highly suspect since there is no confirmed collection record for the species in the country. Additionally, dogfishes are one of the more diverse group of sharks (>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.).

Maypa et al. (1999) 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 also yielded 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, new or confirmed records to the Philippines, among others (Alava et al. 2000; Maypa et al. 2000; Maypa et al. 2001).

Inventory results contributed to the update of Compagno's 2000 Philippine Chondrichthyes checklist from 122 species of belonging to 38 families (i.e., 2 species of chimaeras, 70 shark species and 50 batoids) to about 163 species (i.e., 3 chimaeras, 94 sharks and 66 batoids) (Compagno et al. 2005). From the Compagno's checklist, 59% are confirmed to be present (i.e., based on vouchers and other evidences reviewed by the authors), 41% (67 species) are not confirmed (i.e., no voucher specimens reviewed nor validated by the authors at that date) but with likelihood for occurrence in Philippine waters based on the distributional information of the animal, and at least 23% (38 species) are new records to the Philippines, still undescribed, 16% (26 species) of which are possibly Philippine endemics (see Table 2.1). This suggests high endemicity for Philippine sharks and rays.

Compagno et al.'s 2005 checklist includes the three planktivorous sharks: the whale shark (*Rhincodon typus*) (e.g., in Alava et al. 1999); the megamouth shark (*Megachasma pelagios*) accidentally caught in gillnet fishery in Cagayan de Oro in 1998 (Morissey and Elizaga 1999); and remains of an apparently stranded vagrant basking shark (*Cetorhinus maximus*) in Masbate in 1996 (Compagno et al. 2005). At least six more megamouth individuals have been reported in the Philippines since 1998: three more from Cagayan de Oro, two from Bayawan, Negros Island, one in Tigbauan, Iloilo and recently in Burias Pass (www.flmnh.org; Bagarinao 2004; Yasay 2003; Aca 2009).

A few though sporadic studies on sharks and rays have been conducted which generated at least 30 more species not recorded in the Compagno et al.'s 2005 checklist (Table 2.2). Alava et al, (1997b) conducted a whale shark- manta ray fishery study in the Bohol Sea. Results show reports of mantas and the possibility of other devilray species under the genus *Mobula*. Data, however, was lumped, due to the researchers limited knowledge on mobulid taxonomy When manta ray was protected in 1998, NFRDI and NSAP Region 6 (2003-2004) conducted a fish stock assessment of mobulids (i.e., manta rays and devilrays) in Pamilacan Island, Bohol and Camiguin Island, Mindanao, Results confirmed the presence of at least four species *Mobula which are also directly targeted with the manta rays in the Bohol Sea* (Barut, unpub. ms).

An independent and largely opportunistic discovery by WWF field personnel between 2003-2006 confirmed presence of two other species, namely *Dalatia licha* and *Isurus paucus,* and listed at list eight others which were not identified to the genus and/or species level (Gaudiano, unpub ms). 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 new record for the Philippines and needing further verification and validation (Barut, unpub ms). NSAP-initiated shark and ray assessments in the regions, between 1998-2006, also yielded additional species (see Table 2.2). A number of these species need further validation in terms of species identification.

2.4 Abundance, Distribution and Population Status

There has been no dedicated study on population research on any species of sharks in the Philippines. Information on the status of the population of whales, *Rhincodon typus,* however, may be inferred from the studies of Trono (1996), Alava *et al.* (1997), Yaptinchay *et al.* (1998) on its the fishery and trade of whale sharks in the Philippines, and Groves (1999) and Alava and Yaptinchay (2000) on the burgeoning whale shark tourism industry in Donsol, Sorsogon. These studies confirm occurrences of whale shark aggregation and feeding sites, thus also targeted as fishing grounds.

Datasets also show that the whale shark numbers are going down, based on surrogate population information such as catch data in the Bohol Seas between 1993 and 1997 (Alava *et al.* 1997) and on sighting information in Donsol between 1997 and 1998 (Groves 1999; Alava and Yaptinchay 2000). Information was used in estimating a declining population in the Philippines through the application of the IUCN Red List Criteria and Categories and was classified as Critically Endangered (Alava 2005). Knowledge on the biology and ecology of the animal is still wanting. Whale shark aggregation sites were later identified as priority conservation areas in the Philippines (DENR 2001). There is 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, to identify individuals through distinguishing markings, sexing, behavior, as well as photo-identification. This is envisioned to at least provide valuable information on the characteristics of the whale shark population in Donsol. Recent activities in the past couple of years are currently conducted by Eco-Ocean in collaboration with various local NGOs and volunteers to address. A population discovered in Honda Bay by the Palawan Whale Shark Society in 1999 led to some behavioral studies on the species in the natural habitat (sans tourists) by Torres *et al*. (2000).

Migration patterns through telemetry and satellite tracking as well as population stock analysis through genetic-microsatellite technique and feeding biology through plankton sampling was conducted between 1997 and 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 with one individual tagged in the Bohol Sea in early 1997, monitored to be transmitting signals off the coasts of Vietnam in mid-1997 (Eckert, pers comm.). 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 and thus required global management. Eckert (1998) also provided additional support for 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.

Early attempts at inferring population data on the manta/mobula fishery studies (Alava et al 200b; Barut unpub ms) has been proven difficult largely in part due to the difficulty in the identification of members of the family. Again, reports (and any consequent management recommendations) on any one of the species is considered in this report as a collective for the family.

2.5 Population and Habitat Status

Assessments of the habitat status of sharks and rays in the Philippines are lacking. An attempt, however, is conducted in early 1999 to collect baseline information on the biological and physico-chemical parameters of the municipal waters of Donsol, the world-renowned aggregation site of whale sharks in the Philippines (Boncodin and Alava 1999). Data, however, is patchy and trends has not established. Similar ecological assessment is being conducted in Honda Bay (Puerto Princesa) by a group of researchers in Dos Palmas, Arrecefi Island, Puerto Princesa in 1999-2000. Other areas also known to be seasonally frequented by large aggregates of whale sharks are the Zambales (Mudjie Santos, pers. comm), Mati, Davao (Ruel Uy, pers comm.), Bohol Sea, and Sogod Bay, Leyte (Alava et al. 1997a).

Based on this information, priority conservation areas (PCA) for whale sharks in the Philippines have been identified during the PBCPP (See Figure 2.1). A similar attempt to identify priority conservation areas for elasmobranchs in general is shown in Figure 2.2. Despite the integral significance of habitat modification and loss to the management of sharks, researches on these aspects are virtually lacking. There is thus a need to strengthen research on elasmobranchs in the country so as to address concerns on habitat management.

At least one site has been identified and established as a protected area specific for a shark species: Donsol, Sorsogon where its municipal waters has been primarily protected as a whale shark sanctuary, being the only known aggregation site and critical feeding are of whale sharks at that time. No such other habitat protection is given to any other shark species in the country. Conservation International –Philippines initiated the identification of marine Key Biodiversity Area for globally threatened marine species, inclusive of threatened species sharks and batoids. The mKBA identification process considered over 30 species of threatened sharks and batoids found in the Philippines as trigger species. At least 30 areas have been identified and proposed as mKBAs for sharks and batoids with seven more as candidate mKBAs (Ambal et al, in prep). Although additional information is still needed to refine the resolution of the boundaries, the proposed elasmobranch mKBAs would be one of the first step in highlighting the much needed management or protection of shark and batoids habitats in the country.

2.6 Gaps, Issues and Concerns

Basic concern highlighted here is the 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 presence of largely unidentified species that are potentially new to the Philippines and to science. There is a need to develop a standard identification/field guide, data collection and monitoring protocols for a more productive monitoring of species in fisheries. It is also necessary for field staff to be trained on taxonomy, data collection and monitoring technique 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. Data collectors and monitoring team should have the enabling environment for them to effectively implement their roles, and as such, should have the necessary system of support in the field.

In terms of habitat protection, there are also not many studies done on the habitats and ecology of sharks and sharks species. Priority Conservation Areas (PCAs) have been identified for elasmobranchs in general, the identification of which were based on productivity in captured fishery (whether direct or by-catch). Such areas however are too large that needed refinement for a more focused management intervention. Such PCAs are now currently refined through the MKBA process which currently rely on two criteria such as vulnerability and irreplaceability of trigger species (i.e., under global threat category such as Critically Endangered or; or endemicity). Several iterations have been done on mKBA analysis based on threatened and/or endemic Philippines sharks and batoids. However, since this type of analysis is largely data-dependent, it is recommended that more focused research and assessment is needed on the biology, ecology and threats to each species under consideration. Higher resolution data (in terms of identifying the local threat category of the species) would mean better applicability in terms of mKBA identification and local management (e.g., MPA establishments).

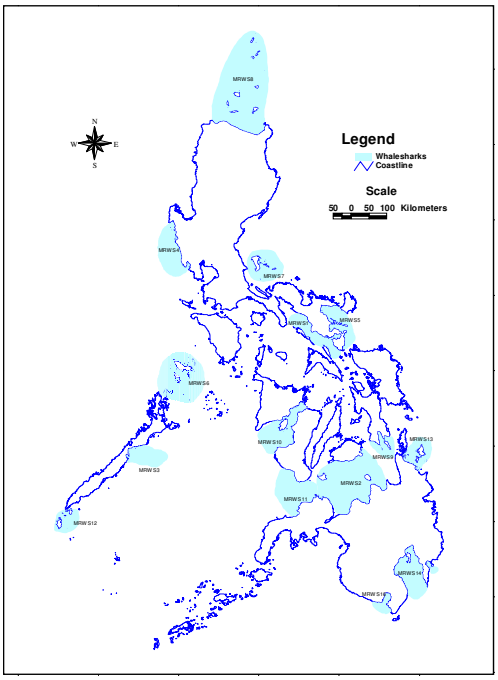


Figure 2.1. Whale shark priority conservation Areas (PCA) of the Philippines. (Source: DENR 2001).

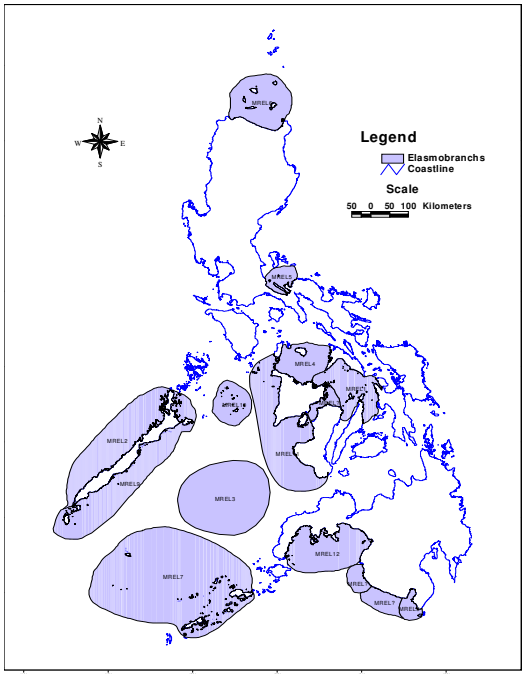


Figure 2.2. Elasmobranch priority conservation Areas (PCA) of the Philippines. (Source: DENR 2001).

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

	SPECIES	AUTHORITIES	COMMON NAME	PHIL OCCURRENCE
Subclass Holocephalii (chimaeras)				
1.	*Chimaera phantasma*	Jordan & Snyder, 1900.	Silver Chimaera.	Confirmed
2.	*Hydrolagus mitsukurii*	(Dean, in Jordan & Snyder, 1904).	Mitsukurii's chimaera.	Confirmed
3.	*Hydrolagus sp.*		Philippines reticulate chimaera.	New/Undescribed/Endemic
Subclass Elasmobranchii (sharks and batoids)				
Sharks				
1.	*Alopias pelagicus*	Nakamura, 1935.	Pelagic thresher	Confirmed
2.	*Alopias superciliosus*	(Lowe, 1839).	Bigeye thresher.	Confirmed
3.	*Alopias vulpinus*	(Bonnaterre, 1788).	Thresher shark.	Confirmed
4.	*Apristurus herklotsi*	(Fowler, 1934).	Longfin catshark.	Confirmed
5.	*Atelomycterus marmoratus*	(Bennett, 1830).	Coral catshark, marbled cat-shark.	Confirmed
6.	*Carcharhinus albimarginatus*	(Rüppell, 1837).	Silvertip Shark.	Confirmed
7.	*Carcharhinus altimus*	(Springer, 1950).	Bignose shark.	Confirmed
8.	*Carcharhinus amblyrhynchoides*	(Whitley, 1934).	Graceful shark.	Confirmed
9.	*Carcharhinus amblyrhynchos*	(Bleeker, 1856).	Gray reef shark.	Confirmed
10.	*Carcharhinus borneensis*	(Bleeker, 1858-1859).	Borneo shark.	Reported/unconfirmed
11.	*Carcharhinus brevipinna*	(Müller & Henle, 1839).	Spinner shark.	Confirmed
12.	*Carcharhinus dussumieri*	(Valenciennes, 1839).	Whitecheek shark.	Reported/unconfirmed
13.	*Carcharhinus falciformis*	(Bibron, 1839).	Silky shark.	Confirmed
14.	*Carcharhinus hemiodon*	(Valenciennes, 1839).	Pondicherry shark.	Confirmed
15.	*Carcharhinus leucas*	(Valenciennes, 1839).	Bull shark.	Confirmed
16.	*Carcharhinus limbatus*	(Valenciennes, 1839).	Blacktip shark.	Confirmed
17.	*Carcharhinus longimanus*	(Poey, 1861).	Oceanic whitetip shark.	Confirmed
18.	*Carcharhinus macloti*	(Müller & Henle, 1839).	Hardnose shark.	Reported/unconfirmed
19.	*Carcharhinus melanopterus*	(Quoy & Gaimard, 1824).	Blacktip reef shark, black-finned shark.	Confirmed
20.	*Carcharhinus sealei*	(Pietschmann, 1913).	Blackspot shark.	Confirmed
21.	*Carcharhinus sorrah*	(Valenciennes, 1839).	Spot-tail shark.	Confirmed
22.	*Carcharodon carcharias*	(Linnaeus, 1758).	White shark.	Confirmed
23.	*Centrophorus ?squamosus*	(Bonnaterre, 1788).	Leafscale gulper shark. ? = *C. acus* Garman, 1906	New/Undescribed/Endemic
24.	*Centrophorus cf. moluccensis*	Bleeker, 1860.	Philippine smallfin gulper shark.	New/Undescribed/Endemic
25.	*Centrophorus isodon*	(Zhu, Meng, & Liu, 1981).	Black gulper shark.	Confirmed
26.	*Centrophorus lusitanicus*	Bocage & Capello, 1864.	Lowfin gulper shark.	Confirmed
27.	*Centroscyllium cf. kamoharai*	Abe, 1966.	Bareskin dogfish.	New/Undescribed
28.	*Cephaloscyllium, sp. nov.*		Philippines swellshark.	New/Undescribed/Endemic
29.	*Cetorhinus maximus*	(Gunnerus, 1765).	Basking shark.	Vagrant

30.	*Chiloscyllium plagiosum*	(Bennett, 1830).	Whitespotted bambooshark.	Confirmed
31.	*Chiloscyllium indicum*	(Gmelin, 1788).	Slender bambooshark.	Reported/unconfirmed
32.	*Chiloscyllium punctatum*	Müller & Henle, 1838.	Brownbanded bambooshark.	Confirmed
33.	*Chiloscyllium griseum*	Müller & Henle, 1838.	Gray bambooshark.	Reported/unconfirmed
34.	*Cirrhoscyllium expolitum*	Smith & Radcliffe In Smith, 1913.	Barbelthroat carpetshark.	Confirmed
35.	*Deania cf rostrata*	Garman, 1906.		New/Undescribed
36.	*Deania profundorum*	(Smith & Radcliffe, 1912).	Arrowhead dogfish.	Confirmed
37.	*Echinorhinus cookei*	Pietschmann, 1928.	Prickly shark.	Reported/unconfirmed
38.	*Eridacnis radcliffei*	Smith, 1913.	Pygmy ribbontail catshark.	Confirmed
39.	*Eridacnis sp.:*		Philippine ribbontail catshark.	New/Undescribed/Endemic
40.	*Etmopterus brachyurus*	Smith & Radcliffe, 1912.	Shorttail lanternshark.	Confirmed
41.	*Etmopterus lucifer*	Jordan & Snyder, 1902.	Blackbelly lanternshark.	Confirmed
42.	*Eusphyra blochii*	(Cuvier, 1816).	Winghead shark.	Confirmed
43.	*Galeocerdo cuvier*	(Peron & Lesueur, 1822).	Tiger shark, spotted shark.	Confirmed
44.	*Galeus sauteri*	(Jordan & Richardson, 1909).	Taiwan sawtail catshark.	Confirmed
45.	*Galeus schultzi*	Springer, 1979.	Dwarf sawtail catshark.	Confirmed
46.	*Galeus sp. nov. near G. nipponensis*	Nakaya, 1979.		New/Undescribed
47.	*Glyphis sp.*		River shark.	Reported/unconfirmed
48.	*Gollum sp. nov.*		Sulu gollumshark.	New/Undescribed/Endemic
49.	*Halaelurus cf. boesemani*	Springer & D'Aubrey, 1972.	Speckled catshark.	New/Undescribed
50.	*Halaelurus cf. buergeri*	(Müller & Henle, 1838).	Blackspotted catshark.	New/Undescribed
51.	*Hemigaleus microstoma*	Bleeker, 1852.	Sicklefin weasel shark.	Confirmed
52.	*Hemipristis elongatus*	(Klunzinger, 1871).	Snaggletooth shark.	Confirmed
53.	*Hemitriakis sp.*		Ocellate topeshark.	New/Undescribed
54.	*Hemitriakis leucopteriptera*	Herre, 1923.	Whitefin tope.	Confirmed
55.	*Heptranchias perlo*	(Bonnaterre, 1788).	Sharpnose sevengill shark.	Confirmed
56.	*Heterodontus zebra*	(Gray, 1831).	Zebra bullhead shark.	Confirmed
57.	*Hexanchus griseus*	(Bonnaterre, 1788).	Bluntnose sixgill shark, cow shark.	Confirmed
58.	*Hexanchus nakamurai*	Teng, 1962.	Bigeyed sixgill shark.	Confirmed
59.	*Iago garricki*	Fourmanoir, 1979.	Longnosed houndshark.	Confirmed
60.	*Isistius brasiliensis*	(Cuvier, In Quoy & Gaimard, 1824).	Cookiecutter shark.	Confirmed
61.	*Isurus oxyrinchus*	Rafinesque, 1810.	Shortfin mako.	Confirmed
62.	*Isurus paucus*	Guitart Manday, 1966.	Longfin mako.	Reported/unconfirmed
63.	*Loxodon macrorhinus*	Müller & Henle, 1838.	Sliteye shark.	Confirmed
64.	*Megachasma pelagios*	Taylor, Compagno & Struhsaker, 1983.	Megamouth shark.	Confirmed
65.	*Mustelus 1 cf. manazo*	Bleeker, 1854.	Philippine white-spotted smoothhound.	New/Undescribed/Endemic

66.	*Mustelus 2 cf. griseus*	Pietschmann, 1908.	Philippine brown smoothhound.	New/Undescribed/Endemic
67.	*Mustelus 3 cf. griseus*	Pietschmann, 1908.	Philippine gray smoothhound.	New/Undescribed/Endemic
68.	*Nebrius ferrugineus*	(Lesson, 1830).	Tawny nurse shark.	Confirmed
69.	*Negaprion acutidens*	(Rüppell, 1837).	Sharptooth lemon shark.	Confirmed
70.	*Orectolobus japonicus*	Regan, 1906.	Japanese wobbegong.	Reported/unconfirmed
71.	*Orectolobus sp. near ornatus.*		Philippine wobbegong.	New/Undescribed/Endemic
72.	*Pentanchus profundicolus*	Smith & Radcliffe, 1912.	Onefin catshark.	Confirmed
73.	*Prionace glauca*	(Linnaeus, 1758).	Blue shark.	Confirmed
74.	*Pristiophorus sp. C*	[Compagno & Niem, 1998].	Philippine sawshark.	New/Undescribed/Endemic
75.	*Pseudocarcharias kamoharai*	(Matsubara, 1936).	Crocodile shark.	Reported/unconfirmed
76.	*Rhincodon typus*	(Smith, 1828).	Whale shark.	Confirmed
77.	*Rhizoprionodon acutus*	(Rüppell, 1835).	Milk shark, Bongalonon.	Confirmed
78.	*Scoliodon laticaudus*	Müller & Henle, 1838.	Spadenose shark.	Reported/unconfirmed
79.	*Scyliorhinus garmani*	(Fowler, 1934).	Brownspotted catshark.	Reported/unconfirmed
80.	*Scyliorhinus torazame*	(Tanaka, 1908).	Cloudy catshark.	Reported/unconfirmed
81.	*Sphyrna lewini*	(Griffith & Smith, 1834).	Scalloped Hammerhead.	Confirmed
82.	*Sphyrna mokarran*	(Rüppell, 1837).	Great hammerhead.	Confirmed
83.	*Sphyrna tiburo*	(Linnaeus, 1758).	Bonnethead shark.	Reported/unconfirmed
84.	*Sphyrna zygaena*	(Linnaeus, 1758).	Smooth hammerhead.	Confirmed
85.	*Squaliolus aliae*	Teng, 1959.	Smalleye pigmy shark.	Confirmed
86.	*Squaliolus laticaudus*	Smith & Radcliffe, 1912.	Spined pigmy shark.	Confirmed
87.	*Squalus sp.*		Philippine longnose spurdog.	New/Undescribed/Endemic
88.	*Squalus sp.*		Philippine fatspined dogfish.	New/Undescribed/Endemic
89.	*Squalus cf. mitsukurii*	Jordan & Snyder, 1903.	Philippines shortspine dogfish.	New/Undescribed/Endemic
90.	*Squalus cf. megalops*	Macleay, 1881.	Philippines shortnose spurdog.	New/Undescribed/Endemic
91.	*Squatina formosa*	Shen & Ting, 1972.	Taiwan angelshark.	Confirmed
92.	*Stegostoma fasciatum*	(Hermann, 1783).	Zebra shark, tiger shark, Butanding.	Confirmed
93.	*Triaenodon obesus*	(Rüppell, 1837).	Whitetip reef shark.	Confirmed
94.	*Triakis scyllium*	Müller & Henle, 1839.	Banded houndshark	Reported/unconfirmed
Batoids				
1.	*Aetobatus cf. guttatus*	(Shaw, 1804).	Indian eagle ray	New/Undescribed
2.	*Aetobatus cf. narinari*	(Euphrasen, 1790).	Spotted eagle ray, bonnetray, eagle ray, Pagi Manok, Paol, Banogan, Taligmanok.	New/Undescribed
3.	*Aetomylaeus milvus*	(Valenciennes, 1841).	Ocellate eagle ray.	Reported/unconfirmed
4.	*Aetomylaeus niehofii*	(Bloch & Schneider, 1801).	Banded eagle ray.	Reported/unconfirmed
5.	*Aetomylaeus vespertilio*	(Bleeker, 1852).	Ornate eagle ray.	Confirmed
6.	*Aetoplatea zonurus*	Bleeker, 1852	Zonetail butterfly ray.	Confirmed
7.	*Anacanthobatis cf. borneensis*	Chan, 1965.	Philippine legskate.	New/Undescribed/Endemic

8.	*Anoxypristis cuspidata*	(Latham, 1794).	Knifetooth sawfish.	Confirmed
9.	*Dasyatis bennettii*	(Müller & Henle, 1841).	Bennett's cowtail or frilltailed ray.	Confirmed
10.	*Dasyatis cf. akajei*	(Bürger In Müller & Henle, 1841).	Philippine red stingray.	New/Undescribed/Endemic
11.	*Dasyatis kuhlii*	(Müller & Henle, 1841).	Bluespotted stingray or maskray, Kuhl's stingray, Dahonan, Doragon, Kiampao, Perisan.	Confirmed
12.	*Dasyatis sp.*		Adon's maskray.	New/Undescribed/Endemic
13.	*Dasyatis zugei*	(Bürger In Müller & Henle, 1841).	Pale-edged stingray.	Confirmed
14.	*Dipturus sp. 1.*		Philippine longnose skate.	New/Undescribed/Endemic
15.	*Dipturus gigas*	Ishiyama, 1958.	Giant skate.	Confirmed
16.	*Dipturus sp.*		Tilted thorn skate.	New/Undescribed
17.	*Dipturus sp.*	[Seret]	[Seret] (Philippines)	New/Undescribed/Endemic
18.	*Dipturus sp. 2.*			New/Undescribed
19.	*Dipturus tengu*	(Jordan & Fowler, 1903).	Goblin skate, tengu skate, acutenose skate.	Confirmed
20.	*Glaucostegus granulatus*	(Cuvier, 1829).	Sharpnose guitarfish.	Reported/unconfirmed
21.	*Glaucostegus halavi*	(Forsskål, 1775).	Halavi guitarfish.	Reported/unconfirmed
22.	*Glaucostegus microphthalmus*	(Teng, 1959).	Smalleyed Guitarfish.	Reported/unconfirmed
23.	*Glaucostegus typus*	(Bennett, 1830).	Giant shovelnose ray.	Confirmed
24.	*Gymnura cf. micrura*	(Bloch & Schneider, 1801).	Smooth butterfly ray.	New/Undescribed
25.	*Gymnura poecilura*	(Shaw, 1804).	Longtail butterfly ray.	Confirmed
26.	*Hexatrygon bickelli*	Heemstra & Smith, 1980.	Sixgill stingray.	Confirmed
27.	*Himantura bleekeri*	(Blyth, 1860).	Longtail whipray.	Confirmed
28.	*Himantura fai*	Jordan & Seale, 1906.	Pink whipray.	Confirmed
29.	*Himantura gerrardi*	(Gray, 1851).	Sharpnose whipray.	Confirmed
30.	*Himantura granulata*	(Macleay, 1882).	Mangrove whipray.	Confirmed
31.	*Himantura imbricata*	(Bloch & Schneider, 1801).	Scaly whipray.	Confirmed
32.	*Himantura jenkinsii*	(Annandale, 1909).	Golden whipray.	Confirmed
33.	*Himantura uarnak*	(Forsskål, 1775).	Spotted whipray, marbled stingray, ring-tailed ray, whip-tailed ray, whip ray, Paging bulik, Paging sulatan.	Confirmed
34.	*Himantura undulata*	(Bleeker, 1852).	Leopard whipray, honeycomb stingray or whipray.	Confirmed
35.	*Himantura walga*	(Müller & Henle, 1841).	Dwarf whipray.	Confirmed
36.	*Insentiraja cf. subtilispinosa*	(Stehmann, 1989).	Philippine looseskin skate.	New/Undescribed/Endemic
37.	*Manta birostris*	(Walbaum, 1792).	Manta.	Confirmed
38.	*Mobula eregoodootenkee*	(Bleeker, 1859).	Longfin devilray.	Confirmed
39.	*Mobula kuhlii*	(Valenciennes, In Müller & Henle, 1841).	Shortfin devilray.	Confirmed
40.	*Mobula thurstoni*	(Lloyd, 1908).	Bentfin devilray.	Confirmed

41.	*Myliobatis cf. tobijei*	Bleeker, 1854.	Philippine kite ray.	New/Undescribed/Endemic
42.	*Narcine timlei*	(Bloch & Schneider, 1801).	Blackspotted numbfish.	Confirmed
43.	*Narke dipterygia*	(Bloch & Schneider, 1801).	Spottail sleeper ray.	Reported/unconfirmed
44.	*Okamejei boesemani*	(Ishihara, 1987).	Black sand skate.	Reported/unconfirmed
45.	*Okamejei hollandi*	(Jordan & Richardson, 1909).	Yellow-spotted skate.	Reported/unconfirmed
46.	*Okamejei kenojei*	(Müller & Henle, 1841).	Spiny rasp skate.	Reported/unconfirmed
47.	*Okamejei sp. nov.*		Philippine ocellate skate.	New/Undescribed/Endemic
48.	*Pastinachus sephen*	(Forsskål, 1775).	Cowtail stingray, feathertail stingray, frill-tailed Pagi.	Confirmed
49.	*Platyrhina sinensis*	(Bloch & Schneider, 1801).	Fanray.	Reported/unconfirmed
50.	*Plesiobatis daviesi*	(Wallace, 1967).	Deepwater stingray, giant stingaree.	Confirmed
51.	*Pristis microdon*	Latham, 1794.	Largetooth or freshwater sawfish, sawfish, Tagan.	Confirmed
52.	*Pristis pectinata*	Latham, 1794.	Smalltooth sawfish.	Confirmed
53.	*Pristis zijsron*	Bleeker, 1851.	Green sawfish.	Confirmed
54.	*Rhina ancylostomus*	Bloch & Schneider, 1801.	Shark ray.	Confirmed
55.	*Rhinobatos cf. schlegelii*	Müller & Henle, 1841.	Philippine guitarfish.	New/Undescribed/Endemic
56.	*Rhinobatos formosensis*	Norman, 1926.	Taiwan guitarfish.	Reported/unconfirmed
57.	*Rhinoptera javanica*	Müller & Henle, 1841.	Javanese cownose ray, flapnose ray, cow-nosed ray, Palimanok, Ogaog, Banogan.	Confirmed
58.	*Rhynchobatus australiae*	Whitley, 1939.	Whitespotted wedgefish.	Confirmed
59.	*Rhynchobatus cf. laevis*	(Bloch & Schneider, 1801).	Smoothnose wedgefish.	New/Undescribed
60.	*Rhynchobatus sp. 2*	Compagno & Last (1999).	Broadnose wedgefish.	New/Undescribed
61.	*Taeniura lymma*	(Forsskål, 1775).	Bluespotted ribbontail ray, bluespotted fantail ray, blue-spotted stingray, blue-spotted Pagi, ribbontailed stingray.	Confirmed
62.	*Taeniura meyeni*	Müller & Henle, 1841.	Round ribbontail ray.	Confirmed
63.	*Temera hardwickii*	(Bloch & Schneider, 1801).	Finless sleeper ray.	Reported/unconfirmed
64.	*Torpedo sp. [spotted]*		Philippine spotted torpedo.	New/Undescribed/Endemic
65.	*Torpedo sp. [offshore]*		Philippine offshore torpedo.	New/Undescribed/Endemic
66.	*Urogymnus asperrimus*	(Bloch & Schneider, 1801).	Porcupine ray, thorny ray.	Confirmed

Table 2.2. List of cartilaginous fishes caught in Philippine waters, as reported from various sources, with remarks on status of identification.

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
1.	*apiang*	Calamba	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	Unidentified. Needs vouchers/photos for identification
2.	*bamer (Unidentified)*	Gingoog/Butuan	Gaudiano unpub ms	Unidentified. Needs vouchers/photos for identification
3.	*banakon*	Region 10	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	Unidentified. Needs vouchers/photos for identification
4.	*binsulan (probably Spiny dogshark)*	Gingoog/Butuan	Gaudiano unpub ms	Unidentified. Needs vouchers/photos for identification
5.	*danlugan (Unidentified)*	Gingoog/Butuan	Gaudiano unpub ms	Unidentified. Needs vouchers/photos for identification
6.	*mistiza*	Region 10	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	Unidentified. Needs vouchers/photos for identification
7.	*pinyahon (Unidentified)*	Gingoog/Butuan	Gaudiano unpub ms	Unidentified. Needs vouchers/photos for identification
8.	*puntahon*	Region 10	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	Unidentified. Needs vouchers/photos for identification
9.	*Shark(chop)*	*Panay Gulf*	R6 2007 (NSAP 6 Shark Report 1998-2007)	Need different method to identify.
10.	*tadlongan*	Region 10	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	Unidentified. Needs vouchers/photos for identification
11.	*Alopias pelagicus*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
		Pilar, Sta. Cruz, Ilocos Sur; Poblacion 1, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Iligan Bay	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	
		Southern Leyte	Balambao 2007 (NSAP 13 Shark Report 1998-2005)	most abundant
		Zambales coast	Bathan 2007 (NSAP 3 Shark Report 1998-2007)	
12.	*Alopias sp.*	Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	Unidentified to species level. Needs confirmation.

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
13.	*Alopias superciliosus*	Zambales coast	Bathan 2007 (NSAP 3 Shark Report 1998-2007)	
		Iligan Bay	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	
14.	*Alopias vulpinus*	Gingoog/Butuan	Gaudiano unpub ms	Confirmed from photo
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
			R7 2007 (NSAP 7 Shark Report 1998-2007)	
		Zambales coast	Bathan 2007 (NSAP 3 Shark Report 1998-2007)	
15.	*Aptychotrema sp.*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	Needs confirmation. Not in Compagno et al 2005 checklist. Only four species reported in the world; three are endemic to Australia.
16.	*Atelomycterus marmoratus*	Poblacion 1, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
			R7 2007 (NSAP 7 Shark Report 1998-2007)	
17.	*Carchahinus dussumieri*	San Pedro, Narvacan, Ilocos Sur; Petal, Dasol, Pangasinan; Puro, Magsingal, Ilocos Sur; San Lorenzo-Abaca, Bangui, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	Needs confirmation (refer to Compagno et al. 2005)
18.	*Carcharhinus albimarginatus*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
		Batanes Waters	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
		Balangiga, E. Samar; Brgy. Bislig, Tanauan, Leyte; Brgy. Bulusao, Lawaan, E. Samar	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
		Surigao Strait	Balambao 2007 (NSAP 13 Shark Report 1998-2005)	
19.	*Carcharhinus altimus*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
20.	*Carcharhinus altinius [=altimus?]*		Balambao 2007 (NSAP 13 Shark Report 1998-2005)	Mis-spelling?
21.	*Carcharhinus amblyrhynchoides*	Surigao del Norte	Balambao 2007 (NSAP 13 Shark Report 1998-2005)	
22.	*Carcharhinus amblyrhynchos*	*Cuyo East Pass; Visayan Sea*	R6 2007 (NSAP 6 Shark Report 1998-2007)	

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
		Brgy. San Roque Tanauan, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
23.	*Carcharhinus amboinensis*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	Not in Compagno et al 2005 checklist; needs confirmation.
		Batanes Waters	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	Not listed in Compagno et al. 2005. Needs confirmation.
24.	*Carcharhinus brachyurus*	*Visayan Sea*	R6 2007 (NSAP 6 Shark Report 1998-2007)	Not in Compagno et al. 2005; needs confirmation.
25.	*Carcharhinus brevipinna*	Pilar, Sta. Cruz, Ilocos Sur	Gaerlan 2007 (NSAP 1 Shark Report)	
		Batanes Waters; Babuyan Channel	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
		Surigao del Norte	Balambao 2007 (NSAP 13 Shark Report 1998-2005)	
26.	*Carcharhinus dussumieri*	Babuyan Channel	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	Needs confirmation (refer to Compagno et al. 2005)
		Tayabas Bay	R4A 2007 (NSAP 4A Shark Report 2004-2007)	Needs confirmation (refer to Compagno et al. 2005)
		Abuyog, Leyte; Brgy. Lupok Guiuan E. Samar; Balangiga, E. Samar; Brgy. Rizal, Dulag, Leyte; Brgy. Sto. Nino, Abuyog, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	Needs confirmation (refer to Compagno et al. 2005)
27.	*Carcharhinus falciformis*	Poblacion 1, Pagudpud, Ilocos Norte; Parinago, Bauang, La Union; San Pedro, Narvacan, Ilocos Sur	Gaerlan 2007 (NSAP 1 Shark Report)	
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
28.	*Carcharhinus galapagensis*	Pilar, Sta. Cruz, Ilocos Sur	Gaerlan 2007 (NSAP 1 Shark Report)	Not in Compagno et al. 2005; needs confirmation.
		Babuyan Channel	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	Not listed in Compagno et al. 2005. Needs confirmation.
29.	*Carcharhinus leucas*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
		Pilar, Sta. Cruz, Ilocos Sur	Gaerlan 2007 (NSAP 1 Shark Report)	
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
30.	*Carcharhinus limbatus*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
		Poblacion 1, Pagudpud, Ilocos Norte; San Pedro, Narvacan, Ilocos Sur; Pilar, Sta. Cruz, Ilocos Sur	Gaerlan 2007 (NSAP 1 Shark Report)	
		Cuyo East Pass; Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Abuyog, Leyte; Balangiga, E. Samar; Tanauan	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
		Zambales coast	Bathan 2007 (NSAP 3 Shark Report 1998-2007)	
			R7 2007 (NSAP 7 Shark Report 1998-2007)	
31.	*Carcharhinus longimanus*	Batanes Waters	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
		Cuyo East Pass	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Balangiga, E. Samar; Brgy. Sto. Nino, Abuyog, Leyte; Macarthur; Taraguna Beach Macarthur, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
32.	*Carcharhinus melanopterus*	Pasaleng, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	
		Batanes Waters; Babuyan Channel	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
		Abuyog, Leyte; Balangiga, E. Samar; Brgy. Bislig, Tanauan, Leyte; Brgy. Lupok Guiuan E. Samar; Brgy. Rizal, Dulag, Leyte; Brgy. San Jose Dulag, Leyte; Brgy. Sto. Nino, Abuyog, Leyte; Brgy. San Miguel Dulag, Leyte; Lawaan; Taraguna Beach, Macarthur, Leyte; Tanauan	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
		Zambales coast	Bathan 2007 (NSAP 3 Shark Report 1998-2007)	
			R7 2007 (NSAP 7 Shark Report 1998-2007)	
33.	*Carcharhinus melanopterus [melanoptera]*	*Visayan Sea*	R6 2007 (NSAP 6 Shark Report 1998-2007)	Other records show *C. melanoptera*
34.	*Carcharhinus melapterus [=malenopterus?]*	Surigao del Norte	Balambao 2007 (NSAP 13 Shark Report 1998-2005)	Mis-spelling?
35.	*Carcharhinus obscurus*	Iligan Bay	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	Needs confirmation. Not in Compagno et al 2005 checklist.
36.	*Carcharhinus palciformis*	Mindoro	R4A 2007 (NSAP 4A Shark Report 2004-2007)	

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
37.	*Carcharhinus plumbeus*	Zambales coast	Bathan 2007 (NSAP 3 Shark Report 1998-2007)	Not listed in Compagno et al. 2005. Needs confirmation.
38.	*Carcharhinus sealei*	Cagdiano, Surigao del Norte	Balambao 2007 (NSAP 13 Shark Report 1998-2005)	
39.	*Carcharhinus sorrah*	Pilar, Sta. Cruz, Ilocos Sur; Petal, Dasol, Pangasinan; Puro, Magsingal, Ilocos Sur; Poblacion 1, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	
		Batanes Waters; Babuyan Channel	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
		Tayabas Bay	R4A 2007 (NSAP 4A Shark Report 2004-2007)	
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Abuyog; Brgy. Bislig Tanauan, Leyte; Tanauan	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
		Maya Daanbantayan, Cebu	R7 2007 (NSAP 7 Shark Report 1998-2007)	
40.	*Carcharhinus sp.*	Batanes Waters; Babuyan Channel	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	Unidentified to species level. Needs confirmation.
		Gaang, Currimao, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	Unidentified to species level. Needs confirmation.
		Tayabas Bay	R4A 2007 (NSAP 4A Shark Report 2004-2007)	Unidentified to species level. Needs confirmation.
		Cuyo East Pass; Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	Unidentified to species level. Needs confirmation.
41.	*Carcharhinus sp. (sliced)*	*Panay Gulf*	R6 2007 (NSAP 6 Shark Report 1998-2007)	Need different method to identify.
42.	*Carcharias melanopterus [=Carcharinus melanpterus?]*	Brgy. Bislig, Tanauan, Leyte; Brgy. Rizal, Dulag, Leyte; Brgy. San Jose Dulag, Leyte; Brgy. Sto. Nino, Abuyog, Leyte; Taraguna Beach Macarthur, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	Probably mis-identified or typo error
43.	*Centrophorus lusitanicus*	Gingoog/Butuan	Gaudiano unpub ms	Confirmed from photo
44.	*Centrophorus moluccensis*	Poblacion 1, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	Needs confirmation (refer to Compagno et al. 2005)
		San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	Needs confirmation (refer to Compagno et al. 2005)
45.	*Centrophorus sp.*	Gingoog/Butuan	Gaudiano unpub ms	With photo but unidentified to species level
46.	*Charcharhinus albimarginatus*	Brgy. Bislig, Tanauan, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	Unidentified to species level. Needs confirmation.
			R7 2007 (NSAP 7 Shark Report 1998-2007)	

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
47.	*Chiloscyllium griseum*	*Visayan Sea*	R6 2007 (NSAP 6 Shark Report 1998-2007)	Needs confirmation (refer to Compagno et al. 2005)
48.	*Chiloscyllium indicum*		R7 2007 (NSAP 7 Shark Report 1998-2007)	Needs confirmation (refer to Compagno et al. 2005)
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	Needs confirmation (refer to Compagno et al. 2005)
49.	*Chiloscyllium plagiosum*	*Visayan Sea*	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Tapilon Daanbantayan	R7 2007 (NSAP 7 Shark Report 1998-2007)	
		Batanes Waters	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
50.	*Chillocylium punctatum*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
		Poblacion 1, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	
		Zambales coast	Bathan 2007 (NSAP 3 Shark Report 1998-2007)	
		Cuyo East Pass; Mindoro Front; Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
51.	*Daenia spp.*	Gingoog/Butuan	Gaudiano unpub ms	Needs confirmation. Not in Compagno et al 2005 checklist.
52.	*Dalatias licha*	Gingoog/Butuan	Gaudiano unpub ms	New record; confirmed from photo
53.	*Eucrossorhinus dasypogon*	Poblacion 1, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	Not in Compagno et al. 2005; needs confirmation.
54.	*Eugomphodus taurus*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	Synonym for *Carcharias taurus*, sand tiger shark
55.	*Euptromicrus sp.*	Gingoog/Butuan	Gaudiano unpub ms	With photo but unidentified to species level
56.	*Eusphyra blochii*	Brgy. Sto. Nino, Abuyog, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
57.	*Galeocerdo cuvier*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
		Pilar, Sta. Cruz, Ilocos Sur; Poblacion 1, Pagudpud, Ilocos Norte; San Pedro, Narvacan, Ilocos Sur	Gaerlan 2007 (NSAP 1 Shark Report)	
		Batanes Waters	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
		Usocan, Plaridel	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	
		Zambales coast	Bathan 2007 (NSAP 3 Shark Report 1998-2007)	
			R7 2007 (NSAP 7 Shark Report 1998-2007)	
58.	*Hemigaleus microstoma*	Babuyan Channel	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
		Tayabas Bay	R4A 2007 (NSAP 4A Shark Report 2004-2007)	
59.	*Hemipristis elongatus*		Gaerlan 2007 (NSAP 1 Shark Report)	
60.	*Hemiscyllium ocellatum*	San Lorenzo-Abaca, Bangui, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	Not in Compagno et al. 2005; needs confirmation.
		Cagdiano, Surigao del Norte	Balambao 2007 (NSAP 13 Shark Report 1998-2005)	Not in Compagno et al. 2005; needs confirmation.
61.	*Hemispristis sp*	Gingoog/Butuan	Gaudiano unpub ms	With photo but unidentified to species level
62.	*Hemitriakis leucopteriptera*		R7 2007 (NSAP 7 Shark Report 1998-2007)	
63.	*Heterodontus sp.*		R7 2007 (NSAP 7 Shark Report 1998-2007)	Needs identification to species level
64.	*Heterodontus zebra*	Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
65.	*Hexanchus gresius [griseus]*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	Misspelling.
66.	*Hexanchus griseus*	Batanes Waters	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
67.	*Hexanchus nakamurai*	Petal, Dasol, Pangasinan	Gaerlan 2007 (NSAP 1 Shark Report)	
68.	*Isurus oxyrhinchus*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
		Southern Leyte; bet. Surigao Strait and Southern Leyte	Balambao 2007 (NSAP 13 Shark Report 1998-2005)	
		Puro, Magsingal, Ilocos Sur	Gaerlan 2007 (NSAP 1 Shark Report)	
		Zambales coast	Bathan 2007 (NSAP 3 Shark Report 1998-2007)	
		Region 10	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	
69.	*Isurus paucus*	Gingoog/Butuan	Gaudiano unpub ms	With supporting photo by author to confirm presence

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
70.	*Loxodon macrorhinus*	Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Abuyog, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
71.	*Megachasma pelagios*		R7 2007 (NSAP 7 Shark Report 1998-2007)	
72.	*Nebrius ferrugineus*	Batanes Waters	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
		Cuyo East Pass; Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Cagdiano, Surigao del Norte; Surigao del Norte	Balambao 2007 (NSAP 13 Shark Report 1998-2005)	
		San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
73.	*Negaprion acutidens*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Region 10	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	
74.	*Notorhynus cepedianus*	Batanes Waters	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	Not listed in Compagno et al. 2005. Needs confirmation.
75.	*Orectolobus ornatus*	Poblacion 1, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	Needs confirmation (refer to Compagno et al. 2005)
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	Needs confirmation (refer to Compagno et al. 2005)
			R7 2007 (NSAP 7 Shark Report 1998-2007)	*Needs confirmation (refer to Compagno et al. 2005: Orectolobus sp. near ornatus.)*
76.	*Orectulobus ornatu [aka, Orectolobus ornatus]*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	Needs confirmation (refer to Compagno et al. 2005)
77.	*Prionace glauca*	Puro, Magsingal, Ilocos Sur	Gaerlan 2007 (NSAP 1 Shark Report)	
78.	*Rhincodon australiae [Rhynchobatus australiae?]*	Poblacion 1, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	No species known. Possibly typo error or mis-identification
79.	*Rhincodon typus*	Iligan Bay	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	
		Poblacion 1, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	
80.	*Scoliodon laticaudis [laticaudus]*	Babuyan Channel	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	Mis-spelling

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
81.	*Scoliodon laticaudus*	*Visayan Sea*	R6 2007 (NSAP 6 Shark Report 1998-2007)	Needs confirmation (refer to Compagno et al. 2005)
			R7 2007 (NSAP 7 Shark Report 1998-2007)	
82.	*Sphyrna lewini*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
83.	*Sphyrna lewini*	Puro, Magsingal, Ilocos Sur; Poblacion 1, Pagudpud, Ilocos Norte; Balaoi, Pagudpud, Ilocos Norte; Gaang Curimao, Ilocos Norte; Teppeng, Sinait, Ilocos Sur; Pilar, Sta. Cruz, Ilocos Sur	Gaerlan 2007 (NSAP 1 Shark Report)	
		Tayabas Bay	R4A 2007 (NSAP 4A Shark Report 2004-2007)	
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Brgy. Bislig, Tanauan, Leyte; Brgy. Bulusao, Lawaan, E. Samar; Brgy. San Roque, Tanauan, Leyte; Brgy. Sto. Nino, Abuyog, Leyte; Taraguna Beach Macarthur, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
		Region 10	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	
			R7 2007 (NSAP 7 Shark Report 1998-2007)	
84.	*Sphyrna zygaena*	*Guimaras Strait*	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Brgy. Rizal Dulag, Leyte; Brgy. Sto. Nino, Abuyog, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
		Iligan Bay	Babanto 2007 (NSAP 10 Shark Report 1998-2005)	
85.	*Squaliformes sp.*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	Needs confirmation. Unidentified to family/genus/species levels
		Southern Leyte	Balambao 2007 (NSAP 13 Shark Report 1998-2005)	Need to be identified and segregated to species level
86.	*Squalos megalops*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	Needs confirmation. Possibly a mis-identification (refer to Compagno et al. 2005)
		San Lorenzo-Abaca, Bangui, Ilocos Norte; Poblacion 1, Pagudpud, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	Needs confirmation (refer to Compagno et al. 2005)

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
87.	*Squalus sp.*		Gaerlan 2007 (NSAP 1 Shark Report)	Unidentified to species level. Needs confirmation.
		Visayan Sea	R6 2007 (NSAP 6 Shark Report 1998-2007)	Unidentified to species level. Needs confirmation.
88.	*Squatina japonica*	*Visayan Sea*	R6 2007 (NSAP 6 Shark Report 1998-2007)	Not in Compagno et al. 2005; needs confirmation.
89.	*Stegostoma fasciatum*	*Cuyo East Pass*	R6 2007 (NSAP 6 Shark Report 1998-2007)	Needs confirmation (refer to Compagno et al. 2005)
90.	*Triaenodon obesus*	Batanes Waters	Aragon 2007 (NSAP 2 Shark Report: 1998-2006)	
		Zambales coast	Bathan 2007 (NSAP 3 Shark Report 1998-2007)	
		Dulag, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	
			R7 2007 (NSAP 7 Shark Report 1998-2007)	
		San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
91.	*Zameus squamolusos*	Gingoog/Butuan	Gaudiano unpub ms	New record; confirmed from photo
		Gingoog/Butuan	Gaudiano unpub ms	Confirmed from photo
92.	*Rhina acylostomata*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
			R7 2007 (NSAP 7 Shark Report 1998-2007)	
93.	*Rhinobatos schlegelii*		R7 2007 (NSAP 7 Shark Report 1998-2007)	*Needs confirmation (refer to Compagno et al. 2005: Rhinobatos cf. schlegelii)*
94.	*Rhinobatus granulatus*	*Cuyo East Pass*	R6 2007 (NSAP 6 Shark Report 1998-2007)	Not in Compagno et al. 2005; needs confirmation.
95.	*Rhinobatus schoegelhi*	San Lorenzo-Abaca, Bangui, Ilocos Norte	Gaerlan 2007 (NSAP 1 Shark Report)	Not in Compagno et al. 2005; needs confirmation.
96.	*Rhinubatus sp. [Rhinobatus sp.]*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	Needs confirmation to species level. There are two species reported present in the Philippines but needs validation.
97.	*Rhizoprionodon acutus*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	
		Brgy. Sto. Nino, Abuyog, Leyte; Taraguna Beach Macarthur, Leyte	Francisco 2007 (NSAP 8 Shark Report 1999-2006)	

	SPECIES	FISHING GROUNDS	SOURCE	REMARKS
98.	*Rhycobatus djiddensi [Rhyncobatus dijiddensi]*	San Jose, Mindoro; Mabua, Surigao del Norte; Aparri, Cagayan; Coron, Palawan	Barut 2006	Misspelling: Needs confirmation. Possibly a mis-identification (refer to Compagno et al. 2005)
99.	*Rhynchobatus australiae*	*Cuyo East Pass*	R6 2007 (NSAP 6 Shark Report 1998-2007)	
		Poblacion, Daanbantayan	R7 2007 (NSAP 7 Shark Report 1998-2007)	
		Pasaleng, Pagudpud, Ilocos Norte; Gaang Curimao, Ilocos Norte; Teppeng, Sinait, Ilocos Sur; San Pedro, Narvacan, Ilocos Sur; Pilar, Sta. Cruz, Ilocos Sur	Gaerlan 2007 (NSAP 1 Shark Report)	

CHAPTER 3

CHAPTER 3: PHILIPPINE SHARK FISHERIES

3.1. Historical Information

Based on FAO statistics, cartilaginous fishes (with focus on elasmobranchs) are a minor group in global fisheries contributing to an average of only 0.82% of the total world fishery landings from 1947 - 1991 (or about 454,9778,900 mt [2], elasmobranch catches out of 57,895,580mt total world catches) (see Figure 1.1 and 3.1A-B, Table 3.1; Compagno 1990 and FAO in Bonfil 1994; BAS-DA Data in FAO FishStat 1950-2003 and SEAFDEC 1976-2006. Roughly this translates to about 91 million individual animals (Bonfil 1994).

Generally, the production of both total global fisheries and total elasmobranch fisheries 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 2002,000 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.) (see Table 3.1; Compagno 1990 and FAO in Bonfil 1994; BAS-DA Data in FAO FishStat 1950-2003 and/or SEAFDEC 1976-2006).

Locally, the Philippine elasmobranch fisheries, which is recorded as early as in the 1950's, is reported to have landed only about 300 mt. for that year and, within a 20-year period, averaged a

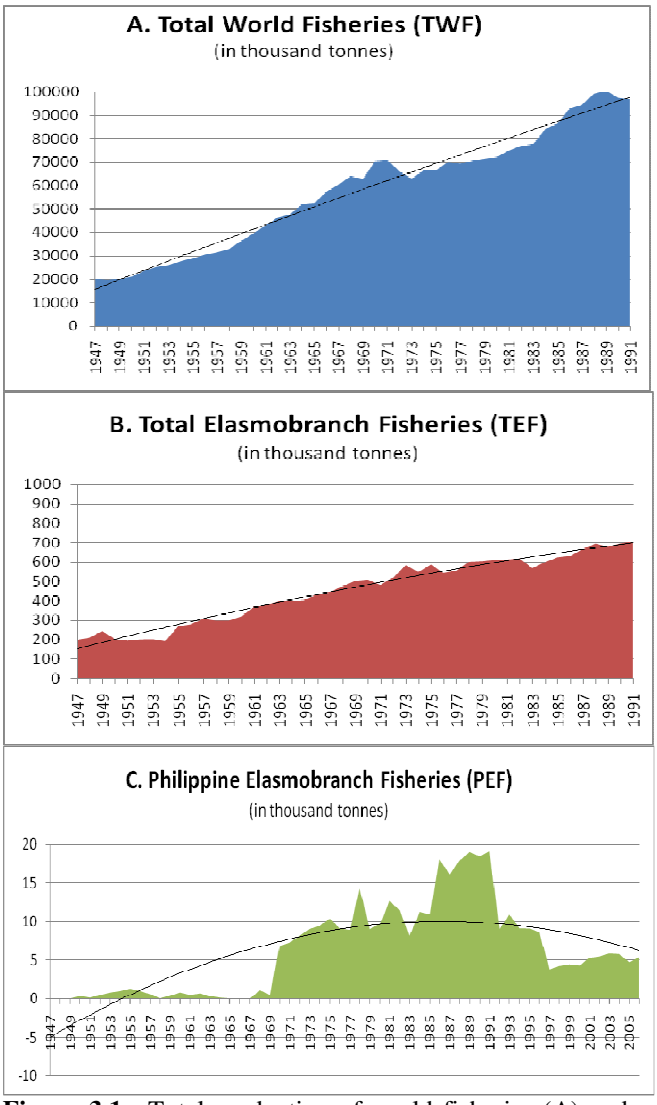


Figure 3.1. Total production of world fisheries (A) and elasmobranch fisheries (B), 1947-1991, and the Philippine elasmobranch fisheries in the Western Central Pacific (C), 1950-2003. (Source: Compagno 1990 and FAO in Bonfil 1994; FAO FishStat 1950-2003; BAS-DA 1976-2006 in SEAFDEC Fishery Bulletins for South China Sea).

[2] mt = metric tonnes

Table 3.1 Total elasmobranch catches of the Philippines (PEF) and the world (TEF), from 1947-2006, expressed in thousand tons. Legend: PEF = Philippine elasmobranch fisheries; TEF = total global elasmobranch fisheries; TWF = total world fisheries. Data sources: 1 = Compagno 1990 and FAO in Bonfil 1994; 2 = FAO FishStat 1950-2003 and BAS-DA 1976-2006.

YEAR	TWF[1]	TEF[1]	TEF[1]/TWF[1] (%)	PEF[2]	PEF[2]/TEF[1] (%)
1947	20,000	201	1.0%		
1948	19,600	211	1.1%		
1949	20,100	245	1.2%		
1950	21,100	204	1.0%	0.3	0.1%
1951	23,600	197	0.8%	0.1	0.1%
1952	25,200	203	0.8%	0.5	0.2%
1953	25,900	204	0.8%	0.8	0.4%
1954	27,600	194	0.7%	1.0	0.5%
1955	28,900	270	0.9%	1.3	0.5%
1956	30,500	280	0.9%	1.0	0.4%
1957	31,500	310	1.0%	0.6	0.2%
1958	32,800	300	0.9%	-	0.0%
1959	36,400	300	0.8%	0.4	0.1%
1960	39,500	320	0.8%	0.8	0.3%
1961	43,000	370	0.9%	0.5	0.1%
1962	46,400	380	0.8%	0.7	0.2%
1963	47,600	400	0.8%	0.3	0.1%
1964	52,000	400	0.8%	0.1	0.0%
1965	52,400	405	0.8%	-	0.0%
1966	57,300	433	0.8%	-	0.0%
1967	60,400	444	0.7%	-	0.0%
1968	63,900	476	0.7%	1.1	0.2%
1969	62,700	502	0.8%	0.5	0.1%
1970	70,388	508	0.7%	6.9	1.4%
1971	70,747	482	0.7%	7.3	1.5%
1972	66,121	519	0.8%	8.2	1.6%
1973	62,824	583	0.9%	9.0	1.5%
1974	66,597	549	0.8%	9.4	1.7%
1975	66,487	586	0.9%	10.4	1.8%
1976	69,930	544	0.8%	9.1	1.7%
1977	69,226	556	0.8%	8.9	1.6%
1978	70,596	600	0.8%	14.3	2.4%
1979	71,331	603	0.8%	9.0	1.5%
1980	72,141	609	0.8%	9.7	1.6%
1981	74,884	612	0.8%	12.6	2.1%
1982	76,810	617	0.8%	11.4	1.9%
1983	77,591	568	0.7%	8.2	1.4%
1984	83,989	598	0.7%	11.3	1.9%
1985	86,454	623	0.7%	11.0	1.8%
1986	92,822	630	0.7%	18.1	2.9%
1987	94,379	666	0.7%	16.2	2.4%
1988	99,016	694	0.7%	17.9	2.6%
1989	100,208	679	0.7%	19.0	2.8%
1990	97,434	695	0.7%	18.4	2.7%
1991	96,926	704	0.7%	19.1	2.7%
1992				9.0	
1993				10.9	
1994				9.1	
1995				9.1	
1996				8.6	
1997				3.8	
1998				4.3	
1999				4.5	
2000				4.3	
2001				5.3	
2002				5.5	
2003				5.9	
2004				5.8	
2005				4.7	
2006				5.4	
AVERAGE (1947-1991)	**57,896**	**455**	**0.8%**	**6.55**	**1.4%**
			Average (1950-2006)	**742.3**	

yearly catch of about 500 mt (see Figure 3.1C; Tables 3.1 and 3.2). It gained relative importance in the 1970's and, within the next 20 years, is reported to average annually at 4,821 mt. Although showing yearly variations, the Philippine elasmobranch production since then has been showing a general upward trend, reaching a six-year high between 1986-1991 at an average of 18,094 mt., peaking in 1991 at 19,049 mt and doing a downward trend thereafter at an average of 6,398 mt. per year from 1992 to 2006. From 1947-1991, the Philippine elasmobranch catches account for 1.44 % of the worldwide elasmobranch catch and comprised only 0.8% of the total national fisheries production (FAO FishStat).

Available statistics on elasmobranch fisheries, however, do not show segregation of volume data; rather it is lumped under general categories such as "sharks, rays, skates, etc." and "rays, stingrays, mantas", as reported in FAO FishStat or as "sharks" and "rays" under DA-BAS and/or SEAFDEC. This highly suggests an arbitrary grouping and needs better refinement of the groupings. There is no separate record found for chimaeran group.

Except for a couple of species (e.g., whale sharks and manta/mobulid group), species-specific fishery assessment is usually absent, making management recommendations doubly difficult. However, existing information on catch landing volume from shark and ray fishery grounds forms valid criteria for site prioritization, particularly for research, monitoring and/or management.

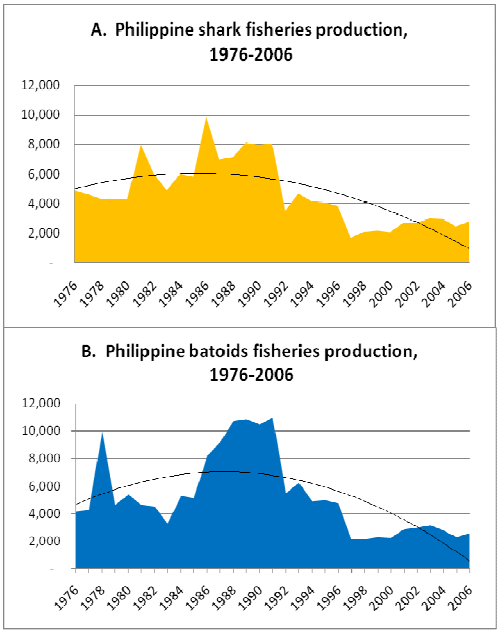


Figure 3.2. Total sharks (A) and batoids (B) production in Philippine elasmobranch fisheries, 1947-1991. (Source: DA-BAS, 1976-2006 in FAO FishStat 1950-2003 and SEAFDEC 1976-2006).

3.1.1. Landing Trends of Sharks and Rays

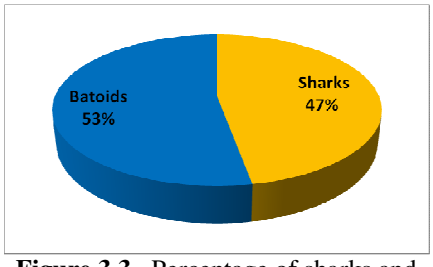


Figure 3.3. Percentage of sharks and batoids production in Philippine elasmobranch fisheries.

Production data for general groups of "sharks" and "rays" is available only from 1976-2006 from the Philippine Bureau of Agriculture Statistics (BAS), as reported in FAO FishStat and SEAFDEC fishery bulletins (Table 3.1; Figure 3.2 A-B)).

Generally, the trend in Philippine elasmobranch fisheries increased in the first 10 and 20 years at an average rate of 10533 mt/year (26%) and 14662 mt/year (51%), respectively (see Figure 3.1C). It declined thereafter at a rate of 5341 mt/year in the next 39 years (45%), suggesting collapsing fisheries.

Table 3.2. Elasmobranch fishery production (MT) in the Philippines, 1968-1994. (Sources: FAO FishStat 1950-2003 and BAS-DA 1976-2006 in SEAFDEC Fishery Bulleting for South China Sea 1976-2006).

Year	Bureau of Agricultural Statistics (BAS), Department of Agriculture (1976-2006), expressed in metric tons									GRAND TOTAL (in mt)
	Sharks	Batoids	Total	Municipal			Commercial			
				Sharks	Batoids	Total	Sharks	Batoids	Total	
1976	4,902	4,163	9,065	4,883	3,966	8,849	19	197	216	9,065
1977	4,620	4,255	8,875	4,604	4,192	8,796	16	63	79	8,875
1978	4,302	9,973	4,275	3,876	9,774	13,650	426	199	625	14,275
1979	4,328	4,637	8,965	3,608	4,325	7,933	720	312	1,032	8,965
1980	4,306	5,392	9,698	3,702	4,914	8,616	604	478	1,082	9,698
1981	7,989	4,635	12,624	7,545	4,389	11,934	444	246	690	12,624
1982	6,010	4,531	10,541	5,593	5,111	10,704	417	320	737	11,441
1983	4,887	3,275	8,162	4,661	3,019	7,680	226	256	482	8,162
1984	5,983	5,292	11,275	5,817	5,106	10,923	166	186	352	11,275
1985	5,801	5,147	10,948	5,490	4,827	10,317	311	320	631	10,948
1986	9,853	8,205	18,058	9,386	7,708	17,094	467	497	964	18,058
1987	6,967	9,188	16,155	5,709	8,708	14,417	1,258	480	1,738	16,155
1988	7,134	10,745	17,879	6,379	9,875	16,254	755	870	1,625	17,879
1989	8,103	10,877	18,980	7,440	9,794	17,234	663	1,083	1,746	18,980
1990	7,958	10,484	18,442	7,706	10,059	17,765	252	425	677	18,442
1991	8,060	10,989	19,049	7,800	10,661	18,461	260	328	588	19,049
1992	3,497	5,488	8,985	3,229	5,165	8,394	268	323	591	8,985
1993	4,685	6,243	10,928	4,376	5,717	10,093	309	526	835	10,928
1994	4,175	4,906	9,081	3,846	4,129	7,975	329	777	1,106	9,081
1995	4,079	4,980	9,059	3,935	4,533	8,468	144	447	591	9,059
1996	3,839	4,756	8,595	3,700	4,328	8,028	139	428	567	8,595
1997	1,690	2,165	3,855	1,586	1,899	3,485	104	266	370	3,855
1998	2,087	2,174	4,261	1,965	1,940	3,905	122	234	356	4,261
1999	2,174	2,299	4,473	2,043	2,050	4,093	131	249	380	4,473
2000	2,071	2,248	4,319	1,974	2,026	4,000	97	222	319	4,319
2001	2,681	2,867	5,548	2,553	2,616	5,169	128	251	379	5,548
2002	2,682	2,986	5,668	2,532	2,676	5,208	150	310	460	5,668
2003	3,021	3,156	6,177	2,906	2,819	5,725	115	337	452	6,177
2004	2,976	2,798	5,774	2,851	2,445	5,296	125	353	478	5,774
2005	2,438	2,306	4,744	2,313	1,971	4,284	125	335	460	4,744
2006	2,772	2,584	5,356	2,663	2,268	4,931	109	316	425	5,356
Average	**4,712**	**5,282**	**9,671**	**4,409**	**4,936**	**9,345**	**303**	**375**	**678**	**10,023**

The same trend is observed for both shark and batoid groups. Shark fisheries showed an immediate decline in the first four years at an average of -8% per year from 1977-1980. Generally, however, it showed about an 18% increase within the first 10-year period from baseline production of about 4902 mt in 1976, and a 19% increase in the next second 10-year period (i.e., 1986-1996) (Figure 3.3A). Within the 20-year period, peaks are notable at short intervals, 1981 to 1982 (at 7989 mt and 6010 mt, respectively), and between 1986-1990, with catches ranging from 7134-9853 mt. Production declined thereafter and in the latter 10-year period by about -50% (see Figure 3.3A).

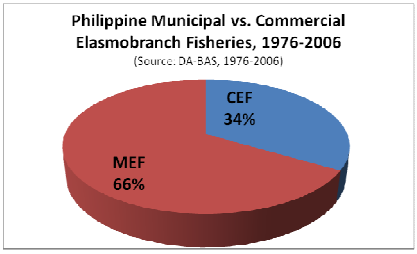


Figure 3.4. Percentage of municipal (MEF) and commercial (CEF) elasmobranch fisheries production in the Philippines.

Batoid production, on the other hand, also increased in the first 10 years, roughly about 33% from its baseline value of 4163 mt in 1976, and in the next 20 years at about 89% (or about 8211 mt/yr). As reflected on total elasmobranch fisheries trend, it declined thereafter by about 39% from 1996-2006 (see Figure 3.3B).

Batoids seem to be slightly more important than sharks in the catches, representing an average of 53 % of the elasmobranch yields during 1976-2006 fisheries production (Table 3.2; Figure 3.3).

There are no other details on shark and batoid catch composition. Targeted and commercial exploitation of the dogfishes started around 1967 due to demand for squalene oil (Chen 1996; Barut and Zartiaga 1997). Prior to this, however, sharks were only caught as by-catch of some major fisheries such as those for tuna and trawl fisheries. Whale sharks (*Rhincodon typus*), has also been traditionally harvested after World War II (Alava et al. 1997), but it is not known if whale shark catches is part of the historical production data. No documentation is found for batoid species, which, as a group contributed the majority of the fisheries production.

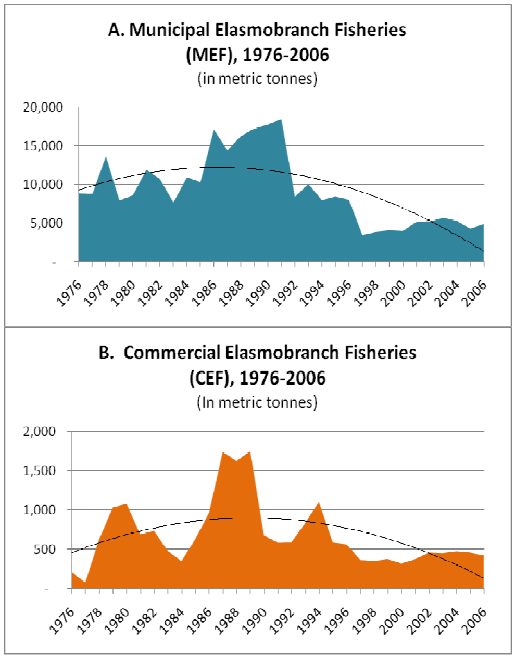


Figure 3.5. Municipal (A; MEF) and commercial (B; CEF) elasmobranch fisheries production in the Philippines, 1976-2006. (Source: DA-BAS, 1976-2006 in FAO FishStat 1950-2003 and SEAFDEC 1976-

3.1.2. Municipal and Commercial Elasmobranch Fisheries

Philippine municipal fisheries dominate over commercial fisheries representing about 66% of the elasmobranch yields during 1976-2006 fisheries production period (Figure 3.4; Table 3.2). It showed increasing production trends at a rate of 14% for the first 10 years (1976-1985), 49% in the second 10-year period (1986-1995), but showed progressive decline at a rate of 48% in the third 10-year period (1996-2005) (Figure 3.3A). Municipal fisheries generally operate within municipal waters, suggesting a decreasing elasmobranch production in near-shore waters, particularly within the 15 kilometer zone.

Philippine commercial fisheries, on the other hand, contributed only about 34% of the total Philippine elasmobranch production for 1976-2006, with records of only 216 mt. for 1976 (Figure 3.4; Table 3.2). As with municipal fisheries production, commercial fisheries also show increasing trends in the first 10 and 20 years. It more than doubled its baseline catches of 216 mt. in 1976 in the first 10-year period (i.e., about 593 mt./yr from 1977-1986;), and almost quadrupled in the second 10-year period (i.e., 1046 ./yr from 1987-1996). As with the general elasmobranch fisheries trend, it declined in the years thereafter by about -89% (i.e., 422 mt./yr from 1997-2006).

Since commercial fisheries usually operate in offshore areas, beyond the 15km limit from the shore, data suggest an increasing productivity in these waters for elasmobranch resources.

As with general Philippine elasmobranch trends, batoids dominate the catches for both municipal and commercial fisheries, at 53% and 55%, respectively (see Figures 3.5 and 3.8). More batoids were being landed in the municipal fisheries rather than in commercial. Over the 30-year period, total volume of batoids from municipal landings was 153,010 mt. and 11,634 mt. for commercial landings compared with sharks at 136,671 mt. for municipal landings and to 9399 mt. from commercial landings. Batoids were landed in greater volume than sharks and are thus impacted more in municipal rather than in commercial fisheries.

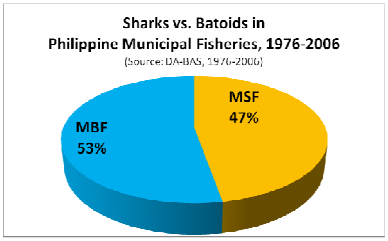


Figure 3.6. Percentage of sharks (MSF) and batoids (MBF) fisheries production in Philippine municipal fisheries.

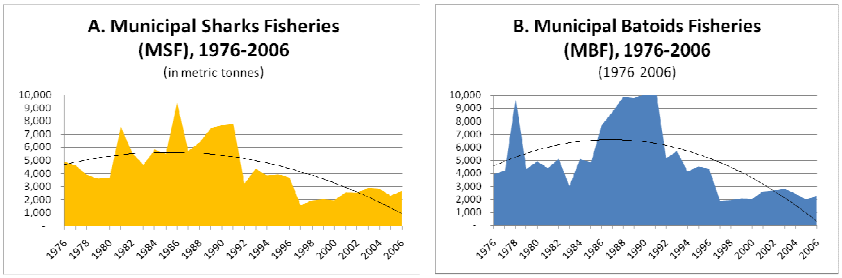


Figure 3.7. Municipal shark (A; MSF) and batoids (B; MBF) fisheries production in the Philippines, 1976-2006. (Source: DA-BAS, 1976-2006 in FAO FishStat 1950-2003 and SEAFDEC 1976-2006).

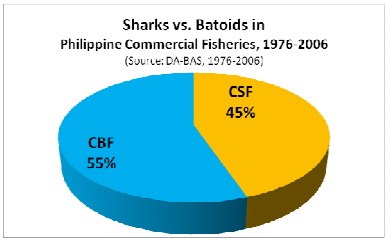


Figure 3.8. Percentage of sharks (CSF) and batoids (CBF) fisheries production in Philippine commercial fisheries.

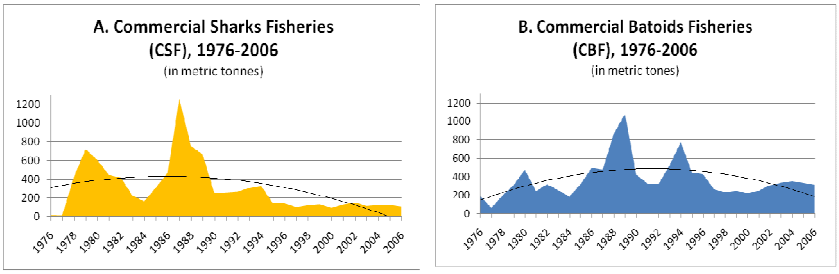


Figure 3.9. Commercial shark (A, CSF) and batoid (B, CBF) fisheries production in the Philippines, 1976-2006. (Source: DA-BAS, 1976-2006 in FAO FishStat 1950-2003 and SEAFDEC 1976-2006).

3.1.3. Fishing Gears

Based on the 1988 catches (i.e., 17879 mt.), small scale fisheries provide the large majority of elasmobranch catches in Philippines (Bonfil, 1994; Figure 3.10; Table 3.3). SEAFDEC 1988 data (in Bonfil, 1994) showed by-catch landings from different types of fishing gears, segregated into the three major geographic groupings the Philippines, *i.e.*, Luzon, Visayas and Mindanao.

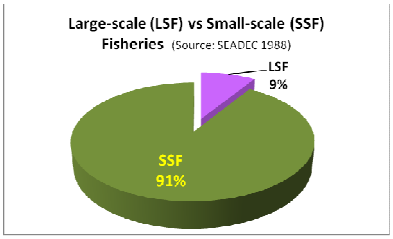


Figure 3.10. Percentage of large-scale shark (LSF) and batoids (SSF) fisheries production in Philippine commercial fisheries.

In Luzon, large scale trawlers accounted for 30% of the local shark catches but only 6% of batoids, with purse seiners taking around 3 % of both groups' catches. In Visayas, trawls were the main gear in large scale fisheries for rays (23%) but accounted for only 1 % of that of sharks. Large scale purse seining took 11 % and 8 % of the shark and ray catches respectively in that area. Catches from small-scale fisheries for both sharks and rays in Luzon and for sharks in Visayas were mainly taken by hook and line and longline (38%-76%) but also by gillnet (8%-30%). The reverse was the case for catches of rays in Visayas where gillnet catches were greater than those from hook and line and long line (42 % vs. 22 %).

Small contributions to the catches of both fishes were made in Visayas and Luzon by "other gear" (< 13%). Minor catches of rays were also taken with traps (< 8%). Small scale fisheries took all the elasmobranch catches in Mindanao. The main gear was with gillnets in the case of rays (81 %) and hook and line for sharks (57%). Small scale gear, classified as "other", was the second most important method of catching both groups (28% of sharks, 10% of rays). Gill nets took 15 % of the small-scale shark catches and traps less than 1 %. For rays, hook and line and longline were the third most important gear in this area taking 7 % of the catch. Traps and otter trawls took little.

Table 3.3. Landing volume (in mt) of elasmobranchs from various fishing gears in Luzon, Visayas and Mindanao. (Source: SEAFDEC 1988; data recalculated from Chen 1996)**.**

	LUZON		VISAYAS		MINDANAO		TOTAL
LARGE SCALE	**Sharks**	**Rays**	**Sharks**	**Rays**	**Sharks**	**Rays**	
Trawl	454	188	17	443	-	-	**1,102**
Purse seine	45	63	192	96	-	-	**396**
Hook/line	30	-	-	-	-	-	**30**
Others	-	31	17	-	-	-	**49**
SMALL SCALE							
Gill/drift net	318	940	139	808	582	4,608	**7,395**
Hook/line	575	1,315	1,324	423	2,211	398	**6,247**
Others	91	376	52	77	1,086	569	**2,251**
Trap	-	219	-	58	-	57	**334**
Otter trawl	-	-	-	19	-	57	**76**
TOTAL	**1,513**	**3,132**	**1,742**	**1,924**	**3,879**	**5,689**	**17,879**

The major gear involved in large scale elasmobranch fisheries in the three areas is the **trawl** (ca. 1,102mt or 6% of total catch), mainly in Luzon, while in small scale fishing involved **gill/drift net** (ca. 7395mt, 41% of total catch), followed by **hook and line** (ca. 6,247mt, 35% of total catch), both mainly in Mindanao (Table 8). Again this data suggests that small-scale fishery provided the majority of the elasmobranch catches in 1988.

BAS data in 1990 and 1994, however, **shifted** this trend towards large-scale fishery providing the majority of the landed catch (Table 3.4). 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.

Other gears used by fishers in elasmobranch fishery based on secondary sources are: lines (troll lines, hand lines, single and multiple hook and lines, single and set longlines) and nets (*pamo*/driftnets, bottom set gill nets, purse seines, ring nets), traps (otoshi-ami, fish corrals, fish pots and fish traps), and spear gun (Maypa et al. 1999; Table 3.5). In Zamboanga alone, Trono (in Chen 1996) reported the use of gears as longlines, bottom set lines and drift nets to catch sharks.

Results of fishing household survey conducted by Silliman from December 1998 to June 1999 in southern Philippines revealed that handlines and long lines were the more prevalent gears, by surface and bottom set gill nets. Traps, trawls and spear gun were the least prevalent (see Table 3.5). Based on this preliminary information, small-scale elasmobranch fishery is still prevalent in many areas. However, data on the volume landed by each gear is not available, thus still inconclusive at this point. Long lines, bottom setlines and drift nets are also used to catch sharks in Zamboanga as mentioned by Trono (Chen, 1996).

Table 3.4. Landing volume (in mt.) of elasmobranchs from various fishing gears in the Philippines, 1990 and 1994. (Source: DA-BAS in Chen 1996).

GEAR	1990			1994		
	Sharks	Batoids	TOTAL	Sharks	Batoids	TOTAL
Purse seine	**163.5**	**262.1**	**425.6**	**116**	**152**	**268**
Trawl	**60.1**	**123.8**	**183.9**	**29**	**447**	**476**
Hook and line	8.2	11.6	19.8	13	16	29
Danish seine	3.3	11.7	15.0	5	118	123
Ring net	6.0	8.5	14.5	158	6	164
Bagnet	2.9	3.1	6.1			
Round haul seine	4.3	1.8	6.0			
Long line	2.0	1.1	3.1	5		5
Beach seine	1.1	0.4	1.5			
Drift gill net	1.6	0.1	1.7		1	1
Gill net	0.2	0.2	0.5	3	37	40
Troll line		<0.0	<0.0			
TOTAL	**250.4**	**421.36**	**671.8**	**329**	**777**	**1106**

Little is known about the species composition of elasmobranch catches in the Philippines. Warfel and Clague (1950) report tiger sharks to be the major catch of shark longlines around the Philippines from exploratory fishing. Other sharks found in the survey include at least six species corresponding to the genus *Carcharhinus,* plus *Sphyrna zygaena, Scyliorhinus torazame, Hexanchus griseus* and an unidentified nurse shark. The species taken by gillnets were *Pristis cuspidatus* and *Rhynchobatus djiddensis.* Encina (1977) reports on a new dogfish fishery catching *Squalus spp.* and *Centrophorus* spp. around the Philippines, primarily directed prosecuted for squalene oil extraction.

Table 3.5. List of gears used in elasmobranch fishery in selected villages of the 10 from December 1998 to June 1999. (Source: Maypa et al. 1999).

FISHING GEARS	Number of Units (among surveyed fishers)
Lines:	
Handlines	78
Longlines	63
Nets:	
Surface gill net	42
Bottom set gill net	29
Trawl	2
Others:	
Fish trap	3
Spear gun	1

3.1.4. Fishing Grounds and Landing Sites

SEAFDEC data from 1976-1990 shows Mindanao as the area of largest harvest for sharks and batoids at 5.9mt./yr (45%), followed by Luzon at 4.3mt./yr (33%) and Visayas at 2.9mt/yr (22%) (Bonfil 1994; Table 3.5). This shifted in 1990 and 1994 to Visayas (48-72%), Luzon (44-23%), Mindanao (4-8%) of total volume landed at 694mt in 1990 and 1106mt in 1994). Batoid catches surpassed sharks and were highest in Visayas in both 1990 and 1994 data (SEAFDEC 1988 in Chen, 1996).

Table 3.6. Total catch production of sharks and batoids (in t/year) in Luzon, Visayas and Mindanao (Philippines) from 1976-1980. (Source: SEAFDEC Data in Bonfil 1994).

Areas	Yearly average catch production (1976-1990)					
	Sharks		Batoids		Total	
	t/yr	%	t/yr	%	t/yr	%
Luzon	1,993	15	2,312	18	4,305	33
Visayas	1,108	8	1,856	14	4,305	22
Mindanao	3,185	24	2,724	21	8,610	45
TOTAL	6,286	47	**6,892**	53	17,220	100

Fishing grounds monitored by DA-BFAR and BAS in 1990 and 1994 for Luzon were: west waters of Palawan (213t, 1990; 238t, 1994), west Sulu Sea (49t, 1990; 12t, 1994), Lamon Bay (23t, 1990), Babuyan Channel (14t, 1990; 3t, 1994), and Cuyo Pass (5t, 1990). For Visayas: Visayan Sea (280t, 1990; 122t, 1994), east Sulu Sea (14.3t, 1990), Guimaras Strait (3.3t, 1990; 444t in 1994), Sibuyan Sea (27t, 1990; 28t, 1994). For Mindanao: South Sulu Sea (55.8t, 1990; 36t, 1994) and Moro Gulf (11t, 1990 and 1994) (See Table 3.7).

For 1976-1990, Mindanao was the area of largest harvest for sharks and batoids, at 24% (avg., 3,185t/yr) and 21% (avg., 2,724t/yr) of the total elasmobranch catches, respectively (SEAFDEC data in Bonfil, 1994). Luzon followed at 15% (1,993t/ry) for sharks and 18% (2,312t/yr) for batoids. Visayas was the lowest at 1,108t/yr (8%) for sharks and 1,856t/yr (14%). In BAS-DA data for 1990 and 1994, Luzon was highest in 1990 (307.48t) but was second only to Visayas in 1994 (at 257 t). Visayas had the second highest landing in 1994 (332.78t) but was highest in 1994 (800t). Mindanao had the least landed volume both in 1990 and 1994, at 55.792t and 49t, respectively.

Sharks catches declined through the years while batoid catches were increasing (Bonfil, 1994). Batoid catches are highest in Visayas in both 1990 and 1994 data (SEAFDEC 1988 in Chen, 1996). For the whale sharks, *Rhincodon typus*, the common fishing grounds is in the Bohol Sea for both of the two traditional fishery sites (e.g., Pamilacan Island, Bohol and Talisayan, Misamis Oriental). The Pamilacan whale shark hunters also fish in waters off Tagbilaran waters as well as in Cebu Strait and Tanon Strait.

Table 3.7. Commercial fishery production (in mt) of elasmobranchs by fishing area in the Philippines, 1990 and 1994. (Source: DA-BAS in Chen 1996).

GEAR	1990			1994		
	Sharks	**Batoids**	**TOTAL**	**Sharks**	**Batoids**	**TOTAL**
Luzon						
Babuyan Channel	10.839	3.560	14.399		3	3
Batangas Coast				1	1	2
Cuyo Pass	2.110	2.934	5.044			
Lamon Bay	5.994	16.818	22.812			
Manila Bay	2.745	0.538	3.283	2		2
West Palawan Waters	96.660	116.190	212.850	91	147	238
West Sulu Sa	32.896	16.200	49.096	11	1	12
Subtotal	**151.244**	**156.24**	**307.484**	**105**	**152**	**257**
Visayas						
Bohol Sea	0.265	2.370	2.635	163	39	202
Camotes Sea	0.017	0.003	0.0320			
East Sulu Sea	3.545	10.752	14.297			
Guimaras Strait	0.325	3.033	3.358	14	430	444
Leyte Gulf	0.043	0.007	0.050			
Ragay Gulf	0.572	0.661	1.233			
Visayan Sea	62.207	218.155	280.362	38	84	122
Samar Sea	0.108	3.608	3.716	1	3	4
Sibuyan Sea	5.612	21.485	27.097	1	27	28
Subtotal	**72.694**	**260.074**	**332.78**	**217**	**583**	**800**
Mindanao						
Davao Gulf	0.076	0.005	0.081		1	1
Mindanao Waters – Pacific side					1	1
Moro Gulf	10.527	0.528	11.055	2	9	11
South Sulu Sea	14.704	7.140	21.844	5	31	36
Subtotal	**31.301**	**24.491**	**55.792**	**7**	**42**	**49**
TOTAL	**253.385**	**424.482**	**677.867**	**329**	**777**	**1106**

3.3. Ad Hoc Studies on Sharks

3.3.1. SEAFDEC-NFRDI shark fisheries assessment (2003-2004): Cagayan, Occidental Mindoro, Palawan, and Surigao del Norte

Figure 3.57. Map of the Philippines showing the four sampling sites. (Source: Barut 2006).

Barut 2006 discussed details of this study in his paper entitled "Landed Catch and Effort Monitoring and Biological Study of Sharks in Selected Landing Sites in the Philippines" SEAFDEC 2006 Report on The Study on Shark Production, Utilization and Management in the ASEAN Region. Highlights of the study are shown below. The study was basically conducted to get an overview on shark fisheries in the country. At least four landing/monitoring sites were selected in the following provinces: Cagayan; Occidental Mindoro; Palawan; and Surigao del Norte (see Figure 3.57).

In Cagayan, Aparri is known to be one of the major landing sites. Two major gears used for sharks were longline (LL) and the multiple hook and line (MHL), with fishing operations normally lasting from 3-5 days, usually within the Babuyan Channel.

In Occidental Mindoro, two major landing sites for sharks were Caminawit and Pagasa. The major gear used in catching sharks in these two sampling sites are gillnet GN) and longline (LL), with average fishing days per trip at around 4-5 days. Fishing areas are generally in northern Palawan.

In Palawan, Coron and Salvacion were the two municipalities with major landings of sharks although landings were irregular and dependent on competitive market prices among local markets in the area. The main fishing gear for catching shark was longline (LL). Average fishing days for most gears was from 3-5 days.

In Surigao del Norte, Mabua is one of the landing site for both sharks and other marine products. The main gear that is uses was multiple hook and line (MHL) which normally operates from 3-4 days. The fishing ground are in eastern Mindanao waters or the Pacific Ocean.

The combined total catch observed in the four landing sites for the month of October 2003 and January 2004 were 5.8 mt and 5.4 mt, respectively (see Appendix 5), totaling to about 1,307 individuals of at least 24 species (Table 3.28). Interview results of traders in Mindoro and Palawan estimates shark production for November 2003 at 3.9 mt and 1.8 mt, respectively. In December 2003, results show Mindoro and Palawan production at 3.5 mt and 2 mt for December 2003 (Table 3.29).

At least 24 species of sharks are landed in the areas monitored (Table 3.30). The size of the shark sampled varies from site to site (Table 3.32). Most of the sharks landed in Mindoro are the immature or small sharks while those landed in Palawan are the bigger or mature sharks. Likewise in Surigao and Cagayan the sharks landed are the mature ones.

Table 3.28. Total landed catch of shark by sampling site from October 2003 to January 2004, based on actual landing monitoring and interview of traders. (Source; Barut 2006).

Landing Sites	October 2003*				Nov 2003**	Dec 2003**	January 2004			
	No. of Species	No. of Individual sharks	Total Weight (kg)	Remarks	Total Weight (kg)	Total Weight (kg)	No. of Species	No. of Individual sharks	Total Weight (kg)	Remarks
Cagayan	1	1	55.0							No catch
Mindoro	19	670	4,000.4	Generally small sharks	3,892.0	3,500.0	21	598	4,574.2	
Palawan	-	-	1,100.0	Cut into pieces when landed	1,800.0	2,000.0	5	19	661.0	
Surigao del Norte	3	17	690.7				1	2	150.0	
TOTAL		**688**	**5,846.1**		**5,692.0**	**5,500.0**		**619**	**5,385.2**	
*	Source: actual landing site monitoring									
**	Source: interviews									

Table 3.29. Catch summary of the four sampling sites from October 2003 to January 2004, based on actual landing monitoring and interview of traders. (Source; Barut 2006).

CATCH SUMMARY TABLE FOR QUARTER (30 days)		Cagayan		Occ. Mindoro		Palawan		Surigao del Norte		TOTAL	
		Production (in kg)	AVG # boats	Production (in kg)	AVG # boats	Production (in kg)	AVG # boats	Production (in kg)	AVG # boats	Production (in kg)	AVG # boats
Shark catches per fishing gear	*Total Shark Catches*	55.00	1	4,000.10	8	661.10	6	690.70	15	**5,406.90**	30
	Gillnet			1,964.00	2					**1,964.00**	2
	Long line	55.00	1	2,036.10	14	661.1	6			**2,752.20**	21
	MHL							690.70	15	**690.70**	15
Total Non-shark Catches				**21,058.80**				**9,007.00**		**30,065.80**	
Total Shark and Non-Shark Catches		**55.00**		**25,058.90**		**661.10**		**9,697.70**		**35,472.70**	

Table 3.30. Species of sharks observed landed in the four landing sites in Palawan (Coron/Panlaitan), Cagayan (Aparri), Occidental Mindoro (San Jose), and Surigao del Norte (Mabua). (Source; Barut 2006).

Alopias pelagicus	*Galeocerdo cuvier*	*Sphyrna lewini*
Aptychotrema sp.	*Hexanchus gresius*	*Squaliformes sp.*
Carcharhinus amboinensis	*Isurus oxyrinchus*	*Squalos megalops*
C. albimarginatus	*Nebrius ferugenius*	*Trieanodon obesus*
C. altimus	*Negaprion acutidens*	
C. leucas	*Orectulobus ornatu*	
C.limbatus	*Rhina ancylostoma*	
Centrophorus mulloccencis	*Rhinubatus sp.*	
Chillocylium punctatum	*Rhizoprionodon acutus*	
Eugomphodus taurus	*Rhycobatus djiddensi*	

Almost all parts of sharks are sold in the local markets (Appendix 5). Fins are targeted for the dried shark fin trade, marketed locally or internationally, depending on the size (i.e., small sized fins sold to local restaurants; larger fins to the international markets where it commands a much higher price). The price of dried fins varies according to species and size (e.g., small sized fins is priced at P3,500 per kg; medium-sized at P 5,000 per kg; and large-sized fins at P 8,000 per kg)..

The price of meat is variable and is dictated by demand in the market (Table 3.31). During December and January where sea condition is rough and fishing is limiting, shark meat price can go up to P80.00 per kg in the market. While for the rest of the month the market price ranges from P 40.00-60.00 per kg. In some areas the jaws and other parts are also sold in the souvenir shops. Generally, shark meat is utilized in the local fish balls industry. In recent years, it is exported to the United States as fish balls.

Table 3.31. Prices of shark products at landing sites. (Source; Barut 2006).

Landing Sites	Species	Meat	Dried Fins	Liver oil	Jaws
Cagayan		30-45	2000-2500		
Occidental Mindoro	Shovel nosed	15-20	3500-7000	500/gallon	150-300/pcs
	All other species		500-600		
Palawan		28-35	2500-8000		
Surigao del Norte		40-50	2500-3000		

Table 3.32. Number, size ranges and weight of sharks in the four landing sites. (Source; Barut 2006).

Species	Number of individuals	Size ranges (cm)	Weight (kg)	Remarks
1. *Alopias pelagicus*	12	273-320	623	
2. *Carcharhinus amboinensis*	1	170	25	
3. *C. albimarginatus*	5	210-240	115	
4. *C. altimus*	1	178	2	
5. *C. leucas*	1	150	13	
6. *C.limbatus*	13	140-220	150	
7. *Chillocylium punctatum*	51	89-121	183	Headless/gutted
8. *Eugomphodus taurus*	1	145	12	
9. *Galeocerdo cuvier*	6	200-290	760	
10. *Hexanchus gresius*	1	90	2	
11. *Nebrius ferugenius*	2	140-150	11	
12. *Negaprion acutidens*	13	120-187	62	
13. *Orectulobus ornatu*	1	92	3	
14. *Rhina ancylostoma*	5	110-175	99	
15. *Rhinubatus sp.*	71	70-93	104	
16. *Rhizoprionodon acutus*	1	138	9	
17. *Rhycobatus djiddensi*	15	120-210	298	
18. *Sphyrna lewini*	2	283-320	110	
19. *Squalos megalops*	186	40-105	333	
20. *Trieanodon obesus*	294	75-167	1490	Headless/gutted

3.3.2. WWF-Philippines direct and indirect takes of elasmobranchs in selected areas in the Philippines

Results of a 3-year WWF-funded Elasmobranch Biodiversity and Conservation Project (1998-2001) in landing and market sites of 10 provinces in central Visayas and northern Mindanao showed high chondrichthyan diversity, most of which were taken directly and incidentally (by-catch) by either or both large-scale and small-scale fisheries. Targeted fisheries were often influenced by the shark fin trade or the liver oil trade. By-catch is reported for major fisheries such as tuna and trawl fisheries (Chen 1996; Barut and Zartiaga, 2002).

In 2002-2003, WWF initiated a 2-year study on the interaction of cetaceans with fisheries in which ten cetacean by-catch assessment sites. Opportunistic and rapid assessments through market surveys and interviews were conducted in some of these sites, namely: Babuyan Channel, Malampaya Sound, Tanon Strait, Leyte Gulf, Gingoog-Butuan Bays and Moro Gulf. Partial results, particularly focusing on data collected for Gingoog-Butuan, were presented by WWF-Philippines at the Philippine NPOA-Shark 2007 planning workshop.

In Butuan and Gingoog (northern Mindanao), however, sharks were targeted for primarily for the shark liver oil trade. Landed volume and individuals harvested from Butuan Bay and Gingoog Bay per fishing years is shown in Tables 3.33-34; Figure 3.58.

Table 3.33. Landed volume and number of individuals harvested from Butuan Bay per fishing years. (Source: Gaudiano 2007).

Years	Volume (tons)		Individuals (in	
1970s	126	184	121	178
1980s	203	310	233	313
2000	106	178	106	184
2001	89	154	106	189
2002	96	164	100	175
Total	**620**	**990**	**666**	**1039**
Mean	*124*	*198*	*133.2*	*207.8*

Table 3.34. Landed volume and number of individuals harvested from Gingoog Bay per fishing years. (Source: Gaudiano 2007).

Years	Volume (tons)		Individuals (in	
1980s	65	108	45	76
2000	35	54	21	32
2001	20	31	17	27
2002	19	26	16	22
Total	**139**	**219**	**99**	**157**
Mean	*35*	*55*	*25*	*39*

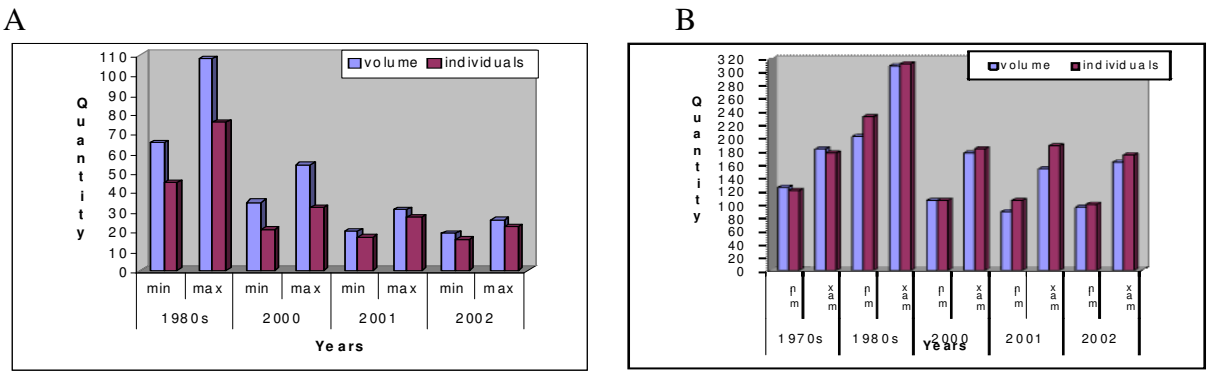


Figure 3.58. Trend in the landed volume (in tones) and number of individuals (in thousands) of dogsharks harvested in Butuan Bay (A)and Gingoog Bay (B) per fishing year. (Gaudiano 2007).

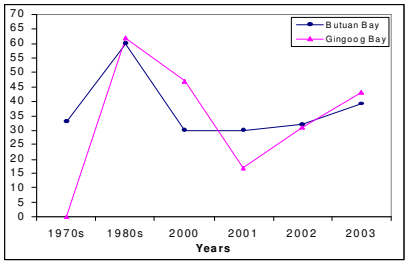


Figure 3.59. Trend in the number of boats with direct impact on dogshark fishery in Butuan and Gingoog bays.

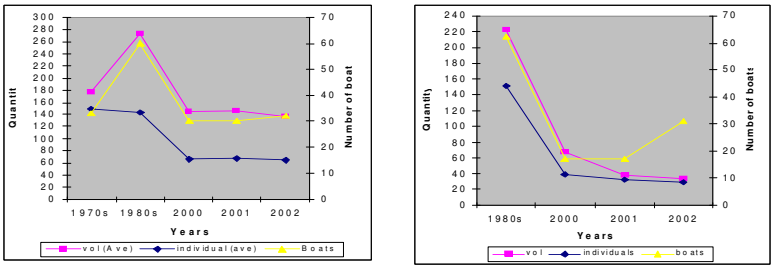


Figure 3.60. Trend in the production of dogsharks in Butuan Bay (A) and Gingoog Bay (B) showing the average volume (tons) and individuals (thousands) and the number of boats per fishing years.

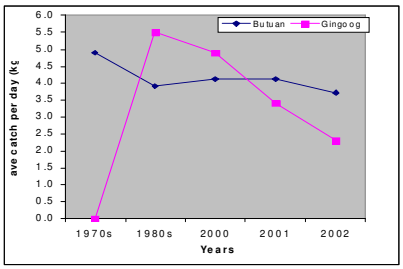


Figure 3.61. Trend in the CPUE in Butuan and Gingoog bays.

Figure 3.62. Relative abundance of species caught in Butuan Bay (A) and Gingoog Bay (B) in terms of number of individuals.

Table 3.35. Classification of shark species based on quality of liver oil produced, Butuan-Gingoog bays. (Source: Gaudiano 2007).

Species Name	Local Name	Class of oil
Binsulan	Binsulan	First class
Centrophorus lusitanicus	Bangaisan	First class
Centrophorus sp.	Dumagahay	First class
Daenia spp.	Raket	First class
Dalatias licha	Lumoboq	First class
Bamer	Bamer	Reject
Danluqan (Unidentified)	Danluqan	Second class
Pinyahon (Unidentified)	Pinyahon	Second class
Zameus squamolusos	Intsik	Reject

Production trends show a general decline in terms of volume and number of individuals as well as the resulting catch per unit effort (Figures 3.60 and 3.61), suggesting the fisheries may be collapsing soon also.

Shark liver oil is the target for this fishery; oil is sold at PhP 110-130/liter (1st class) and PhP 60-80/li (2nd class). Species considered as first class are shown in Table 3.35. Meat, considered as aphrodisiac, is sold at PhP 25-30/kilo fresh and utilized for family consumption. Previously not a priority, dogshark fins were recently utilized for the fin trade and sold at PhP 250-300/kilo fresh. Large sharks were hunted primarily for the fin trade. Fins are then sold to a major buyer based in Cagayan de Oro and transported to an exporter based in Binondo, Manila for export, primarily to Japan.

At present, a systematic monitoring for shark fisheries for both direct and indirect is still absent. Available data on these fisheries show lumped catch volume under "sharks" and "rays" and thus species-specific fishery assessment is necessary for shark management.

In a separate WWF study on by-catch fisheries in March 2007, WWF by-catch fisheries study shows sharks contribute to about 24% of total volume (Figure 3.63).

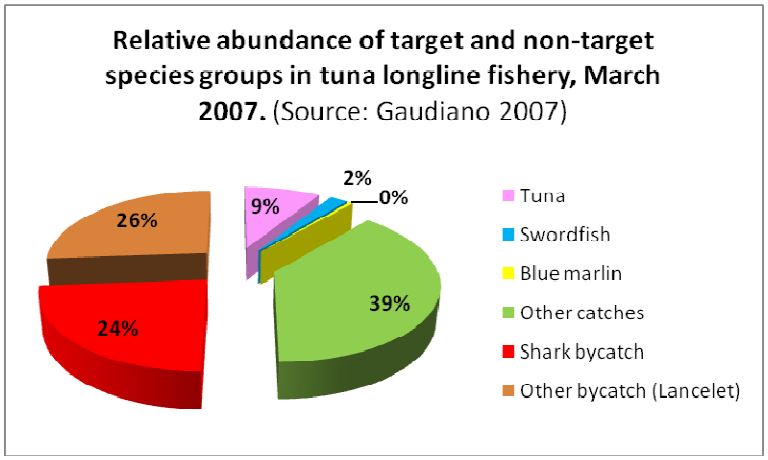


Figure 3.63. Relative abundance and percent composition of target versus non-target species groups in a tuna longline fisheries (March 2007). (Source: Gaudiano 2007).

6.4. Conclusions and Recommendations

A lack of data on shark catches, use and discard has hampered stock assessments and the introduction of fisheries management. There is evidence, however, that many large oceanic sharks are being fished unsustainably and that the populations of the most biologically-vulnerable of these species are below healthy levels. Improved information on shark catches is essential for effective shark fisheries management but should not be used as an excuse for inaction. Precautionary limits are warranted immediately, based on the low reproductive capacity of sharks and the history of frequent collapse in shark fisheries.

Shark fisheries have often been undervalued and ignored, but have boomed in recent decades as international demand has risen for shark products. 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 European Union is the world's largest exporter of shark fins to China, the biggest consumer market. Shark meat is usually low value, but is becoming increasingly popular; reported world landings have tripled since 1985. EU countries (particularly Spain and Italy) were responsible for 56% of global shark meat imports in 2005. Other shark products on the international market include liver oil, skins, cartilage, jaws and teeth.

Since most shark product trade is under-recorded, it is difficult to estimate the relationship between trade and shark catches, and the total volume of shark fisheries globally. Those data that are available demonstrate that the volume of traded shark products has increased considerably over the past 15 years. 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 United Nation's (UN) Food and Agriculture Organization's (FAO) mid-range estimate of landings, and three times higher than the FAO's 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.

Accurate fisheries and trade data are needed for effective management. While the precautionary approach to fisheries dictates that fisheries management should not wait until we have all the answers, fisheries scientists need good estimates of how many sharks have been taken out of the sea in order to make sound recommendations for fishing limits. This requires improved records both of shark catches and the products traded. When sharks are processed before they are brought to the dock, scientists and managers must use the volumes of processed products landed (such as meat, liver oil or fins) to determine how many animals were taken. They do this using a 'conversion factor' for how much shark product is equivalent to the original live sharks. Without such conversion factors, it is difficult to estimate the relationship between the volume of shark products traded and the quantities of sharks originally taken by fisheries. We do not, therefore, know the global impact that these fisheries are having on shark populations unless we can develop ways to measure how quantities of shark products relate to the number of sharks caught. Conversion factors are also important for the regulation of fisheries. They are used to calculate and enforce fishing quotas, and are widely used to implement bans on shark finning.

CHAPTER 4

CHAPTER 4: UTILIZATION AND TRADE

7.3. Shark Products/By-products

Cartilaginous fishes in general are a valuable fisheries resource. Shark meat, fins and other by-products such as skin and internal organs, are used for human consumption. Historically considered as a having a relatively minor contribution to the overall production in fisheries of many nations, including the Philippines, their trade and utilization have been poorly documented. In 1994, the TRAFFIC Network began to address the paucity of information by initiating a global study of chondrichthyan fisheries and trade. In 1996, Traffic International published an overview of the fisheries and trade in sharks and other cartilaginous fishes in Southeast Asia (Chen 1996) and the world (Rose 1996) the hope that the available information will also promote efforts to conserve and manage the resources at the national and international levels. Chondrichthyan products in trade are shark meat, fins, liver, skin, teeth, jaws, internal organs/offals. Discussions below are largely from the TRAFFIC reports by Rose (1996) and Chen (1996).

Shark meat has traditionally been consumed in dried, slated, and/or smoked form in coastal communities worldwide (e.g., in Germany as belly flaps from piked dogfish; in UK as the "fish" in fish-and-chips) and may be sold under market names designated to disguise their true identities in the marketplace (e.g., piked dogfish = "grayfish"; "rock salmon". "huss" or "rig","flake"; "cape shark" = for other species). Processed forms of meat are often used in the domestic production of minced fish products, including fish balls, fish sausage, tempura, artificial crabs or scallops, and fish "ham". Fish tempura is popular with consumers in Taiwan but recent trade data showed it to be exported to the USA at some US$3.00 per kg, but no other information is available on the destination of these products (Chen 1996). The advantage of this production method is the ability to utilize most fish regardless of size or species. Shark meat well suited: gives a firm and elastic texture to minced fish products and because this form of processing neutralizes the strong ammonia flavor often associated with shark meat (Chen et al. 1996). Management concerns: status of production of shark meat is difficult to assess; customs data for trade of meat are not available.

Shark fins are among the world's most expensive fisheries commodities. Fins largely consists of ceratotrichia or a soft collagen and elastin fibers commonly referred to as fin rays or fin needles, which have been used for human consumption for centuries. Fins are highly appreciated in Chinese cuisine. Its value varies according to color, size, thickness, and fin needle content, but nearly all species have commercially valuable fins (Kreuzer and Ahmed 1978; Subasinghe 1992).

Hong Kong is the world capital of shark fin cuisine, having access to the highest quality and most diverse cooking methods in the world. It, however, has a minimum contribution to global fin trade. It 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, tope shark. White fins (e.g., hammerheads; sandbar sharks) are considered more valuable than black fins (e.g., mako sharks and blue sharks) as black fins have 50% less of fin ray content.

In Taiwan, fins of the giant guitarfish are considered as most superior. In the Philippines, fins of guitarfishes are highly preferred and earn some US$110 per kg for the fishers.

The Philippines is also reported to be one of the major suppliersuppliers of blacktip reef sharks to the Middle East, and of whale sharks fins to other Asian countries, (at approx US$14/kg of fins). Some fins, however, were considered not commercially valuable such as the fins of nurse sharks, pectoral fins of saw sharks, and the upper caudal lobe of all species. Reported world trade in shark fins currently involves imports, exports and re-exports between China and two other important processing and trade centers: Hong Kong and Singapore (Parry-Jones 1996). Management concerns: status of production of shark fins is confusing to assess. Customs data for trade of meat may be available but largely incomplete: imports and/or are reported in some countries but not in others, and if reported, only in some years not in all, which may lead to falsely assume absence of trade.

Another important commodity is the **shark liver oil** which is used in the textile and tanning industries and in the manufacture of lubricants, cosmetics, vitamins (e.g., Vitamin A), and pharmaceutical products. Sharks have no swimbladdersswim bladders; instead, hydrostatic functions are performed by their large livers saturated with 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. Liver oils yield various compounds such as squalene, squalane, diacyl glyceryl ethers, and squalamine.

Squalene, an acyclic hydrocarbon (C30H62) that appears to serve a biological function related to living at great depths and that is used in the manufacture of lubricants, bactericides, pharmaceuticals, and cosmetic products such as skin creams. Squalene is a non-active ingredient in applications which imparts increased skin permeability. Preferred species for squalene are mostly deepwater sharks (600 to 1000m). Squalane is a compound produced by hydrogenating sauqene, which is miscible with natural skin oils and is therefore useful as skin moisturizer. Diacyl glyceryl ethers (another compound found in shark liver oils) = reported to be effective in the healing of wounds, and to prevent the multiplication of bacteria, protect against radiation. Squalamine has been isolated from dogfish in 1993 in a US study which is found to be effective against bacterial infection, viruses (including HIV). It is reported to slow the process of vascularization in solid brain tumors and thus has been tested for its potential use in the treatment of several sexually transmitted diseases, including herpes, gonorrhea, and *Chlamydia*. Shark liver oils also yield vitamin A as found in tope shark, piked dogfish, catsharks (Galeus spp.), longfin mako, starspotted smooth-hound, hammerhead shark. Species found to have high squalene, however, were found to have lower vitamin A in their liver oil. The calculation/conversion for 1 ton of squalene is about 2500-3000 shark livers. Development of synthetic substitutes soon caused the shark liver oil to collapse.

Chen (1996) described briefly a hook and line fishery for piked dogfish in the Philippines which was reported to catch on average, small sharks ranging from 35-40cm in size. About 60-80 such sharks caught in one boat trip may produce about 151 crude oil, purchased at US$14=17.5 per liter, and sold to buyers in Manila, in gasoline drums of approx 200 liters each, which takes an estimated 800-1000 sharks to produce. Refined oil is packed in 25-li containers eight of which make up a drum of about US$7,700.00, exported primarily to Japan from 1979-1981 at an average of 263t of shark liver oil annually. Export fell to 45t in 1993, and amounted to 1121t in 1994, with exports in those years reported only to Japan (134t or 85% of total exports) and South Korea (23t or 15% of total exports).

In recent years, markets opened for soft and hard **cartilages of sharks and skates**. This offered newer opportunity to utilize a fisheries by-product that would otherwise be discarded or used in low-value fishmeal production. Cartilage has been used in the manufacture of fishmeal and is increasingly marketed as a treatment of cancer, with additional research

underway to test its efficacy in treating a wide variety of additional ailments. It is increasingly marketed as a health supplement worldwide. Ground rostrums of sawfishes are for sale in apothecaries' shops in southern China as a medicinal product. Natrium, a chemical compound found in the shark cartilage, is used in Japan as a treatment for eye fatigue and rheumatism; chondroitine = a pharmaceutical substance used in eye drops. AN unknown cartilaginous chemical extract = used in the development of a synthetic skin for burn victims while cartilage capsules = marketed extensively worldwide as treatment for cancers. Management concerns: tracing trade routes is difficult owing to the nature of the trade. Volume of production is difficult to assess because limited companies appear to actually manufacture the cartilage powder; these companies purchase cartilage directly from the vessel (if the shark is processed on board), from the processors or retail outlets, and/or from shark fin dealers who often handle a variety of dried products (e.g., fin, cartilage, sea cucumbers, fish maws).

Shark skins are characterized by the presence of small placoid (toothlike) plates, called dermal denticles, on the skin and the attachment of the muscles directly to the skin – making it difficult to skin sharks and to process their hides. In its rough form, is known as shagreen. These were originally used as a rough abrasives for rasping and polishing. Recently, skins may be tanned to produce 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 in the USA, Japan and Europe, . Shark leather is made by polishing the denticles to a high gloss. It is considered extremely durable, with an attractive grain similar to crocodile skin (Kreuzer and Ahmen 1978). Management concerns: fisheries based on the production of hides have historically proven economically unsustainable (Rose 1996).

Teeth and jaws of requiem sharks such as mako or great white are utilized largely as tourist curios but traditionally in many cultures used in making both functional and ceremonial objects (e.g., carvings, swords, knives, war clubs, other weapons). Market, however is largely opportunistic and are by-products of growing commercial fisheries. Other curio products are dried and stuffed shark heads, stuffed whole sharks, stuffed rays, vertebrae used in walking sticks. Management concerns: difficult to quantify utilization and trade for this commodity.

Other parts of the sharks (e.g., shark waste, offal, internal organs and other related products) are also used in the production for fishmeal for use as in animal feeds or fertilizers, feed for shrimp aquaculture. Other products and uses include: glue in traditional Japanese lacquerware; shark bie (from starspotted smooth-hound) in traditional Chinese medicine in the treatment of laryngopharyngitis; or dogfish carcasses in biology dissections and for medical research. Management concerns: limited or no data available on production, consumption or trade. No anecdotal evidence point to international trade in these products.

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,* Epaulette sharks *Hemiscyllium ocellatum.* In the wild, they are now becoming major tourism products for scuba diving and recreational fisheries. In the Philippines, the whale sharks in Donsol, Sorsogon and the thresher sharks in Malapascua are drawing a number of tourists yearly.

7.4. FAO Fishery Statistics Data on Trade Flow (1976-2002)

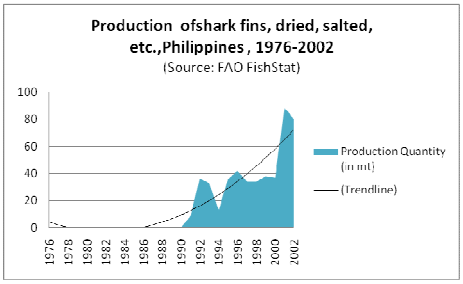


Figure 4.1. Production of shark fins (dried and salted) for trade in the Philippines from 1976 to 2002. A = quantity (in mt); B = value (in US$). Source: FAO FishStat 1976-2002).

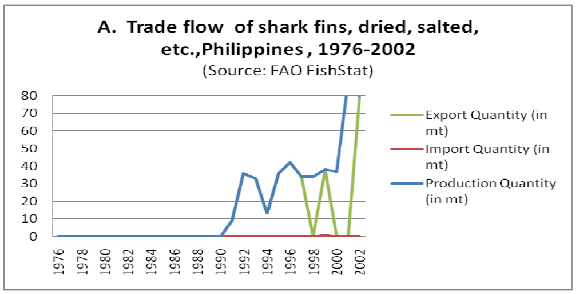
Trade flow on the import and export of shark and shark products are extracted from FAO Fishery Statistics database for 1976 to 2002 (see Appendix 4; Figure 4.1). Records show four statistical classification, namely: "Shark fins, dried, salted, etc."; "Shark liver oil"; "Sharks, dried, salted or in brine"; "Sharks, fresh or chilled"; and "Sharks, frozen".

Generally, data is patchy, with records for most of the categories available only in the 1990's. Records available for the trade of shark fins only appear in 1991, although targeted fishery within the country had been recorded as early as 1947 (refer to Chapter 1). Records for shark liver oil is also available from 1991 onwards, although fishery for shark liver and squalene oil has also been reported in previous chapters to have been targeted in the mid 1960s.

Figures 4.2-4.4 show trade flow of these four groups in terms of quantity and value. Generally, despite some deep troughs, trends of production quantity for shark fins have been increasing, with export quantity contributing to 64% of total production (Figure 4.2A). The price, however, had not match export/import production trends but rather has shown general decline (Figure 4.2B).

For shark liver oil, data suggest congruence of quantity and value: value was relatively high and production was on the rise (see Figure 4.3 A-B). Highest shark liver export and value is observed in 1992 but markedly dropped thereafter. Both import quantity and value of shark liver oil seem to be negligible compared to export quantity.

There is only one data set on the trade flow of sharks (dried, salted, or in brine) and it is for the year 1987 (see Appendix 4). It is not known whether this is an under-reporting or there actually was no trade prior to, and after, 1987 for this particular commodity.



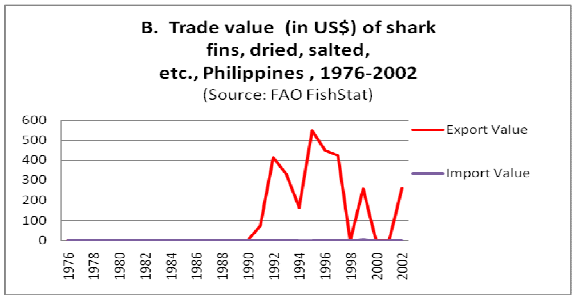
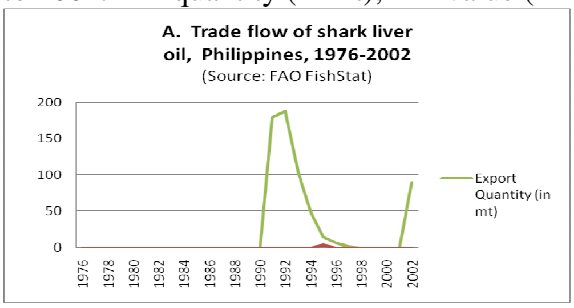


Figure 4.2 (A-B). Trade flow of shark fins (dried and salted) in the Philippines from 1976 to 2002. A = quantity (in mt); B = value (in US$). Source: FAO FishStat 1976-2002).



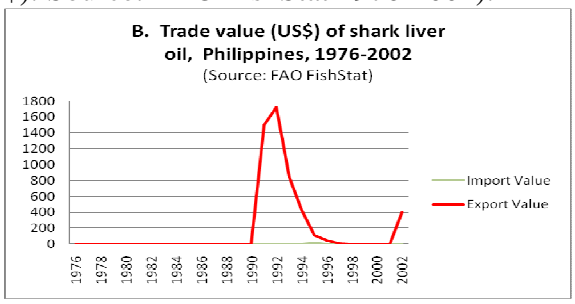
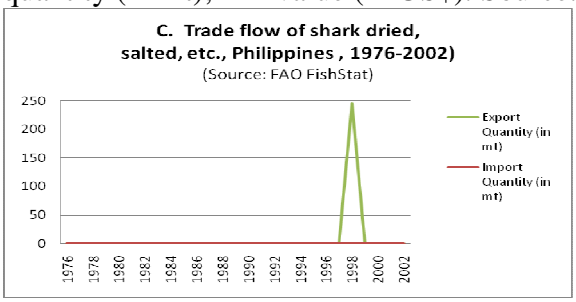


Figure 4.3 (A-B). Trade flow of shark liver oil in the Philippines from 1976 to 2002. A = quantity (in mt); B = value (in US$). Source: FAO FishStat 1976-2002).



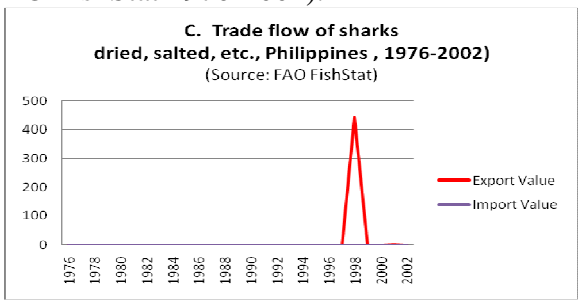


Figure 4.4 (A-B). Trade flow of sharks, dried, salted in the Philippines from 1976 to 2002. A = quantity (in mt); B = value (in US$). Source: FAO FishStat 1976-2002).

7.5. 4.3 Marketing

Barut and Zartiga (2002) briefly discussed methods of processing and selling of shark meat in the country. Generally, the methods and prices were variable, depending on the region. Meat when sold fresh will fetch a price of PhP20 – PhP60 per kg in Luzon or PhP10-PhP24 per kg in Visayas and Mindanao. Buying rate at the landing site is usually lower. Dried meat commands a higher price of PhP 35-PhP 75 per kg. Meat is usually consumed locally. In recent years, meat is processed into fish balls.

Shark fins are usually dried before being sold and commands a much higher price than dried shark meat, at P1,800-2,000 per kg. Fins are sold in sets consisting of all fins of the sharks (i.e., dorsal, pectoral, anal and caudal fins of an individual shark) (Barut and Zartiga 2002). Prices may also vary depending on the species. Fins are usually exported to other Asian countries, major importers of which are Hong Kong and Taiwan.

Shark liver oil, particularly from dogfishes, is also traded and exported to other Asian countries.

Data gathered by the WWF Philippine Program for TRAFFIC Southeast Asia in Zamboanga City during a market survey of shark species used and prices of shark products between March-April 1996 is shown in Appendix 15. Whole sharks and most parts of the sharks were reported to have been utilized such as: fins (fresh or dried); meat (fresh or dried), liver oil (from dogfishes, identified in the report as *Squalus acanthias*[3]); jaws (fresh or dried); and skin.

Dried fins, depending on size, were marketed at a price range of PhP300 – PhP 3,100/kg by traders or between PhP400 – P3,400 when traded in Manila. Larger fins garnered the higher prices, e.g., large white fins from guitarfishes, with sizes 12" and above, were sold for PhP3,100 /kg (or =US$ 110/kg at that time). Large black fins (from a hammerhead or tiger sharks) were marketed at about PhP2,300 and P2,500, by local traders and in Manila, respectively.

Fresh meat (e.g., from a small tiger shark) was marketed at PhP 120/kg while dried meat at PhP 40/kg. A 200-liter squalene liver oil was marketed between P2,000-3,000. Jaws were priced at PhP110/kg (fresh) or between PhP 800-1,000/kg (dried). Whole sharks, depending on weight, were marketed from between PhP2,400-P10,000. Dried skin was priced at P50/kg.

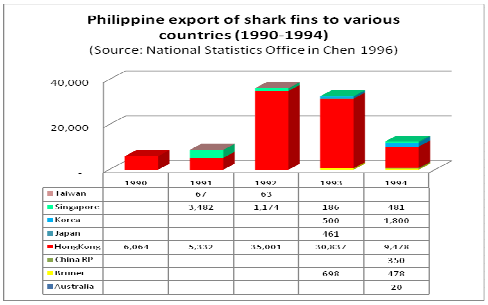


Figure 4.5. Philippine export of dried unsalted shark fins (in kg) from 1990-1994. (Source: NSO in Chen 1996).

7.5.1. National Statistics Office Data on Shark Fins and Shark Liver Oil (1990-1994)

National Statistics Office data on the export on shark fins (dried unsalted) from 1990-1994 is reported in Chen 1996 (see Appendix 6). Eight countries are recorded to have imported dried unsalted shark fins from the Philippines, namely: Australia, Brunei, China RP, Hong Kong, Japan, Korea, Singapore, and Taiwan (Figure 4.5). A total of 96.5 mt is reported to have been exported to these countries.

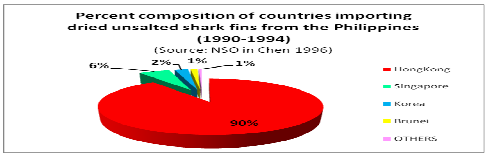


Figure 4.6. Percent composition (%) of countries importing dried unsalted shark fins (in kg) from the Philippines, 1990-1994. (Source: NSO in Chen 1996).

The country with highest import of Philippine dried and unsalted shark fins is HongKong, receiving about 90% (86.7 mt) of the total traded commodity from 1990-1994, followed by Singapore (6% or 5.3 mt), Korea (2% or 2.3 mt), and Brunei (1% or 1.2 mt). The rest of the countries only received about 0.5% of total dried fins exports (Figure 4.6).

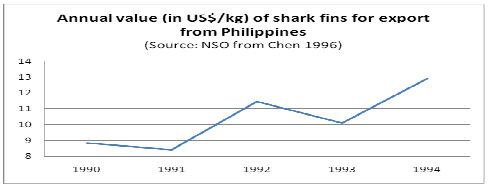


Figure 4.7. Average price (expressed in US$/kg) of dried unsalted shark fins from the Philippines, 1990-1994. (Source: NSO in Chen 1996).

As with trends in the fisheries, a similar trend can

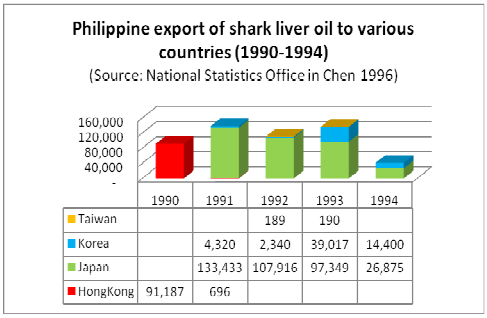
[3] Possibly a mis-identification. *S. acanthias* is a temperate-water species. Species reported may be of other species within the family of dogfishes Squalidae. Data needs to be re-validated.

also be seen with the trade in shark fins: low in the first couple of years, increasing in volume towards the middle (i.e, in this case, reaching its peak in 1992 at 36 mt), but declining thereafter, suggesting a possible decline also from sources (Figure 4.7). The price which averaged at US$10.34/kg within the 5-year period has been shown to increase at an average of 17% per year, from US$8.85 in 1990 to US$12.9 in 1994.

7.5.2. National Statistics Office Data on Shark Liver Oil (1990-1994)

National Statistics Office data on the export on shark liver oil from 1990-1994 is reported in Chen 1996 (see Appendix 6). Only four countries are recorded to have imported shark liver oil from the Philippines, namely: Hong Kong, Japan, Korea, and Taiwan (Figure 4.8). A total of 517.9 mt is reported to have been exported to these countries, more than four times the volume of shark fins exported in the same year. Though export volume for shark liver oil had been high, trends also show decline within the four-year period.

The country with highest import of Philippine shark fin liver oil is Japan, receiving about 71% (365.6 mt) of the total traded commodity from 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 (Figure 4.9).



	1990	1991	1992	1993	1994
Taiwan			189	190	
Korea		4,320	2,340	39,017	14,400
Japan		133,433	107,916	97,349	26,875
HongKong	91,187	696			

Figure 4.8. Philippine export of shark liver oil (in kg) from 1990-1994. (Source: NSO in Chen 1996).

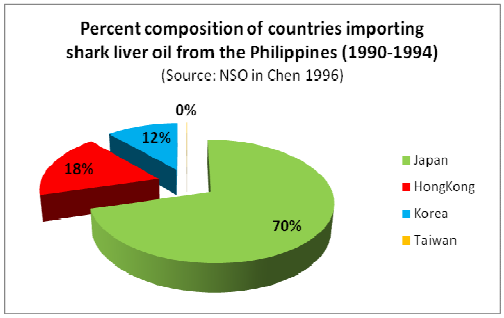


Figure 4.9. Percent composition (%) of countries importing dried unsalted shark fins (in kg) from the Philippines, 1990-1994. (Source: NSO in Chen 1996).

7.5.3. Philippine Fisheries Statistics Data on Squalene Liver Oil (1973-1981)

Fisheries Statistics of the Philippines presented data on the export figures for squalene liver oil as presented in Chen 1996 is shown in Table 4.1. A total of 1,283.6 mt had been exported out of the country from 1973 to 1981. Despite the classic increase-decrease in annual volume, data suggests the trend line for squalene liver oil was increasing (see Figure 4.10). Both annual value (in PHP) and price rate (PhP/kg) also followed the general trends (see Figures 4.10-12).

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**

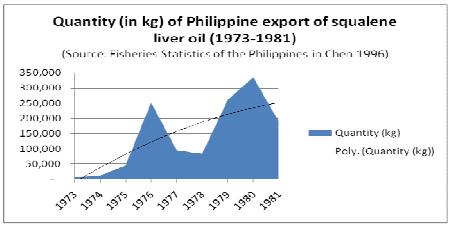


Figure 4.10. Philippine export of squalene liver oil from 1973 to 1981. (Source: Fishery Statistics of the Philippines in Chen 1996).

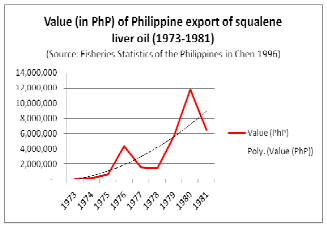


Figure 4.11. Philippine export of squalene liver oil from 1973 to 1981 (in volume). (Source: Fishery Statistics of the Philippines in Chen 1996).

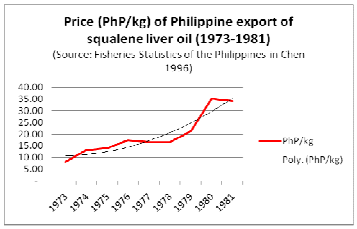


Figure 4.12. Price (in PhP/kg) of Philippine export of squalene liver oil from 1973 to 1981. (Source: Fishery Statistics of the Philippines in Chen 1996).

7.5.4. Data on Trade of Sharks from BFAR- Fisheries Regulatory and Quarantine Division (2005-2006).

More recent data on the trade of shark by-products in the Philippines is shown in Table 4.2, as presented by Alesna (2007). Five groupings were used in the reporting of shark by-products for exports: "Sharks fin, dried"; "Shark liver oil"; "Shark bones, dried"; "Shark gills, dried"; "Shark skin, dried". Highest volume exported is recorded for dried fins at 293.6 mt for the 3-year period, followed by dried skin at 17mt, and liver oil at 16 mt. Other by-products previously not encountered in other reports are the dried bones and dried gills at 11 mt and 10 mt, respectively (see Figure 4.13).

Imported shark products, on the other hand, are grouped as follows: "Sharksfin, dried"; "Dogfish and other sharks, frozen"; "Sharksfin, frozen"; "Headless shark, frozen"; "Shark meat, frozen "; and "Shark head, frozen". Majority of the shark by-products which are imported to the country were in frozen form. Highest volume imported between 2005 and 2005 was the frozen products of dogfish and other sharks (990.6 mt). In descending orders, volume of other frozen imported shark products were shark meat (290.5 mt), sharksfin (241.9 mt), headless sharks (136.2 mt), shark head (10 mt). Records for dried sharks fin was also reported in 2005 at 1.4 mt (see Figure 4.14).

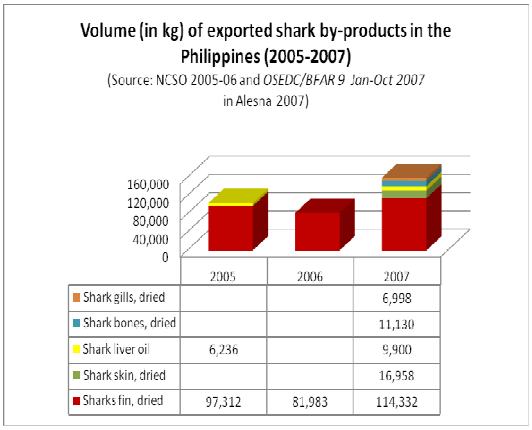


Table 4.13. Volume (in kg) of exported shark products in the Philippines, 2005-2007. (Source: NCSO 2005-2006 and OSEDC/BFAR 9 Jan-Oct 2007 in Alesna 2007).

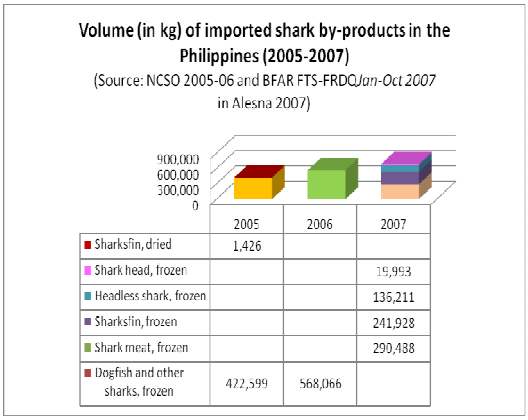


Table 4.14. Volume (in kg) of imported shark products in the Philippines, 2005-2007. (Source: NCSO 2005-06 and BFAR FTS-FRQD Jan-Oct 2007 in Alesna 2007).

7.6. Conclusion and Recommendations

Globally, sharks resources are valuable. Volume of shark products, primarily for meat and fins from both targeted and incidental catches have been growing but assessment of the conservation and management implications remains a difficult challenge largely because of major gaps in data and information. Status of production of shark meat is difficult to assess; customs data for trade of meat are not available. Knowledge regarding utilization of sharks is often limited as there is no reporting on the production of meat, skins and leather, jaws, fishmeal and fertilizer, liver oil, cartilage or even fins.

There are problems in reporting also as many countries use subheadings for "shark fin" in trade but Customs records of trade in shark leather, oil and cartilage are virtually non-existent or absent. In the case of shark fins, imports and exports may not always be reported. In cases when imports are reported, there may be no report of outgoing trade.

In terms of trade statistics, when available, the categories and classifications are often not standardized nor defined for better interpretation and analysis. Data as presented does not capture all shark trade statistics, and is disjointed at best. 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. It cannot be ascertained whether a decline in the volume is a reflection of declines in shark populations, of fishing effort, or of increased under-reporting. Production data at the local/regional levels is also not readily accessible. Artisanal fisheries producing salted meat and other products for local consumption may also be under-reported.
Trade data does not identify sharks to species level also, thus, making it more difficult for management. Under the Philippine laws, all species listed in the CITES Appendices are prohibited from trade (e.g., whale shark, basking shark, white shark, sawfishes). Whale sharks and manta rays are protected nationally and thus are prohibited in fisheries and trade. There is no regulatory policy on other species of sharks. Regulation may also be difficult to enforce in the absence of trained field personnel and regulatory officers with the

technical capability to identify species. This is made more challenging by the fact that most traded products are not of whole individual sharks but of parts and by-products or commodities. Other data gaps include: export data from foreign boats entering Philippines to buy fish and fishery products, those entering Palawan and Tawi-Tawi; shark products illegally exported through the country's back door going to Malaysia and other countries; poaching by foreign fishing vessels in national waters.

The following **recommendations** are thus proposed to address data gaps and concerns identified above:

- Propose inclusion of shark scientific name in the Harmonized System Code
- Identification of 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)
- Development of 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
- Recommend for policy to regulate shark species listed as endangered and critically endangered under the IUCN Red List
- Define and standardized 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 (e.g., fins, jaws, meat, gills, bones, others) to species level.

CHAPTER 5

CHAPTER 5: LEGAL AND MANAGEMENT INSTRUMENTS

5.1. International Laws and Policies Applicable to Shark Management

A host of international non-fisheries legislation is also promoted by environmental NGOs for the conservation or management of elasmobranchs, again in greater detail by Fowler (1999). International conservation laws are grouped by Fowler into soft-law (not necessarily binding) instruments and the binding instruments such as treaties and conventions. Binding instruments include the Convention on Biological Diversity (CBD), Convention on the Conservation of Migratory Species of Wild Animals (CMS), Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), United Nations Convention on the Law of the Sea (UNCLOS), and regional treaties such as the ASEAN.

5.1.1. Convention on Biological Diversity (CBD).

The Convention on Biological Diversity (CBD) is an international treaty negotiated under the auspices of the United Nations Environment Programme (UNEP). It was opened for signature at the June 1992 UN Conference on Environment and Development (UNCED) and entered into force on 29 December 1993, ninety days after the 30th ratification. As of October 1998, more than 170 countries had become Parties which also includes the Philippines. 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. Many parties are developing national strategies for the conservation of their biodiversity. One party (UK) has developed biodiversity action plans for the conservation of certain elasmobranch species such as the basking shark (*Cetorhinus maximus*), the common skate (*Raja raja*), and listed three others as species of concern: tope (*Galeorhinus galeus*), porbeagle (*Lamna nasus*), and the blue shark (*Prionace glauca*).

5.1.2. 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 Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range. It is an **intergovernmental treaty**, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. Since the Convention's entry into force, its membership has grown steadily to include 112, which includes the Philippines. It was signed in 1979 and ratified into effect in 1983. It recognizes the need for countries to cooperate in the conservation of species that migrate across national boundaries. The focus is on species categorized as endangered (CMS Appendix 1 listing) or with unfavorable conservation status (Appendix II listing). CMS currently lists on its appendices the basking shark *Cetorhinus maximus* and the great white shark *Carcharodon carcharias* (Appendix I & II), and whale shark *Rhincodon typus*, shortfin mako *Isurus oxyrinchus*, longfin mako *Isurus paucus*, porbeagle shark *Lamna nasus*, and piked dogfish *Squalus acanthias* (northern hemisphere populations (Appendix II).

In 11-13 December 2007 CMS conducted the "Meeting to Identify and Elaborate an Option for International Cooperation on Migratory Sharks under the Convention on Migratory Species" in Seychelles. The meeting examined the (i) conservation status of sharks defined

as migratory under CMS, (ii) existing international, regional and other initiatives to improve the conservation status of migratory sharks, including lessons learned, and (iii) options for international cooperation under CMS. The main aim of the meeting was to identify and, to the extent practicable, elaborate a preferred option for international cooperation under CMS, possibly a clear agreement amongst key Range States as to whether there should be a legally or non-legally binding shark instrument under CMS and what its scope should be.

5.1.3. Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)

The Convention on International Trade in Endangered Species of Wild Flora and Fauna (Fauna (CITES) was established in 1975, to protect species of wild flora and fauna from over-exploitation through international trade. Two listings are defined: Appendix I, species that are threatened with extinction and for which no international trade is allowed except under exceptional circumstances; Appendix II, species that are subject to strict regulation and monitoring to ensure that it is not detrimental to the status of the listed species. Species currently listed in CITES Appendices include all sawfishes (Pristiformes) under) under Appendix I, except *Pristis microdon*) under Appendix I, the basking shark (*Cetorhinus maximus*), whale, whale shark (*Rhincodon typus*), the great white shark (*Carcharodon carcharias*), and the sawfish *Pristis micro*don (*micro*don (under Appendix II).

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

5.1.4. United Nations Convention on the Law of the Sea (UNCLOS).

The United Nations Convention on the Law of the Sea (UNCLOS), adopted in 1982 and established in 1994, provides the conservation and management of fisheries and other uses of the sea. Its provision on the EEZ (Exclusive Economic Zones) of coastal states and high seas provisions require cooperation between states for the conservation and utilization of highly migratory species.

UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks, adopted in 1995, facilitates implementation of the UN Convention on the Law of the Sea (UNCLOS) provisions relating to the conservation and management of high seas fish stocks. The Agreement will establish rules and conservation measures for high seas fishery resources, and is complemented by the FAO Code of Conductof Conduct for Responsible Fisheries which sets out principles andprinciples and international standards of behavior. Under UNCLOS, oceanic sharks defined as highly migratory species are: bluntnose sixgill sharks (sharks (*Hexanchus griseus*), basking shark (*Cetorhinus maximus*), whale shark (*Rhincodon typus*), Alopiidae spp. Carcharinidae spp., Sphyrnidae and Lamnidae.

5.1.5. Regional Treaties

ASEAN Agreement on the Conservation of Nature and Natural Resources, 1985. Based on the objectives of the World Conservation Strategy, this 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.

5.1.6. Others (Non-binding)

The International Union for Conservation of Nature (IUCN), founded in 1948 as the world's first global environmental organization, is the world's oldest and largest professional global conservation network which brings governments, non-government organizations, United Nations agencies, companies, business, and local communities together to develop and implement policy, laws and best practice toward biodiversity conservation. Its fundamental expertise is on species, habitats and ecosystems. Its mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

For nearly 50 years, IUCN, through the Species Survival Commission (SSC), 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. The SSC holds the world's most complete body of information on the status of species, most notably of those threatened with extinction. It disseminates this information through the IUCN Red List of Threatened Species[4] which is the world's most comprehensive inventory of the global conservation status of plant and animal species. The overall aim of the Red List is to convey the urgency and scale of conservation problems to the public and policy makers, and to motivate the global community to reduce species extinctions. The List is an essential part of the toolkit needed to guide conservation priorities and move towards the sustainable use of our natural resources. Currently there are 1045 species assessed against the IUCN Red List Categories and Criteria, about 17% are globally threatened (i.e. Critically Endangered, CR; Endangered, EN; or Vulnerable, VU); 13% are Near Threatened (NT) while about 47% are Data Deficient (DD) (refer to Chapter 6).

[4] www.iucnredlist.org

5.2. National Laws and Policies Applicable to Shark Management

5.2.1. 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 Republic Act (RA) 7160 (also known as the Local Government Code). LGUs' essentially cover the *barangays*the barangays,
municipalities, cities and provinces. Rural coastal development may be viewed as one of the inherent functions of LGUs in accordance with their general powers for management within their territorial jurisdictions, which include municipal waters within 15 kilometers of the coastline. LGUs are authorized to pass local resolutions and enact ordinances that would strengthen implementation of national laws. They are also authorized to issue licenses and collect fees from any activities within their municipal jurisdiction.

In the context of marine resources management, the decentralization or devolution of power is viewed as a positive development but has also led to some complex implementation problems. For example, mechanisms to support fisheries management capacity-building efforts for local governments are necessary and the national line agency (BFAR) is expected to respond to this need, but is dislocated from this role by RA 7160, unless invited to do so by LGUs. In the absence of invitations to BFAR, some support has come from NGOs and private organizations in areas where they are present. However, due to limited resources, a considerable number of LGUs do not consider aquatic resources management important and do not receive this kind of support, thus fisheries extension services are rendered relatively ineffective.

5.2.2. Philippine Fisheries Code of 1998 (RA 8550)

The primary mandate for aquatic resources management was further defined by the enactment of Republic Act 8550, also known as the New Philippine Fisheries Code, which became effective on 23 June 1998. It largely clarified issues pertaining to the extent of LGU jurisdiction in municipal waters and the operation of commercial vessels. The Code also aims for food security through development, management and conservation of the aquatic resources. Operationally, BFAR takes its general directives from the Department of Agriculture (DA).

The **Bureau of Fisheries and Aquatic Resources (BFAR)** is an agency of the Philippine government under the Department of Agriculture responsible for the development, improvement, management and conservation of the Philippine fisheries and aquatic resources. The Fisheries Code provided for the reconstitution of BFAR as a line bureau and the creation of the Undersecretary for Fisheries and Aquatic Resources under the DA to ensure that the needs of the fishing industry are attended to. The Bureau aims to improve aquaculture productivity within ecological limits; optimize utilization of off-shore fisheries and deep-sea resources; improve product quality; reduce post-harvest resources; conserve, protect and sustain management of the country's fishery and aquatic resources; alleviate poverty among municipal fishers and provide supplementary livelihoods; and provide a favorable policy environment conducive to increased investment, global competitiveness and people's participation.

In pursuit of these aims, BFAR has to work with LGUs, which have now become its direct clients by virtue of RA 8550. BFAR does not directly engage with fishers because it is the LGUs who are given 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.

5.2.3. Ban on the taking or catching, selling, purchasing and possessing, transporting and exporting of Whale Sharks and Manta Rays (FAO 193 s. 1998).

Pursuant to Sections 65 and 107 of RA No. 8550, the Department of Agriculture issued Fisheries Administrative Order No.193 (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 ban, known as the whale shark and manta ray ban, also stated that when same species are accidentally taken (i.e., by-catch) in gears targeting other species, immediate release unharmed in the sea is required. Stranded individuals, however, need to be surrendered to the nearest Department of Agriculture (DA) Regional Field Unit or Bureau of Fisheries Regional or Provincial Fishery Office for proper disposition. The ban was published in the Manila Bulletin & Phil. Star – March 27, 1998, with the effectivity date set on April 12, 1998. Offenders are subject to a fine of not less than five hundred (P500.00) pesos to not more than five thousand (P5,000) pesos or imprisonment from six (6) months to four (4) years, or both such fine and imprisonment depending on the discretion of the court. Director of Fisheries and Aquatic Resources is hereby empowered to impose upon the offender an administrative fine not more than five thousand (P5,000.00) pesos or to cancel his permit or license or to impose such fine and to cancel his permit or license at his discretion including the confiscation of the whale shark and/or manta rays for proper disposition/documentation of the government.

Since the establishment of the ban, however poaching occurs in many areas of the country (i.e., Bohol, Sorsogon, Palawan), reflecting the limited capacity of the government to implement such a ban. Alava *et a.l.* (1998) reported at least 31 villages involved in mobulid and other elasmobranch fishery in the country, and the list was growing as the ban was issued. Three confiscations were documented since 1998 for whale sharks alone, while manta ray fishery is still pervasive in a number of villages in the country. One of the difficulties in the implementation of the ban, particularly for manta rays, was reported due to the inadequacy of field personnel and implementing officers to correctly identify species in the landing and market site. More so since the specimens are already cut up to marketable chunks. In 2001, a de facto lifting of the ban was applied for manta rays, amidst clamor from the local fisherfolksfisher folks. A collaborative research on the population and stocks of manta rays and *Mobula* spp. Was initiated during the de facto lifting.

In addition to FAO 193, the New Fisheries Code has been passed (Republic Act 8550), which potentially protects all fishery resources under the "precautionary approach" to management.

5.2.4. Wildlife Resources Conservation and Protection Act of 2001 (RA 9147)

With the general aim to conserve the country's wildlife resources and their habitats for sustainability Republic Act 9147, also known as the Wildlife Resources Conservation and Protection Act or Wildlife Act, was issued in 2001, to apply 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, with the following objectives: to conserve and protect wildlife species and their habitats to promote ecological balance and enhance biological diversity; to regulate the collection and trade of wildlife; to

pursue, with due regard to the national interest, the Philippine commitment to international conventions, protection of wildlife and their habitats; and to initiate or support scientific studies on the conservation of biological diversity.

The Department of Environment and Natural Resources (DENR) has the 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 and dugong. The Department of Agriculture (DA) has the 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 herein conferred is vested to the Palawan Council for Sustainable Development pursuant to Republic Act No. 7611.

Pertinent sections to elasmobranch management include which refers to the collection, possession, exportation and/or importation, and transport of wildlife, its by-products and derivatives (Sections 7-11),scientific researches (Section 15), economically important species (Sec. 18), implementation of CITES (Sec 19), identification and protection of threatened species (Sec 22-27), to name a few. Under RA 9147, all threatened species are thus protected. Initial list of species under protection are currently listed under the Fisheries Administrative Order 208 (i.e., Conservation of rare, threatened and endangered fishery species, series 2001). FAO 208 will be amended after more species have been assessed.

CHAPTER 6

CHAPTER 6: CONSERVATION STATUS OF PHILIPPINE SHARKS

The life histories of shark species generally make them vulnerable to heavy predation. As apex predators, they are on top of food chain, having very low natural mortality from predation from other marine species, but at the bottom of the pyramid in terms of numbers. Sharks are generally described as "k-selected" species. 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, making them vulnerable to heavy predation by humans through fishing.

Another characteristic which makes sharks vulnerable to overfishing is that most species segregate by sex and size, which means some fisheries tend to target either female or male groups and prove detrimental to breeding populations and lowers ratio and chances for reproduction. Some shark breeders often give birth in nursery areas which are also separated from the rest of the population. Threats to these nursery grounds also threaten the new recruits. All these characteristics place sharks at risk of overexploitation and population depletion, with an inability to recover from reduced population levels once depleted. 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.

Shark populations are being impacted by a wide range of human activities, both directly and indirectly, and as such. The threat of extinction results from several factors as pointed by Camhi et al (1998):

- Life history strategy (i.e., k-selected) make them susceptible to overexploitation and impede recovery of depleted populations;
- Growing shark fisheries that are generally unregulated and partly driven by unrestricted international trade in shark products (e.g., shark fins, liver oil);
- Very high levels of mortality from bycatch (incidental takes) in fisheries;
- Degradation of important breeding and nursery grounds and other critical coastal, estuarine, and freshwater habitats from development, alteration, overfishing and pollution.

To assess the threat status of sharks, global assessments have been conducted using the IUCN Red List Criteria and Categories. The IUCN Red List of Threatened Species is considered the most authoritative and objective system for classifying species' extinction risk. The global Red List and Red Lists developed at sub-global levels are integral to meeting CBD commitments (e.g. Article 7; Annex 1), particularly for the target of reducing biodiversity loss by 2010. Threat status is also used by the CMS (Article III; Appendix I) to help identify migratory species requiring protection. In addition, biodiversity conservation policies are most often implemented at national (e.g. state, province) and regional (e.g. European Union) levels, and accurate extinction risk assessment is a vital part of this process.

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). Following the Lower Risk category are the three subcategories for taxa that are not

currently threatened: Conservation Dependent (CD), Near Threatened (NT), and Least Concern (LC). The methodology of Red Listing (IUCN, 2001; IUCN Red List URL, 2004) is applicable to shark like fishes although with some difficulties. 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. It is anticipated, however, that most if not all Philippine cartilaginous fishes will be assessed for Red Listing as part of an ongoing IUCN Species Survival Commission project conducted by the IUCN Shark Specialist Group to assign ranking to all species of living cartilaginous fishes, and that rankings for presently Listed Philippine species will be modified or changed as knowledge of their status increases.

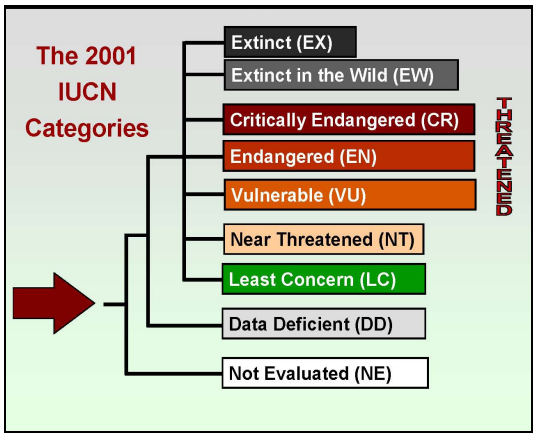


Figure 6.1. The IUCN Red List Categories. The threatened categories (*i.e.*, Critically Endangered, Endangered, and Vulnerable) are intended to serve as a means of setting priority measures for biodiversity conservation. (Source: www.iucnredlist.org).

Sharks and rays are among the first marine groups to be systematically assessed. About 547 species have been globally assessed and listed in the IUCN Red List of Threatened Species 2006). Globally, about 20 % are threatened with extinction. This confirms suspicions that these mainly slow-growing species are exceptionally susceptible to over-fishing and are disappearing at an unprecedented rate across the globe. In the Philippines, the 2006 IUCN Red List URL 2004 included 56 Philippine species (Table 6.1). At least 23 of these globally threatened species are found to occur in the Philippines.

Seventeen additional Philippine species have been added to the threatened categories in the 2007 IUCN Red List Assessment, as shown in Table 6.2. Declines in some of the freshwater and marine shark fisheries have been documented (e.g., Herre 1958; Compagno & Cook 1995), the first reports of which was noted for sawfishes and other freshwater elasmobranch populations under pressure from human activities. Some habitats in the Philippines were not adequately investigated for their cartilaginous fish faunas (particularly rivers and lakes) 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. It is critical that urgent action to greatly improve management practices and implement conservation measures, such as agreed non-fishing areas, enforced mesh-size regulations and international catch limits, is taken before it is too late.

Table 6.1. Shark and batoid species in the Philippines in the 2006 IUCN List of Threatened Species.

	Family	Species	Common Name/s	IUCN Category*
Sharks				
1	CARCHARHINIDAE	*Carcharhinus hemiodon*	Pondicherry Shark	CR A2acd; C2a(i) ver 3.1 (2001)
2	CARCHARHINIDAE	*Carcharhinus borneensis*	Borneo Shark	EN C2b ver 2.3 (1994)
3	TRIAKIDAE	*Hemitriakis leucoperiptera*	Whitefin Topeshark	EN B1+2ce, C2b ver 2.3 (1994)
4	SPHYRNIDAE	*Sphyrna mokarran*	Great hammerhead	EN A2bd+4bd ver 3.1 (2001)
5	RHINCODONTIDAE	*Rhincodon typus*	Whale Shark	VU A1bd+2d ver 2.3 (1994)
6	LAMNIDAE	*Charcharodon carcharias*	White shark/Great white shark	VU A1cd+2cd ver 2.3 (1994)
7	GINGLYMOSTOMATIDAE	*Nebrius ferrugineus*	Tawny Nurse Shark	VU A2abcd+3cd+4abcd ver 3.1 (2001)
8	STEGOSTOMIDAE	*Stegostoma fasciatum*	Leopard Shark/ Zebra Shark	VU A2abcd+3cd+4abcd ver 3.1 (2001)
9	CARCHARHINIDAE	*Carcharhinus longimanus*	Oceanic Whitetip Shark	VU A2ad+3d+4ad ver 3.1 (2001)
10	CENTROPHORIDAE	*Centrophorus squamosus*	Deepwater Spiny Dogfish/ Leafscale Gulper Shark/ Nilson's Deepsea Dogfish	VU A2bd+3bd+4bd ver 3.1 (2001)
11	HEMIGALEIDAE	*Hemipristis elongatus*	Fossil Shark/ Snaggletooth Shark	VU A2bd+3bd+4bd ver 3.1 (2001)
12	ODONTASPIDIDAE	*Carcharias taurus*	Grey Nurse Shark/ Sand Tiger Shark	VU A1ab+2d ver 2.3 (1994)
Batoid fishes				
1	PRISTIDAE	*Anoxypristis cuspidata*	Knifetooth Sawfish	CR A2bcd+3cd+4bcd ver 3.1 (2001)
2	Dasyatidae	*Urogymnus asperrimus*	Porcupine ray	VU A1bd, B1+2bcd ver 2.3 (1994)
3	Dasyatidae	*Taeniura meyeni*	Black-blotched ribbon tail/Round ribbon tail	VU A2ad+3d+4ad ver 3.1 (2001)
4	RHINIDAE	*Rhina ancylostoma*	Bowmouth Guitarfish/ Mud skate/ Shark ray	VU A2bd+3bd+4bd ver 3.1 (2001)
5	RHYNCHOBATIDAE	*Rhynchobatus australiae*	White-spotted Guitarfish/ White-spotted Wedgefish	VU A2bd+3bd+4bd ver 3.1 (2001)
6	RHINOBATIDAE	*Rhinobatos granulatus*	Sharpnose Guitarfish (E)	VU A2bd+3d+4d ver 3.1 (2001)
7	RHINOPTERIDAE	*Rhinoptera javanica*	Flapnose ray (E)	VU A2d+3cd+4cd ver 3.1 (2001)
8	MYLIOBATIDAE	*Aetomylaeus nichofii*	Banded Eagle Ray	VU A2d+3d+4d ver 3.1 (2001)
9	RHYNCHOBATIDAE	*Rhynchobatus sp. nov. B**	Broadnose Wedgefish	VU A2ad+3d+4ad ver 3.1 (2001)
10	RHINOBATIDAE	*Rhinobatos formosensis**	Taiwan Guitarfish	VU A2d+3d+4d ver 3.1 (2001)

Table 6.2. Additional shark and batoid species in the Philippines in the preliminary 2007 IUCN List of Threatened Species.

	Family	Species	Common Name/s	IUCN Category*
Sharks				
1	CARCHARHINIDAE	*?Glyphis sp.*	River shark	EN (2000)
2	CARCHARHINIDAE	*Lamiopsis temmincki*	Broadfin Shark	EN (2007)
3	LAMNIDAE	*?Isurus paucus*	Longfin mako	VU (2005)
4	ALOPIIDAE	*Alopias pelagicus*	Pelagic thresher	VU
5	ALOPIIDAE	*Alopias superciliosus*	Bigeye thresher	VU
6	LAMNIDAE	*Charcharodon carcharias*	White shark/Great white shark	VU A1cd+2cd ver 2.3 (1994)
7	SCYLIORHINIDAE	*Atelomycterus baliensis*		VU (2007)
8	CARCHARHINIDAE	*Carcharhinus sorrah*	Spot-tail shark	VU (2007)
9	HEMIGALEIDAE	*Chaenogaleus macrostoma*	Hooktooth Shark	VU (2007)
10	SCYLIORHINIDAE	*Halaelurus boesemani*	Speckled catshark	VU (2007)
Batoid fishes				
1	DASYATIDAE	*?Himantura kittipongi*		EN B1abiii (2007)
2	DASYATIDAE	*Himantura gerrardi*	Sharpnose Stingray	VU A2bd+3bd (2007)
2	DASYATIDAE	*Himantura hortlei*	Hortle's Whip ray	VU A2bd+3bd (2007)
4	DASYATIDAE	*Himantura lobistoma*		VU A2bd+A3bd 2007
5	DASYATIDAE	*Himantura pastinacoides*	Round Whip ray	VU A2bd+3bd 2007
6	DASYATIDAE	*Himantura uarnacoides*	Whitenose Whip ray	VU A2bd+3bd 2007
7	DASYATIDAE	*Himantura uarnak*	Honeycomb Stingray	VU (2007)

CHAPTER 7

CHAPTER 7: DATA NEEDS, ISSUES AND CHALLENGES, RECOMMENDATIONS AND PRORITIES FOR ACTION

7.1. Data Gaps and Needs

A wide range of data types are required to determine the sustainable yield of a fish stocks. To manage it effectively data requirements may include fish biology, fishery (catch and effort statistics), the fishers and fish markets (socio-economic considerations) are important. Biological data generally used to determine stock boundaries, the productivity of a species, and its response to fishing pressure. Fisheries data are used to estimate population losses through fishing mortality, and to monitor trends in stock biomass. Both biological and fishery data can be collected by fishers, fish processors, scientific observers, scientists, and/or fishery administrators.

7.1.1. Fisheries and Socio-Economic Data Needs

Much of the assessment, monitoring and management of shark populations relies on fisheries data (referred to as fishery-dependent data).Accurate stock assessments of shark resources are required for fishery managers to make informed decisions that help to conserve exploited shark populations and avoid socio-economic and ecological problems. Available fisheries data in the country, however, are generally deficient, requiring the need to improve and implement mechanisms to collect and enhance the reliability of the reporting and monitoring system as well as improve the accuracy of stock assessments. Collection of fishery and biological data in support of these assessments has been hampered by the relatively low economic value of sharks compared to teleosts.

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 (CPUE); exploitation rates.

Additional data needs would be coming from the socio-economic aspects of shark fisheries such as demographic profiles, fisheries profile, fishing operation practices including fleet and vessel size, gears used, areas fishes, numbers of fishers, markets and values for different products, and the structure and flow of trade, problems, and fishery systems. There is also a need for standardized data collection and reporting methods, for comparison of trends, between regions and over time.

Commercial and targeted shark fishery data acquisition is required as well as the accurate quantification and/or estimation of by-catch in the numerous fisheries and gear types in which different species are caught.

Fishery-independent surveys and studies, particularly on relative abundance are necessary to stock assessments. It is important that these indices be of long duration and covers much of the geographical range occupied by a given stock. In the absence of these fishery independent information, CPUE data from various fisheries can also be used as indices of abundance after adequate standardizations are made.

7.1.2. Biological and Ecological Data Needs

Management must be driven by the biological capacity of the sharks to ensure sustainability of the fishery. The life-history characteristics of sharks make it particularly difficult to collect the biological information required in more detailed stock assessment models. While stock assessment methodologies have become increasingly sophisticated, basic knowledge on many species is still fragmentary and underscores the need for good quality data.

Basic research, therefore, is required to gain better understanding on the biology and ecology of the animals. Such researches should include taxonomy, as well as the biology and ecology of species and populations. Results of elasmobranch inventory in the Philippines are proof that many more species are being discovered. More often, populations are exploited to extinction before anything is known about them. Greater taxonomic effort is needed, including species description and genetic research into stock structure and dynamics. Species/population biology and/or ecology research should include: reproductive characteristics (age at maturity, gestation, period and average annual pups per female); critical habitats at different life cycles (e.g., mating, popping, nursery, feeding grounds); growth rates and age structure; mortality (natural and fishing) for all age classes; stock and relative abundance; and stock structure and migration patterns.

7.1.3. Conservation and Management needs

Camhi *et al.* (1998) recommended adoption of FAO's Precautionary Approach to their management, which would dictate that fisheries only be conducted where stock management regimes are in place. It should be noted that there is a need to take management action even where there are uncertainties and gaps in knowledge. The following are recommended:

- to improve the quality of ecological and fisheries data
- to develop and apply management mechanisms and tools, including to control and monitor trade.
- to invest in human and financial resources in research and management, in developing the necessary policy, legal and institutional frameworks, and in training and other capacity-building to implement management measures.

FAO's Precautionary Approach (1995) provides guidance on the minimal management actions needed for both new and existing fisheries. Cooperation is necessary among all parties interested in the long-term productivity of shark populations.

7.2. Issues and Challenges

A number of significant issues pertaining to the conservation and management of sharks emerge from the assessment of shark catches—target, byproduct and bycatch—reported in this document. Primary threats to chondrichthyan fishes to date is unregulated fishery, whether it be targeted or by-catch. Since generally they are K-strategists, their life histories make them highly vulnerable to over-exploitation. Effective management regimes, which takes into account the biological constraints and life histories of these fishes, is urgently required to ensure sustainability of exploited stocks and address their broader conservation needs. Issues and challenges associated to needs identified above are listed below:

7.2.1. Monitoring

- 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

7.2.2. Data Collection/Compilation/Reporting/Analysis:

- 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;
- Lumping of data into general groupings such as sharks or rays
- 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
- Difficulty in species identification and collection of biological data of incomplete (headless, finless or gutted) sharks landed
- 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 socio-economic data on shark fisheries, including fleet and vessel size, gears used, areas fished, 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

7.2.3. Research

- Lack of information of the volume and extent of shark finning and its impact
- 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
- 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

7.2.4. Capacity-building

- 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);

7.2.5. Conservation and Management (Policy, IEC, Compliance and Enforcement)

- Insufficient policies and legal mechanisms to manage shark stocks, including pelagic/shared stocks, deepwater, 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; others)
- 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

7.3. Recommendations and Priorities for Action

Close to 50 issues and challenges have been identified in the assessment of shark resources, fisheries, conservation and management in the Philippines. These issues have been further clarified and refined in the Philippine NPOA-Shark consultation process. Priority issues are re-stated as recommendations and, when applicable, linked to the IPOA objective(s) to which it relates (see Appendix 19, also Introduction), and grouped into major components, as stated in the IPOA and recommended by the ASEAN-SEAFDEC.

Each action identified in the NPOA-Shark has been allocated a priority ranking (1A, 1B, 1C, 2 or 3). The distinction between 1A and 1B is made in order to acknowledge that, while all

Priority 1 actions need to be initiated as soon as possible, the feasible time frame for completion of these actions will vary. It is reasonable to expect that actions categorised as A and 1B can be initiated within the first year of the NPOA-Shark and that actions with a 1A rating can be completed within 2 years. A 1B rating acknowledges that it is not possible to specify a completion date for some actions. A 1C rating recognises that an action is dependent on the completion of another action or other work underway, for example, those Actions that rely on the results of risk assessments will have to be carried out under this NPOA-Shark. Shark species vary in their distribution in Philippine waters as does the fisheries where sharks are captured and the jurisdiction, which has responsibility for managing the fisheries.

Therefore, even though this is a National Shark-plan, there will inevitably be some variation between jurisdictions in the timing and implementation of actions and not all actions will be relevant to all jurisdiction. The broad interpretation of each priority category is provided in Table 1.

CHAPTER 8

CHAPTER 8: NATIONAL PLAN OF ACTION - SHARKS

8.1 INTRODUCTION

In accordance with the requirements of the agreed International Plan of Action for the Conservation and Management of Sharks (IPOA-*Sharks* 1999), Philippines has begun preparing its National Plan of Action for the Conservation and Management of Sharks (NPOA-*Sharks*). Participation in the IPOA-*Sharks* and preparation and implementation of an NPOA-*Sharks* is voluntary. The IPOA *Sharks* suggests that member States of the FAO (such as Philippines) should adopt a NPOA-*Sharks* if their vessels conduct directed fisheries for sharks or their vessels regularly catch sharks in non-directed fisheries.

The IPOA *Sharks* requires each member nation that take shark in their fisheries to prepare a shark assessment report (SAR) with the aim of identifying conservation, management and any other issues associated with the shark catch. If necessary, these issues can then be addressed in a NPOA- *Sharks*. The SAR will be updated regularly to report the status of shark stocks as assessments are made and to identify gaps in knowledge. The NPOA-*Sharks* requires collection and ongoing synthesis of compatible data at the appropriate resolution, including *inter alia* commercial data and data leading to improved species identification and, eventually, abundance indices.

The shark data collected by Philippines for trans-boundary, highly migratory and high seas shark stocks should be done through international collaboration and data sharing systems and all shark data should be made available to relevant subregional and regional fisheries organisations, and the FAO (IPOA-*Sharks* 1999).

There is a considerable body of literature concerning some Philippine shark species and stocks. In order to clearly and concisely describe the current state of knowledge of these stocks, this document (Shark Assessment Report-Overview) presents an overview of the information available. Other recent Philippines shark studies are listed in a Bibliography and these documents can be obtained by contacting the Secretariat of the NPOA-Shark Technical Working Group.

The SAR follows the format as presented at the Philippine NPOA-Shark workshop in Clark, Pampanga in November 2007.

8.2 Philippine Shark Plan: Matrix

The Phillippine Shark Plan subdivided into the four major issues: Monitoring, Data Collection and Analysis, Research, Building Human Capacity, and Conservation and Management (which include). The Shark Action Plan is presented in a matrix format to show each issues' basic objectives, actions, remarks, responsible agencies andstrategic partners, indicators and level of priority, as follows:

National Plan of Action for the Conservation and Management of Sharks*
(Philippine NPOA-Shark* or Philippine Shark*-Plan)

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
1. MONITORING						
1.1. Lack of routine and non-routine mechanisms to improve shark and ray fisheries statistics	1.1.1. To establish routine and non-routine mechanisms in improving shark and ray fisheries statistics	1.1.1a Identify routine mechanisms		GA/NGOs		
		• National Shark Assessment Report		GA/TWG		
		• Regional Shark Assessment Report		BFAR Regions		
		1.1.1a. Identify non-routine mechanisms		GA/NGOs		
1.2. Lack of regular and sustained monitoring to assess status and trends of shark and ray stocks	1.2.1. Establish system for the regular and sustained monitoring of the status of the fisheries, market and trade of sharks and rays	1.2.1a. Create multi-sectoral group to develop monitoring system		GA/NGOs/LGUs		
		1.2.2b. Identify financial mechanisms to sustain monitoring system		GA/NGOs/LGUs		

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
2. DATA COLLECTION AND ANALYSIS						
2.1. Limited understanding on shark* fisheries	2.1.1. To regularly update NSAP data on sharks, batoids and chimaeras	2.1.1a. Regularly update data and information collection on shark, rays and skates on catch and effort, utilization, trade		NSAP-NFRDI FRQD (Regions)		
		2.1.1b. Segregate shark, batoids and chimaeran species from other fisheries data	Need to develop standardized data form for shark*	NFRDI-FRQD		
		2.1.1c. Facilitate participatory resource assessment/focus group discussion on shark fisheries	Need for training on data collection, including conduct of focus group discussions (FGDs) and participatory resource assessment (PRA)	NFRDI-FRQD Academe/Phil Natl Museum		
		2.1.1d. Gather catch and effort data, types of fishing gears used		LGUs, BFAR-RFOs, NSAP, LGU, FARMCs/POs		
	2.1.2. To review and verify shark identification on catches per region	2.1.2a. seek assistance from experts	inter-Regional Fisheries Units (RFUs)	NSAP-NFRDI FRQD (Regions)		
2.2. Limitied ecological information on shark* species	2.2.1. To be able to determine species distribution and habitat suitability	2.2.1a. provide NSAP enumerators with grid maps	mapping	FRQD-FIMC		

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
	2.2.1. To determine biological information on species	2.2.1a. provide training for enumerators on species identification, sexual maturity (bio-ecological parameters)	*refer to 4.1*	LGUs, BFAR-RFOs, FRMD		
	2.2.3. To improve on information from sightings and strandings	2.2.3a. Develop sightings and strandings reporting system	including photos			
		2.2.3b. Gather sightings, strandings data	including photos	LGUs, RFOs		
		2.2.3c. Establish sightings and strandings database	including photos	FRMD		
2.3. Limited understanding on shark* utilization and trade	2.3.1. To improve current knowledge and information of shark utilization, market and trade	2.3.1a. Review current data available on utilization and trade	standardization of commodity names	FRQD		
	2.3.2. To determine post harvest technology and marketing channels or outlets for shark products	2.3.2a. Documentation and update on the list of processors on their outlet and market channels.	trade route mapping	FRQD, BAS		
		2. 3.2b. Gather export and import data on shark fisheries		FRQD		

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
2.4. Limited cooperation with industry	2.4.1. To develop linkage with the industry	2.4.1a. Networking with the industry	meetings/ consultations	FRQD, DTI		
2.5. Lack of information/ understanding of the socio-economic importance of shark fisheries	2.5.1.To assess socio-economic impacts of shark fisheries	2.5.1a. Gather cost and production data on shark fisheries		BAS, NGOs, FRQD, NFRDI, Academe		
	2.5.2. To analyze cost and production on shark fishery industries	2.5.2a. Conduct ROI/ Economic valuation of shark fisheries and shark by-products		NFRDI, NGOs, Academe, DTI		
3. RESEARCH						
3.1. Limited information on the biology and ecology of species, including taxonomy	3.1.1. To improve current knowledge and information on the biology and ecology of species	3.1.1a. Conduct life history researches		NFRDI, Ris		
		3.1.1b. Collation of existing literature		NFRDI		
		3.1.1c. Conduct genetic studies and DNA mapping on headless, gutted and finless sharks		NFRDI, National Museum, SharkBOL?		
		3.1.1d. Integration of GIS on species distribution		NFRDI, FIMC, NGOs		

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
3.2. Limited facilitation and encouragement research on little known shark species	3.2.1. To promote understanding of little known shark species	3.2.1a. Conduct studies on little known shark species		NFRDI		
		3.2.1b. Establishn documentation and reporting system of studies		NFRDI, Ris		
	3.2.2. To establish/ generate baseline information on little known shark species	3.2.2a. Conduct assessment		NFRDI, Ris		
		3.2.2b. Conduct IEC		NFRDI, RFOs, LGUs, DILG, Academe		
3.3. Limited information and understanding on current utilization of sharks and shark products	3.3.1. To develop technology on value added products	3.3.1a. Conduct studies on post harvest and product development		NFRDI, Post Harvest		
	3.3.2. To maximize full utilization of sharks	3.3.2a. To evaluate existing fishing gears on shark fisheries		NFRDI, FTD		
		3.3.2b. Encourage the use of effective and sustainable fishing practices		NFRDI, FPED, FRMD, FRQD, MPA (Media)		

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
	3.3.3. To identify alternative, non-consumptive use of sharks and rays	3.3.3a. Review/ evaluation of current practices of alternative uses of sharks and rays (tourism)		NFRDI, LGUs, FRMD, DILG, DOT, PTA		
		3.3.3a. Identify and promote alternative uses of sharks and rays (aquarium trade; tourism)		NFRDI, LGUs, FRMD, DILG, DOT, PTA, DTI		
3.4. Assessment of threats to shark populations, determine and protect critical habitats	3.4.1. To evaluate existing threats to shark populations	3.4.1a. Conduct status and trends studies		NFRDI, RFOS		
		3.4.1b. Documentation and reporting		NFRDI, RFOs		
	3.4.2. To determine species-gear interactions	3.4.2a. Conduct gear inventory		NFRDI, FRQD, LGUs		
		3.4.2b. Evaluate impacts of various gears on sharks populations and ecosystems		NFRDI, Ris, FTD		
		3.4.2c. Promote shark 'friendly' gears	Review strategy. There are no shark-friendly gears. Should be part of research. Review of gears and impact on shark population			

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
		3.4.2d. Identify and regulate (manage) gears that critically impacting sharks populations	*Regulate the use of fishing gears as based on scientific studies*			
		3.4.2d. Conduct valuation study on elasmobranch fisheries	refer to 2.5.2a			
4. BUILDING HUMAN CAPACITY						
4.1. Limited capacity for species identification	4.1.1. To increase capacity of BFAR CO, NFRDI, NSAP and BAS regional staff and field enumerators in elasmobranch identification, strategies, approaches in data collection (to include BFAR-FRQD)	4.1.1a. Develop training modules on Taxonomy, Biology, Ecology, Data Collection		NFRDI, FRQD, RFTCs		
		4.1.1b. Develop field guide to the identification of Philippine elasmobranchs		NFRDI, NGOs, FRQD		
		4.1.1c. Conduct Trainors Training on Taxonomy, Biology and Ecology and Data Collection Methods	refer to 4.1.1a			
		4. Regional Training	refer to 4.1.1a			

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
4.2. Limited capacity for data collection	4.2.1. Improve knowledge on biology, taxonomy and ecology of elasmobranch resources	4.2.1a. Module Development	refer to 4.1.1a			
		4.2.1b. Conduct hands-on training to collect ecological data (eg. Whale shark, dogfish: habitat mapping, life history of commercially exploited species)	refer to 4.1.1a			
	4.2.2. Enhance use of the NSAP database to accommodate elasmobranch fisheries data	4.2.2a. Need to evaluate current database program and regional system to run program.	*assessment of database requirement for trade and data collection requirements*	NFRDI, FIMC		
4.3. Lack of technical expertise on sharks	4.3.1. To develop a support network of experts	4.3.1a. Establish a network of experts to support conservation and management efforts		NFRDI, Ris, SSG		
		4.3.1b. Establish shark red-list authority/ specialist group in the Philippines				
		4.3.1c Establish linkages with national and international experts, SUCs		NFRDI, SSG		

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
4.3. Limited knowledge/ understanding on conservation and management needs of threatened species	4.3.1. To enhance knowledge of DA, BFAR, NFRDI, NSAP, BAS, LGUs, DENR, PCSD, PFOs in the IUCN Red Listing Process	4.3.1a. Training on IUCN Categories and Criteria	Note: inclusion of DENR due to conflict in the implementation of laws/ policies at the regional level.	TWG		
4.4. Limited knowledge and appreciation for shark and shark resources	4.4.1. Increase knowledge and appreciation for shark and shark resources	4.4.1a. Develop IEC strategy for appreciation of shark and shark resources.	*Identify specific problem, public, product and plan* (4P)	NFRDO, MPA-TWG		
			Develop monitoring and evaluation tools for the strategy	MPA		
		4.4.1b. Advocate for inclusion of modules on conservation and management of chondrichthyan fishes in academic curricula	*focus on sustainability.*	NFRDI, BFAR		
		4.4.1c. Conduct valuation study of elasmobranch resources	(refer to 2.5.2a)			
5. CONSERVATION AND MANAGEMENT (Policy, IEC, Compliance & Enforcement)						
5.1. No definite conservation and management policies on shark and rays	5.1.1 To develop national policies on the conservation and management of sharks and rays	5.1.1a. Assessment of all sharks and rays of the Philippines		BFAR, NGOs		
		5.1.1b. Identification of threatened species and their habitat		BFAR, FRQD, NFRDI		

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
	5.1.2. To ensure sustainable shark and ray fisheries	5.1.2a. Identification of protected areas for the threatened species		NFRDI, Ris, RFOs, LGUs, NGOs		
		5.1.2b. Draft of a Fisheries Administrative Order on the regulation and management (e.g. restriction of fishing gears and methods, etc.) of all threatened shark and ray species	Amend FAO 208, to include threatened species (i.e, critically endangered, endangered, vulnerable)	BFAR-FRQD, BFAR-Legal		
5.2. Inconsistencies of existing laws with regards to conservation, i.e. Wildlife Act	5.2.1. To review and amend existing laws for the conservation of sharks and rays	5.2.1a. Creation of a technical working group to review existing laws		BFAR/NFRDI, FRQD, BFAR-legal, RFOs, FRQD		
		5.2.1b. Consultation with stakeholders		BFAR/NFRDI, FRQD, BFAR-legal, RFOs, FRQD		
5.3. Lack of information on shark fisheries	5.3.1. To educate and increase the awareness of all stakeholders and agencies on shark biology, conservation, and management	5.3.1a. Develop and disemminate IEC materials	(refer to 4.4.1a)	(refer to 4.4.1a)		
5.4. Lack of information on trade and marketing	5.4.1. To identify distribution areas of shark products	5.4.1a. To conduct extensive studies on shark and ray trade and marketing	(refer to 2.3.2a)	(refer to 2.3.2a)		

ISSUES	OBJECTIVES	ACTIONS	REMARKS	Agency Responsible/ Strategic Partners	Indicators	PRIORITY
5.5. lack of enforcement for the conservation and management of threatened and endangered shark and ray species	5.5.1. To formulate regulations on the enforcement of policies for the protection of threatened shark and ray species	5.5.1a. (to be reflected/ captured in the FAO to be drafted)	1. raised concern regarding enforcers. 2. define role of other stakeholders in enforcement (e.g FARMCs) (refer to 5.1.2b)	BFAR		

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APPENDICES

APPENDIX 1: PHILIPPINE CHECKLIST OF CHONDRICHTHYAN FISHES (Source: Compagno et al., 2005)

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.
Genus *Hydrolagus* Gill, 1863.	*Hydrolagus mitsukurii (Dean, in Jordan & Snyder, 1904). Mitsukurii's chimaera.*
Genus *Hydrolagus* Gill, 1863.	*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 s harks.	*Heterodontus zebra* (Gray, 1831). Zebra bullhead shark.

Order Lamniformes Garman, 1885. Mackerel sharks.

Family Pseudocarchariidae Compagno, 1973. Crocodile sharks.

Genus Pseudocarcharias Cadenat, 1963. Crocodile sharks.	*?Pseudocarcharias kamoharai* (Matsubara, 1936). Crocodile shark.

Family Megachasmidae Taylor, Compagno & Struhsaker, 1983. Megamouth sharks.

Genus Megachasma Taylor, Compagno & Struhsaker, 1983. Megamouth sharks.	*Megachasma pelagios Taylor, Compagno & St*ruhsaker, 1983. Megamouth shark.

Family Alopiidae Bonaparte, 1838. Thresher sharks.

Genus Alopias Rafinesque, 1810. Thresher sharks.	*Alopias pelagicus* Nakamura, 1935. Pelagic thresher
	Alopias superciliosus (Lowe, 1839). Bigeye thresher.
	Alopias vulpinus (Bonnaterre, 1788). Thresher shark.

Family Cetorhinidae Gill, 1862. Basking sharks.

Genus Cetorhinus Blainville, 1816. Basking sharks.	*Cetorhinus maximus* (Gunnerus, 1765). Basking shark.

Family Lamnidae Müller & Henle, 1838. Mackerel sharks, Pating, Chacon.

Genus Carcharodon Smith, 1838. White sharks.	*Carcharodon carcharias* (Linnaeus, 1758). White shark.
Genus Isurus Rafinesque, 1810. Mako sharks.	*Isurus oxyrinchus* Rafinesque, 1810. Shortfin mako.
	?Isurus paucus Guitart Manday, 1966. Longfin mako.

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.

Family Orectolobidae Gill, 1896. Wobbegongs.

Genus Orectolobus Bonaparte, 1834. Beardless wobbegongs.	*?Orectolobus japonicus* Regan, 1906. Japanese wobbegong.

Class Chondrichthyes Huxley, 1880. Cartilaginous fishes.	
	Orectolobus sp. near *ornatus*. Philippine wobbegong.
Family Hemiscylliidae Gill, 1862. Longtailed Carpetsharks.	
Genus Chiloscyllium Müller and Henle, 1837. Bamboosharks.	?Chiloscyllium griseum Müller & Henle, 1838. Gray bambooshark.
	?Chiloscyllium indicum (Gmelin, 1788). Slender bambooshark.
	Chiloscyllium plagiosum (Bennett, 1830). Whitespotted bambooshark.
	Chiloscyllium punctatum Müller & Henle, 1838. Brownbanded bambooshark.
Family Stegostomatidae Gill, 1862. Zebra sharks.	
Genus Stegostoma Müller & Henle, 1837. Zebra sharks.	*Stegostoma fasciatum* (Hermann, 1783). Zebra shark, tiger shark, Butanding.
Family Ginglymostomatidae Gill, 1862. Nurse sharks.	
Genus Nebrius Rüppell, 1837. Tawny nurse sharks.	*Nebrius ferrugineus* (Lesson, 1830). Tawny nurse shark.
Family Rhincodontidae Müller & Henle, 1839. Whale sharks.	
Genus Rhincodon Smith, 1829. Whale sharks.	*Rhincodon typus* (Smith, 1828). Whale shark.
Order Carcharhiniformes Garman, 1913. Ground sharks.	
Family Scyliorhinidae Gill, 1862. Cat sharks.	
Genus *Apristurus* Garman, 1913. Demon catsharks.	*Apristurus herklotsi* (Fowler, 1934). Longfin catshark.
Genus *Atelomycterus* Garman, 1913. Coral catsharks.	*Atelomycterus marmoratus* (Bennett, 1830). Coral catshark, marbled cat-shark.
Genus *Cephaloscyllium* Gill, 1862. Swellsharks.	*Cephaloscyllium,* sp. nov. Philippines swellshark.
Genus *Galeus* Rafinesque, 1810. Sawtail catsharks.	*Galeus sauteri (Jordan & Richardson, 1909). Taiwan sawtail catshark.*
	Galeus schultzi Springer, 1979. Dwarf sawtail catshark.
	Galeus sp. nov. near G. nipponensis Nakaya, 1979.
Genus *Halaelurus* Gill, 1862. Tiger catsharks	*?Halaelurus cf. boesemani Springer & D'Aubrey, 1972. Speckled catshark.*
	Halaelurus cf. buergeri (Müller & Henle, 1838). Blackspotted catshark.
Genus *Pentanchus* Smith & Radcliffe, *in* Smith, 1912. Onefin catsharks.	*Pentanchus profundicolus Smith & Radcliffe, 1912. Onefin catshark.*
Genus *Scyliorhinus* Blainville, 1816. Spotted catsharks.	*?Scyliorhinus garmani (Fowler, 1934). Brownspotted catshark.*
	?Scyliorhinus torazame (Tanaka, 1908). Cloudy catshark.
Family Proscylliidae Fowler, 1941. Finback catsharks.	
Genus *Eridacnis* Smith, 1913. Ribbontail catsharks.	*Eridacnis radcliffei* Smith, 1913. Pygmy ribbontail catshark.
	?Eridacnis sp.: Philippine ribbontail catshark.
Family Pseudotriakidae Gill, 1893. False catsharks.	
Genus *Gollum* Compagno, 1973. Gollumsharks.	*Gollum* sp. nov. Sulu gollumshark.
Family Triakidae Gray, 1851. Houndsharks.	
Genus *Hemitriakis* Herre, 1923. Combtooth houndsharks.	*Hemitriakis leucopteriptera Herre, 1923. Whitefin tope.*
	Hemitriakis sp. Ocellate topeshark.

Class Chondrichthyes Huxley, 1880. Cartilaginous fishes.	
Genus *Iago* Compagno & Springer, 1971	*Iago garricki Fourmanoir, 1979. Longnosed houndshark.*
Genus *Mustelus* Linck, 1790. Smooth-hounds.	*Mustelus 1 cf. manazo Bleeker, 1854. Philippine white-spotted smoothhound.*
	Mustelus 2 cf. griseus Pietschmann, 1908. Philippine brown smoothhound.
	Mustelus 3 cf. griseus Pietschmann, 1908. Philippine gray smoothhound.
?Genus *Triakis* Müller & Henle, 1838. Leopard sharks.	*?Triakis scyllium Müller & Henle, 1839. Banded houndshark*
Family Hemigaleidae Hasse, 1879. Weasel sharks.	
Genus *Hemigaleus* Bleeker, 1852. Weasel Sharks.	*Hemigaleus microstoma Bleeker, 1852. Sicklefin weasel shark.*
Genus *Hemipristis* Agassiz, 1843. Snaggletooth sharks.	*Hemipristis elongatus (Klunzinger, 1871). Snaggletooth shark.*
Family Carcharhinidae Jordan & Evermann, 1896. Requiem sharks, gray sharks, Pating.	
Genus *Carcharhinus* Blainville, 1816. Gray sharks, Pating.	*Carcharhinus albimarginatus (Rüppell, 1837). Silvertip Shark.* *Carcharhinus altimus (Springer, 1950). Bignose shark.*
	Carcharhinus amblyrhynchoides (Whitley, 1934). Graceful shark. *Carcharhinus amblyrhynchos (Bleeker, 1856). Gray reef shark.* *?Carcharhinus borneensis (Bleeker, 1858-1859). Borneo shark.* *Carcharhinus brevipinna (Müller & Henle, 1839). Spinner shark.* *?Carcharhinus dussumieri (Valenciennes, 1839). Whitecheek shark.* *Carcharhinus falciformis (Bibron, 1839). Silky shark.* *Carcharhinus hemiodon (Valenciennes, 1839). Pondicherry shark.* *Carcharhinus leucas (Valenciennes, 1839). Bull shark.* *Carcharhinus limbatus (Valenciennes, 1839). Blacktip shark.*
	Carcharhinus longimanus (Poey, 1861). Oceanic whitetip shark. *?Carcharhinus macloti (Müller & Henle, 1839). Hardnose shark.* *Carcharhinus melanopterus (Quoy & Gaimard, 1824). Blacktip reef shark, black-finned shark.* *Carcharhinus sealei (Pietschmann, 1913). Blackspot shark.*
	Carcharhinus sorrah (Valenciennes, 1839). Spot-tail shark.
Genus *Galeocerdo* Müller & Henle, 1837. Tiger sharks.	*Galeocerdo cuvier (Peron & Lesueur, 1822). Tiger shark, spotted shark.*
?Genus Glyphis Agassiz, 1843. River sharks.	*?Glyphis sp. River shark.*
Genus *Loxodon* Müller & Henle, 1838. Sliteye sharks.	*Loxodon macrorhinus Müller & Henle, 1838. Sliteye shark.*
Genus *Negaprion* Whitley, 1940. Lemon sharks.	*Negaprion acutidens (Rüppell, 1837). Sharptooth lemon shark.*
Genus *Prionace* Cantor, 1849. Blue sharks.	*Prionace glauca (Linnaeus, 1758). Blue shark.*
Genus *Rhizoprionodon* Whitley, 1929. Sharpnose sharks.	*Rhizoprionodon acutus (Rüppell, 1835). Milk shark, Bongalonon.*
?Genus *Scoliodon* Müller &	*?Scoliodon laticaudus Müller & Henle, 1838.*

Class Chondrichthyes Huxley, 1880. Cartilaginous fishes.

Henle, 1837. Spadenose sharks	*Spadenose shark.*
Genus *Triaenodon* Müller & Henle, 1837. Whitetip reef sharks.	*Triaenodon obesus (Rüppell, 1837). Whitetip reef shark.*

Family Sphyrnidae Gill, 1872. Hammerhead sharks.

Genus *Eusphyra* Gill, 1862. Winghead sharks.	*Eusphyra blochii (Cuvier, 1816). Winghead shark.*
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 mokarran (Rüppell, 1837). Great hammerhead.
	Sphyrna zygaena (Linnaeus, 1758). Smooth hammerhead.
	?Sphyrna tiburo (Linnaeus, 1758). Bonnethead shark.

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.*
Genus *Hexanchus* Rafinesque, 1810. Sixgill sharks.	*Hexanchus griseus (Bonnaterre, 1788). Bluntnose sixgill shark, cow shark.*
	Hexanchus nakamurai Teng, 1962. Bigeyed sixgill shark.

Order Squaliformes Gill, 1862. Dogfish sharks.

Family Echinorhinidae Gill, 1862. Bramble sharks.

Genus *Echinorhinus* Blainville, 1816. Bramble sharks.	*?Echinorhinus cookei Pietschmann, 1928. Prickly shark.*

Family Squalidae Blainville, 1816. Dogfish sharks, spurdogs, spiny dogfishes.

Genus *Squalus* Linnaeus, 1758. Spurdogs.	*Squalus cf. megalops Macleay, 1881. Philippines shortnose spurdog.*
	Squalus cf. mitsukurii Jordan & Snyder, 1903. Philippines shortspine dogfish.
	Squalus sp. Philippine fatspined dogfish.
	Squalus sp. Philippine longnose spurdog.

Family Centrophoridae Bleeker, 1859. Gulper sharks.

Genus *Centrophorus* Müller & Henle, 1837. Gulper sharks.	*Centrophorus isodon (Zhu, Meng, & Liu, 1981). Black gulper shark.*
	Centrophorus lusitanicus Bocage & Capello, 1864. Lowfin gulper shark.
	Centrophorus cf. moluccensis Bleeker, 1860. Philippine smallfin gulper shark.
	Centrophorus ?squamosus (Bonnaterre, 1788). Leafscale gulper shark. ? = C. acus Garman, 1906
Genus *Deania* Jordan & Snyder, 1902. Birdbeak dogfishes.	*?Deania cf rostrata Garman, 1906.*
	Deania profundorum (Smith & Radcliffe, 1912). Arrowhead dogfish.

Family Etmopteridae Fowler, 1934. Lantern sharks.

Genus *Centroscyllium* Müller & Henle, 1841. Combtooth	*Centroscyllium cf. kamoharai Abe, 1966. Bareskin dogfish.*

Class Chondrichthyes Huxley, 1880. Cartilaginous fishes.	
dogfishes.	
Genus *Etmopterus* Rafinesque, 1810. Lantern sharks.	*Etmopterus brachyurus Smith & Radcliffe, 1912. Shorttail lanternshark.*
	Etmopterus lucifer Jordan & Snyder, 1902. Blackbelly lanternshark.
Family Dalatiidae Gray, 1851. Kitefin sharks.	
Genus *Isistius* Gill, 1865. Cookiecutter sharks.	*Isistius brasiliensis (Cuvier, In Quoy & Gaimard, 1824). Cookiecutter shark.*
Genus *Squaliolus* Smith & Radcliffe, 1912. Spined pygmy sharks.	*Squaliolus aliae Teng, 1959. Smalleye pigmy shark.*
	Squaliolus laticaudus Smith & Radcliffe, 1912. Spined pigmy shark.
Order Squatiniformes Jordan, 1923. Angel sharks.	
Family Squatinidae Bonaparte, 1838. Angel sharks.	
Genus *Squatina* Dumeril, 1806. Angel Sharks.	*Squatina formosa* Shen & Ting, 1972. Taiwan angelshark.
Order Pristiophoriformes White, 1936. Saw sharks.	
Family Pristiophoridae Bleeker, 1859. Saw sharks.	
Genus *Pristiophorus* Müller & Henle, 1837. Fivegilled sawsharks.	*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.
	Pristis microdon Latham, 1794. *Largetooth* or freshwater sawfish, sawfish, Tagan. *Pristis pectinata* Latham, 1794. Smalltooth sawfish. *Pristis zijsron* Bleeker, 1851. Green sawfish.
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.
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 cf. laevis (Bloch & Schneider, 1801). Smoothnose wedgefish. *Rhynchobatus sp. 2* Compagno & Last (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 halavi (Forsskål, 1775). Halavi

Class Chondrichthyes Huxley, 1880. Cartilaginous fishes.		
		guitarfish.
		?Glaucostegus microphthalmus (Teng, 1959). Smalleyed Guitarfish.
		Glaucostegus typus (Bennett, 1830). Giant shovelnose ray.
	Genus *Rhinobatos* Linck, 1790. Guitarfishes.	*?Rhinobatos formosensis* Norman, 1926. Taiwan guitarfish.
		Rhinobatos cf. *schlegelii* Müller & Henle, 1841. Philippine guitarfish.
?Suborder Platyrhinoidei: McEachran, Dunn & Miyake, 1996. Fanrays and thornbacks.		
	?Family Platyrhinidae Jordan, 1923. Fanrays and thornbacks.	
	?Genus *Platyrhina* Müller & Henle, 1838. Fanrays.	*?Platyrhina sinensis* (Bloch & Schneider, 1801). Fanray.
Suborder Torpedinoidei Gill, 1893. Electric rays.		
	Family Narcinidae Gill, 1862. Numbfishes.	
	Genus *Narcine* Henle, 1834. Numbfishes.	*Narcine timlei* (Bloch & Schneider, 1801). Blackspotted numbfish.
	Family Narkidae Fowler, 1934. Sleeper Rays.	
	Genus *Narke* Kaup, 1826. Onefin sleeper rays.	*?Narke dipterygia* (Bloch & Schneider, 1801). Spottail sleeper ray.
	Genus *Temera* Gray, 1831. Finless sleeper rays.	*?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 offshore torpedo.
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.
	Family Rajidae Blainville, 1816. Hardnose skates, skates, rays, Pagi.	
	Genus *Dipturus* Rafinesque, 1810. Longnose skates.	*Dipturus gigas* Ishiyama, 1958. Giant skate.
		Dipturus tengu (Jordan & Fowler, 1903). Goblin skate, tengu skate, acutenose skate.
		Dipturus sp. 1. Philippine longnose skate.
		Dipturus sp. 2.
		Dipturus sp. [Seret] (Philippines)
		Dipturus sp. Tilted thorn skate.
	Genus *Okamejei* Ishiyama, 1958.	*?Okamejei boesemani* (Ishihara, 1987). Black sand skate.
		?Okamejei hollandi (Jordan & Richardson, 1909). Yellow-spotted skate.
		?Okamejei kenojei (Müller & Henle, 1841). Spiny rasp skate.
		Okamejei sp. nov. Philippine ocellate skate.
	Genus Anacanthobatis von Bonde & Swart, 1924. Smooth legskates.	*Anacanthobatis* cf. *borneensis* Chan, 1965. Philippine legskate.
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.
	Family Hexatrygonidae Heemstra & Smith, 1980. Sixgill stingrays.	
	Genus *Hexatrygon* Heemstra & Smith, 1980. Sixgill stingrays.	*Hexatrygon bickelli* Heemstra & Smith, 1980. Sixgill stingray.
	Family Dasyatidae Jordan, 1888. Whiptail stingrays, sting rays, Pagi.	

Class Chondrichthyes Huxley, 1880. Cartilaginous fishes.		
	Genus *Dasyatis* Rafinesque, 1810. Fringetailed stingrays.	*Dasyatis* cf. *akajei* (Bürger In Müller & Henle, 1841). Philippine red stingray. *Dasyatis bennettii* (Müller & Henle, 1841). Bennett's cowtail or frilltailed ray. *Dasyatis kuhlii* (Müller & Henle, 1841). Bluespotted stingray or maskray, Kuhl's stingray, Dahonan, Doragon, Kiampao, Perisan. *Dasyatis zugei* (Bürger *In* Müller & Henle, 1841). Pale-edged stingray. *Dasyatis* sp. Adon's maskray.
	Genus *Himantura* Müller & Henle, 1837. Whiprays.	*Himantura bleekeri* (Blyth, 1860). Longtail whipray. *Himantura fai* Jordan & Seale, 1906. Pink whipray. *Himantura gerrardi* (Gray, 1851). Sharpnose whipray. *Himantura granulata* (Macleay, 1882). Mangrove whipray. *Himantura imbricata* (Bloch & Schneider, 1801). Scaly whipray. *Himantura jenkinsii* (Annandale, 1909). Golden whipray. *Himantura uarnak* (Forsskål, 1775). Spotted whipray, marbled stingray, ring-tailed ray, whip-tailed ray, whip ray, Paging bulik, Paging sulatan. *Himantura undulata* (Bleeker, 1852). Leopard whipray, honeycomb stingray or whipray. .*Himantura walga* (Müller & Henle, 1841). Dwarf whipray.
	Genus *Pastinachus* Rüppell, 1829. Cowtail stingrays.	*Pastinachus sephen* (Forsskål, 1775). Cowtail stingray, feathertail stingray, frill-tailed Pagi.
	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 meyeni* Müller & Henle, 1841. Round ribbontail ray.
		Urogymnus asperrimus (Bloch & Schneider, 1801). Porcupine ray, thorny ray.
	Family Gymnuridae Fowler, 1934. Butterfly rays.	
	Genus *Aetoplatea* Valenciennes, *In* Müller & Henle, 1841. Finned butterfly rays.	*Aetoplatea zonurus* Bleeker, 1852. Zonetail butterfly ray.
	Genus *Gymnura* Kuhl *In* Van Hasselt, 1823. Butterfly rays.	*Gymnura* cf. *micrura* (Bloch & Schneider, 1801). Smooth butterfly ray.
		Gymnura poecilura (Shaw, 1804). Longtail butterfly ray.
	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. *guttatus* (Shaw, 1804). Indian eagle ray
	Genus *Aetomylaeus* Garman, 1908.	*?Aetomylaeus milvus* (Valenciennes, 1841). Ocellate eagle ray. *?Aetomylaeus niehofii* (Bloch & Schneider, 1801). Banded eagle ray. *Aetomylaeus vespertilio* (Bleeker, 1852). Ornate eagle ray.
	Genus *Myliobatis* Cuvier,	*Myliobatis* cf. *tobijei* Bleeker, 1854. Philippine

Class Chondrichthyes Huxley, 1880. Cartilaginous fishes.	
1816. Eagle rays.	kite ray.
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, cownosed ray, Palimanok, Ogaog, Banogan.
Family Mobulidae Gill, 1893. Devil rays.	
Genus *Manta* Bancroft, 1828. Mantas.	*Manta birostris* (Walbaum, 1792). Manta.
Genus *Mobula* Rafinesque, 1810. Devil rays, Salanga, Safiga, Sarafigan.	*Mobula eregoodootenkee* (Bleeker, 1859). Longfin devilray.
	Mobula kuhlii (Valenciennes, *In* Müller & Henle, 1841). Shortfin devilray.
	Mobula thurstoni (Lloyd, 1908). Bentfin devilray.

APPENDIX 2: NSAP REGIONAL REPORTING FORMS

FORM 1: REGIONAL DATA SETS

Region: **Informant:**

Review of Regional Data Sets

DATA SETS	YES/NO	REMARKS
1. Landings of sharks and rays in Philippines from ___ to 2006.		
2. Landings of sharks and rays by Region (___-2003).		
3. Fishing grounds of sharks and rays in Philippines waters.		
4. Species compositions and relative abundance by landing site (percentage by numbers).		
5. Size distribution of sharks by species and area.		
6. Percentage of maturity for five most dominant species of sharks by area and sex.		
7. Changes in the catch composition of sharks percentage by different gears from ___ – 2006.		
8. Price, local usage and marketing destination of shark at six landing sites (2005 or most recent)		
9. The import and export of shark's products in terms of volume (tonnes) and value (US$) during the period ___-2006.		
10. The landing and market prices of sharks and rays in Philippines.		
11. The landing and market prices of fins and other products of sharks and rays in Philippines.		
12. The value of elasmobranch fishery in Philippines in terms of percentage during ___ -2006.		
13. Fishery Statistical Bulletin for South China Sea Area ___-2006		
14.		
15.		

FORM 2: REGIONAL DATA SETS

Regional Sharks and Rays Profile
Period covered: _____

Region: Name of Informant:

	SPECIES			FISHING GROUND		
1. **Shark Species** (True Sharks/ Flat Sharks/ Silver Sharks) endemic/ migrating (indicate specific area in the region) a. Directed Catch b. Indirect Catch						
2. Species/products landed	**Location (specific landing sites)**	**Gears**	**Volume (Min-Max, kg.)**	**# Individuals**	**Unit price**	**Final destination/s**
a. Sharks (indicate if fins, meat, jaws, entrails, whole)						
b. Rays (indicate if fins, meat, jaws, entrails, whole)						

FORM 3: PLAN OF ACTION

3. Component	Issues and Concerns
3.1. Monitoring (core component)	
a. Improvement of fisheries statistics (routine and non-routine mechanism, indicators)	
b. Improvement of fisheries statistics (routine and non-routine mechanisms, indicators)	
c. Assessment of status and trends of shark stocks and ensure continuous monitoring	
3.2. Data collection and analysis	
a. Review of shark fisheries	
b. Cooperation with industry	
c. Gathering of ecological information on shark species	
d. Understanding shark utilization and trade	
e. Understanding socio-economic importance of shark fisheries	
3.3. Research	
a. Development of taxonomy	
b. Facilitation and encouragement research on little known shark species	
c. Promotion of research activities to maximize utilization of sharks	
d. Assessment of threat to shark populations, determine and protect critical habitats	
3.4. Building human capacity	
a. Training those concerned with identification of shark species	
b. Promotion of effective utilization of shark catches	
c. Building awareness on shark resource management among stakeholders and public.	
3.5. Conservation and Management	
a. Policy	
b. Institutional Arrangements	
c. Information, Education and Communication	
d. Compliance and Enforcement	

APPENDIX 3: REGION 6 SHARK FISHERIES Annual Production (1998-2007) (Source: NSAP Region 6 Shark Report 2007 and 2008)

Year	Fishing Ground	Gear		Shark's Species			Catch (kg)
2003	Visayan Sea	PS	True Shark	Carcharhinidae	*Carcharhinus*	*sorrah*	17.50
				Carcharhinidae	*Scoliodon*	*laticaudus*	595.00
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	41.00
		DS	True Shark	Carcharhinidae	*Carcharhinus*	*limbatus*	511.00
				Carcharhinidae	*Carcharhinus*	*sorrah*	635.60
				Carcharhinidae	*Galeocerdo*	*cuvier*	650.00
				Hemiscylliidae	*Chiloscyllium*	*plagiosum*	18.50
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	498.00
				Sphyrnidae	*Sphyrna*	*lewini*	1.00
			Rays	Myliobatidae	*Aetobatus*	*narinari*	614.00
				Dasyatidae	*Dasyatis*	*kuhlii*	3,806.25
				Dasyatidae	*Dasyatis*	*sephen*	560.00
				Gymnuridae	*Gymnura*	*australis*	52.25
				Dasyatidae	*Himantura*	*jenkinsii*	125.00
				Dasyatidae	*Himantura*	*uarnak*	755.00
				Mobulidae	*Mobula*	*sp.*	225.00
				Rhinobatidae	*Rhynchobatus*	*australiae*	370.75
		MWT	True Shark	Scyliorhinidae	*Atelomycterus*	*marmoratus*	3.00
				Carcharhinidae	*Carcharhinus*	*limbatus*	179.25
				Carcharhinidae	*Carcharhinus*	*sorrah*	108.00
				Hemiscylliidae	*Chiloscyllium*	*plagiosum*	75.25
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	572.75
				Sphyrnidae	*Sphyrna*	*lewini*	314.50
			Rays	Dasyatididae	*Dasyatis*	*kuhlii*	42.25
					Himantura	*uarnak*	40.00
					Taeniura	*meyeni*	27.50
				Mobulidae	*Mobula*	*sp.*	579.00
				Myliobatidae	*Aetobatus*	*narinari*	1,266.00
		OT	True Shark	Alopiidae	*Alopias*	*vulpinus*	150.00
					Alopias	*pelagicus*	436.00
				Carcharhinidae	*Carcharhinus*	*limbatus*	17.50
					Carcharhinus	*sorrah*	17.50
					Scoliodon	*laticaudus*	150.00
				Heterodontidae	*Heterodontus*	*zebra*	697.50
				Scyliorhinidae	*Atelomycterus*	*marmoratus*	17.50
				Hemiscylliidae	*Chiloscyllium*	*plagiosum*	279.50
					Chiloscyllium	*punctatum*	1,116.00
				Sphyrnidae	*Sphyrna*	*lewini*	17.50
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	8,572.50
					Himantura	*jenkinsii*	3,912.50
					Himantura	*uarnak*	100.00
				Gymnuridae	*Gymnura*	*australis*	70.00
				Mobulidae	*Mobula*	*sp.*	388.00
				Myliobatidae	*Aetobatus*	*narinari*	393.00

Year	Fishing Ground	Gear		Shark's Species			Catch (kg)
				Rhinobatidae	*Rhinobatus*	*sp.*	70.00
					Rhynchobatus	*australiae*	4,117.25
2003 Total							**33,205.60**
2004	Cuyo East Pass	HL	True Shark	Carcharhinidae	*Carcharhinus*	*amblyrhynchos*	59.50
				Carcharhinidae	*Carcharhinus*	*longimanus*	2.00
				Carcharhinidae	*Carcharhinus*	*sp.*	1,025.00
	Visayan Sea	PS	True Shark	Alopiidae	*Alopias*	*pelagicus*	92.00
				Carcharhinidae	*Carcharhinus*	*sorrah*	29.50
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	38.50
			Rays	Dasyatididae	*Dasyatis*	*kuhlii*	61.25
					Himantura	*uarnak*	15.00
				Mobulidae	*Mobula*	*sp.*	130.00
				Myliobatidae	*Aetobatus*	*narinari*	25.00
				Rhinobatidae	*Rhynchobatus*	*australiae*	5.00
		DS	True Shark	Alopidae	*Alopias*	*pelagicus*	1,355.00
				Carcharhinidae	*Carcharhinus*	*sp.*	103.00
				Carcharhinidae	*Carcharhinus*	*limbatus*	97.00
				Carcharhinidae	*Carcharhinus*	*melanopterus*	7.00
				Carcharhinidae	*Carcharhinus*	*sorrah*	53.00
				Carcharhinidae	*Loxodon*	*macrorhinus*	70.00
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	742.75
				Hemiscylliidae	*Chiloscyllium*	*plagiosum*	4.00
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	3,034.50
					Dasyatis	*sephen*	500.00
					Himantura	*jenkensi*	870.00
					Himantura	*uarnak*	537.00
					Taeniura	*melanospila*	480.00
					Taeniura	*meyeni*	105.00
				Mobulidae	*Mobula*	*sp.*	74.00
				Myliobatidae	*Aetobatus*	*narinari*	924.00
				Rhinobatidae	*Rhynchobatus*	*australiae*	1,261.75
		MWT	True Shark	Alopiidae	*Alopias*	*pelagicus*	8.00
				Carcharhinidae	*Carcharhinus*	*limbatus*	10.75
				Carcharhinidae	*Carcharhinus*	*melanopterus*	30.00
				Carcharhinidae	*Carcharhinus*	*sorrah*	243.20
				Scyliorhinidae	*Atelomycterus*	*marmoratus*	1.50
				Hemiscylliidae	*Chiloscyllium*	*plagiosum*	16.00
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	594.25
				Sphyrnidae	*Sphyrna*	*lewini*	17.25
			Rays	Dasyatididae	*Dasyatis*	*kuhlii*	70.75
					Himantura	*uarnak*	70.00
				Mobulidae	*Mobula*	*sp.*	195.00
				Myliobatidae	*Aetobatus*	*narinari*	1,004.00
		OT	True Shark	Alopiidae	*Alopias*	*pelagicus*	3,192.00
				Carcharhinidae	*Carcharhinus*	*sorrah*	980.00

Year	Fishing Ground	Gear		Shark's Species			Catch (kg)
				Hemiscylliidae	*Chiloscyllium*	*plagiosum*	339.00
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	4,550.50
				Heterodontidae	*Heterodontus*	*zebra*	4,025.00
			Rays	Dasyatididae	*Dasyatis*	*akajei*	2,225.00
					Dasyatis	*kuhlii*	27,263.50
					Himantura	*jenkinsii*	6,213.00
					Himantura	*uarnak*	1,603.00
					Taeniura	*meyeni*	105.00
				Mobulidae	*Mobula*	*sp.*	4,156.00
				Myliobatidae	*Aetobatus*	*narinari*	2,335.00
				Rhinobatidae	*Rhynchobatus*	*australiae*	10,603.00
2004 Total							**81,551.45**
2005	Cuyo East Pass	HL		Carcharhinidae	*Carcharhinus*	*amblyrhynchos*	15.00
				Carcharhinidae	*Carcharhinus*	*sp.*	436.00
	Visayan Sea	DS	True Shark	Alopiidae	*Alopias*	*pelagicus*	1,575.00
				Carcharhinidae	*Carcharhinus*	*limbatus*	434.50
				Carcharhinidae	*Carcharhinus*	*sorrah*	1,064.25
				Carcharhinidae	*Carcharhinus*	*sp.*	420.00
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	412.25
				Scyliorhinidae	*Atelomycterus*	*marmoratus*	1.50
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	3,402.50
					Dasyatis	*sephen*	607.00
					Dasyatis	*sp.*	70.00
					Himantura	*jenkinsii*	475.00
					Himantura	*uarnak*	1,086.00
					Taeniura	*melanospila*	92.00
					Taeniura	*meyeni*	145.00
				Mobulidae	*Mobula*	*diabolus*	50.00
				Myliobatidae	*Aetobatus*	*narinari*	767.00
				Rhinobatidae	*Rhinobatus*	*schlegelii*	175.00
					Rhynchobatus	*australiae*	334.50
		MWT	True Shark	Carcharhinidae	*Carcharhinus*	*limbatus*	15.00
				Carcharhinidae	*Carcharhinus*	*sorrah*	264.25
				Hemiscylliidae	*Chiloscyllium*	*plagiosum*	17.50
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	266.00
				Sphyrnidae	*Sphyrna*	*lewini*	25.50
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	1.25
					Himantura	*uarnak*	55.00
				Mobulidae	*Manta*	*birostris*	110.00
					Mobula	*sp.*	55.00
				Myliobatidae	*Aetobatus*	*narinari*	778.00
		OT	True Shark	Alopiidae	*Alopias*	*pelagicus*	3,648.00
				Carcharhinidae	*Carcharhinus*	*sorrah*	70.00
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	4,655.00
				Heterodontidae	*Heterodontus*	*zebra*	5,215.00

Year	Fishing Ground	Gear		Shark's Species			Catch (kg)
			Rays	Dasyatididae	*Dasyatis*	*akajei*	525.00
					Dasyatis	*kuhlii*	25,694.50
					Himantura	*jenkinsii*	3,167.00
				Mobulidae	*Mobula*	*sp.*	307.00
				Myliobatidae	*Aetobatus*	*narinari*	1,610.00
				Rhinobatidae	*Rhynchobatus*	*australiae*	11,357.50
2005 Total							**69,399.00**
2006	Cuyo East Pass	HL	True Shark	Carcharhinidae	*Carcharhinus*	*limbatus*	55.00
				Carcharhinidae	*Carcharhinus*	*sp.*	513.00
				Stegostomatidae	*Stegostoma*	*fasciatum*	6.50
			Rays	Rhinobatidae	*Rhynchobatus*	*diabolus*	30.00
		DS	True Shark	Stegostomatidae	*Stegostoma*	*fasciatum*	15.00
			Rays	Dasyatidae	*Dasyatis*	*sephen*	20.00
		PS		Ginglymostomatidae	*Nebrius*	*ferrugineus*	140.00
	Mindoro Front	DS	True Shark	Hemiscylliidae	*Chiloscyllium*	*punctatum*	12.00
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	43.75
					Dasyatis	*lymna*	17.50
					Himantura	*jenkensi*	968.00
					Himantura	*uarnak*	120.00
					Pastinachus	*sephen*	95.00
				Rhinobatidae	*Rhynchobatus*	*australiae*	177.00
	Visayan Sea	BSGN	True Shark	Carcharhinidae	*Carcharhinus*	*falciformis*	28.30
				Carcharhinidae	*Carcharhinus*	*sp*	76.60
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	35.00
					Himantura	*uarnak*	3.50
		DGN		Carcharhinidae	*Carcharhinus*	*limbatus*	235.00
		EGN		Carcharhinidae	*Carcharhinus*	*sp*	6.50
		SLN		Carcharhinidae	*Carcharhinus*	*sp*	58.00
		PS	True Shark	Hemiscylliidae	*Chiloscyllium*	*punctatum*	210.00
			Rays	Mobulidae	*Manta*	*birostris*	88.00
					Mobula	*sp.*	859.00
				Rhinobatidae	*Rhynchobatus*	*australiae*	35.00
		DS	True Shark	Alopiidae	*Alopias*	*pelagicus*	280.00
				Carcharhinidae	*Carcharhinus*	*limbatus*	232.00
				Carcharhinidae	*Carcharhinus*	*sorrah*	72.00
				Carcharhinidae	*Carcharhinus*	*falciformis*	2.00
				Carcharhinidae	*Carcharhinus*	*sp.*	21.10
				Carcharhinidae	*Galeocerdo*	*cuvier*	30.00
				Ginglymostomatidae	*Nebrius*	*ferrugineus*	1.30
				Hemiscylliidae	*Chiloscyllium*	*plagiosum*	13.50
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	672.00
			Rays	Dasyatidae	*Aetobatus*	*narinari*	30.00
					Dasyatis	*kuhlii*	3,477.75
					Dasyatis	*sephen*	105.00

Year	Fishing Ground	Gear		Shark's Species			Catch (kg)
					Himantura	*jenkensi*	145.00
					Himantura	*uarnak*	881.00
					Taeniura	*melanospila*	60.00
					Taeniura	*meyeni*	304.00
				Mobulidae	*Manta*	*birostris*	70.00
				Myliobatidae	*Aetobatus*	*narinari*	800.00
				Rhinobatidae	*Rhynchobatus*	*australiae*	571.00
					Rhinobatus	*djiddensis*	105.00
		MWT	True Shark	Alopiidae	*Alopias*	*pelagicus*	40.00
				Carcharhinidae	*Carcharhinus*	*limbatus*	35.50
				Carcharhinidae	*Carcharhinus*	*sorrah*	383.50
				Carcharhinidae	*Galeocerdo*	*cuvier*	87.00
				Hemiscylliidae	*Chiloscyllium*	*plagiosum*	3.00
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	196.00
				Sphyrnidae	*Sphyrna*	*lewini*	17.00
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	4.75
					Himantura	*jenkensii*	15.00
					Taeniura	*meyeni*	4.00
				Mobulidae	*Manta*	*birostris*	75.00
				Myliobatidae	*Aetobatus*	*narinari*	1,445.50
				Rhinobatidae	*Rhynchobatus*	*australiae*	6.00
		OT	True Shark	Alopiidae	*Alopias*	*pelagicus*	2,583.00
				Carcharhinidae	*Carcharhinus*	*sorrah*	105.00
				Hemiscylliidae	*Chiloscyllium*	*punctatum*	3,508.00
				Heterodontidae	*Heterodontus*	*zebra*	4,263.00
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	29,260.00
					Dasyatis	*akajei*	1,085.00
					Himantura	*jenkensi*	3,090.00
					Himantura	*uarnak*	35.00
					Taeniura	*meyeni*	290.00
				Mobulidae	*Mobula*	*sp.*	503.00
				Myliobatidae	*Aetobatus*	*narinari*	2,840.00
				Rhinobatidae	*Rhynchobatus*	*australiae*	10,220.00
		FT	True Shark	Carcharhinidae	*Carcharhinus*	*falciformis*	27.20
				Carcharhinidae	*Carcharhinus*	*sp*	156.00
				Ginglymostomatidae	*Nebrius*	*ferrugineus*	280.20
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	25.70
					Himantura	*uarnak*	11.50
		FC	True Shark	Carcharhinidae	*Carcharhinus*	*falciformis*	18.00
				Carcharhinidae	*Carcharhinus*	*sp*	20.00
	Panay Gulf	PS	True Shark	Shark(chop)	*Shark(chop)*	*shark(chop)*	70.00
	Guimaras Strait	PS	True Shark	Sphyrnidae	*Sphyrna*	*zygaena*	630.00
2006 Total							**73,053.15**
2007	Cuyo East Pass	HL	True Shark	Carcharhinidae	Carcharhinus	limbatus	18.00

Year	Fishing Ground	Gear		Shark's Species			Catch (kg)
					Carcharhinus	sp.	367.00
					Shark (chop2)	Shark (chop2)	36.00
			Rays	Dasyatidae	*Dasyatis*	*sephen*	10.00
		PS	True Shark	Carcharhinidae	Sharks (chop2)	Sharks (chop2)	80.00
			Rays	Mobulidae	*Manta*	*birostris*	32.00
		DS	Rays	Dasyatidae	*Dasyatis*	*kuhlii*	175.00
					Dasyatis	*sephen*	315.00
					Gymnura	*japonica*	140.00
					Himantura	*jenkensi*	50.00
				Myliobatidae	*Aetobatus*	*narinari*	105.00
				Rhinobatidae	*Rhychobatus*	*australiae*	193.00
					Rhinobatus	*schegelii*	175.00
	Visayan Sea	DGN	True Shark	Carcharhinidae	*Carcharhinus*	*sp.*	70.00
		BSGN	True Shark	Dasyatidae	*Dasyatis*	*kuhlii*	5.20
		FT	True Shark	Carcharhinidae	*Carcharhinus*	*sp*	2.30
				Ginglystomatidae	*Nebreus*	*ferrugineus*	82.80
		PS	Rays	Mobulidae	*Manta*	*birostris*	184.00
					Mobula	*sp.*	96.00
		DS	True Shark	Alopiidae	*Alopias*	*pelagicus*	65.00
				Carcharhinidae	*Carcharhinus*	*limbatus*	285.50
					Carcharhinus	*sorrah*	476.75
					Carcharinus	*sp*	140.00
					Nebrius	*ferrugenius*	1.80
				Hemiscyllidae	*Chiloscyllium*	*punctatum*	338.40
				Ginglystomatidae	*Nebreus*	*ferrugineus*	28.80
			Rays	Dasyatidae	*Dasyatis*	*annotata*	280.00
					Dasyatis	*kuhlii*	2,930.75
					Dasyatis	*sephen*	696.00
					Himantura	*jenkensi*	377.00
					Himantura	*uarnak*	2,059.25
				Myliobatidae	*Aetobatus*	*narinari*	237.50
				Rhinobatidae	*Rhynchobatus*	*australiae*	215.50
		MWT	True Shark	Carcharhinidae	*Carcharhinus*	*limbatus*	159.50
					Carcharhinus	*sorrah*	710.25
				Hemiscyllidae	*Chiloscyllium*	*plagiosum*	4.50
					Chiloscyllium	*punctatum*	182.75
				Sphyrnidae	*Sphyrna*	*lewini*	7.75
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	21.00
					Himantura	*uarnak*	15.00
				Mobulidae	*Manta*	*birostris*	40.00
					Mobula	*sp.*	167.00
				Myliobatidae	*Aetobatus*	*narinari*	1,128.25
					Aetomylaeus	*vespertilio*	35.00
		OT	True Shark	Alopiidae	*Alopias*	*pelagicus*	352.00
				Hemiscyllidae	*Chiloscyllium*	*punctatum*	840.00
			Rays	Dasyatidae	*Dasyatis*	*kuhlii*	26,010.00
					Himantura	*jenkensi*	1,610.00

Year	Fishing Ground	Gear		Shark's Species			Catch (kg)
				Myliobatidae	*Aetobatus*	*narinari*	678.00
					Mobula	*sp.*	28.00
				Rhinobatidae	*Rhychobatus*	*australiae*	875.00
					Rhynchobatus	*australiae*	5,845.00
	Panay Gulf	PS	True Shark	Carcharhinidae	*Carcharhinus*	*sp. (sliced)*	115.00
					Sharks (chop2)	*Sharks (chop2)*	32.00
2007 Total							**49,124.55**

APPENDIX 4: REGION 8 SHARK FISHERIES Annual Production (1998-2006) (Source: NSAP Region 8 Shark Report 2007)

YEAR	Fishing Gear	Landing Center	Species	Sum of Catch (in kg)
1999	Crab Net	Brgy. Lupok Guiuan E. Samar	*Carcharhinus melanopterus*	6.00
	Danish Seine (Municipal)	Brgy. Rizal, Dulag, Leyte	*Carcharhinus melanopterus*	3.00
	Danish Seine(Commercial)	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus longimanus*	85.00
	Drift Gill Net	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus limbatus*	10.00
			Carcharhinus longimanus	2.60
			Carcharhinus melanopterus	11.70
			Carcharhinus sorrah	4.30
			Loxodon macrorhinus	5.60
			Rhizoprionodon acutus	20.00
			Sphyrna lewini	37.90
			Sphyrna zygaena	2.40
	Fish Coral	Guiuan Public Market E. Samar	*Carcharhinus melanopterus*	13.00
	Gill Net	Brgy. Bislig, Tanauan, Leyte	*Carcharias melanopterus*	12.06
		Brgy. Lupok Guiuan E. Samar	*Carcharhinus melanopterus*	7.80
		Brgy. Rizal, Dulag, Leyte	*Carcharhinus dussumieri*	10.70
			Carcharhinus melanopterus	10.20
			Sphyrna zygaena	0.70
		Guiuan Public Market E. Samar	*Carcharhinus melanopterus*	207.70
		Taraguna Beach Macarthur, Leyte	*Carcharhinus longimanus*	9.30
			Carcharhinus melanopterus	4.90
			Carcharias melanopterus	2.20
			Rhizoprionodon acutus	2.92
			Sphyrna lewini	11.05
	Hook & Line	Brgy. Lupok Guiuan E. Samar	*Carcharhinus melanopterus*	197.10
	Hook Line	Guiuan Public Market E. Samar	*Carcharhinus melanopterus*	60.50
	Hook & Line w/ light	Brgy. San Jose Dulag, Leyte	*Carcharias melanopterus*	2.00
	Trawl	Brgy. Sto. Nino, Abuyog, Leyte	*Sphyrna lewini*	2.50
	Trawl (Commercial)	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus melanopterus*	20.00
			Sphyrna lewini	61.10
			Sphyrna zygaena	28.00
	TOTAL			**852.23**
2000	Danish Seine(Commercial)	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus limbatus*	130.00
	Drift Gill Net	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus dussumieri*	5.00
			Carcharhinus limbatus	26.70
			Carcharhinus longimanus	52.10
			Carcharhinus melanopterus	648.45
			Carcharias melanopterus	1.20
			Sphyrna lewini	49.70
	Fish Coral	Guiuan Public Market E. Samar	*Carcharhinus melanopterus*	9.00

YEAR	Fishing Gear	Landing Center	Species	Sum of Catch (in kg)
	Gill Net	Brgy. Bislig, Tanauan, Leyte	*Carcharhinus*	15.30
			Carcharhinus melanopterus	9.90
		Brgy. Rizal, Dulag, Leyte	*Carcharhinus melanopterus*	18.27
			Carcharias melanopterus	0.25
			Sphyrna zygaena	3.38
		Guiuan Public Market E. Samar	*Carcharhinus melanopterus*	314.30
			Carcharias melanopterus	6.00
		Taraguna Beach Macarthur, Leyte	*Carcharhinus melanopterus*	2.32
			Sphyrna lewini	0.92
	Gill Net w/ light	Brgy. Bislig, Tanauan, Leyte	*Carcharhinus melanopterus*	15.00
		Brgy. Bislig, Tanauan, Leyte	*Charcharhinus*	1.50
	Hook & Line	Brgy. Lupok Guiuan E. Samar	*Carcharhinus dussumieri*	10.00
			Carcharhinus melanopterus	220.35
		Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus melanopterus*	17.10
		Guiuan Public Market E. Samar	*Carcharhinus melanopterus*	22.50
			Carcharias melanopterus	13.80
		Taraguna Beach Macarthur, Leyte	*Carcharhinus melanopterus*	0.15
	Hook & Line w/ light	Brgy. San Jose Dulag, Leyte	*Carcharhinus melanopterus*	11.25
	Hook & Line w/ light	Taraguna Beach Macarthur, Leyte	*Carcharhinus melanopterus*	1.95
	Multiple Hook & Line	Brgy. Lupok Guiuan E. Samar	*Carcharhinus melanopterus*	49.50
	Trawl (Commercial)	Brgy. Sto. Nino, Abuyog, Leyte	*Eusphyra blochii*	1.50
	TOTAL			**1,657.39**
2001	Danish-Seine Commercial	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus melanopterus*	7.00
	Drift Gillnet	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus melanopterus*	167.17
	Gillnet	Brgy. Rizal Dulag, Leyte	*Carcharhinus melanopterus*	3.50
			Sphyrna zygaena	0.65
			Sphyrna zygaena	0.30
		Brgy. San Roque Tanauan, Leyte	*Carcharhinus*	2.00
		Public Market Guiuan Eastern	*Carcharhinus melanopterus*	196.00
		Taraguna Beach, Macarthur, Leyte	*Carcharhinus melanopterus*	2.66
			Sphyrna lewini	0.21
	Hand-line	Public Market Guiuan Eastern	*Carcharhinus melanopterus*	45.00
	Hook & Line w/ Light	Taraguna Beach, Macarthur, Leyte	*Carcharhinus melanopterus*	6.50
	Trawl Commercial	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus sorrah*	5.00
	Troll line	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus melanopterus*	5.70
	TOTAL			**441.69**
2002	Crab Net	Guiuan	*Carcharhinus melanopterus*	10.00
		Tanauan	*Carcharhinus*	0.50
	Danish Seine(Commercial)	Abuyog, Leyte	*Carcharhinus melanopterus*	2.50
	Drift Gill Net	Abuyog, Leyte	*Carcharhinus dussumieri*	11.60
			Carcharhinus limbatus	7.00
			Carcharhinus melanopterus	460.44

YEAR	Fishing Gear	Landing Center	Species	Sum of Catch (in kg)
			Loxodon macrorhinus	6.80
	Gill Net	Balangiga, E. Samar	*Carcharhinus*	115.28
			Carcharhinus dussumieri	0.25
			Carcharhinus limbatus	0.20
			Carcharhinus longimanus	1.00
			Carcharhinus melanopterus	5.40
		Brgy. Bislig, Tanauan, Leyte	*Sphyrna lewini*	0.75
		Brgy. Bolosao, Lawaan E. Samar	*Sphyrna lewini*	1.00
		Brgy. Sto. Nino, Abuyog, Leyte	*Sphyrna lewini*	24.50
		Dulag, Leyte	*Carcharhinus melanopterus*	10.00
			Triaenodon obesus	6.25
		Guiuan	*Carcharhinus melanopterus*	222.00
		Lawaan	*Carcharhinus*	13.00
		Macarthur	*Carcharhinus melanopterus*	14.27
		Public Market, Balangiga E. Samar	*Sphyrna lewini*	19.25
		Tanauan	*Carcharhinus limbatus*	5.25
	Gill Net w/ light	Dulag, Leyte	*Carcharhinus melanopterus*	6.00
	Hook & Line	Balangiga, E. Samar	*Carcharhinus*	31.00
			Carcharhinus melanopterus	3.00
		Guiuan	*Carcharhinus melanopterus*	103.00
		Public Market, Balangiga E. Samar	*Sphyrna lewini*	2.50
	Hook & line (2 Hooks)	Guiuan	*Carcharhinus melanopterus*	3.00
	Hook & Line w/ light	Dulag, Leyte	*Carcharhinus melanopterus*	4.00
	Multiple Hook & Line	Balangiga, E. Samar	*Carcharhinus*	4.50
	Spear Gun	Guiuan	*Carcharhinus melanopterus*	1.65
	Trawl (Commercial)	Abuyog, Leyte	*Carcharhinus melanopterus*	30.70
		Brgy. Sto. Nino, Abuyog, Leyte	*Sphyrna zygaena*	5.00
	TOTAL			**1,131.59**
2003	Danish seine Commercial	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus melanopterus*	2,935.10
	Drift gillnet	Brgy. Bislig Tanauan, Leyte	*Carcharhinus sorrah*	16.00
		Brgy. Rizal Dulag, Leyte	*Carcharhinus melanopterus*	12.50
		Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus limbatus*	642.80
			Carcharhinus melanopterus	11,964.40
	Gillnet	Brgy. Bulusao, Lawaan, E. Samar	*Carcharhinus*	233.49
			Sphyrna lewini	79.99
		Brgy. Rizal Dulag, Leyte	*Carcharhinus melanopterus*	47.65
		Public Market Balangiga E. Samar	*Carcharhinus*	1,944.89
			Sphyrna lewini	259.37
		Taraguna Beach, Macarthur, Leyte	*Carcharhinus melanopterus*	7.51
	Handline	Brgy. San Miguel Dulag, Leyte	*Carcharhinus melanopterus*	172.95
		Public Market Balangiga E. Samar	*Carcharhinus*	61.40
	Trawl Commercial	Brgy. Sto. Nino, Abuyog, Leyte	*Carcharhinus melanopterus*	1,900.80

YEAR	Fishing Gear	Landing Center	Species	Sum of Catch (in kg)
	TOTAL			**20,278.85**
2004	Bag Net (Commercial)	Tanauan	*Carcharhinus melanopterus*	17.00
	Crab Gill Net	Brgy. San Roque, Tanauan, Leyte	*Sphyrna lewini*	3.00
	Crab Net	Tanauan	*Carcharhinus melanopterus*	18.00
	Danish Seine(Commercial)	Abuyog	*Carcharhinus melanopterus*	10.00
	Drift Gill Net	Abuyog	*Carcharhinus limbatus*	21.00
			Carcharhinus melanopterus	503.27
	Gill Net	Balangiga	*Carcharhinus*	146.75
			Carcharhinus melanopterus	5.50
		Brgy. Bolosao, Lawaan E. Samar	*Sphyrna lewini*	5.00
		Dulag	*Carcharhinus melanopterus*	10.30
		Lawaan	*Carcharhinus*	7.00
		Macarthur	*Carcharhinus longimanus*	2.00
			Carcharhinus melanopterus	0.72
		Public Market, Balangiga E. Samar	*Sphyrna lewini*	38.00
		Tanauan	*Carcharhinus melanopterus*	7.50
			Carcharhinus sorrah	2.00
	Hook & Line	Balangiga	*Carcharhinus*	6.00
	Hook & Line w/ light	Dulag	*Carcharhinus melanopterus*	1.50
		Tanauan	*Carcharhinus melanopterus*	5.20
			Carcharhinus sorrah	1.50
	Multiple Hook & Line	Balangiga	*Carcharhinus*	6.50
	Spear Gun	Lawaan	*Carcharhinus melanopterus*	0.75
	Trawl (Commercial)	Abuyog	*Carcharhinus melanopterus*	15.00
		Brgy. Sto. Nino, Abuyog, Leyte	*Sphyrna lewini*	1.50
	TOTAL			834.99
2005	Crab Net	Tanauan	*Carcharhinus melanopterus*	8.00
	Danish Seine(Commercial)	Abuyog	*Carcharhinus melanopterus*	4.30
	Drift Gill Net	Abuyog	*Carcharhinus limbatus*	1.10
			Carcharhinus melanopterus	579.54
			Carcharhinus sorrah	17.40
		Tanauan	*Carcharhinus melanopterus*	8.00
	Fish Coral	Guiuan	*Carcharhinus melanopterus*	1.00
	Gill Net	Balangiga	*Carcharhinus*	115.25
			Carcharhinus melanopterus	9.00
		Dulag	*Carcharhinus melanopterus*	1.00
		Guiuan	*Carcharhinus melanopterus*	9.00
		Lawaan	*Carcharhinus*	4.75
			Carcharhinus melanopterus	2.50
		Public Market, Balangiga E. Samar	*Sphyrna lewini*	3.25
		Tanauan	*Carcharhinus melanopterus*	8.50
			Carcharhinus sorrah	29.55

YEAR	Fishing Gear	Landing Center	Species	Sum of Catch (in kg)
	Hook & Line	Balangiga	*Carcharhinus*	13.00
	Multiple Hook & Line	Balangiga	*Carcharhinus melanopterus*	1.50
		Tanauan	*Carcharhinus sorrah*	6.80
	Trawl (Commercial)	Abuyog	*Carcharhinus melanopterus*	9.50
	TOTAL			**832.94**
2006	Bag Net (Commercial)	Tanauan	*Carcharhinus melanopterus*	8.00
	Crab Net	Tanauan	*Carcharhinus sorrah*	5.00
	Drift Gill Net	Abuyog	*Carcharhinus limbatus*	15.00
		Abuyog	*Carcharhinus melanopterus*	94.80
	Gill Net	Balangiga	*Carcharhinus*	93.00
			Carcharhinus melanopterus	5.50
		Brgy. Bislig, Tanauan, Leyte	*Sphyrna lewini*	10.00
		Dulag	*Carcharhinus melanopterus*	7.00
		Lawaan	*Carcharhinus*	7.50
		Macarthur	*Carcharhinus melanopterus*	0.39
		Tanauan	*Carcharhinus melanopterus*	29.05
			Carcharhinus sorrah	25.00
	Hook & Line	Balangiga	*Carcharhinus*	8.50
			Carcharhinus melanopterus	4.50
		Dulag	*Carcharhinus melanopterus*	6.00
		Guiuan	*Carcharhinus melanopterus*	41.30
		Public Market, Balangiga E. Samar	*Sphyrna lewini*	12.50
		Tanauan	*Carcharhinus melanopterus*	10.15
	Hook & Line w/ light	Tanauan	*Carcharhinus melanopterus*	8.00
	Multiple Hook & Line	Tanauan	*Carcharhinus melanopterus*	3.00
	Trawl (Commercial)	Abuyog	*Carcharhinus melanopterus*	28.50
	TOTAL			**422.69**
	GRAND TOTAL			**26,452.37**

APPENDIX 5: SEAFDEC-NFRDI Shark Fisheries Assessment (October 2003 – January 2004) (Source: Barut 2006)

A. SUMMARY TABLE FOR SHARK SPECIES COMPOSITION AND BIOLOGICAL INFORMATION.

Shark Species	Species information			Biological Parameters			
	Total Sampled (kg) for 7 days	No. observation days	% of total sampled catch	Mean length (cm)	Sex		Maturity (% per category)
					% Male	% Female	
Cagayan							
1. Sphyrna *lewini*	55	1	100	45	100		M2
Total for all shark species	**55.00**						
Occidental Mindoro							
1. Chiloscyllium puntatum	66.2	2	5.57	108.75	47.62	52.38	
2. Triaenodon obesus	754.3	1	63.47	122.67			
3. Squalus megalops	277.4	3	23.34	85.74	81.99	18.01	
4. Rhizoprionodon acutus	9	1	0.76	138	100		
5. Rhyncobatus djiddensis	18	1	1.51	120		100	
6. Rhinobatos sp.	3.5	1	0.29	89		100	
7. Carcharinus amboinensis	25	1	2.1	170	100		
8. Carcharinus leucas	13	1	1.09	150	100		
9. Eugomphodus taurus	12	1	1.01	145		100	
10. Negaprion acutidens	10	1	0.84	130		100	
Total for all shark species	**1,188.40**						
Palawan							
1. Carcharinus falcoformes	79.8	60	40				
2. Carcharinus dussumieri	130	100					
3. Carcharinus melanopterus	132.1	50	50				
Total for all shark species	**1,188.40**						
Surigao del Norte							
1. Alopias pelagicus	563	5	89.65%	300.5	45	55	
2. Squaliformes sp.	5	2	0.80%		50	50	
3. Isurus oxyrinchus	60	1	9.55%				
Total for all shark species	**628.00**						

B. SUMMARY TABLE FOR LOCAL USAGE AND MARKETING OF SHARKS FOR QUARTER (30 days)(October 2003 – January 2004)

Species	Part	Shark Source		Abundance at landing site	Locally consumed (***C***), Discarded (***D***), Traded (***T***), Processed (**Type of Processing**)	Local price per kg[2]	Market destination
		Type of fishing boat	Type of fishing gear				
Cagayan							
1. *Sphyrna lewini*	Meat		LL		C	P28-35	Aparri
Occidental Mindoro							
1. *Chiloscyllium puntatum*	Meat		GN	++	T	P15-20	Mindoro
2. *Triaenodon obesus*	Meat		GN	+++	T	P15-20	Mindoro
3. *Squalus megalops*	Meat		GN	++	T	P15-20	Mindoro
	Liver				Processed (cooked)	P500/	Manila
					Extract liver oil	gallon	
4. *Rhizoprionodon acutus*	Meat		GN	+	C		
	Fins				T	7000	Manila
5. *Rhyncobatus djiddensis*	Meat		GN	+	T		
	Fins				T	7000	Manila
6. *Rhinobatos sp.*	Meat		GN	+	T		
	Fins				T	7000	Manila
7. *Carcharinus amboinensis*	Meat		LL	+	C	30-45	Mindoro
	Fins				T	500-600	Manila/Palawan
	Jaws				T	150/pcs	Mindoro
8. *Carcharinus leucas*	Meat		LL	+	C	30-45	Mindoro
	Fins				T	500-600	Manila/Palawan
	Jaws				T	150/pcs	Mindoro
9. *Eugomphodus taurus*	Meat		GN	+	C		
10. *Negaprion acutidens*	Meat		LL	+	C		
Palawan							
1. *Carcharinus falcoformes*	Meat		LL	++	C	P35-45	Coron, Palawan
	Fins				T	P3000	Puerto Princesa/Manila
2. *Carcharinus dussumieri*	Meat		LL	+	C	P35-45	Coron, Palawan
	Fins				T	P3000	Puerto Princesa/Manila
3. *Carcharinus melanopterus*	Meat		LL	+	C	P35-45	Coron, Palawan
	Fins				T	P3000	Puerto Princesa/Manila
Surigao del Norte							
1. *Alopias pelagicus*	Meat		MHL	++	C	P30-45	Surigao
	Fins				T	P2500	Manila
2. *Squaliformes sp.*							
3. *Isurus oxyrinchus*	Meat		MHL	+	C	P30-45	Surigao
	Fins				T	P2500	Manila

APPENDIX 6: TRADE FLOW OF SHARK COMMODITIES IN THE PHILIPPINES (1976-2002)
(Source: FAO Fishery Statistics 1976-2002)

Commodity/ Trade Flow	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Shark fins, dried, salted, etc.																											
Export Quantity (in mt)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9	36	33	13	36	42	34	.	38	.	.	80
Export Value	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	75	415	330	163	548	450	422	.	256	.	.	259
Import Quantity (in mt)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	-	-	-	1	-	-	-
Import Value	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	-	-	-	-	-	6	-	-	-
Production Quantity (in mt)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9	36	33	13	36	42	34	34	38	37	88	80
Shark liver oil																											
Export Quantity	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	180	188	104	50	14	6	1	-	-	-	-	90
Export Value	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1,499	1,721	846	436	109	47	5	-	-	-	-	400
Import Quantity	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	-	-	-	-	-	-	-
Import Value	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	12	-	-	-	-	-	-	-
Sharks, dried, salted or in brine																											
Export Quantity	19	4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Export Value	6	13	-	-	-	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Import Quantity	.	.	.	.	.	.	.	.	.	.	.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Import Value	.	.	.	.	.	.	.	.	.	.	.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sharks, fresh or chilled																											
Export Quantity	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	245	-	-	-	-
Export Value	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	442	-	-	2	-
Import Quantity	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-
Import Value	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-
Sharks, frozen																											
Import Quantity	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	26
Import Value	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6

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