



TROPICAL CONSERVATION PLAN FOR THE PROTECTION OF GREAT HAMMERHEAD SHARK (*Sphyrna mokarran*)

By: COLOMBIA WILD CORPORATION



SUMMARY

The management plans for the conservation the sharks of the genus 'Sphyrna' and their habitats are mainly based on the approach of guides that allow linking and promoting adequate management for their preservation. The applicability and success of such management depend mainly on the implementation of action plans with different lines by environmental authorities such as CAR and Arahuac indigenous community, research institutes, private and public universities, governmental and non-governmental organizations, and other actors involved in the country.

For this reason, an articulation of actors is necessary as a strategic alliance for the conservation and protection of of the sharks of the genus 'Sphyrna', whose habitat is the Caribbean Sea; mainly Great Hammerhead (*Sphyrna mokarran*), listed as critically endangered CR by IUCN using five lines of action associated with the National Conservation Program of this endemic species of Colombia, that allow the use and

guarantee of tactics to strengthen the environmental management plan, unifying efforts at the regional and national levels.

The lines of action of this Management and Conservation Plan are organized as follows:

1. Inventory and knowledge of the species.
2. Sustainable management and use.
3. Education and community participation.
4. Information and disclosure.
5. Institutional strategic alliances for the conservation

Each line of action includes objectives, goals, actions, indicators, responsible parties involved and deadlines; focused on the conservation and protection of the species in an effective and sustainable way, promoting education and awareness about its cultural, historical and biological importance within and outside the ecosystem of the jurisdiction of the Regional Autonomous Corporation - CARSUCRE, implementing awareness-raising mechanisms and community participation, likewise, are aimed at the development of legal tools that guarantee the conservation of the Great Hammerhead (*Sphyrna mokarran*) in its natural habitat according to the social, economic and cultural panorama of the nation.

1. SYSTESIS OF THE TARGET SPECIES

1.1. TAXONOMY

- (i) Great Hammerhead
(*Sphyrna mokarran*)
- (ii) Scalloped Hammerhead
(*Sphyrna lewini*)
- (iii) Smalleye Hammerhead
(*Sphyrna tudes*)



Taxonomic note

In the region there was no clarity regarding the recognized species, where Great Hammerhead (*Sphyrna mokarran*), Scalloped Hammerhead (*Sphyrna lewini*)



And Smalleye Hammerhead (*Sphyrna tudes*) were distinguished as separate taxa. Faria et al.

1.2. JUSTIFICATION

Great Hammerhead (*Sphyrna mokarran*) is a species that presented a wide distribution in the southern Caribbean and the Colombian Pacific, and that was considered Critically Endangered in the previous national evaluation under the name of Great Hammerhead (*Sphyrna mokarran*), taking into account that its last records dated from more than 20 at 9 years in the Colombian Caribbean and Pacific, respectively (Acero et al. 2002). The size of their populations is assumed to be minimal given their high vulnerability to fishing (industrial and artisanal) and the deterioration of their habitats.

Currently, there is evidence of the presence of 18 mature specimens of this species in the Colombian Caribbean and it is suggested, based on the traditional knowledge of artisanal fishermen, that it is probable that there are no natural populations in the area (Caldas et al. 2014).

1.3. Diagnosis

Previously depressed body, whose face is prolonged in the form of a hammerhead shark with a row of prominent teeth on each side (14 to 20 pairs). Posterior region of the head, trunk and pectoral fins slightly enlarged forming a triangular disc. Eyes and spiracles on the top of the head, transverse and straight mouth, without beards or grooves, small, numerous teeth

Global Category

Critically Endangered CR

and arranged in a band along the jaws. Nostrils anteriorly and completely separated from the mouth. Two large widely separated dorsal fins and tail fin lobes well differentiated. Coloring: Marine individuals are brown to dark gray, while freshwater individuals are gray with some reddish areas; the first dorsal fin may be pale yellow with reddish free end. Size: it can reach up to 7 m LT and a weight of 600 kg, although it is common up to 4 m (Cervigón et al. 1992, Cervigón and Alcalá 1999, McEachran and de Carvalho 2002a, Robertson and Allen 2015, Robertson et al. 2015).



Global geographic distribution: hammerhead shark is distributed global in the western and eastern regions of the Atlantic, eastern Pacific and Indo-Pacific, in tropical coastal waters, including estuarine areas and river mouths (Kyne et al. 2013). National: it has been registered in different locations in the Colombian Caribbean, specifically on the island of



Salamanca, Cartagena Bay, Cispatá Bay, Urabá Gulf, Atrato River Basin, Magdalena River and Sinú River (Dahl 1964, 1971, Álvarez-León and Blanco 1985, Acero et al. 1986, Gómez-Rodríguez et al. 2014). Artisanal fishermen point it out for the entire Colombian Pacific, although there are specific records in Bahía Cuevita (Baudó), Bahía Buenaventura, mouth of the San Juan river, Gulf of Tortugas, Punta Coco, Yurumanguí, Naya, Sanquianga, Bahía Solano, Bahía Málaga and Gorgona (Rubio 1988, Rubio and Estupiñán 1992, Acero et al. 2002, Mejía-Falla et al. 2007, SQUALUS Foundation unpublished data). Depth range: 1-10 m (Robertson et al. 2015, Robertson and Allen 2015).

1.4. Population

Although there are no specific population data for Colombia, fishermen from different Pacific regions indicate that individuals of this species used to see more frequently, especially in shallow waters and river mouths. The last record for the Pacific corresponds to an individual caught by an artisanal fisherman with a gillnet in

1.5. Ecology

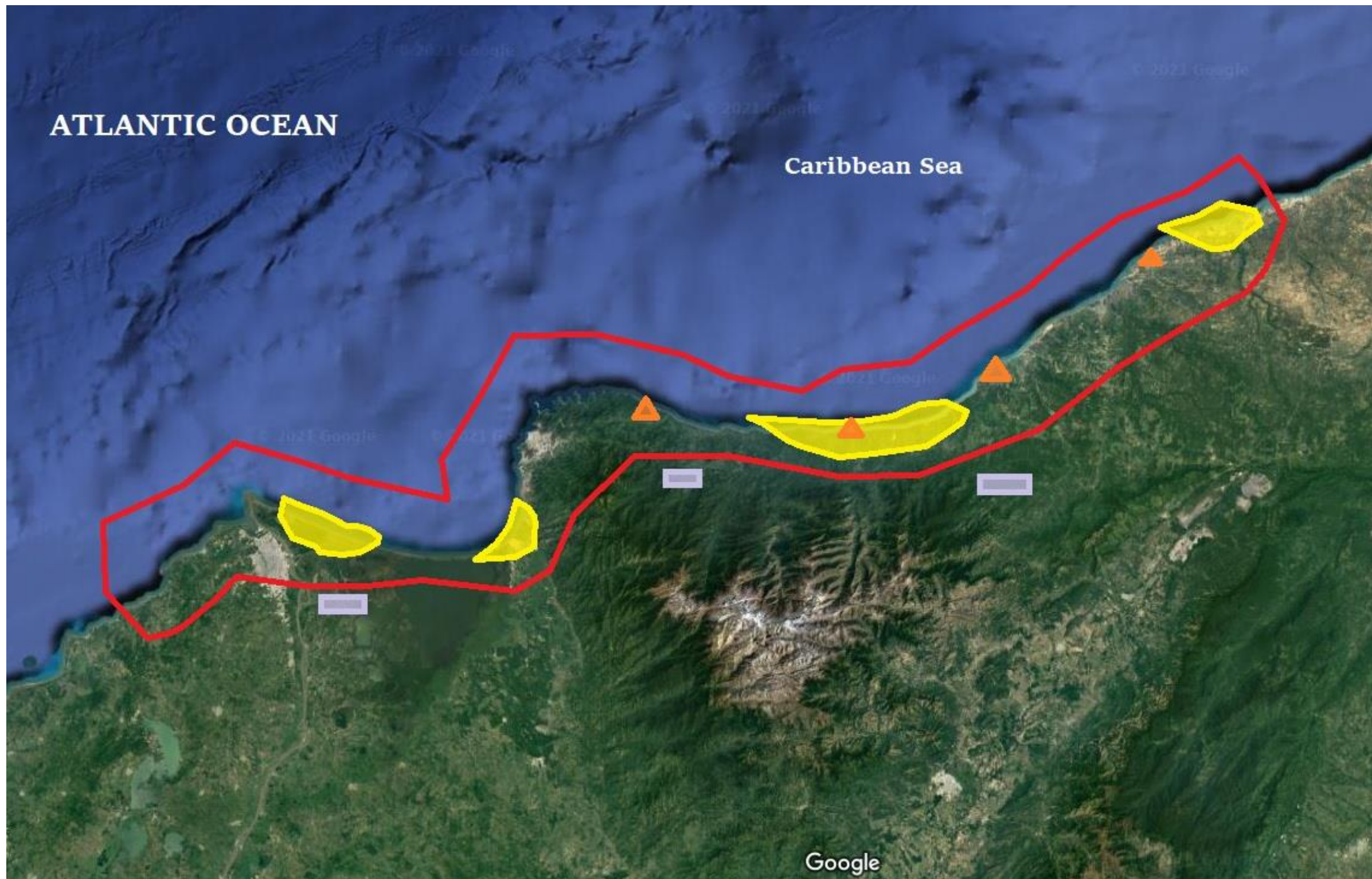
There is no biological information for the species in Colombia. The hammerhead shark is a benthic species, euryhaline (which can tolerate a wide range of salinity), which can generally be found in rivers, lakes, estuaries, and marine waters at depths generally less than 20 m (Robertson and Allen 2015). Juvenile hammerhead shark prefer shallow water, often observed at depths around 0.25 m, which helps them avoid predators (Whitty

November 2007 in Bahía Solano north of Chocó (Fundación SQUALUS unpublished data); This encounter evidenced the presence of the species in the natural environment, but the absence of other records suggests a low abundance.

In the Colombian Caribbean, the most detailed information on hammerhead shark was provided by Dahl (1971), who noted that catches of these specimens were very rare by fishermen and that large individuals were occasionally mentioned. For this region, only punctual records of the hammerhead shark are found, which do not have verifiable supports in collections of reference or other type of record (i.e. filmic or photographic, Grijalba-Bendeck et al. 2009). Taking into account the number of registers and face extensions that have been examined (Caldas et al. 2014, Gómez-Rodríguez et al. 2014), it is likely that for the Colombian Caribbean region Great Hammerhead (*Sphyrna mokarran*) was a less abundant species compared to *P. pectinata*, the other species recorded in the region.





et al. 2009, Simpfendorfer et al. 2010). It mainly feeds on fish, which it captures with its hammer that is agitated on the seabed and in the water column (McEachran and di Sciara 1995, Harrinson and Dulvy 2014).

MAP OF PROJECT AREA




TROPICAL CONSERVATION PLAN FOR THE PROTECTION OF GREAT HAMMERHEAD SHARK (*Sphyrna mokarran*)


Conventions

	Project area
	UUI fishing areas
	Arahua indigenous town
	Illegal trade in shark fins

Scale

 1cm = 50,000m

1. Departments: Bolívar, Magdalena, Guajira
2. Country: Colombia
3. Geographical coordinates
From the Ciénaga de Magdalena:
 11°01'10.0"N 74°39'08.5"W;
To Punto Guamachito:
 11°24'32.6"N 73°08'16.9"W





Like other species in the family, it is characterized by slow growth, late maturity and low fertility, which generally contributes to a low intrinsic rate of population increase, estimated between 0.03 and 0.12 in different regions; (Simpfendorfer 2000). It is a lecithotrophic aplacental viviparous species, with both functional ovaries, but mainly uses the left one. In the Nicaraguan lake, females give birth to 1 to 13 offspring per litter, measuring between 60-76 cm LT, after a gestation period of five months. The reproductive cycle is possibly biennial in the western Atlantic (Thorson 1976), and appears to be annual in northern Australia (Peverell 2009), where birth sizes between 72-90 cm LT, maturity sizes 300 cm LT are suggested for females and 280-300 cm LT for males, maturity age 8-10 years and

maximum age 35 years (Thorburn et al. 2004, Peverell 2009, Whitty et al. 2008).

1.6. Applications

The hammerhead shark has historically been in great demand in commerce, with fins, meat, rostral extensions, liver and skin being identified as the main parts of the commercialization (McDavitt 1996). In Colombia the main product in demand is the fin, which are used as ornaments in restaurants and public places, as well

as to make crafts. Likewise, it is known by artisanal fishermen that meat and fins were commercialized in the country (Caldas et al. 2014, Navia et al. 2008a, Navia et al. 2009).

1.7. Threats

Because the species is restricted to habitats in shallow coastal areas, hammerhead shark populations have been strongly affected by different human activities over time, such as habitat degradation and fishing. In the latter case, the interaction becomes greater since hammerhead shark are very susceptible to becoming entangled in fishing nets, particularly due to the extension of the hammer-shaped face (Dahl 1971, Navia et al. 2008a, Navia et al. 2009). Although they are considered rare in fishermen's catches, large specimens they present great danger in their manipulation by the hammerhead shark (Dahl 1971).



Figure 2. Bycatch of hammerhead shark. **Source:** COLOMBIA WILD CORPORATION

1.8. Conservation measures taken

In Colombia there are no specific conservation measures for this species; however, in the National Action Plan for the Conservation and Management of Sharks, Rays and Chimeras of Colombia (PAN-Sharks Colombia), hammerhead shark were identified as species with Very High Priority for conservation, and therefore they should be focus research and management efforts on this species (Caldas et al. 2010). The PAN-Sharks Colombia was adopted by Presidential Decree 1124 of 2013 and involves a monitoring Committee created by Resolution 0272 of 2014 of the Ministry of Agriculture, which generates a formal mechanism for the implementation of the actions associated to it in the country, and

that can support future actions for the conservation of the species.

Great Hammerhead (*Sphyrna mokarran*) species are listed in Appendix I of the CITES Convention, so their international trade is prohibited and allowed only under particular conditions for non-commercial purposes. Great Hammerhead (*Sphyrna mokarran*) has been categorized as Critically Endangered (CR) globally by IUCN, taking into account that populations in some distribution areas have apparently been extirpated, with a significant reduction in their extent of occurrence (Kyne et al. 2013).

Proposed conservation measures



In the first edition of the Red Book of Marine Fish of Colombia (Acero et al. 2002) the urgent need to establish a total closure for the species was identified, however, to date, no specific actions have been developed towards it. Taking into account that the extinction of this species is suspected for the Colombian Caribbean and

there is a greater probability of finding individuals in the Pacific region, it is essential to carry out studies that allow confirming or ruling out the presence of specimens in the natural environment in the Caribbean, and evaluating the distribution and abundance in the Pacific.

2. CONSERVATION PLAN

2.1. LINE OF ACTION 1: INVENTORY AND KNOWLEDGE OF THE SPECIES.

Objective	Goals	Timeline
Collect information through an inventory of distribution geographic, biological and populational of the species, and of the collection ichthyological in water bodies of Cundinamarca in CAR jurisdiction	Have a database on the geographical distribution of the species, including characteristics morphological, biological, habitat and distribution in water bodies within Cundinamarca, jurisdiction CAR	2 years for the elaboration of maps and every four years the update of information
	Update existing cartography on the distribution of the species captain of the savannah, in which the presence or absence of this, in water bodies within the jurisdiction of the CAR	
Establish physical conditions, chemical and biological habitat Great Hammerhead (Sphyrna mokarran)	Generate a methodology for taking physical, chemical and biological that allow to carry out all research associated with the species.	2 years
Establish a monitoring system and monitoring the Great Hammerhead (Sphyrna mokarran), having a control of the itself and thus guarantee the conservation of the species	Preserve the Great Hammerhead (Sphyrna mokarran) in the water bodies of CAR territory.	2 years

Table 1. Component 1 objectives.



Actions	Indicators	Stakeholders
Find out which are the main environmental entities and government who are within the study area.	Information collected from the species per semester during the term raised.	Research institutes, government entities, nongovernment and universities public and private
Request secondary information from Ichthyological data of the species at respective environmental entities and governmental.		
Elaboration of cartography of the spatial location of the species in Cundinamarca water bodies, CAR jurisdiction, where evidence the presence of this, including coordinates, basins, coverage Vegetable and fauna associated with the basin from the river.	Number of maps produced by two years.	Research institutes, government entities, nongovernment and universities public and private
Diagnose the quality of water bodies where the sort by implementing of physicochemical parameters and biological.	Number of physical parameters, chemical and biological reported by each report generated, based on the proposed methodology.	Research institutes, government entities, nongovernment and universities public and private
Perform periodic monitoring that allow you to keep a record of individuals in the water bodies of the CAR territory	Number of individuals monitored per water body	Research institutes, government entities, nongovernment and universities public and private



2.2. LINE OF ACTION 2: SUSTAINABLE MANAGEMENT AND USE.

Objective	Goals	Timeline
Diagnosing anthropogenic threats and biological that generate impacts negatives on the species.	Generate a matrix that consolidates the different biological risk factors and anthropic for the species	2 years
Identify biotic and abiotic factors that favor the increase, the ecological connectivity and conservation Great Hammerhead (<i>Sphyrna mokarran</i>) in the area of jurisdiction	Obtain a list of biotic factors antibiotics that guarantee the prioritization of areas for the conservation of the species.	2 years
Promote conservation initiatives in situ or ex situ for the species and associated ecosystems articulating actions with lines of work investigative around the species	Recover current habitats and potentials of Great Hammerhead (<i>Sphyrna mokarran</i>) and species associated with it, increasing this way the population and its area of distribution	2 years
	Establish a crop of the species to starting from parental males guaranteeing the reproduction and sustainment of fry.	
Determine potential uses of the species with a view to promoting development of productive activities between the artisanal fishing community	Define the potential use of the species.	2 years
Design contingency measures efficient for the recovery of aquatic ecosystems during and after to the dredging process as a measure of cleaning of water bodies.	Use of tools that help minimize environmental impacts during and after dredging	2 years

TROPICAL CONSERVATION PLAN FOR THE PROTECTION OF SHARKS OF THE GENUS 'Sphyrna'

Actions	Indicators	Stakeholders
Identify anthropic activities and environmental.	Number of anthropic activities and environmental by study area	Community surrounding the bodies water, research institutes, government entities, nongovernment and public universities and private
Quantify impacts based on anthropic and environmental activities identified.	Number of recorded negative impacts per monitored water body.	Community surrounding the bodies water, research institutes, government entities, nongovernment and public universities and private
	Number of impacts identified by anthropic and environmental activities identified	
Generate, collect and analyze information biotic and abiotic that allows prioritizing connectivity and conservation areas of the species	Number of biotic and abiotic factors defined for the conservation of species	Community surrounding the bodies water, research institutes, government entities, nongovernment and public universities and private
	Number of aquatic ecosystems evaluated as priority areas and conservation of the species	



	Percentage of strategies generated for increased connectivity between ecosystems that report the presence of the species	
Promote the generation of projects investigative and community that guarantee conservation and use sustainable of the species as well as its habitat	Number of habitats with presence of the species	Community surrounding the bodies water, research institutes, government entities, nongovernment and public universities and private
	Percentage increase in populations	
	Percentage increase in populations associated.	
Promote research initiatives, tending to achieve breeding and breeding of the species in captivity, for the purpose of population recovery	Number of cultivation initiatives of the species	Community surrounding the bodies water, research institutes, government entities, nongovernment and public universities and private
Establish proposals for development of productive activities in communities settled in the area of distribution of the species	Number of productive activities established in communities	Community surrounding the bodies water, research institutes, government entities, nongovernment and public universities and private
Study the different impacts environmental caused during the process dredging.	Type of dredging due to environmental damage caused	Community surrounding the bodies water, research institutes, government entities, nongovernment and public universities and private
Establish environmental projects for stabilization and return to the bodies of the species extracted during the dredging process.	Number of species extracted by number of species successfully returned to water bodies	Community surrounding the bodies water, research institutes, government entities, nongovernment and public universities and private

2.3. Line of action 3: education and community participation

For the adequate conservation of the species under study, it is of utmost importance and very necessary that both the community and the political and environmental organizations know through different activities to the captain of the savannah and in this way guarantee the protection of his ecosystem.

Objective	Goals	Timeline
Design an information system and interactive registration geared towards populations near the bodies of interest, through which make the Emetize catch report and its associated species.	Develop an interactive platform in which the community can carry out the report the catches of Emetize and its associated species	2 yesar



Compile information about the fish captain of the savannah for drawing of pedagogical tools, designed for the use of the community	Select the basic information of the savannah captain fish, for use by the community within the process of conservation of the species.	2 yesar
Produce material and activities pedagogical for different levels of cognitive development on Great Hammerhead (Sphyrna mokarran)	Develop pedagogical tools and / or didactics in more than 60% of the study.	2 yesar

Actions	Indicators	Stakeholders
Develop digital tools for communication as photos of the species, online chat among others that are included on the platform.	Number of people trained by number of reports	Community surrounding the bodies water, research institutes, government entities, nongovernment and universities public and private
Inform and train the community in the management and use of the platform		
Classify master fish information from the database savanna coming from research centers and public and private entities	Amount of relevant information selected by general database.	Community surrounding the bodies water, research institutes, government entities, nongovernment and universities public and private
Design books, folders, books and games interactive on Great Hammerhead (Sphyrna mokarran)	Number of pedagogical tools elaborated by study area	Community surrounding the bodies water, research institutes, government entities, nongovernment and universities public and private
Apply pedagogical tools designed with the community, aimed at conservation of the species.		

2.4. Line of action 4: information and disclosure

Objective	Goals	Timeline
Generate spaces in radio programs locally and regionally as a tool of the species	Broadcasting the program twice by week	2 yesar
Implement informative activities and educational programs aimed at the community office-to-face way to raise awareness from Great Hammerhead (Sphyrna mokarran) state	Two informative and educational activities (Workshops and seminars) biannual for study area	2 yesar



Actions	Indicators	Stakeholders
Perform a string search radial that allow a space Great Hammerhead (Sphyrna mokarran) species information of the savanna.	Airtime of informational space per number of radial chains.	Community surrounding the bodies water, research institutes, government entities, nongovernment and universities public and private
Prepare didactic workshops with different community members like fishermen's associations, leaders' community, schools, companies, among others.	Number of people participating by workshops held	Community surrounding the bodies water, research institutes, government entities, nongovernment and universities public and private
Create an expert panel that develop informative talks and educational on topics related to the Great Hammerhead (Sphyrna mokarran)	Total attendees for talks and seminars given	Community surrounding the bodies water, research institutes, government entities, nongovernment and universities public and private

2.5. Line of action 5: strategic institutional alliances for conservation

Objective	Goals	Timeline
Strengthen management capacity anointer-institutional coordination forth execution of the Management Plan and Conservation of the species in the CAR territory	Establish all strategic alliances possible to benefit compliance of the objectives of the Management Plan and Conservation in each of its stages	2 yesar
Promote community participation in the different activities of the Plan Management and Conservation of the fish species Great Hammerhead (Sphyrna mokarran)	Implement cooperation documents regional, local, national or international that guarantee the implementation of plan	2 yesar
Consolidate social responsibility, environmental and business of all actors involved in conservation of the species	Prepare responsibility projects social and environmental financed or executed by private entities in the framework of the plan's objectives	2 yesar



Actions	Indicators	Stakeholders
Support and strengthen regional initiatives and local, national and international conservation-oriented Great Hammerhead (Sphyrna mokarran) in the CAR territory	Number of local initiatives, regional, national or international implemented	Community surrounding the bodieswater, research institutes, government entities, nongovernment and universities public and private
Promote the consolidation of agreements of inter-institutional cooperation and community participation with their order to manage human resources, logistical and economic that allow the implementation of the plan's actions	Percentage of alliances established in the development of the plan lines.	Community surrounding the bodieswater, research institutes, government entities, nongovernment and universities public and private
Encourage the management and participation of companies and private entities of the region	Number of responsibility projects social and environmental implemented by companies in the region.	Community surrounding the bodieswater, research institutes, government entities, nongovernment and universities public and private