Ministry of the Food Industry

National Plan of Action for the Conservation and Management of Chondrichthyes in the Republic of Cuba

Havana, Cuba 2015

PREPARATION OF THIS DOCUMENT

The National Plan of Action for the Conservation and Management of Chondrichthyes in Cuba (NPOA-Sharks) was prepared as an initiative of the government of Cuba, complying with three guiding principles established in the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks), in line with the FAO Technical Guidelines for Responsible Fisheries (FAO, 2000). The purpose of the document is to direct activities designed to safeguard these fisheries as sources of both food and employment for the coastal communities that depend on them, as well as to preserve healthy populations of this valuable fishing resource.

This document will for the first time provide a general view of the use of elasmobranchs in Cuban waters, identifying priority Actions and Tasks that will guarantee a sustainable use of this resource. It also highlights the current legislative framework of Cuba and offers a review of the status of past and present knowledge on these fisheries as well as current management measures. It includes a list of recommendations to improve conservation practices for commercially important as well as charismatic species.

Technical and administrative information included here is for the period from 2013-2015, provided by the Directorate of Fishing Regulations and Sciences, part of the Ministry of the Food Industry (MINAL). The description of the strategy followed in preparing this NPOA-Shark is given in the section entitled “NPOA-Sharks Preparation Process”.

This document will preferably be cited as:

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1. Introduction

The rise in catch of species throughout the world, together with the absence of an appropriate form of management, is placing many species at risk; among these, sharks (Baum *et al*, 2003; Benjamins *et al*, 2010). Reports indicate that millions of sharks are caught every year from the world's oceans (Camhi *et al*, 2009), with hundreds of tons then thrown back into the sea, and with no records kept of the amounts (Fowler *et al*, 2005). Over 100 countries practice shark fishing and world landings exceed 800 thousand tons per year. The principal shark-producer nations are Indonesia, India, Taiwan, Spain and Mexico, with both artisanal and industrial fisheries in Indonesia, India and Mexico (Musick and Musick 2011).

Like in other parts of the world, Chondrichthyes (sharks, rays and chimaeras) constitute an important resource from the ecological, fishing, food, tourism and socio-economic perspectives. In Cuba, almost the entire shark is used: the meat is the main product used essentially for human consumption, distributed either fresh or salted, depending on the species and the region, and fins are exported to the Asian markets. Other subproducts such as skin and liver, highly valued on the international market, are discarded due to the lack of the necessary conditions for their processing.

Sharks play an important role in the tourism industry (Figueredo-Martín *et al*, 2010). The geographic location of Cuba, together with its oceanographic conditions, favors the aggregation of certain species of sharks. This translates into an excellent opportunity for the development of observational diving tourism, a potentially profitable activity that would generate both jobs and revenue.

Sharks and rays are not just resources of great use to humans, but as predators also playing a vital role in maintaining the health of the ecosystems in which they live (Robbins *et al*, 2006). This group forms an important part of the trophic system, due to its position at the apex of the trophic pyramid. However, the ecological effects from the elimination of sharks can be difficult to research and quantify. Recent knowledge suggests that the effect of intense fishing on shark populations can cause alterations in the trophic relations within ecosystems. These effects can be vertical and bidirectional (top→down or bottom→up), altering the ecosystem balance (Baum and Worm 2009; Ferretti *et al*, 2010; Arreguín-Sánchez 2011).

Chondrichthyes in general tend to be more vulnerable to fishing exploitation than other fish, especially deep water species. Their biological characteristics, such as slow growth, late maturity, prolonged longevity, low fertility, prolonged gestation periods and a complex spatial structure by size and segregation by sex, results in populations with low recuperation rates, which in turn limits a sustainable level of exploitation (Holden 1974, Musick 1999, Camhi *et al*. 2009). In addition, certain chondrichthyan populations may be depleted by catch in multi-specific fisheries, while (more productive) target fisheries continue to be viable (Kulka *et al*. 2005). Consequently, the decrease in abundance of both direct and indirect catch of Chondrichthyes should be systematically monitored.

An assessment of elasmobranch fisheries would ideally require a quantitative focus, with a combination of studies on reproduction rates, mortality rates and abundance

rates. This information, together with sufficiently long historical series on catch and effort is necessary to estimate the status of the populations (Walker 2004). However, these data are often scarce in the case of shark and ray fisheries, and it takes time to obtain them. On the other hand, an ecological risk assessment could be used to identify species that have a high risk to fishing, in order to establish research, monitoring and management priorities. This assessment would be directed at all the species used or discarded based on available information on biological productivity and susceptibility to catch from literature or from local knowledge of the fisheries (Walker 2007). In addition, bilateral and multilateral plans between neighboring nations could also be used to evaluate and manage shared stocks that move between their waters (FAO 2000).

The susceptibility of chondrichthyan populations to fishing at the global level makes it important and necessary that fishery managers be informed of the low biological productivity of these species, as well as the need to consider their biological characteristics when enacting regulations and management measures (Walker 1998, Walker 2004). Knowledge of lifespans and the reproductive aspects of the species caught (either directly or indirectly) is especially useful when determining the resilience of the populations exploited and requires that appropriate decisions be made regarding their management.

Few investigations have been made in Cuba on the composition of shark and ray catch by species. Important investigations were carried out early in the 1970s regarding short-range marine pelagic fisheries in the Northwest region of Cuba (Guitart 1968, 1975, 1983). Over the last 30 years elasmobranch biodiversity in Cuban waters has been intermittently documented (Guitart 1979, Espinosa 1997, Claro and Robertson 2010; Pina-Amargós *et al.* 2012, Pina-Amargós *et al*. 2013, Aguilar *et al*. 2014). Shark fishing and biological studies were recently carried out by the Center for Marine Research (Hernández 2010; Borroto 2011; Briones 2011; Aguilar *et al*. 2014).

1.1 Fishery development

Cuban literature from the 1920s described the sale of sharks by American companies. Shark fishing acquired relevance during World War II due to the value of the shark liver oil. The Cuban shark industry had a turbulent past, with periods when shark skin was the only commercial product, while at other times the main product was shark fins or liver (Baisre 1986). As in other countries of Latin America, shark catch in Cuba has historically represented a source of work as well as food (Castillo-Geniz *et al*, 1998). According to Martínez (1947) and Baisre (1986), shark fishing during the 1920s covered 30 different species. Historically, a high diversity of Chondrichthyes has been registered in Cuban waters, representing 75 species (Annex I). Of these, 49 are sharks, 25 are rays and one is a chimaera (Guitart 1979, Rodríguez and Valdés 1982, Claro and Robertson 2010).

1.2 Historic Production in Cuban Waters

Shark fishing in Cuba probably began at the beginning of the 20th Century; however, the first official records were made in 1959. Beginning that year, shark fishing was structured and organized as part of the creation of fishing cooperatives (state-run). The historic series of shark production from Cuban waters (1959–2014) shows a period of growth (1959–1981) which peaked with a maximum production of 2,644t in 1981. Overall, the period with the highest levels of production was during the first half of the 1980s, with an average production of 2,482t from 1980-1985. This amount later showed an unsteady but consistently downward trend to an historic minimum of 869t in 1993. After the maximum peak of 1,918t produced in 1997, production once again fell to 546t and 541t in 2004 and 2005 respectively. Following a peak of 900t in 2008, production shrank to 469.5t and 487.5t in 2012 and 2013 respectively, increasing slightly in 2014 to 533.6t (Figure 1).

The ray fishery appeared during the development of the shark fishery. According to official numbers, ray production from Cuban waters began with 209t landed in 1981, followed by an abrupt increase to the historic maximum of 3691t in 1986. The first important decrease in production occurred in 1993 with a production of 1,522t. Since then, ray production has oscillated between 1,366t and 2,193t, with an average of 1,700t landed from 1993-2014 (Figure 1). Elasmobranch production (sharks and rays) reached an historic peak in 1986 with landings of 6,049t, and then began to decrease, with production peaks of 4,095t and 2,878t registered in 1997 and 2008 respectively. The total production of elasmobranchs in 2014 was 1968t (Figure 1).

During the first four years of the ray fishery, ray landings were lower than shark landings, representing from 9% to 44% of elasmobranch landings in 1981 and 1984 respectively (Figure 2). From 1985 to 2014, the proportion of rays to sharks varied from 51% to 76%, with an average of 63% during that period (Figure 2).

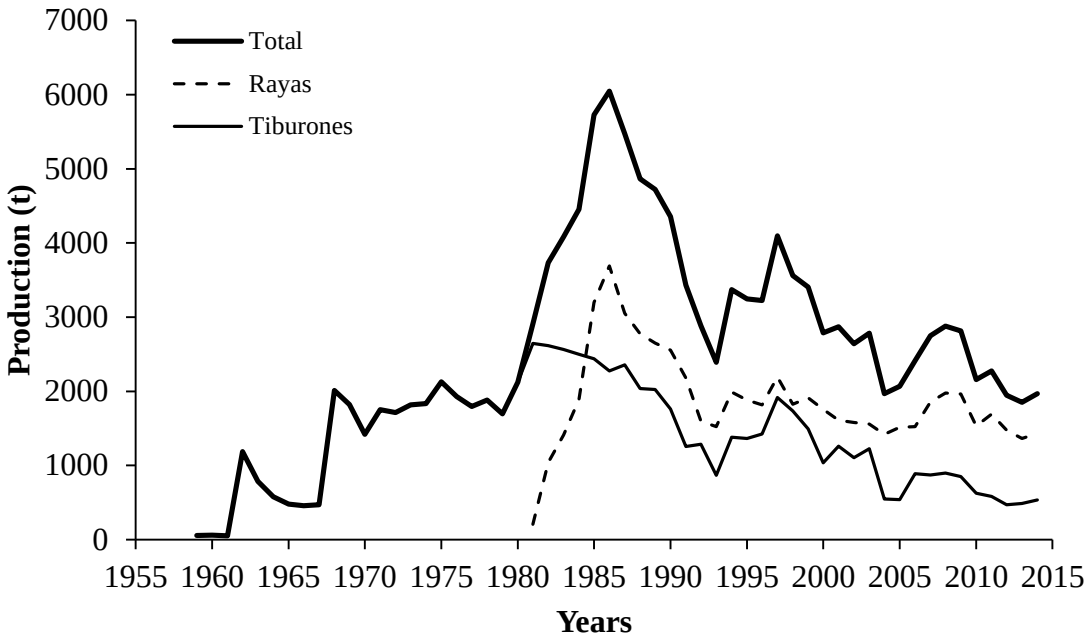


Figure 1. Historical series of Cuban elasmobranch production (1959–2014) in Cuban waters. Total production (**—**), Sharks (—), Rays (-----).

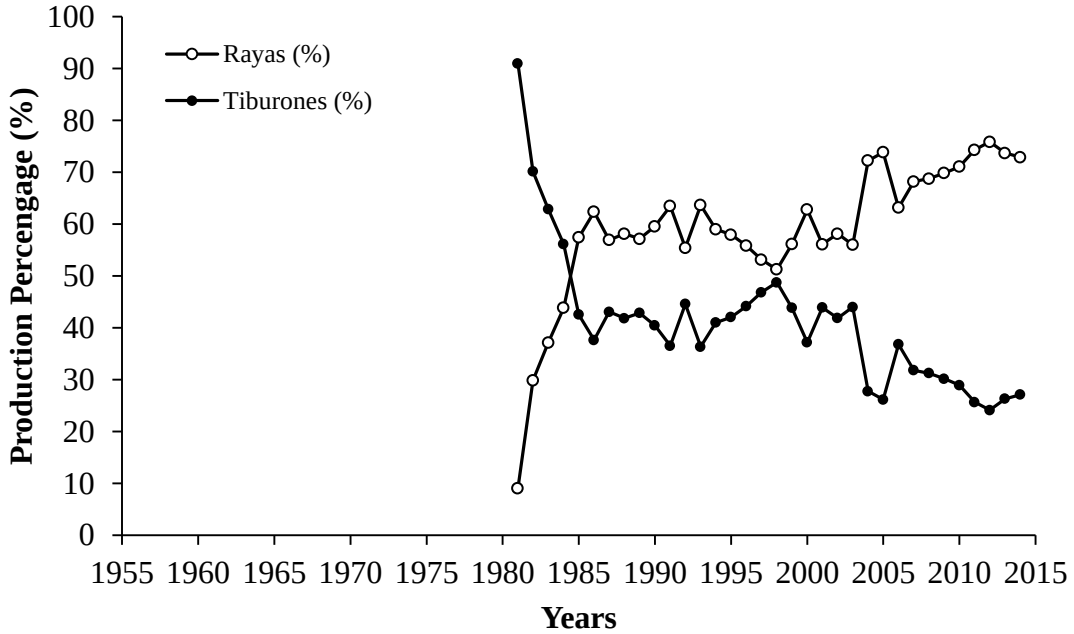


Figure 2. Contribution (%) to production per group, 1981–2014 in Cuban waters. Sharks (●), Rays (○).

1.2.1 Production per coast and fishing zone

The trend in shark and ray production is not easily explained, as it is based on a combination of various factors that are related to fishing grounds and zones (the official fishing zones are described in Section 1.3.1.5), fishing regulations associated with political changes in the country, environmental factors and the absence of any classification of landings by species.

Elasmobranchs (sharks and rays).- The majority of elasmobranch production from 2000 to 2014 was from the South coast, with an average annual landing of 1,363t, or 64% of national production (Figure 3A1). Zones A and B on that coast contributed 43% and 21% respectively (Figure 3A2). Contributions by group of species were 70% for rays (Figure 3B2) and 53% for sharks (Figure 3C2). The average production from the North coast was 778t, representing 36% of national landings (Figure 3A1), with a contribution of 6% and 30% respectively from Zones C and D (Figure 3A3). Contributions per group of species were 47% for rays (Figure 3B3) and 30% for sharks (Figure 3C3). The series of elasmobranch production in Zone A increased by 38%[1] while production in Zone B decreased 19% (Figure 3A2). Production in Zone C increased over 100%, while Zone D decreased 35% (Figure 3A3).

Rays.- Trends in ray production from 2000 to 2014 were positive on both coasts. Average landings in the South were 951t (70%) with a maximum of 1,377t in 2009. Landings in the North averaged 413t (30%) with a maximum of 672t in the same year (Figure 3B1). Average landings in Zone A were 613t (45%) while average landings in Zone B were 338t (25%) (Figure 3B2). Average landings in Zone C were 92t (7%), while the average in Zone D was 321t (24%) (Figure 3B3).

Sharks.- This resource showed a negative trend on both coasts with marked fluctuations over the years (Figure 3C1). Average landings on the South coast were 411t, or 53% of total national shark production, while the average landings on the North coast were 365t (47%) (Figure 3C1). The average landings in Zone A were 309t (40%), while average landings in Zone B were 102t (13%) (Figure 3C2). Average landings in Zone C were 41t (5%), and for Zone D, 324t (42%) (Figure 3C3).

[1] Determined as the ratio between average landings for the last four years by landings during the first four years.

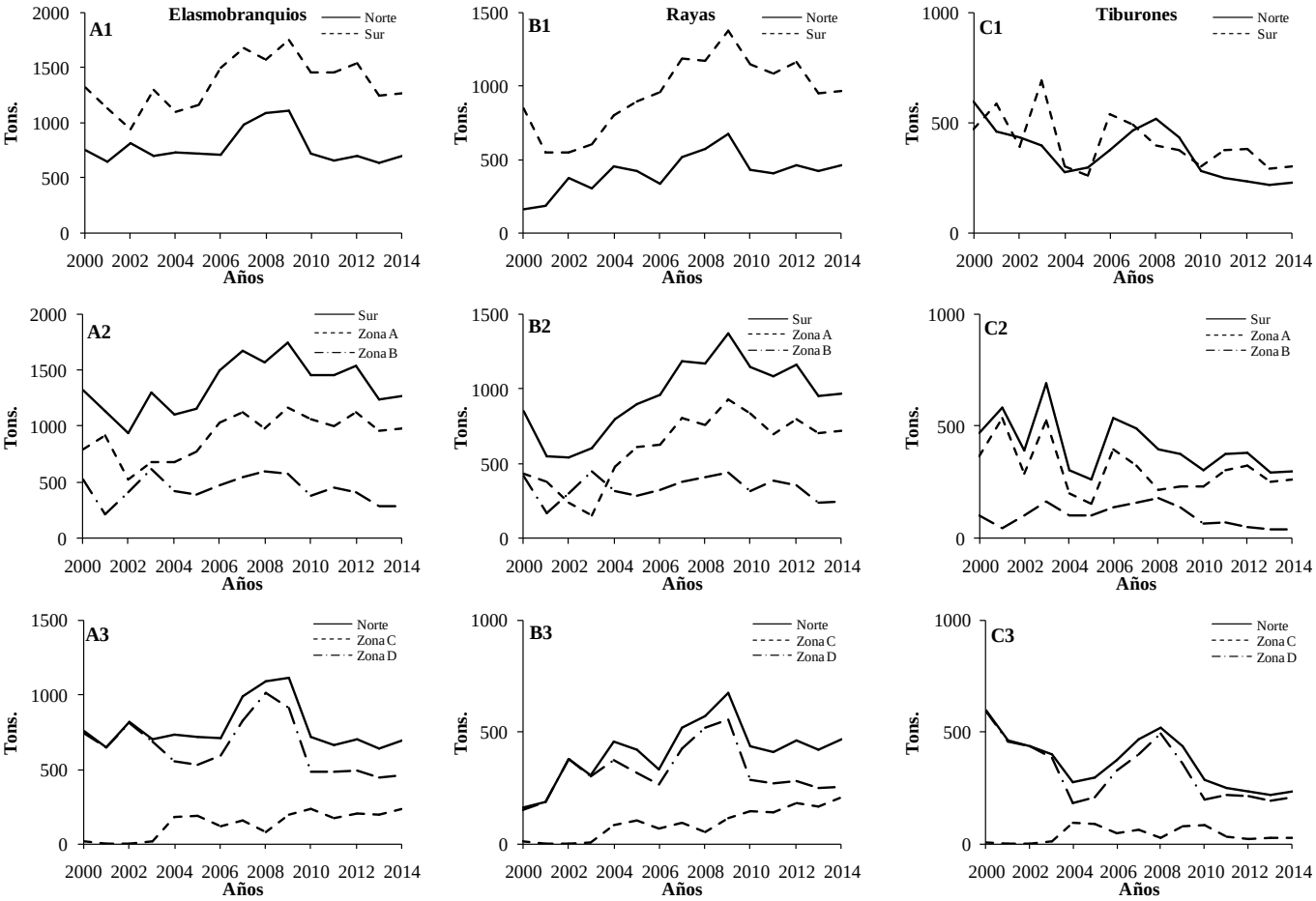


Figure 3. Trend in landings of elasmobranches (A1-3), Rays (B1-3) and Sharks (C1-3) by coast and fishing zone. (Source: GEIA).

Translation key: años – years; norte – north; sur - south

1.2.2 Production per Company

Around 50% of shark production is reported by Cuban Fishing Enterprises (Figure 4A). This production, in order of importance, is by: EPIVILA (17.2%), EPICAI (11.6%), EPICOL (10.9%), PESCAMAT (9.9%). The greatest landings of rays are recorded by PESCAHABANA (17.8%), EPIVILA (14.1%), EPICAI (13.0%), and EPINIQ (10.6%), with 55% of total production (Figure 4b).

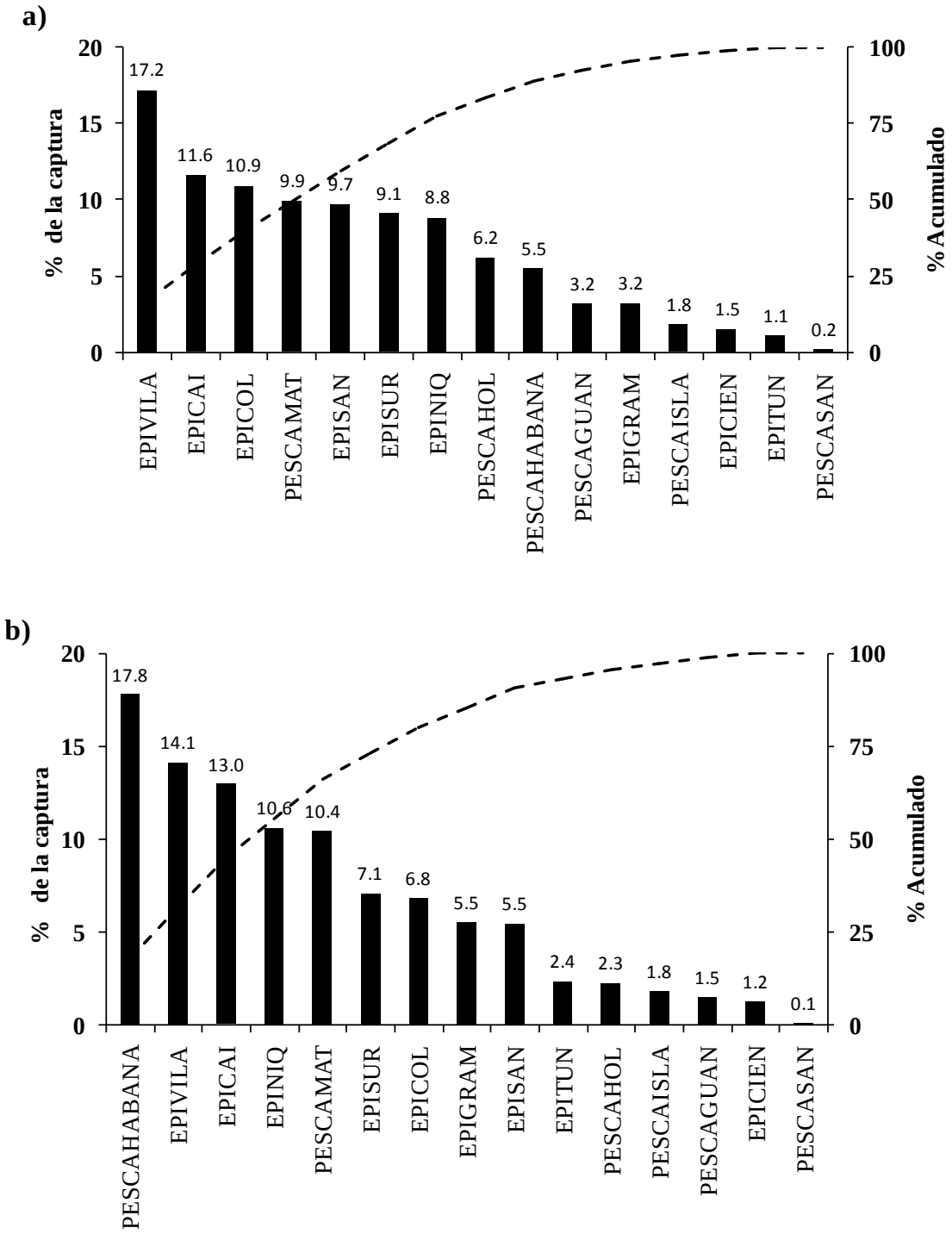


Figure 4. Historical contribution from fishing enterprises in percentage of production. (**a**) Shark production from 1959-2014, (**b**) Ray production from 1981-2014. The bars represent percentage per company, and the dotted line is accumulated percentage. (Source: GEIA).

1.3 Types of fisheries

Elasmobranch fishing in Cuba is divided into two forms: state fishing, which is represented by the historical production described above; and private fishing which includes private commercial fishers who enter a contract with the fishing enterprises for the sale of their landings. The contribution from private fishing represented less than 15% of total shark landings in 2013.

Fishing gear used in each type of fishery may vary according to the target species and habits. Independently of the type of fishery, drift lines are used for pelagic offshore species, while coastal species are caught with bottom line and gill net (Claro 2007).

García (2005) noted that a directed shark fishery cannot be discussed in its traditional form, as the main objective for boats that fish for shark during part of their fishing campaigns is usually bony fish. It is for this reason that this activity could be cataloged as bycatch and alternative catch. However, recent monitoring of this activity has shown that fishing gear formed of gangions with wires indicate shark as the target species.

1.3.1 Official commercial fishing

This type of fishing is referred to as industrial or large-scale fishing, according to the scale and magnitude. The different processes for catch and connected activities are performed by fishing boats with a registry over 10t gross, with only limited mechanization used in fishing operations and in processing their catch (Sánchez and Delgado 2013).

1.3.1.1 Fishing Enterprises/ Local Fishing Production Unit

In official numbers, the official fishing industry is organized by 12 fishing enterprises (Annex II) and 35 Local Fishing Production Units (UEB for the Spanish acronym). The UEBs are distributed throughout the country (Figure 5), with 49% located on the North coast and the other 51% in the South. This state fishery has great employment potential, with 13,974 workers in the fishing sector. Of these, 3,376 are official fishermen with the other 1,715 dedicated to finfish (according to GEIA data). The product is received at the UEB installations and then industrially processed.

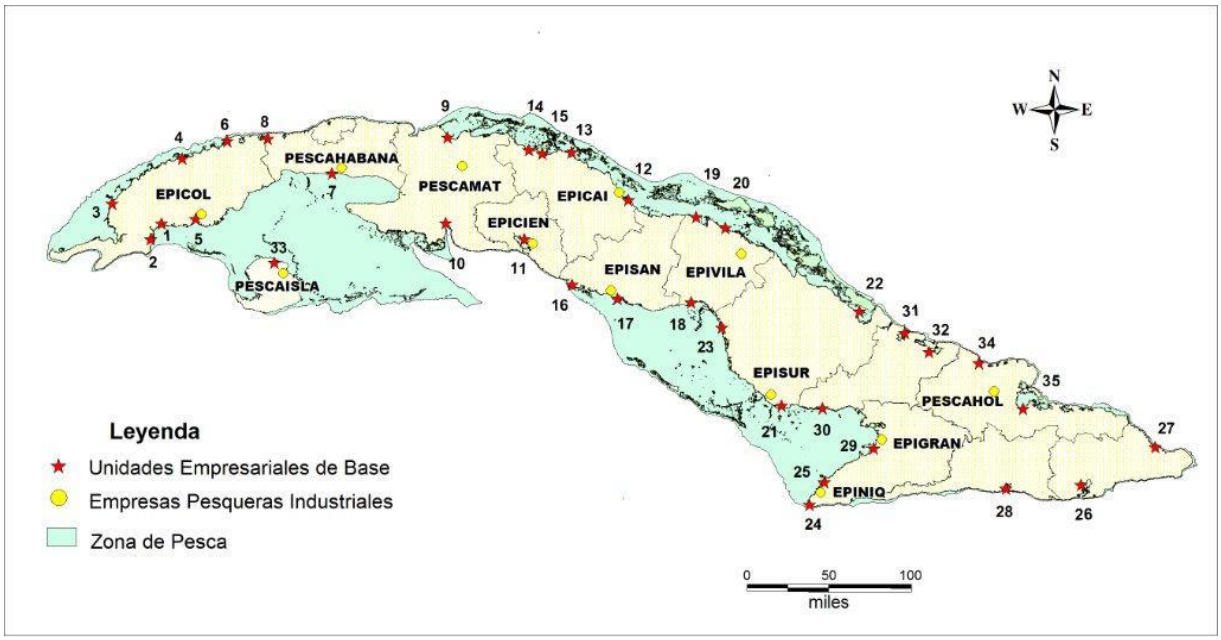


Figure 5. Distribution of official fishing enterprises (yellow dots) and the corresponding Local Fishing Production Units (UEBs; red stars) (Source: GEIA).

1.3.1.2 Fishing fleet

Fishing Enterprises operate a total of 675 industrial fishing boats, 339 of which are for finfish with a crew of 5-6, depending on the type of boat. The provinces with the largest number of finfish boats are: Granma (42), Ciego de Ávila (37) and Villa Clara (35). These boats are made of plastic (10m length and 3.60m beam), wood (18.34m length and 4.56m beam) and ferrocement (12.9–6.16m length and 4.05–4.90m beam). Fishing trips range from 5-20 days of fishing depending on the boat characteristics and technical conditions. Product is preserved aboard using ice, with coolers up to 6.50m^3 in size depending on the type of boat (Sánchez and Delgado 2013).

1.3.1.3 Fishing gear

Official commercial fisheries use drift nets and hooked lines, depending on the target species and fishing zone. Drift nets are used to capture coastal species, with lengths that reach and exceed 200m, and a height of 2-10m (depending on the target species and characteristics of the zone), and a mesh opening of180-240mm. Nets used to catch rays are normally polypropylene mesh with a mesh opening of 220mm, unlike the nets used for sharks which are made of polyamide with a mesh opening of 180mm. Boats fishing for shark use 5 to 7 nets which when joined can exceed 250m in length (Sánchez and Delgado 2013).

The longline constitutes another type of gear used in this type of fishery, with a bottom longline (also known in Cuba as a “placer” line) used to catch rays and sharks. This type of gear can generally reach a length of up to 200m with over 100 No. 3 or 4 hooks and with wires 1-2m in length. Gears that are used to catch shark species use line that must also fulfill other specifications, such as a 1.5m wire just before the hook. The average distance between hooks is 10m (Sánchez and Delgado, 2013). The bait is usually a

species with a low commercial value (moray, spotted eagle ray wings, grunts and jacks, among others) obtained as bycatch (Aguilar *et al*. 2014) from the nets, fish traps, hand lines, beach nets and longlines. Gear designs and construction generally vary according to the criteria of the fisher, making it difficult to standardize criteria regarding the main technical characteristics (Sánchez and Delgado, 2013).

1.3.1.4 Fishing trip

The fishing trip varies according to the region and fishing gear used. Fishing is usually from sunset to dawn, although in some zones such as those north of Villa Clara some boats put out the same fishing gear up to three times in the day. Sharks and rays are processed aboard and preserved in ice until landed (Sánchez and Delgado, 2013). This type of fishery is basically dedicated to coastal species (Briones, 2011), although mainly pelagic species are caught in the Eastern region.

1.3.1.5 Fishing zone

Official commercial fishing is performed in the 69,880.58km^2 of the Cuban shelf up to the 200m isobath. There are four fishing zones: Zone A from Punta de María Aguilar to Cabo Cruz, Zone B from Cabo Francés to Playa Girón, Zone C from El Cabo de San Antonio to Punta de Gobernadora, and Zone D from La Punta de Prácticos to the Point of the Hicacos Peninsula. These zones, reflected in Decree-Law 164 "Fishing Regulation" were determined in accordance with the fishing code as well as ecological studies. Each zone represents the following percentage of the total area: Zone A (33%), Zone B (39%), Zone C (8%) and Zone D (21%). Finfish (porgy, lane snapper, cubera snapper, king mackerel, bonito and sharks, among others) are caught in all established fishing zones, with Zones D and B traditionally reporting the greatest volumes of these species (Sánchez and Delgado, 2013). The fishing zones are divided into subzones as decreed in Resolution 226/2005, thus allowing finfish landings to be zoned in order to preserve fish stocks that inhabit the area and also guaranteeing the catch levels required for commercial use by authorized state entities (Figure 6).

1.3.2 Private commercial fishing

This is an artisanal or small-scale fishery with volumes of shark landings below those of state fishing. The boats generally do not exceed 10 tons gross registry and operate with a low level of technology (Sánchez and Delgado, 2013).

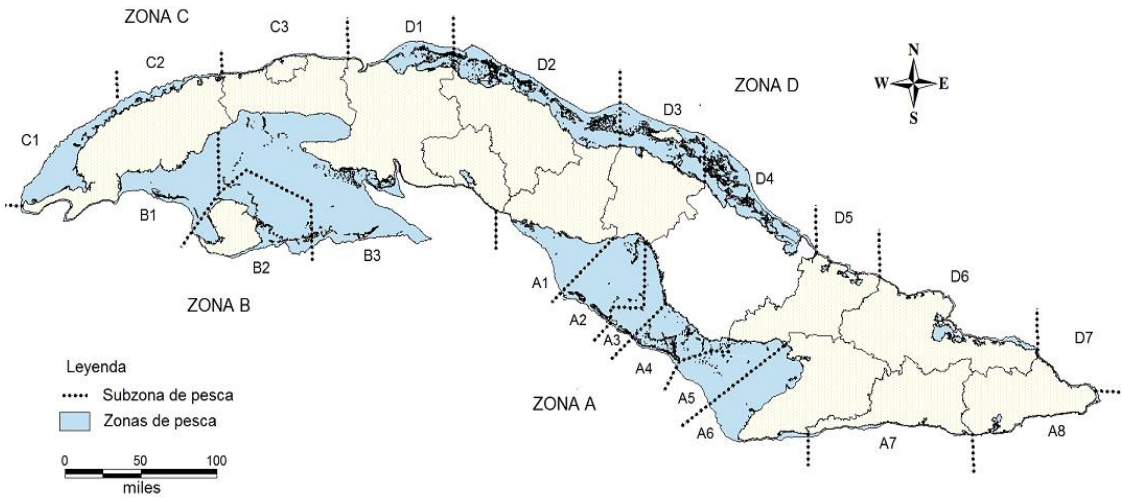
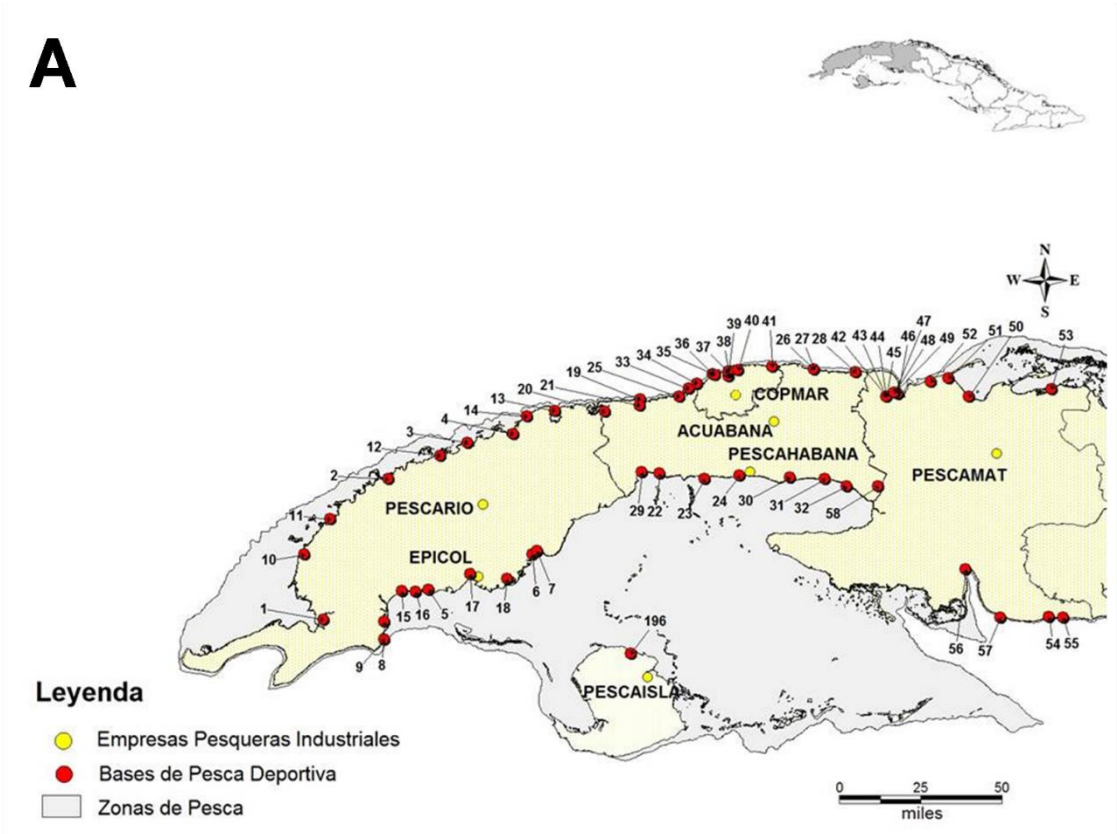


Figure 6. Fishing Zones and Subzones. (Source: MINAL)

This form offers two types of fishing: private commercial fishing (known here as private "sport" fishing) and sports/recreational fishing. The latter is characterized as using just a single reel, rod, line and hook, and wire as established in Decree-Law 164 "Fishing Regulation." This document will focus only a description of state and private commercial fishing.

1.3.2.1 Fishing Enterprises/Private Fishing Bases

Private fishing operates from 196 private sport fishing bases distributed throughout the country (Figure 7). A total of 3,328 boats with 18,638 fishermen are dedicated to private commercial fishing, and 5,436 boats 17,657 fishermen to private non-commercial fishing (according to GEIA data). This represents an important source of employment to the fishing communities associated with this activity. Most private boat owners have contracts with Fishing Enterprises, to whom they sell their catch (Annex III).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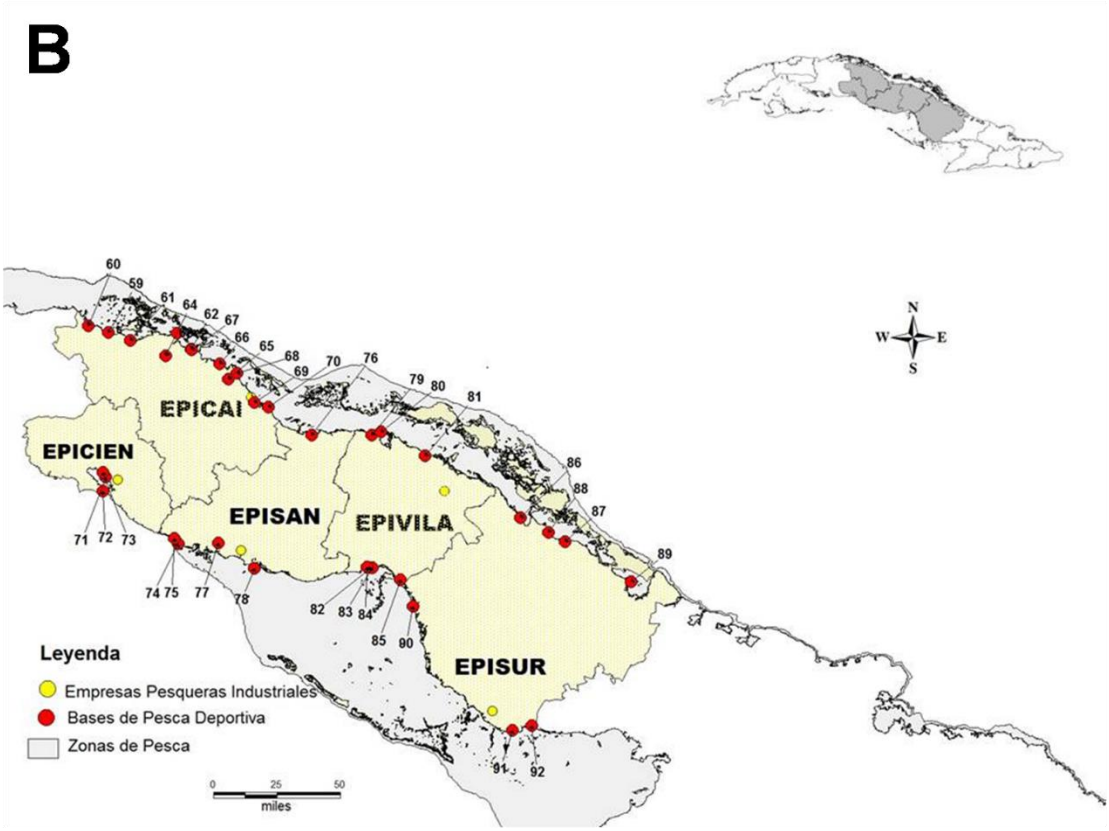
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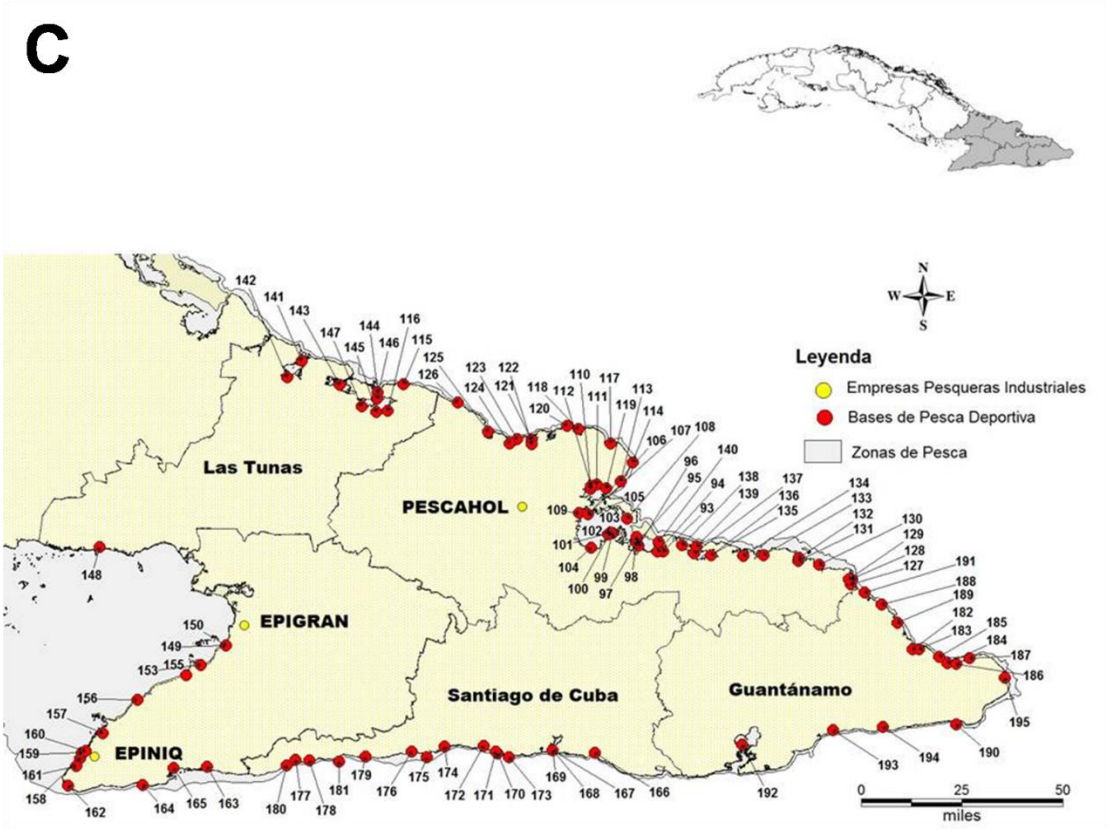

Figure 7. Regional distribution of Private Fishing Bases and State Fishing Enterprises with whom they have a contract. West (**A)**, Central (**B**) and East (C). (Source: GEIA).

Translation key for figure 7: Empresas Pesqueras Industriales are the State Fishing Enterprise Headquarters (yellow dots); Bases de Pesca Deportiva are the Private Fishing Bases (red dots) (Although "pesca deportiva" translates literally to "sport fishing," in reality this sector represents private fishers who sell their product commercially to the state or who practice subsistence fishing, they are not participating in a recreational fishery.)

1.3.2.2 Fishing units

Fishing boats in this fishery vary in length from 3-9m and with crews of from 2-5 fishermen, depending on the length of the boat. Most are made of wood, with only a few made of plastic. There is no infrastructure to preserve the product. There are a total of 3,328 private fishing boats, located mostly in the Provinces of Granma (350), Matanzas (327), and Mayabeque (327).

1.3.2.3 Fishing gear

The most common form of fishing gear used in this fishery is drift (or surface) longline. These tend to be devices with large dimensions that drift with the current, and are generally made in sections that are later joined (Sánchez and Delgado, 2013).

Gear configuration varies according to the target species (swordfish or marlin); however, both fisheries catch shark as bycatch, which are later retained (Aguilar *et al*., 2014). Sailfish (*Istiophorus platypterus*), white marlin (*Tetrapturus albidus*) and blue marlin (*Makaira nigricans*) are caught using day drift lines with hooks operating at

different depths according to the species targeted. There is no wire section; rather a nylon monofilament is used with approximately 200 No. 12 “J” type hooks (Sánchez and Delgado, 2013). Different types of bait are used, with sardines, grunt, halfbeak and bonefish the most common (Borroto, 2011).

The day lines described are generally very similar to the night lines, which are used to catch swordfish (*Xiphias gladius*) and sharks. This gear has longer gangions, made of wire, and a smaller number of hooks. Generally 120 No. 5-17 “J” type hooks are used. The type of bait varies, with the most commonly used species needlefish/garfish, tench, squid and bonefish. Often various types of bait are used on the same line (Borroto 2011).

Private commercial fishing allows a limited number of fishing gear with limited characteristics, as established in MINAL Resolution 353/10. This legislation authorizes the use of only four drift nets with a maximum length of 200m per boat to catch rays and spotted eagle rays. Each boat can use three longlines with 50 hooks for shark fishing, and 100 hooks for fishing other species.

1.3.2.4 Fishing trips

Fishing trips vary according to the target species. Fishing trips for marlin and blue marlin are daytime, starting at dawn and ending the afternoon of the same day (Borroto, 2011). This fishery is during the summer (from April to June). On the other hand, swordfish, which is typically nocturnal (Aires da Silva *et al*., 2008), is fished during the night, with boats leaving at dusk and returning the next morning. Swordfish is fished during the winter season (October to March).

1.3.2.5 Fishing zone

Fishing areas are distributed over the four established zones (Figure 6). In comparison with state commercial fishing, private fishing activities tend to operate in places that are closer to the port. Very distant areas are used exclusively by state fishers in view of the lack of autonomy of private commercial boats.

1.3.3 Other fisheries

Some species of chondrichthyans are caught in other fisheries as bycatch, including fisheries that use purse seines and shrimp trawl nets, used only by the state commercial fishing. Levels of bycatch are unknown, although these would presumably be high, particularly for the group of rays in both fisheries. Those fisheries are described below.

Purse seines are used mainly to catch bony fish such as lane snapper (*Lutjanus sinagris*), cubera snapper (*Lutjanus cyanopterus*), grunts (*Haemulon spp*.) and mutton snapper (*Lutjanus analis*), among others. Nevertheless, some species of rays (*Himantura schmardae, Dasyatis guttata, D. sabina)* are being caught using this gear. This gear was first used as a substitute for the finfish trawl (Resolution 503/12, Instruction M2/2013) due to its impacts on the benthic ecosystem and on fish stocks, where juveniles were caught as well as examples with a very low commercial value (70%). Purse seines can be used at different depths, and are used in combination with fish aggregation devices (FADs), both natural (cabezos, or heads) and artificial

(pesquero, or fishing). This equipment is handled during the day with the assistance of auxiliary vessels (Sánchez and Delgado 2013). This type of fishery is carried out in the four fishing zones, but only by state commercial fishing.

The shrimp trawl is another fishing gear that catches numerous species of sharks (*Rhizoprionodon* spp., *Sphyrna tiburo, S. lewini)* and rays (*Dasyatis americana, D. guttata, Himantura schmardae)* as bycatch. Despite this, the gear design includes a cod-end cover where a fish-eye type bycatch reduction device is located, allowing 25% of the animals to escape (Sánchez and Delgado 2013). This type of nocturnal fishery is carried out in the Southeastern region of the country in Zone A, at a depth of 5-25m with muddy and/or sandy-muddy bottoms (Figure 8). Resolution 479/09 establishes the characteristics of this gear, and that it can be used by just four Fishing Enterprises, which are: EPICIEN (Manati, Palomo, Máximo Gómez), EPIVILA (Tunas, Júcaro, Baraguá), EPISUR (Playa Florida, Santa Cruz Arriba and Santa Cruz Abajo) and EPIGRAN (Zones I, II and III).

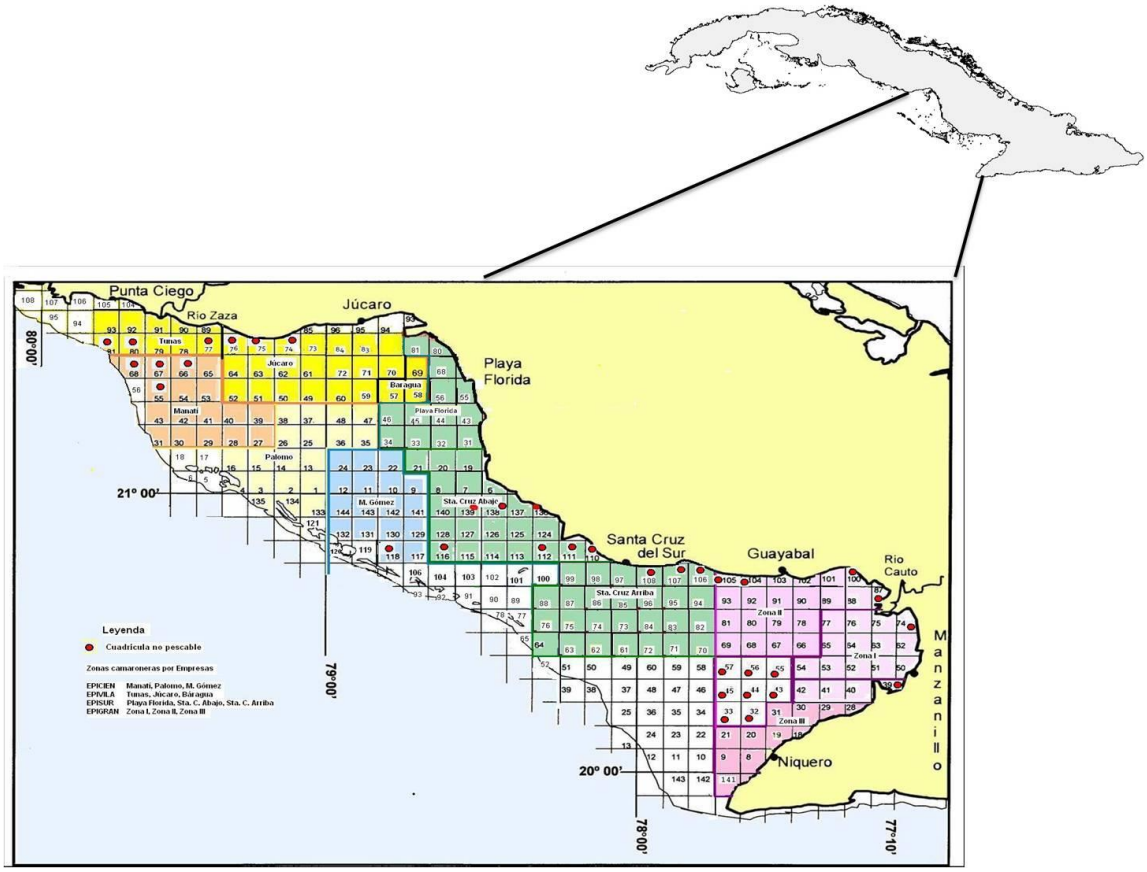

Figure 8. Distribution by cells of shrimp trawl zones (Source: CIP).

1.4 Current status of elasmobranch fisheries in Cuba

1.4.1 Status of biological knowledge

Cuba contains four suborders of rays. The most representative are Rajoidei with six genera and Myliobatoidei with seven. In the case of sharks, five orders exist, with the most represented being Carcharhiniformes, with a total of 11 genera (Table 1).

Table 1. Number of genera and orders/suborders reported in Cuban waters.

Genera	Order/Suborder					
	Chimaeriformes	Myliobatoidei	Pristoidei	Rajoidei	Torpedinoidei	Total
Chimaeras	**1**					**1**
Chimaera	1					1
Rays		**10**	**1**	**11**	**3**	**25**
Aetobatus		1				1
Anacanthobatis				1		1
Benthobatis					1	1
Breviraja				1		1
Cruriraja				2		2
Dasyatis		4				4
Dipturus				1		1
Fenestraja				5		5
Himantura		1				1
Manta		1				1
Mobula		1				1
Narcine					1	1
Pristis			1			1
Rhinobatos				1		1
Rhinoptera		1				1
Torpedo					1	1
Urobatis		1				1

Genera	Order / Suborder					
	Carcharhiniformes	Hexanchiformes	Lamniformes	Orectolobiformes	Squaliformes	Total
Sharks	**26**	**3**	**6**	**2**	**5**	**42**
Alopias			2			2
Apristurus	1					1
Carcharhinus	11					11
Carcharodon			1			1
Centrophorus					1	1
Centroscymnus					1	1
Cetorhinus			1			1
Eridacnis	1					1
Etmopterus					1	1
Galeocerdo	1					1
Galeus	1					1
Ginglymostoma				1		1
Heptranchias		1				1
Hexanchus		2				2
Isurus			2			2
Mustelus	1					1
Negaprion	1					1
Prionace	1					1
Rhincodon				1		1
Rhizoprionodon	2					2
Scyliorhinus	2					2
Sphyrna	4					4
Squalus					2	2

A monitoring pilot project was performed by specialists from CIM and MINAL on the biology of species caught by state and non-state (private) commercial fishing. Different zones in the northern and southern regions of the island were monitored from October 2010 until April 2015. A total of five species of rays was registered, corresponding to three genera and two families. Twenty five species of sharks were reported representing 11 genera and eight families (Table 2).

Table 2. Number of genera and families reported in samplings from October 2010 to April 2015.

	Families										
Genera	**Alopiidae**	**Carcharhinidae**	**Dasyatidae**	**Ginglymostomatidae**	**Hexanchidae**	**Lamnidae**	**Myliobatidae**	**Sphyrnidae**	**Squalidae**	**Triakidae**	**Total**
Rays			**4**				**1**				**5**
Aetobatus							1				1
Dasyatis			3								3
Himantura			1								1
Sharks	**1**	**14**		**1**	**2**	**2**		**4**	**1**	**1**	**26**
Alopias	1										1
Carcharhinus		9									9
Galeocerdo		1									1
Ginglymostoma				1							1
Hexanchus					2						2
Isurus						2					2
Mustelus										1	1
Negaprion		1									1
Prionace		1									1
Rhizoprionodon		2									2
Sphyrna								4			4
Squalus									1		1

A total of 219 samples of rays were examined as a result of the pilot monitoring by the biologists (Table 3). The most abundant species were *Dasyatis guttata* (106), *D. americana* (56) and *Aetobatus narinari* (41), with an average disc width (DW) of 70cm (min=27, max=120), 69cm DW (min=36, max=105) and 131cm DW (min=32, max=280), respectively. Basic biological information was likewise registered for 531 sharks. The greatest diversity of species corresponds to the Carcharhinidae family, followed by Sphyrnidae (Table 1). The species most often represented in landings was the Caribbean reef shark *Carcharhinus perezii* (73), with an average size of 155cm total extended length (TL) (min=30, max=241) (Table 3).

Table 3. Average values and length bins for species of elasmobranchs caught in the monitoring pilot program performed by biologists of the fishing enterprises (October 2010-April 2015). Ray size is stated in disc width (DW, cm), and shark length as total extended length (TL, cm).

	N	Average	Min.	Max.
Rays	**219**	**84**	**27**	**280**
Aetobatus narinari	41	131	32	280
Dasyatis americana	56	69	36	105
Dasyatis guttata	106	70	27	120
Dasyatis sabina	1	66	66	66
Himantura schmardae	15	114	83	149
Sharks	**531**	**189**	**30**	**485**
Alopias superciliosus	12	298	83	485
Carcharhinus acronotus	2	106	105	106
Carcharhinus falciformis	39	165	83	275
Carcharhinus leucas	23	242	200	275
Carcharhinus limbatus	22	137	83	186
Carcharhinus longimanus	36	170	85	291
Carcharhinus obscurus	1	275	275	275
Carcharhinus perezii	73	155	30	241
Carcharhinus plumbeus	2	184	180	187
Carcharhinus signatus	10	205	115	253
Galeocerdo cuvier	36	252	142	390
Ginglymostoma cirratum	55	160	77	290
Hexanchus griseus	8	113	90	160
Hexanchus nakamurai	5	161	128	197
Isurus oxyrinchus	32	243	128	336
Isurus paucus	47	270	171	385
Mustelus canis	7	83	59	101
Negaprion brevirostris	9	258	236	283
Prionace glauca	13	250	103	345
Rhizoprionodon spp	41	85	65	115
Rhizoprionodon terraenovae	1	92	92	92
Sphyrna lewini	6	268	164	300
Sphyrna mokarran	32	257	160	400
Sphyrna tiburo	1	35	35	35
Sphyrna zygaena	2	170	59	280
Squalus cubensis	16	94	51	165

1.4.2 General aspects of the state commercial elasmobranch fishery and relative abundance of landed species

The results of the monitoring pilot project performed in the different zones of state commercial fishing operations, using the specific forms provided during the period from June 2014 to April 2015, allowed landings to be registered during fishing trips. Information was provided by captains from eight UEBs, which are Batabanó, Cabañas, Caibarién, Cortés, Júcaro, Manatí, Pamar and Pescasilda. The dimension of the fishing gear reported in the monitoring pilot period includes an average hooked line length of 5,046m (min= 300, max= 9000) and an average number of 439 hooks (min= 4, max= 1400). Nets had an average length of 3,040m (min= 252, max= 5550), an average height of 4.2m (min= 2, max= 8) and an average mesh size of 254.6mm (min= 50, max= 350). Average operating depth was 30m (min= 1.85, max= 301).

Fishing gears used by the state commercial fishery that affect catch of shark and ray species are the drift net and the bottom line (Table 4); however, rays are caught by both gears, depending on species, while the bottom line was responsible for more shark catches (Annex IV).

Table 4. Species caught by fishing gear during the monitoring pilot performed by boat captains during the period from June 2014 to April 2015.

		Red		Anzuelo			
Grupo	**Especie**	**chinchorro de boliche**	**red de enmalle**	**palangre de fondo**	**palangre vertical**	**Total**	**%**
Rayas	*Dasyatis americana*		97	148		245	54,0
	Aetobatus narinari		129	39		168	37,0
	Himantura schmardae	1	7	25		33	7,3
	Dasyatis guttata	2	3			5	1,1
	Dasyatis sp.			2		2	0,4
	Dasyatis sabina	1				1	0,2
Total Rayas		**4**	**236**	**214**		**454**	
Tiburón	*Ginglymostoma cirratum*		55	24		79	21,1
	Galeocerdo cuvier		7	42	2	51	13,6
	Carcharhinus limbatus		27	21		48	12,8
	Rhizoprionodon spp		13	21		34	9,1
	Sphyrna mokarran		15	15		30	8,0
	Hexanchus nakamurai			29		29	7,7
	Carcharhinus plumbeus		3	21		24	6,4
	Mustelus canis			19		19	5,1
	Sphyrna zygaena			12		12	3,2
	Carcharhinus leucas		5	5		10	2,7
	Carcharhinus perezii		7			7	1,9
	Carcharhinus falciformis		3	4		7	1,9
	Sphyrna lewini		6			6	1,6
	Sphyrna tiburo		5			5	1,3
	Carcharhinus acronotus		4			4	1,1
	Prionace glauca			3		3	0,8
	Carcharhinus signatus			3		3	0,8
	Squalus cubensis			2		2	0,5
	Hexanchus griseus			2		2	0,5
Total Tiburón			**150**	**223**	**2**	**375**	

Table 4 Translation Key:
Red – net
Chinchorro de boliche – purse seine
Red de enmalle – drift net
Anzuelo – hook (and line)
Palangre de fondo – bottom longline
Palangre vertical – vertical longline
Tiburón – shark
Rayas - rays

1.4.3 Socio-economic aspects

A monitoring pilot program was carried out with the Los Canarreos Archipelago as the focal point, to understand the interaction between fishing and tourism activities aligned with shark diving. Eighty-one people were interviewed, including fishing directors, fishermen, tourism operators and tourists in six provinces adjacent to the study area. The result of these interviews could be used for resource management and applied in other regions of the country to allow the characterization of these activities as well as a better understanding of the perceptions of different sectors. The data obtained show that fishermen understand the purpose of the MPA/ZBREUP as well as the need to protect the different species, despite their admission that they occasionally fish in those areas. The fishermen are uncertain regarding the economic implications of establishing the MPA/ZBREUP, and do not appear to agree with the limits of the areas. There is a general concern that the MPA/ZBREUP tend to shrink their fishing grounds which will result in a decrease of catch. A closer contact between these different sectors may help to support future shark conservation efforts.

It was noted that sharks/rays are important to the fishing sector as food on both the local and the national level, as well as for fins and cartilage. Traditional catch include a wide range of species of finfish, rays and sharks due to the high diversity of the zone. This activity, together with tourism, offers sources of employment for the coastal communities in the region.

Tourism operators use this area in response to the demand of tourists seeking to interact with sharks and rays. However to date the offering of this service has not been made official, despite the perceived potential that it represents. Diving tourism is well developed in the regions of Jardines de la Reina and Santa Lucía, focusing mainly on observing sharks. Sharks are a principal attraction for tourists in Jardines de la Reina, many of whom are willing to return, including at higher prices (Figueredo-Martín *et al*., 2010).

1.4.4 Existing problems

In general, some gaps have been identified for an adequate sharks/ray management. These are identified as follows:

- Limitations in fishing statistics, where landings are not classified by species
- Little preparation for technical personnel at the base to identify species
- Lack of research cruises for the specific purpose of learning the distribution of the different species, mean densities and stock biomass
- Lack of regular sampling programs on elasmobranch landings

- No historical data on shark and ray landings or fishing effort by non-state commercial fishing
- Absence of specific regulations that would contribute to the conservation and sustainable use of elasmobranchs
- Conflicts of interest regarding the use of these resources.

1.4.5 Legal framework

1.4.5.1 Biological diversity protections

Chapter 2 of Law 81, the Environment, is dedicated to the protection and sustainable use of biological diversity. According to Article 84 of that Law: “All state bodies and organizations as well as all individuals and legal entities are required to adopt actions and measures necessary, within their respective areas of jurisdiction, to assure the conservation of national biological diversity and for a sustainable use of its components.”

1.4.4.2 Fishing Code

MINAL, the Ministry of the Food Industry is the Central State Administrative Authority that is responsible for "Directing the use and preservation of aquatic resources in the territorial oceans, the exclusive economic zone and interior waters". Decree Law 164, the Fishing Regulation, regulates the use and conservation of aquatic resources. Complementary standards are issued in correspondence with the terms of the Code of Conduct for Responsible Fishing, and provisions of DL 164 regarding the management of fishing resources based on scientific criteria.

The Directorate of Fishing Regulations and Sciences (DRPC) is the highest authority to prepare and propose regulatory measures for aquatic resources at the national level. These measures are formulated based on scientific-technical information that is provided by the country’s research entities, mostly from the Center for Fisheries Research, or Centro de Investigaciones Pesqueras (CIP). Regulatory measures are analyzed by the Fishing Advisory Committee (Comision Consultiva de Pesca) which is the advisory body involved in resource administration and regulation. The committee comprises numerous institutions (CIP, the National State Inspection Office, INDER, CICA, IMV, DC, TGF, FCPD, MINTUR, CIM, IdO, CNAP, ENPFF, GEIA, RH), and its dispositions are adopted as a consensus of the different dependencies and presented for consideration by and approval of the Minister of MINAL. The dispositions, once approved, are mandatory. These documents are sent to the Enterprise Sector through the GEIA for implementation. The National State Inspection Office is responsible for controlling and verifying compliance with the stipulated legislation (Figure 9).

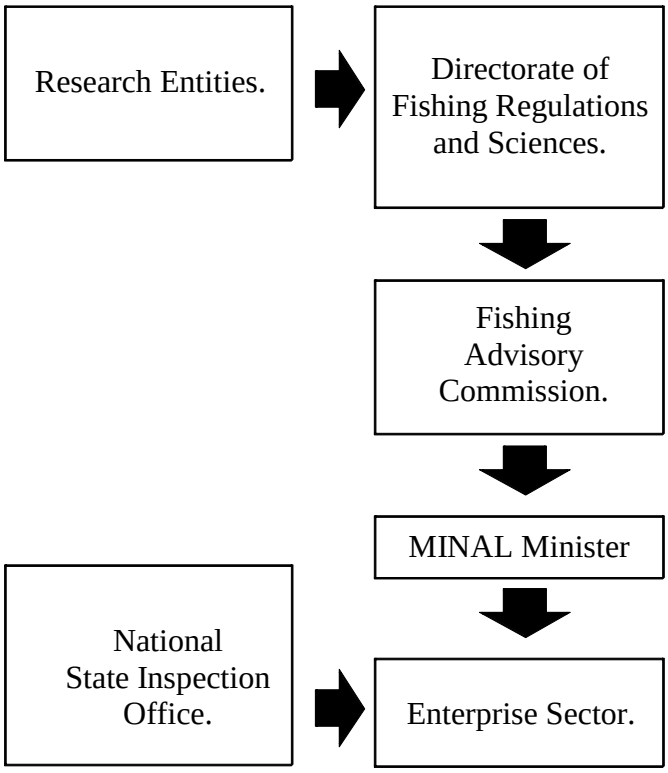

Figure 9. Fishing management process.

2. History

2.1 Origin of IPOA-Sharks

During the ninth Conference of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) held in 1994, CITES asked the FAO to compile and gather biological and commercial data on species of shark. The purpose was to prepare and propose guidelines that would lead to a Plan for Action for the conservation and regulation of that group.

Reflecting that concern, the FAO organized a meeting of experts in April 1998, during which an International Plan of Action was prepared for the conservation and regulation of sharks (IPOA-Sharks). As part of that plan, the basis of guiding principles and guidelines was set for the formation of the National Plan of Action for Sharks; that plan was ratified in the 23rd period of the session of the COFI in February 1999 in Rome.

The IPOA-Sharks recognizes the vulnerability of sharks and rays to fishing and the urgent need for managing this resource, creating an important framework to foment a responsible use. The IPOA-Sharks in this regard emphasizes that the exploitation of sharks must be biologically sustainable and economically reasonable, with the use of all products and subproducts of all landings. This management must also be in a form that ensures the conservation of biodiversity and the maintenance of the ecosystem structure and function. The IPOA-Sharks guidelines establish that: *i*) nations that in any way contribute to shark population mortality as a result of fishing must participate in their conservation and management, *ii*) shark fisheries must have a sustained management,

iii) discarded products and waste must be minimized (FAO, 1999; Walker, 2007). It also highlights the importance of an international collaboration among nations for the management of highly migratory species. In this regard, the drafting of a Regional Plan for the conservation of sharks will allow joint management strategies and assessments of shared resources. According to FAO surveys performed in 2010 in Latin America and the Caribbean, only 66.70% of the countries have assessed and consequently drafted a National Plan of Action for chondrichthyes, including the countries of Argentina, Colombia, Ecuador, Chile, Costa Rica, Guatemala, México, Uruguay, Nicaragua, Venezuela and Peru, among others.

2.2 International Agreements

2.2.1 NPOA-Sharks

Knowledge of elasmobranch biology is limited in Cuba. No historical series on catch and effort are available that would allow us to determine patterns and trends of relative abundance of the species (Aguilar *et al*., 2014). The lack of this information complicates any assessment of the populations and management of the related fishery. For this reason, Cuba has initiated the preparation of its own National Plan of Action for the Management and Conservation of Chondrichthyes (NPOA-Sharks), in congruence with the FAO IPOA-Sharks, in order to guarantee an adequate management of this resource.

The highest authority, represented by the minister of MINAL by virtue of the above and exercising the authority granted, approved Resolution 25/2015, which decrees actions designed to regulate fisheries. Pursuant to that document, the NPOA-Sharks is a policy instrument that establishes guidelines for the conservation and sustainable use of sharks. The Directorate of Fishing Regulations and Sciences (DRPC for the Spanish acronym) is responsible for coordinating the preparation, execution and monitoring of the NPOA-Sharks in collaboration with a Working Group that was specially formed to comply with the guidelines set in that document. The preparation process is described in Section 2.3.

2.2.2 CITES

The 16th Conference of the Parties held in Bangkok, Thailand in 2013 approved the incorporation of Appendix II which includes eight species of sharks and rays (Annex V), meaning that these can be marketed only if the exporter country can prove that the animals come from a sustainable stock. Cuba, as signatory of CITES, will adopt the proposal to include the species cited in Appendix II, pursuant to which international trade of their fins will be subject to a finding that their extraction is not detrimental.

2.3 Process for preparation of the NPOA-Sharks in Cuba

The initiative to prepare NPOA-Sharks began with the creation of a Working Group formed of representatives from the different entities directly or indirectly related with the sea and its resources. These include:

- Centro de Investigaciones Pesqueras, Ministerio de la Industria Alimentaria (CIP-MINAL)
- Grupo Empresarial de la Industria Alimentaria (GEIA)

- Dirección de Regulaciones Pesqueras y Ciencias, Ministerio de la Industria Alimentaria (DRPC-MINAL)
- Centro de Investigaciones de Ecosistemas Costeros, Ministerio de Ciencia, Tecnología y Medio Ambiente (CIEC-CITMA)
- Centro de Investigaciones Marinas, Universidad de La Habana. (CIM-UH)
- Instituto de Oceanología, Ministerio de Ciencia, Tecnología y Medio Ambiente (IdO-CITMA)
- Centro Nacional de Áreas Protegidas, Ministerio de Ciencia, Tecnología y Medio Ambiente (CNAP-CITMA)
- Acuario Nacional de Cuba, Ministerio de Ciencia, Tecnología y Medio Ambiente (ANC-CITMA)
- Ministerio del Turismo (MINTUR)
- Centro de Inspección y Control Ambiental, Ministerio de Ciencia, Tecnología y Medio Ambiente (CICA-CITMA)
- Tropas Guarda Fronteras, Ministerio del Interior (TGF-MININT)
- Empresa Nacional para la protección de la Flora y la Fauna, Ministerio de la Agricultura (ENPFF-MINAG)
- Oficina Nacional de Inspección Estatal, Ministerio de la Industria Alimentaria (MINAL)
- Federación Cubana de Pesca Deportiva, Instituto Nacional de Deporte y Recreación (FCPD-INDER).

In November 2013, Cuba held its first international workshop, requesting the assistance, collaboration and advice from countries such as Belize, Colombia, Mexico, the United States of America, Ecuador and Canada who have moved forward in the preparation and implementation of their respective management plans, as well as the assistance of representatives of the FAO, COSPE and EDF. In May 2014, a workshop was held in the City of Trinidad, led by MINAL, GEIA, CIP, MML and UAS specialists, among others. This event also had the active participation of nine technicians and 20 fishermen representing 10 companies (EPICOL, PESCAHABANA, PESCAMAT, EPISAN, EPICAI, EPIVILA, EPISUR, PESCAHOL, EPIGRAN, EPINIQ) located throughout the country. The purpose of the workshop was to train personnel related to fishing activities in the use of shark and ray identification guides as well as in completing the identification sheets provided, all in order to improve the biological and fishing information compiled. The intention is to extend this activity to all provinces of the country; another workshop was held in April 2015 with personnel related to fishing activities and with international specialists.

In June 2014, a workshop was held with the participation of international experts from different institutions (EDF, MML, SEMARNAT, UAS, COBI) and Cuban collaborators (MINTUR, MINAL, CITMA, MES), for the purpose of discussing the need to generate information and research. Round tables were formed to review and analyze current standards that apply to the fishing, conservation and tourism sectors, in an effort to conciliate these to achieve a sustainable use of sharks. Monitoring campaigns were initiated onboard the boats, beginning in July 2014, in order to set in practice the species identification guides and sampling sheets in compliance with the work established by the Work Group.

In light of the growth in tourism development in Cuba and in particular the rise in shark diving, a joint project was carried out by various institutions (MINAL, CITMA and MINTUR) to determine whether shark and ray abundance favors the consolidation of these activities. The Archipelago of Los Canarreos and neighboring zones were used as a case study for this purpose, with surveys applied to administrators of protected areas, fishing directors, fishermen, tour operators and tourists in general.

3. NPOA-Sharks Definition and Objective

3.1 Definition

The NPOA-Sharks establishes a set of permanent research, regulation, oversight and education "Activities and Tasks" that will regulate and optimize the use and conservation of these resources in Cuban waters. It is an adaptive and transparent instrument that takes into account the participation of the different sectors involved in the use of the resource in all its forms.

3.2 General objective

Ensure the rational use, conservation and sustainable management of sharks, rays and chimaeras that inhabit the marine waters of the Republic of Cuba.

3.2.1 Specific objectives

- Reinforce the national information system with registries of landings by species and by region.
- Identify and assess threats to elasmobranch stocks and habitats.
- Study the spatial-temporal distribution, residence and migratory patterns of chondrichthyan species as well as their connectivity with other regions.
- Promote biological, ecological and fishing research for chondrichthyes present in Cuban marine waters.
- Identify critical chondrichthyan habitats, including nursery, reproduction and feeding areas.
- Develop tourism sector use of sharks and rays as a means of preserving these charismatic species, as well as to create jobs and generate revenue for the economy.
- Determine and prepare a regulatory and normative framework for the management and conservation of Chondrichthyes.
- Structure and direct a program that will allow an efficient oversight and control of fishing or other activities that impact Chondrichthyes in marine waters.

4. Activities and Tasks

The following "Activities" and "Tasks" have been established as necessary to achieve the above Objectives. To assure compliance with each Activity and the corresponding Tasks, specific Periods, Person Responsible and Objectives have been defined. The periods are established in correspondence with the period of time necessary to execute the task. In this sense "Short Term" is used to define tasks that can be carried out in one

to two years, “Medium Term” proposals refer to work that can be executed within a period of two to four years, and “Long Term” refer to tasks that require more than five years. Notwithstanding this, there are tasks that given their magnitude and importance need to be performed more frequently; these can be categorized as “Permanent.” Other tasks are annual, and allow an assessment of the progress made in implementing this document.

4.1 **Action 1.** Biological-fishery research

One of the most important Activities presented in this NPOA-Sharks is the performance of biological and fishery studies on chondrichthyan species that are directly or indirectly caught in the fisheries of Cuba. To better understand their biology, the species must be correctly identified both onboard the fishing boats as well as at landing sites. This biological-fishery research will be one of the pillars used when making decisions aimed at the management and conservation of chondrichthyan species.

Task 1.1. Prepare practical guidelines for the identification of sharks and rays.
Period: Short Term
Responsible Institutions: Dirección de Regulaciones Pesqueras y Ciencias, Centro de Investigaciones Pesqueras
Objective: Draft, distribute and implement a Manual to be used to identify commercially important shark and ray species, allowing the identification of species that are fished either targeted or caught incidentally in the country’s fisheries.

Task 1.2. Draft and implement a standard operating procedure to classify species during landing.
Period: Short Term
Responsible Institutions: Centro de Investigaciones Pesqueras
Objective: Establish a Work Instruction that will improve, facilitate and classify species that are landed.

Task 1.3. Implement the completion of identification forms with fish information per species, by both state and non-state fisheries.
Period: Medium Term
Responsible Institutions: Centro de Investigaciones Pesqueras
Objective: Compile fishing information from boats of the fishing sector regarding the spatial-temporal abundance of species captured.

Task 1.4. Survey state and private fishing fleets that catch sharks either directly or as bycatch.
Period: Medium Term
Responsible Institutions: Dirección de Regulaciones Pesqueras y Ciencias, Grupo Empresarial de la Industria Alimentaria
Objective: This task will provide information on fishing effort for sharks and rays at the national level, and also allow an up-to-date inventory of the fishing boats and their principal characteristics.

Task 1.5. Fishing gear selectivity studies to decrease shark and ray bycatch.
Period: Medium Term

Responsible Institutions: Centro de Investigaciones Pesqueras, Grupo Empresarial de la Industria Alimentaria
Objective: Determine the selective properties of gears used by fisheries that affect Chondrichthyes and recommend actions to decrease the impact on undesired and biologically more vulnerable species.

Task 1.6. Migration studies and movement patterns
Period: Long Term
Responsible Institutions: Centro de Investigaciones Marinas, Centro de Investigaciones de Ecosistemas Costeros
Objective: Perform conventional tagging and recapture studies as well as satellite tagging studies in order to determine species' times of residence in the coastal zones, habitat use and migratory patterns. This will help to improve knowledge on population structure and the areas most commonly used as reproduction and feeding areas.

Task 1.7. Create a biological-fishery database for species caught by the UEBs.
Period: Medium Term
Responsible Institutions: Grupo Empresarial de la Industria Alimentaria, Centro de Investigaciones Pesqueras
Objective: After implementing the standard operating procedure regarding the collection of fishery (Task 1.2) and biological data (Task 1.8), a database should be prepared with the information gathered, systematically using practical guidelines (Task 1.1) and correctly completing the identification sheets with the fishery (Task 1.3) and biological data (Task 1.9). This database will form the foundation of a data management system based on analytical methodologies, providing the information that is required to make recommendations on conservation and management decisions.

Task 1.8. Draft and implement a standard operating procedure to classify shark and ray species captured, by sex, length and degree of maturity.
Period: Short Term
Responsible Institutions: Centro de Investigaciones Pesqueras
Objective: Establish the standard operating procedure required in order to systematically gather and standardize biological information on the species captured.

Task 1.9 Implement the completion of biological data sheets with information on landed species.
Period: Medium Term
Responsible Institutions: Grupo Empresarial de la Industria Alimentaria, Centro de Investigaciones Pesqueras
Objective: Register biological information per species through the use of identification guides (Task 1.1), to provide information on composition by size, weight, sex and stage of development.

Task 1.10 Productivity and Susceptibility Analysis (PSA).
Period: Short Term
Responsible Institutions: Centro de Investigaciones Pesqueras

Objective: Prepare a limited data susceptibility analysis of sharks and rays that are subject to fishing pressure.

Task 1.11 **Stock assessment**
Period: Long Term
Responsible Institutions: Centro de Investigaciones Pesqueras
Objective: Perform stock assessments using biological-fishing information in order to estimate the status of stocks of species subject to fishing. This will allow limits to be established by biomass and fishing effort for dominant or vulnerable species.

4.2 **Action 2.** Socio-economic research

Socio-economic studies will offer not just an understanding of the role of sharks/rays as a fishing resource and as a source of employment, income and food for coastal communities, but also as a potential resource for activating a tourism economy in the form of observational diving.

Task 2.1 Carry out surveys to evaluate the importance of sharks/rays as a potential eco-tourism resource.
Period: Medium Term
Responsible Institutions: Dirección de Desarrollo, Ministerio de Turismo
Objective: Provide a strategic design for surveys that will gather first-hand information from actors and institutions on fishing activities, tourism institutions and protected areas; evaluate the potential of sharks as the subject of a tourism package for observational diving and other related non-extractive activities.

4.3 **Action 3.** Fishing Code

Using the best scientific information available in congruence with the guiding principles of the FAO Precautionary Approach and considering interests in assuring the well-being of fishing communities, identify and adopt regulatory measures that are aimed at responsible use and conservation of the resource. An effective fishery management will include the active collaboration of fishermen and the use of incentives that could be adopted through the implementation of good practices during fishing activities.

Task 3.1 Establish minimum landings sizes.
Period: Medium Term
Responsible Institutions: Ministerio de la Industria Alimentaria
Objective: Determine the structure of chondricthyan stocks that are susceptible (directly or indirectly) to fishing and implement measures to protect juvenile stages of the species, establishing minimum landings sizes.

Task 3.2 Implement regulations that prohibit “finning”.
Period: Completed
Responsible Institutions: Ministerio de la Industria Alimentaria

Objective: Resolution to control the use of sharks.

Task 3.3 Evaluate and propose conservation areas.
Period: Medium Term
Responsible Institutions: Ministerio de la Industria Alimentaria
Objective: Identify the characteristics and use of the most important habitats used as chondrichthyan nursery, breeding and feeding areas. These critical habitats will be protected with access and use limited according to criteria for Special Use and Protection Zones.

Task 3.4 Regulate the use of selective fishing gears.
Period: Medium Term
Responsible Institutions: Ministerio de la Industria Alimentaria
Objective: Decrease chondrichthyan mortality through technical experimentation and good fishing practices.

Task 3.5 Establish temporary and permanent no-take seasons.
Period: Long Term
Responsible Institutions: Ministerio de la Industria Alimentaria
Objective: Establish seasonal fishing closures for commercially important chondrichthyan species as well as those that are more vulnerable to fishing.

Task 3.6 Establish total allowable catch per group of species.
Period: Medium Term
Responsible Institutions: Ministerio de la Industria Alimentaria
Objective: Decree landings quotas for vulnerable species, reconciling these with a responsible use of the resource in order to assure its maintenance as a source of direct jobs as well as the sustainability of the target populations.

4.4 **Action 4.** Control and Oversight

The success of any control measure strictly depends on its enforcement. Oversight coverage will be fundamental in assuring the sustainable use and preservation of sharks and rays.

Task 4.1 Control compliance with resolutions issued on the use and conservation of Chondrichthyes.
Period: Permanent
Responsible Institutions: Inspection Body
Objective: Assure compliance with fishery control regulations in order to assure a sustainable use and management of shark and ray stocks.

Task 4.2 Propose systems for observation by inspectors and personnel of the organizations responsible for protecting marine resources.
Period: Short Term
Responsible Institutions: Inspection Body
Objective: Establish a strategic control and oversight system that will allow the enforcement of fishing restrictions and regulations. The system

will be accompanied by an environmental education and training program provided to resource users and inspectors (see Action 5).

Task 4.3 Control compliance with international conventions related to sharks and rays.
Period: Permanent
Responsible Institutions: Dirección de Regulaciones Pesqueras y Ciencias.
Objective: Guarantee compliance with international commitments by means of controlling the fishery. Create a mechanism that will incentivize fishermen in use of good fishing practices in fishing activities, and prepare communications strategies to inform all fishing personnel of the need to conserve and make a rational use of the resource, based on international agreements.

4.5 **Action 5.** Training

The best strategy to achieve the conservation and management objectives is through education. Training for personnel with regard to chondrichthyans is fundamental, not just to improve identification of the landed species, but also to induce "good practices" during fishing trips. The support of the conservation and tourism sectors is also important, as they can identify critical habitats as well as breeding areas during their activities. Training and awareness-raising are equally important to the fishing sector regarding the need for a sustainable management of fishing activities in order to assure the sustainable use of the resource.

Task 5.1 Train fishing bosses and fishers in the use of shark and ray identification guides.
Period: Short Term
Responsible Institutions: Dirección de Regulaciones Pesqueras y Ciencias, Centro de Investigaciones Pesqueras
Objective: Establish a training program for fishing-boat captains in order to improve the reporting of chondrichthyan landings, per species.

Task 5.2 Instruct tourism and conservation personnel in the identification of nursery and reproduction areas.
Period: Short Term
Responsible Institutions: Centro de Investigaciones Pesqueras
Objective: Train and inform personnel of the tourism and conservation sectors in how to identify chondrichthyan nursery and reproduction areas.

Task 5.3 Give courses to prepare Inspectors and Border Guard personnel in regulatory standards issued.
Period: Medium Term
Responsible Institutions: Dirección de Regulaciones Pesqueras y Ciencias, Centro de Inspección y Control Ambiental.
Objective: Train and inform Inspectors and Border Guard personnel in regulatory standards issued and their application.

Task 5.4 Provide short workshops to raise awareness on the sustainable use and conservation of Chondrichthyes.
Period: Short Term
Responsible Institutions: Centro Nacional de Áreas Protegidas, Centro de Investigaciones Pesqueras
Objective: Raise awareness of fishing communities on the need for a sustainable use of Chondrichthyes, through environmental education programs.

4.6 **Action 6.** Evaluation and follow up by NPOA-Sharks

Establish a permanent program for the NPOA-Sharks Working Group that will allow an evaluation of the progress made in compliance with the NPOA timeline. This initiative will be presided and coordinated by the Dirección de Regulaciones Pesqueras y Ciencias (DRPC - MINAL) in accordance with the provisions of Resolution 25/2015. The work program shall include the participation of all institutions that form part of the Working Group, and will be measurable based on compliance with the NPOA-Sharks Actions and Tasks.

Task 6.1 Analyze the results obtained and measures applied.
Period: Annual
Responsible Institutions: Dirección de Regulaciones Pesqueras y Ciencias, Grupo de Trabajo
Objective: Make an annual report reflecting the status of execution of the tasks set out in compliance with the NPOA-Sharks Objectives.

5. Current standards and regulations

Measures based on studies by competent institutions have been implemented to decrease impacts on marine ecosystems that threaten the long term sustainability of commercial fisheries. One of the gears that has proven to have a low selectivity is the beach seine net which catches juveniles as well as especially significant species. By virtue of the above and with the approval of the Fishing Advisory Commission, the use of the finfish seine net has been forbidden in state commercial fisheries (MINAL Resolution 503/2012).

MINAL in its Resolution 252/14 likewise prohibited shark finning, requiring that sharks caught be landed whole at the port. This complies with the recommendations made by the FAO and the IUCN on the need for a sustainable and integral use of this resource.

Cuba, as a state and as part of international conventions (CITES, SPAW, CMS) and based on the provisions of Law 81 “The Environment” in CITMA Resolution 160/11, enacted measures to control and protect species with special significance for the country’s biological diversity. Pursuant to provisions of that resolution, organisms of the Pristidae family can be used only for research or conservation purposes (Appendix I, Resolution 160/11); and use of the great white shark (*Carcharodon carcharias*) and the whale shark (*Rhincodon typus*) will require an environmental license (Appendix II, Resolution 160/11). This document is currently being updated by the appropriate institution in accordance with international provisions to include elasmobranch species.

The National System of Protected Areas (SNAP) has a network of Protected Natural Areas that were designed and established for the purpose of protecting ecosystems and habitats that are essential for biodiversity (Figure 10).

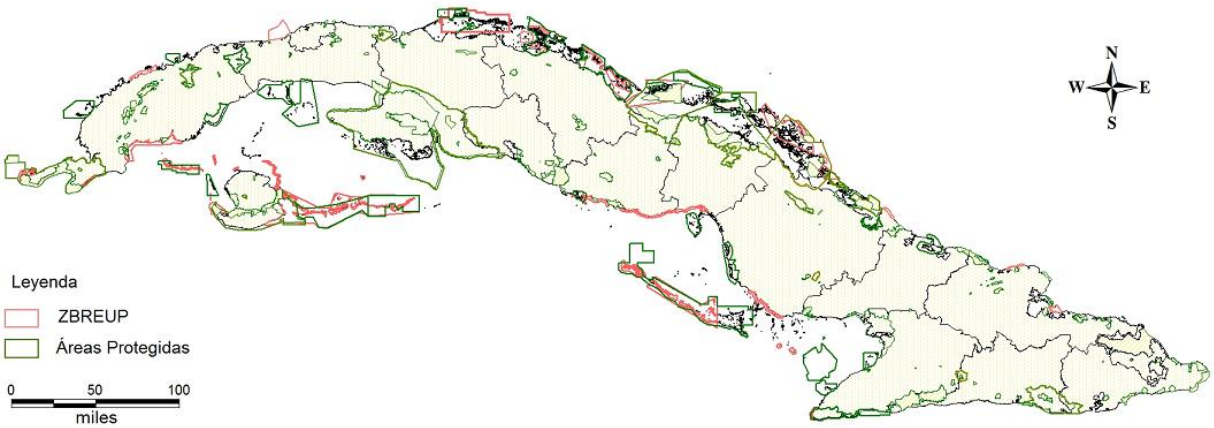

Figure 10. Network of Protected Areas and Zones under a Regimen for Special Use and Protection (ZBREUP).

To achieve these objectives, protected areas are organized and classified in management categories according to their degree of biodiversity conservation, geodiversity and the associated historic cultural values. These include: Natural Reserve (RN), National Park (PN), Environmental Reserve (RE), Outstanding Natural Element (END), Managed Flora Reserve (RFM), Wildlife Refuge (RF), Natural Protected Landscape (PNP), Managed Resources Protected Area (APRM). MINAL also includes a form of reserve referred to as Zones Under a Special Use and Protection Regimen (ZBREUP), where fishing activities are governed by special provisions (Figure 10). These zones potentially assure the survival of species of sharks and rays that may use them. Fishing areas cover approximately 69,880.58 km², 26% of which is subject to different forms of protection (AMP and ZBREUP). To strengthen this system, the enactment of surveillance mechanisms is needed by regulatory and control authorities of the country.

6. Monitoring, compliance and control

The Working Group will verify the operability of NPOA-Sharks by supervising compliance with the tasks executed by the corresponding institutions within the period set. In the event that any of the tasks should not be completed as specified in the Work Timeline, the required measures will be adopted to guarantee the optimum functioning of the NPOA.

7. Bibliographic References

Aguilar, C., G. González-Sansón, R. Hueter, E. Rojas, Y. Cabrera, A. Briones, R. Borroto, A. Hernández y P. Baker. 2014. Captura de tiburones en la región noroccidental de Cuba. *Latin American Journal of Aquatic Research* 42(3), 477-487.

Aires da Silva, A. M., J. J. Hoey y V. F. Galluci. 2008. A historical index of abundance for the blue shark (Prionace glauca) in the western Atlantic. *Fisheries Research*, 92, 41-52.

Arreguín-Sánchez, F. 2011. Ecosystem dynamics under "top-down" and "bottom-up" control situations generated by intensive harvesting rates. *Hidrobiológica*, 21(3), 323–332.

Baisre, J.A. 1986. Los recursos Pesqueros Marinos de Cuba: Fundamentos Ecológicos y Estrategia para su utilización. *Tesis Doctoral*. 100 pp. Centro de Investigaciones Pesqueras. La Habana, Cuba.

Baum, J.K. y B. Worm. 2009. Cascading top-down effects of changing oceanic predator abundances. *J. Anim. Ecol*., 78, 699–714

Baum, J.K., R.A. Myers, D.G. Kehler, B. Worm, S.J. Harley, y P.A. Doherty. 2003. Collapse and conservation of shark populations in the northwest Atlantic. *Science*, 299, 389-392.

Benjamins, S., D.W. Kulka, y J. Lawson 2010. Recent incidental catch of sharks in gillnet fisheries of Newfoundland and Labrador, Canada. *Endang. Species. Res.*, 11, 133–146.

Borroto, R. 2011. La pesquería de tiburones con palangre de deriva en la base de pesca de Cojímar. *Tesis de Diploma*. 62 pp. Centro de Investigaciones Marinas. La Habana, Cuba.

Briones, A. 2011. La pesca de tiburones en Cuba: Estudio piloto en la unidad "Carmelo Barrios" de Cabaña. *Tesis de Diploma*. 86 pp. Centro de Investigaciones Marinas. La Habana, Cuba.

Camhi, M.D., S.V. Valenti, S.V. Fordham, S.L. Fowler y C. Gibson. 2009. The Conservation Status of Pelagic Sharks and Rays: Report of the IUCN Shark Specialist Group Pelagic Shark Red List Workshop. IUCN Species Survival Commission Shark Specialist Group. Newbury, UK. 78 pp.

Castillo-Géniz, J. L., J. F. Márquez-Farías, M. C. Rodríguez de la Cruz, E. Cortés and A. Cid del Prado. 1998. The mexican artisanal shark fishery in the Gulf of Mexico: towards a regulated fishery. Aust. J. Mar. Freshwater Res. 49, 611-620.

Claro R. 2007. Conservación y manejo. En R. Claro (ed.), La Biodiversidad marina de Cuba. Instituto de Oceanología, CITMA, La Habana. En CD-ROM disponible en http://www.redciencia.cu/

Claro, R. y D.R. Robertson. 2010. Los peces de Cuba. Instituto de Oceanología, CITMA, La Habana, Cuba. En CD-ROM.

Espinosa, L. 1997. Estado de explotación y perspectivas del recurso tiburón en Cuba. 1a Reunión Nacional de Biodiversidad Marina, Inst. Oceanología, 6-27 Nov., Ciudad de La Habana, Cuba.

FAO 1999. International Plan of Action for reducing incidental catch of seabirds in longline fisheries. International Plan of Action for the conservation and management of sharks. International Plan of Action for the management of fishing capacity. Rome, FAO. 1999. 26p.

FAO 2000. Fisheries Management 1. Conservation and management of sharks. Pp 1-37. In: FAO Technical Guidelines for Responsible Fisheriess, Vol. 4. Supplement pp. 37. (Food and Agricuture Organization of the United Nations: Rome.) (Internet link: ftp://ftp.fao.org/docrep/fao/003/x8692e/x8692e00.pdf)

Ferretti, F., B. Worm, G.L. Britten, M.R. Heithaus y H.K. Lotze. 2010. Patterns and ecosystem consequences of shark declines in the ocean. *Ecol. Letters*., 13(8), 1055–1071.

Figueredo-Martín, T., F. Pina-Amargós, J. Angulo-Valdés y R. Gómez-Fernández. 2010. Buceo contemplativo en Jardines de la Reina, Cuba: Caracterización y percepción sobre el estado de conservación del área. *Revista de Investigaciones Marinas* 31(1), 23-32.

Fowler, S.L., R.D. Cavanagh, M. Camhi, G.H. Burgess, G.M. Caillet, S.V. Fordham, C. Simpfendorfer y J.A. Musick. 2005. Sharks, Rays and Chimaeras: The Status of the Chondrichthyan Fishes. IUCN/SSC Shark Specialist Group. IUCN, Gland, Switzerland y Cambridge, UK. 462 pp.

García, E. 2005. Utilización del aceite de hígado de tiburón obtenido en Cuba en el desarrollo de productos nutricionalmente mejorados. *Tesis Doctoral*. Centro de Investigaciones Biológicas del Noroeste, S.C. La Paz, B.C.S.

Guitart , D.J. 1983. Los Tiburones. *Editorial Científico-Técnica*, La Habana, 57 p.

Guitart, D.J. 1968. Guía para los tiburones de aguas cubanas: (con notas adicionales sobre los del Golfo de México, Mar Caribe y Océano Atlántico cerca de Cuba) *Serie Oceanológica*, Inst. Ocean., Acad. Cienc. Cuba, (1), 1-63.

Guitart, D.J. 1975. Las Pesquerías Pelágico-Oceánicas de Corto Radio de Acción en la Región Noroccidental de Cuba. Academia de Ciencia de Cuba. Instituto de Oceanología. La Habana. p. 26.

Guitart, D.J. 1979. Sinopsis de los peces marinos de Cuba. *Editorial Científico-Técnica*, La Habana, pp. 9-68.

Hernández, A. B. 2010. La pesquería de tiburones con palangre de deriva nocturno en la base de pesca de Cojímar, Cuba. *Tesis de Diploma*. 63 pp. Centro de Investigaciones Marinas. La Habana, Cuba.

Holden, M. J. 1974. Problems in the rational exploitation of elasmobranch populations and some suggested solutions. En: Harden-Jones (Eds.). *Ses Fisheries Research*. John Wiley and Sons, New York. Pp. 117–137.

Kulka, D.W., J.A. Musick, M.G. Pawson and T.I Walker. 2005. Report of Symposium. Elasmobranch Fisheries: Managing for Sustainable use and Biodiversity Conservation. E-journal *Northwest Atlantic Fishery Science*. Vol 35: http://journal.nafo.int/35/35.html

Martinez, J. L. 1947. Part I—the Cuban shark industry. *Fishery Leaflet* no. *250, Fish* and Wildlife Service. Washington, D. C. U.S. Department of the Interior. 18 pp.

Musick, J. A. 1999. Ecology and conservation of long-lived marine animals. pp. 1-10. In: J. A.Musick. (ed.) Life in the Slow Lane: Ecology and Conservation of Long-Lived Marine Animals. American Fisheries Society Symposium 23, Bethesda, M.

Musick, J. A. y S. Musick 2011. Sharks. In. Review of the state of world marine fishery resources. FAO Fisheries and Aquaculture Technical Paper No. 569. Rome, FAO. 2011. 13p.

Pina-Amargós, F., H. Salvat Torres, J.A. Angulo Valdés, Y. Cabrera Páez, E. García-Machado. 2012. Ictiofauna del golfo de Ana María, Cuba. *Rev. Invest. Mar*. 32(2), 45-53.

Pina–Amargós, F., H. Salvat-Torres, W. Acosta de la Red, E. Fernández de la Vega. 2013. Inventario de la ictiofauna de la costa norte de Ciego de Ávila, Cuba. *Rev. Invest. Mar.* 33(1), 31-38.

Robbins, W. D., Hisano, M., Connolly, S.R., y Choat, J. H. 2006. Ongoing Collapse of Coral-Reef Shark Populations. *Current Biology*, 16, 2314-2319.

Rodríguez, A. y R. Valdés. 1982. Peces Marinos importantes de Cuba. *Editorial Científico-Técnica*, La Habana p 238.

Sánchez, R. y C. Delgado. 2013. Manual de las artes de pesca de Cuba. Informe. 68 pp. Centro de Investigaciones Pesqueras. La Habana, Cuba.

Walker, T.I. 1998. Can shark resources be harvested sustainably? A question revisited with a review of shark fisheries. *Mar. Freshw. Res*. 49, 553–572.

Walker, T.I. 2004. Management measures. En: J. A. Musick and R. Bonfil (Eds.). Technical Manual for the Management of Elasmobranchs. Asia Pacific Economic Cooperation Secretariat, Singapore. Chapter 13. Pp. 285–321.

Walker, T.I. 2007. The state of research on chondrichthyan fishes. *Marine and Freshwater Research*, 58(1), 1–3.

8. ACRONYMS

AMP	Áreas Marinas Protegidas / Marine Protected Areas
ANC	Acuario Nacional de Cuba / National Aquarium of Cuba
CICA	Centro de Inspección y Control Ambiental / Center for Inspection and Environmental Control
CIEC	Centro de Investigaciones de Ecosistemas Costeros / Center for Coastal Ecosystem Research
CIM	Centro de Investigaciones Marinas / Center for Marine Research
CIP	Centro de Investigaciones Pesqueras / Center for Fisheries Research
CITES	Convención sobre el Comercio Internacional de Especies Amenazadas de Flora y Fauna Silvestres / Convention on International Trade in Endangered Species of Wild Flora and Fauna
CITMA	Ministerio de Ciencia, Tecnología y Medio Ambiente / Ministry of Science, Techonology and the Environment
CMS	Convention on the Conservation of Migratory Species of Wild Animals (Convención sobre la Conservación de las Especies Migratorias de Animales Silvestres)
CNAP	Centro Nacional de Áreas Protegidas / National Protected Areas Center
COBI	Organización No Gubernamental "Comunidad y Biodiversidad", México / Mexican NGO “Community and Biodiversity”
COFI	Committee of Fisheries (Comité de Pesquerías) FAO
COSPE	Cooperación para el Desarrollo de Países Emergentes / Italian NGO “Cooperation for the Development of Emerging Countries”
DC	Defensa Civil / Civil Defense
DRPC	Dirección de Regulaciones Pesqueras y Ciencias / Directorate of Fishing Regulations and Sciences
EDF	Environmental Defense Fund (Fondo para la Defensa del Medio Ambiente) USA
ENPFF	Empresa Nacional para la Protección de la Flora y la Fauna / National Enterprise for the Protection of Flora and Fauna
FAO	Food and Agriculture Organization of the United Nations (Organización de las Naciones Unidas para la Agricultura y la Alimentación)
FCPD	Federación Cubana de Pesca Deportiva / Cuban Federation of Sport Fishing (private comercial fishing)
GEIA	Grupo Empresarial de la Industria Alimentaria / Food Industry Enterprise Group
IdO	Instituto de Oceanología / Oceanology Institute
IMV	Medicia Veterinaria / Veterinary Medicine
INDER	Instituto Nacional de Deporte y Recreación / National Institute of Sports and Recreation
MES	Ministerio de Educación Superior / Ministry of Superior

	Education
MINAL	Ministerio de la Industria Alimentaria / Ministry of the Food Industry
MINTUR	Ministerio de Turismo / Ministry of Tourism
MML	Mote Marine Laboratory (Laboratorio Marino Mote) USA
ONEI	Oficina Nacional de Estadistica e Informacion / National Office of Statistics and Information
PAI-Tiburones	Plan de Acción Internacional para la Conservación y Ordenamiento de los Tiburones (IPOA-Sharks)
PAN-Tiburones	Plan de Acción Nacional de Manejo y Conservación de Condrictios de la República de Cuba (NPOA-Sharks)
RH	Recursos Hidráulicos / Hydraulic Resources
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales, México / Mexico's Secretary of the Environment and Natural Resources
SNAP	Sistema Nacional de Áreas Protegidas / National System of Protected Areas
SPAW	Protocol Concerning Specially Protected Areas and Wildlife (Protocolo sobre Áreas Protegidas y Vida Silvestre)
TGF	Tropas Guardafronteras / Border Troops
UAS	Universidad Autónoma de Sinaloa, México / Autonomous Univeristy of Sinaloa, Mexico
UEB	Unidades Empresariales de Base / Local Fishing Production Units
UH	Universidad de La Habana / University of Havana
UICN	Unión Internacional para la Conservación de la Naturaleza (IUCN)
USA	United States of America, Estados Unidos de América
ZBREUP	Zonas Bajo Régimen Especial de Uso y Protección / Zones Under a Special Use and Protection Regimen

9. APPENDICES

Appendix I.

List of shark and ray species historically registered in Cuban waters (*Inventory from inter-institutional monitorings CIM, CIEC, CIP y MINAL; **Species frequently caught but only identified to genus).

Group	Species	Guitart (1979)	Rodríguez and Valdés (1982)	Claro and Robertson (2010)	Monitorings (2010-2015)*
	Alopias vulpinus		x	x	
	Apristurus riveri	x		x	
	Carcharhinus falciformis	x	x	x	x
	Carcharhinus acronotus	x	x	x	x
	Carcharhinus altimus	x	x	x	
	Carcharhinus brevipinna	x	x	x	
	Carcharhinus leucas	x	x	x	x
	Carcharhinus limbatus	x	x	x	x
	Carcharhinus longimanus	x	x	x	x
	Carcharhinus obscurus	x	x	x	x
	Carcharhinus perezii	x	x	x	x
	Carcharhinus plumbeus	x	x	x	x
	Carcharhinus signatus	x	x	x	x
	Carcharodon carcharias	x	x	x	
	Centrophorus granulosus	x		x	
	Centroscymnus coelolepis			x	
	Cetorhinus maximus		x	x	
	Eridacnis barbouri			x	
	Etmopterus hillianus	x		x	
	Galeocerdo cuvier	x	x	x	x
	Galeus arae	x		x	
	Ginglymostoma cirratum	x	x	x	x
	Heptranchias perlo	x		x	
	Hexanchus griseus	x	x	x	x
	Hexanchus nakamurai	x			x
	Isurus oxyrinchus	x	x	x	x
	Isurus paucus	x	x	x	x
	Mustelus canis	x	x	x	x
	Negaprion brevirostris	x	x	x	x
	Prionace glauca	x	x	x	x
	Rhincodon typus	x	x	x	x
	Rhizoprionodon porosus	x		x	x**
	Rhizoprionodon terraenovae		x	x	x **
	Scyliorhinus boa	x		x	
	Scyliorhinus torrei	x		x	
	Sphyrna lewini	x	x	x	x
	Sphyrna mokarran	x	x	x	x
	Sphyrna tiburo	x	x	x	x
	Sphyrna zygaena	x	x		x
	Squalus acanthias			x	

Group	Species	Guitart (1979)	Rodríguez and Valdés (1982)	Claro and Robertson (2010)	Monitorings (2010-2015)*
Rays	***Aetobatus narinari***	x			x
	Anacanthobatis longirostris			x	
	Benthobatis marcida	x			
	Breviraja colesi			x	
	Cruriraja atlantis			x	
	Cruriraja poeya			x	
	Dasyatis americana	x		x	x
	Dasyatis guttata	x		x	x
	Dasyatis sabina	x		x	x
	Dasyatis say	x			
	Dipturus teevani			x	
	Fenestraja atripinna			x	
	Fenestraja cubensis			x	
	Fenestraja ishiyamai			x	
	Fenestraja plutonia			x	
	Fenestraja sinusmexicanus			x	
	Himmantura schmardae	x		x	x
	Manta birostris	x		x	
	Mobula hypostoma			x	
	Narcine bancroftii	x		x	
	Pristis pectinata	x		x	
	Rhinobatos percellens			x	
	Rhinoptera bonasus	x		x	
	Torpedo nobiliana	x			
	Urobatis jamaicensis	x		x	
Chimerae	***Chimaera cubana***	x		x	

Appendix II.

List of state fishing enterprises and their local fishing production units (UEB).

FISHING ENTERPRISES	UEB	COAST
Empresa Pesquera Industrial de la Coloma (EPICOL) Pinar del Río	1. Boca de Galafre	South
	2. Cortés	South
	3. Arroyos de Mantua	North
	4. Puerto Esperanza	North
	5. Coloma	South
	6. Morrillo	North
Empresa Pesquera Industrial de Batabanó (PESCAHABANA) Mayabeque	7. Batabanó	South
	8. Cabañas	North
Empresa Pesquera Matanzas (PESCAMAT)	9. Cárdenas	North
	10. Ciénaga de Zapata	South
Empresa Pesquera Industrial de Cienfuegos (EPICIEN)	11. Escasur	South
Empresa Pesquera Industrial de Caibarién (EPICAI) Villa Clara	12. Caimar	North
	13. Isamar	North
	14. Pamar	North
	15. Cahamar	North
Empresa Pesquera Industrial de Sancti Spíritus (EPISAN)	16. Pescasilda.	South
	17. Pescazaza	South
Empresa Pesquera Industrial Ciego de Ávila (EPIVILA)	18. Júcaro	South
	19. Punta Alegre	North
	20. Turiguanó	North
Empresa Pesquera Industrial de Santa Cruz (EPISUR) Camagüey	21. Santa Cruz del Sur	South
	22. Nuevitas	North
	23. Playa Florida	South
Empresa Pesquera Industrial de Níquero (EPINIQ) Granma	24. Escabo	South
	25. Extraniq	South
	26. Caimar	South
	27. Baramar	North
	28. Punta Gorda	South
Empresa Pesquera Industrial de Granma (EPIGRAN)	29. Manzanillo	South
	30. Guayabal	South
	31. Manatí	North
	32. Puerto Padre	North
Empresa Pesquera Industrial de la Isla de la Juventud (PESCAISLA)	33. Islamar	South
Empresa Pesquera Industrial de Holguín (PESCAHOL)	34. Conchazul	North
	35. Pescanipe	North

Appendix III.

List of private fishing bases per province and associated state fishing enterprises with which they have a contract.

PROVINCE	ENTERPRISE		PRIVATE FISHING BASE
Pinar del Rio	PESCARIO	1	La Fe
Pinar del Rio	PESCARIO	2	Santa Lucía
Pinar del Rio	PESCARIO	3	Pajarito
Pinar del Rio	PESCARIO	4	La Mulata
Pinar del Rio	PESCARIO	5	La Salina
Pinar del Rio	PESCARIO	6	Boca San Diego
Pinar del Rio	PESCARIO	7	Dayaniguas
Pinar del Rio	EPICOL	8	Cortés
Pinar del Rio	EPICOL	9	La Yana
Pinar del Rio	EPICOL	10	Arroyos de Mantua
Pinar del Rio	EPICOL	11	Dimas
Pinar del Rio	EPICOL	12	Puerto Esperanza
Pinar del Rio	EPICOL	13	Punta de Piedra
Pinar del Rio	EPICOL	14	Morrillo
Pinar del Rio	EPICOL	15	Boca de Galafre
Pinar del Rio	EPICOL	16	Punta de Cartas
Pinar del Rio	EPICOL	17	La Coloma
Pinar del Rio	EPICOL	18	La Playita
Mayabeque	PESCAHABANA	19	Punta Mariel
Mayabeque	PESCAHABANA	20	Cabañas
Mayabeque	PESCAHABANA	21	Boca Mariel
Mayabeque	PESCAHABANA	22	Guanímar
Mayabeque	PESCAHABANA	23	Cajío
Mayabeque	PESCAHABANA	24	Batabanó
Mayabeque	ACUABANA	25	Playa Baracoa
Mayabeque	ACUABANA	26	Boca Jaruco
Mayabeque	ACUABANA	27	Santa Cruz del Norte
Mayabeque	ACUABANA	28	Puerto Escondido
Mayabeque	ACUABANA	29	Majana
Mayabeque	ACUABANA	30	Rosario
Mayabeque	ACUABANA	31	Caimito
Mayabeque	ACUABANA	32	Tasajera
La Habana	COPMAR	33	Santa Fe
La Habana	COPMAR	34	Jaimanitas
La Habana	COPMAR	35	Juan Manuel Márquez
La Habana	COPMAR	36	Camilo Cienfuegos
La Habana	COPMAR	37	Granma
La Habana	COPMAR	38	Casa Blanca
La Habana	COPMAR	39	Bernardino García
La Habana	COPMAR	40	Ernest Hemingway

PROVINCE	ENTERPRISE		PRIVATE FISHING BASE
La Habana	COPMAR	41	Guanabo
Matanzas	PESCAMAT	42	Camilo Cienfuegos
Matanzas	PESCAMAT	43	Pedro H Mendoza
Matanzas	PESCAMAT	44	Pedro H Mendoza 2
Matanzas	PESCAMAT	45	Rio San Juan
Matanzas	PESCAMAT	46	Reynold García
Matanzas	PESCAMAT	47	Ernesto Acosta
Matanzas	PESCAMAT	48	Luis Salgado
Matanzas	PESCAMAT	49	José A Echevarría
Matanzas	PESCAMAT	50	Cárdenas
Matanzas	PESCAMAT	51	Varadero
Matanzas	PESCAMAT	52	Boca Camarioca
Matanzas	PESCAMAT	53	Salinas
Matanzas	PESCAMAT	54	Guasasa
Matanzas	PESCAMAT	55	Cocodrilo
Matanzas	PESCAMAT	56	Caletón
Matanzas	PESCAMAT	57	Playa Girón
Matanzas	PESCAMAT	58	San Agustín
Villa Clara	EPICAI	59	Panchita
Villa Clara	EPICAI	60	El Salto
Villa Clara	EPICAI	61	Carahatas
Villa Clara	EPICAI	62	Uvero
Villa Clara	EPICAI	63	Isabela
Villa Clara	EPICAI	64	Río Sagua
Villa Clara	EPICAI	65	El Santo
Villa Clara	EPICAI	66	Nazabal
Villa Clara	EPICAI	67	Piñón
Villa Clara	EPICAI	68	Juan Francisco
Villa Clara	EPICAI	69	Jinaguayabo
Villa Clara	EPICAI	70	Caibarién
Cienfuegos	EPICIEN	71	Laguna del Cura
Cienfuegos	EPICIEN	72	Castillo Jagua
Cienfuegos	EPICIEN	73	Playa Inglés
Sancti Spíritus	EPISAN	74	Casilda
Sancti Spíritus	EPISAN	75	La Boca
Sancti Spíritus	EPISAN	76	Playa Vitoria
Sancti Spíritus	EPISAN	77	San Pedro
Sancti Spíritus	EPISAN	78	Tunas de Zaza
Ciego de Ávila	EPIVILA	79	Punta Alegre
Ciego de Ávila	EPIVILA	80	Máximo Gómez
Ciego de Ávila	EPIVILA	81	Boca de Manatí-Turiguanó
Ciego de Ávila	EPIVILA	82	La Zanja
Ciego de Ávila	EPIVILA	83	Palmarito
Ciego de Ávila	EPIVILA	84	Júcaro

PROVINCE	ENTERPRISE		PRIVATE FISHING BASE
Ciego de Ávila	EPIVILA	85	Baraguá
Camagüey	EPISUR	86	Jigüey
Camagüey	EPISUR	87	Puerto Piloto
Camagüey	EPISUR	88	Guanaja
Camagüey	EPISUR	89	Nuevitas
Camagüey	EPISUR	90	Playa Florida
Camagüey	EPISUR	91	Dársena
Camagüey	EPISUR	92	Manoplas
Holguín	PESCAHOL	93	Cabonico
Holguín	PESCAHOL	94	Carbón
Holguín	PESCAHOL	95	Cabal (Nicaro)
Holguín	PESCAHOL	96	Caballeriza (Nicaro)
Holguín	PESCAHOL	97	El Mesón
Holguín	PESCAHOL	98	Canal
Holguín	PESCAHOL	99	Río Mayarí
Holguín	PESCAHOL	100	El Rancho (Guatemala)
Holguín	PESCAHOL	101	Los Muros (Guatemala)
Holguín	PESCAHOL	102	Catanga (Guatemala)
Holguín	PESCAHOL	103	Camilo Cienfuegos
Holguín	PESCAHOL	104	Juan Vicente
Holguín	PESCAHOL	105	Aserrío
Holguín	PESCAHOL	106	Playita
Holguín	PESCAHOL	107	Capiro
Holguín	PESCAHOL	108	El Ramón
Holguín	PESCAHOL	109	Lengua de Tierra
Holguín	PESCAHOL	110	Nicaragua (Macabí)
Holguín	PESCAHOL	111	Embarcadero
Holguín	PESCAHOL	112	Torronteras
Holguín	PESCAHOL	113	Puerto Rico
Holguín	PESCAHOL	114	Punta Mula
Las Tunas	PESCAHOL	115	La Herradura
Las Tunas	PESCAHOL	116	Cascarero
Holguín	PESCAHOL	117	Río Seco
Holguín	PESCAHOL	118	Boca Samá
Holguín	PESCAHOL	119	Pajarito
Holguín	PESCAHOL	120	Guardalavaca
Holguín	PESCAHOL	121	Puerto Vita
Holguín	PESCAHOL	122	Tumbadero
Holguín	PESCAHOL	123	Playa Blanca
Holguín	PESCAHOL	124	Jururú
Holguín	PESCAHOL	125	Gibara
Holguín	PESCAHOL	126	Caletones
Holguín	PESCAHOL	127	Yamaniguey
Holguín	PESCAHOL	128	Cañete

PROVINCE	ENTERPRISE	PRIVATE FISHING BASE
Holguín	PESCAHOL	129 Cupey
Holguín	PESCAHOL	130 Punta Gorda
Holguín	PESCAHOL	131 La Playa
Holguín	PESCAHOL	132 Puerto Moa
Holguín	PESCAHOL	133 Yaguaneque
Holguín	PESCAHOL	134 Cañada Amarilla
Holguín	PESCAHOL	135 La bomba País
Holguín	PESCAHOL	136 El Muelle F. País
Holguín	PESCAHOL	137 Punta Gorda País
Holguín	PESCAHOL	138 Barredera
Holguín	PESCAHOL	139 Boca de Tánamo
Holguín	PESCAHOL	140 Carenerito
Las Tunas	EPIGRAN	141 Manatí
Las Tunas	EPIGRAN	142 Sabanalamar
Las Tunas	EPIGRAN	143 La Jíbara
Las Tunas	EPIGRAN	144 El Socucho
Las Tunas	EPIGRAN	145 Río Delicias
Las Tunas	EPIGRAN	146 Carúpano
Las Tunas	EPIGRAN	147 Puerto Padre
Las Tunas	EPIGRAN	148 Guayabal
Granma	EPIGRAN	149 INDER
Granma	EPIGRAN	150 Malecón
Granma	EPIGRAN	151 12 de Agosto
Granma	EPIGRAN	152 ICH
Granma	EPIGRAN	153 Troya
Granma	EPIGRAN	154 Pino Mar
Granma	EPIGRAN	155 Campechuela
Granma	EPINIQ	156 Media Luna
Granma	EPINIQ	157 Níquero
Granma	EPINIQ	158 Palma la Cruz
Granma	EPINIQ	159 Belic
Granma	EPINIQ	160 Marea de Belic
Granma	EPINIQ	161 Las Coloradas
Granma	EPINIQ	162 Cabo Cruz
Granma	EPINIQ	163 Marea del Portillo
Granma	EPINIQ	164 Boca del Toro
Granma	EPINIQ	165 Pilón
Santiago de Cuba	EPINIQ	166 Siboney
Santiago de Cuba	EPINIQ	167 Trocha (Cangrejito)
Santiago de Cuba	EPINIQ	168 Nispero
Santiago de Cuba	EPINIQ	169 Cayo Granma
Santiago de Cuba	EPINIQ	170 Bahía Larga
Santiago de Cuba	EPINIQ	171 Boca Dos Ríos
Santiago de Cuba	EPINIQ	172 Aserradero

PROVINCE	ENTERPRISE	PRIVATE FISHING BASE
Santiago de Cuba	EPINIQ	173 Cañizo
Santiago de Cuba	EPINIQ	174 El Mazo
Santiago de Cuba	EPINIQ	175 Tabacal
Santiago de Cuba	EPINIQ	176 Chivirico
Santiago de Cuba	EPINIQ	177 Las Cuevas
Santiago de Cuba	EPINIQ	178 Ocujal
Santiago de Cuba	EPINIQ	179 Uvero
Santiago de Cuba	EPINIQ	180 La Plata
Santiago de Cuba	EPINIQ	181 Uvita
Guantánamo	EPINIQ	182 Bahía Baracoa
Guantánamo	EPINIQ	183 Boca de Miel
Guantánamo	EPINIQ	184 Bahía de Mata
Guantánamo	EPINIQ	185 Bahía de Boma
Guantánamo	EPINIQ	186 El Manglito
Guantánamo	EPINIQ	187 Yumurí
Guantánamo	EPINIQ	188 Morel
Guantánamo	EPINIQ	189 Cayo Guín
Guantánamo	EPINIQ	190 Boca de Jauco
Guantánamo	EPINIQ	191 Nibujón (Jaragua)
Guantánamo	EPINIQ	192 Caimanera
Guantánamo	EPINIQ	193 Sabanalamar
Guantánamo	EPINIQ	194 Rio Imías
Guantánamo	EPINIQ	195 Punta Maisí
Isla de Juventud	PESCAISLA	196 Río las Casas

Appendix IV.

List of species caught by commercial fishing and the gear used (information obtained by MINAL and CIM)

Group	Species	Long line	Drift Net	Shrimp Trawl	Purse Seine
Sharks	*Carcharhinus falciformis*	x	x		
	Carcharhinus perezii		x		
	Ginglymostoma cirratum	x	x		
	Sphyrna lewini		x	x	
	Carcharhinus acronotus		x		
	Sphyrna mokarran	x	x		
	Galeocerdo cuvier	x	x		
	Carcharhinus plumbeus	x			
	Carcharhinus leucas	x	x		
	Isurus paucus	x			
	Isurus oxyrinchus	x			
	Carcharhinus longimanus	x			
	Squalus cubensis	x			
	Mustelus canis	x			
	Hexanchus griseus	x			
	Negaprion brevirostris	x	x		
	Alopias superciliosus	x			
	Carcharhinus limbatus	x			
	Sphyrna zygaena	x			
	Prionace glauca	x			
	Rhizoprionodon spp	x		x	
	Carcharhinus signatus	x			
	Sphyrna tiburo			x	
	Carcharhinus obscurus		x		
	Hexanchus nakamurai	x			
	Aetobatus narinari	x	x	x	
Rays	*Dasyatis guttata*		x	x	x
	Himantura schmardae	x	x	x	x
	Dasyatis sabina				x
	Dasyatis americana	x	x	x	

Appendix V.

List of shark and ray species registered in Cuban waters and included in CITES Appendix II.

Scalloped hammerhead shark (*Sphyrna lewini*)
Great hammerhead shark (*Sphyrna mokarran*)
Smooth hammerhead shark (*Sphyrna zygaena*)
Oceanic whitetip shark (*Carcharhinus longimanus*)
Basking shark (*Cetorhinus maximus*)
Great white shark (*Carcharodon carcharias*)
Whale shark (*Rhincodon typus*)
Mantas (*Manta spp*)