WCS Bangladesh
A Wildlife Conservation Society Program

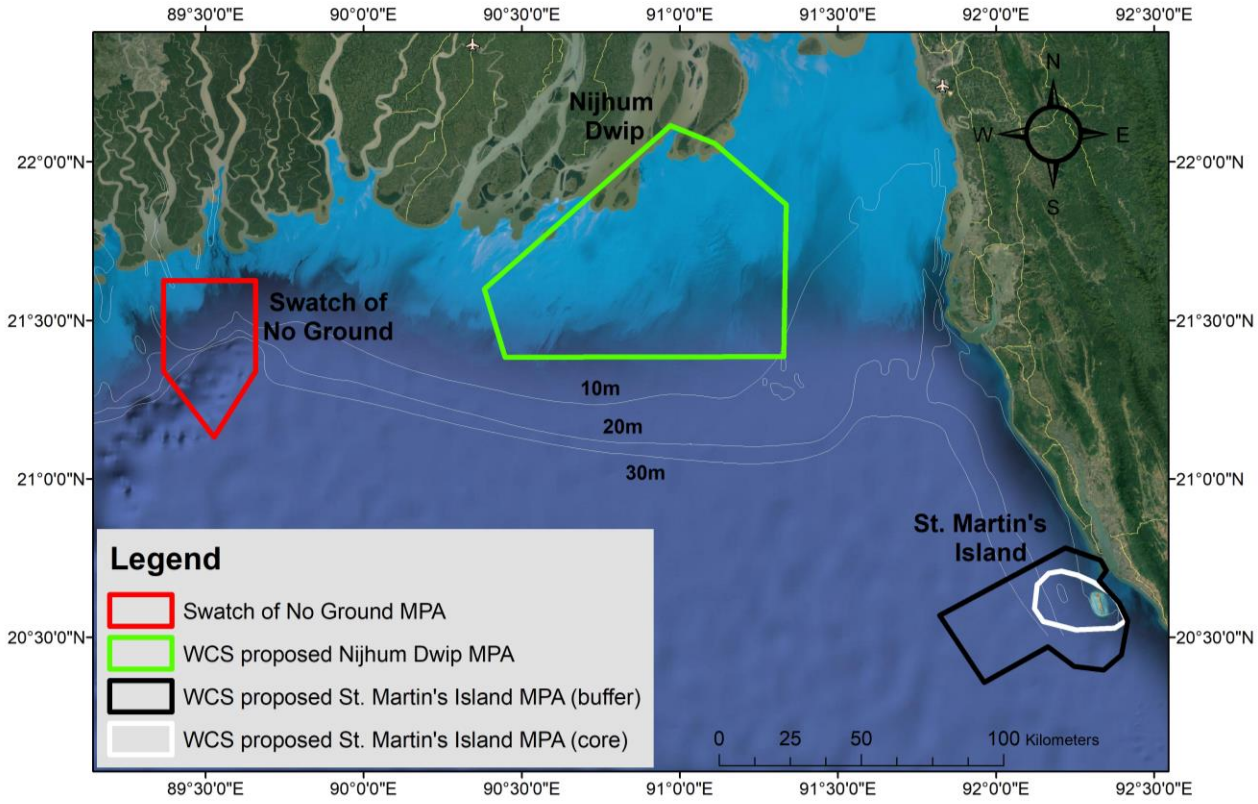
Proposal for a new marine protected area around Saint Martin's Island: A major step towards achieving 10% marine protection in Bangladesh

March 2018

Executive Summary

Protecting priority marine habitat in Bangladesh within an effectively managed network of marine protected areas (MPAs) can provide a safety net for marine biodiversity at global risk of extinction and sustain fisheries vital to food security, local livelihoods and the national economy. This proposal for a new MPA in the waters around Saint Martin's Island reports on the results of surveys conducted by the Wildlife Conservation Society (WCS) Bangladesh Program. These surveys revealed that the waters around St. Martin's Island are a biodiversity "hotspot" supporting a large variety of iconic marine megafauna including globally threatened cetaceans, sharks, rays and marine turtles.

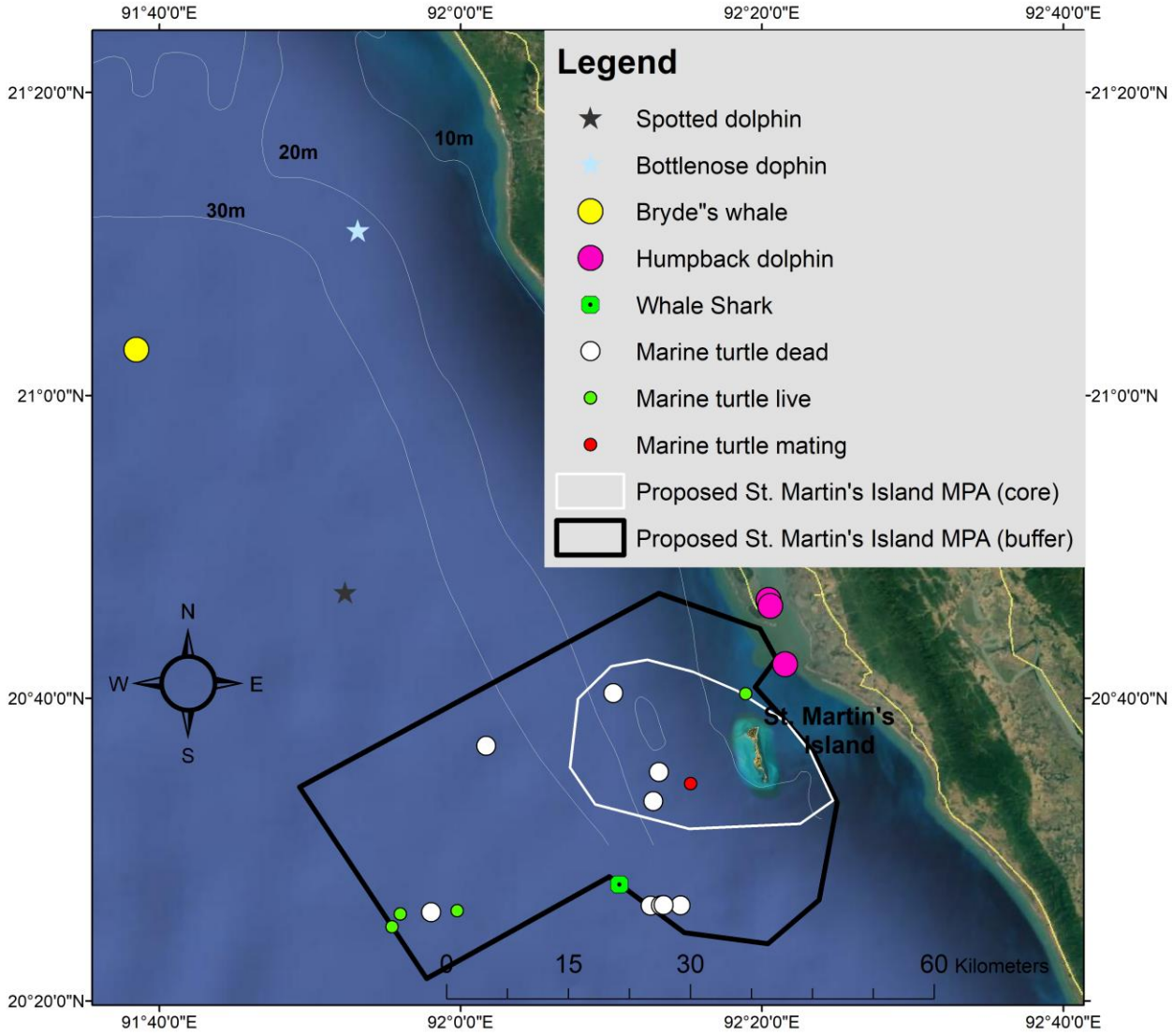
The proposal makes recommendations for establishing a new protected area in the waters around Saint Martin's Island based on rigorous science and community input. An additional proposal is being submitted to the Government of Bangladesh to establish a new MPA in the waters around Nijhum Dwip. Establishing these MPAs would be a major step towards achieving Bangladesh's national goal and international obligation to protect 10% of its marine waters.



Caption: Map showing the boundaries of the existing MPA in the Swatch-of-No-Ground (white) with two potential new MPAs (black) in the waters around Saint Martin's Island and Nijhum Dwip . Together all three MPAs would cover 8.3% of Bangladesh's EEZ.

The proposed new MPA for the waters surrounding St. Martin's island covers 1,743 km^2 or 1.5% of Bangladesh's EEZ. It protects at least 17 species of globally threatened or near threatened marine megafauna or seabirds confirmed as occurring in the area and as many as 28 additional threatened species that are suspected to occur in the waters around Saint Martin's Island but have not yet been recorded. Threatened species (i.e., IUCN Red Listed as Critically Endangered - CR, Endangered – EN, or Vulnerable – VU) confirmed as occurring in the proposed St. Martin's Island MPA include the Indo-Pacific humpback dolphins, whale sharks, ocellated eagle ray, sharpnosed whipray,

Bleeker's whipray, bigeye tuna, giant sea bass, olive ridley turtles, green turtles, loggerhead turtles and black bellied terns. Five other confirmed species and eight suspected species as occurring in Nijhum Dwip are listed as Data Deficient (DD) but may well be classified as threatened after more information becomes known about their status.



Caption. Map of the proposed St. Martin's MPA which if declared would cover 1.5% of Bangladesh's EEZ and protect a large variety of threatened marine megafauna as well as the country's only coral reef

The proposed new MPA in St. Martin's Island, together with the existing MPA in the Swatch-of-No-Ground submarine canyon and open estuarine waters offshore the Sundarbans, cover a total of 3,481 km of marine habitat which is 3.0% of the country's EEZ. If effectively managed these MPAs could provide protection for almost the complete range of marine biodiversity in Bangladesh. They could also provide a foundation for sustaining and enhancing marine fisheries, thereby supporting a sustainable blue economy.

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List of acronyms and abbreviations

AGN	Anchored gill net
BFD	Bangladesh Forest Department
BDT	Bangladeshi Taka
BSS	Beaufort sea-state
BOBLME	Bay of Bengal Large Marine Ecosystem
CR	Critically endangered
DD	Data deficient
DGN	Drifting gill net
EN	Endangered
FGN	Fixed gill net
GBM	Ganges-Brahmaputra-Meghna
GPS	Global Positioning System
GoB	Government of Bangladesh
LC	Least concern
MPA	Marine Protected Area
NP	National Park
NT	Near threatened
NTU	Nephelometric turbidity units
NL	Not listed
PPT	Parts per thousand
SoNG	Swatch-of-No-Ground
SST	Sea surface temperature
SBN	Set bag net
VU	Vulnerable
WCS	Wildlife Conservation Society

BACKGROUND ON MARINE PROTECTED AREAS IN BANGLADESH

Protecting priority marine habitat in Bangladesh within an effectively managed network of marine protected areas (MPAs) can provide a safety net for marine biodiversity at global risk of extinction. Additonally, MPAs in Bangladesh have the potential to support sustainable fisheries vital to the food security and livelihoods of 50 million people living along the country's 750 kilometer long coast due to spillover effects improving fisheries in areas outside of the MPAs. This is a vital consideration given declining fish catches and the difficulties of implementing other management approaches in the diverse small-scale marine fisheries that characterize Bangladesh.

In October 2014, the Government of Bangladesh declared its first and currently only MPA, safeguarding 1,738 km^2 of shallow estuarine waters offshore of the Sundarbans mangrove forest and at the head of the Swatch-of-No-Ground (SoNG) submarine canyon. Although this MPA only covers about 1.5% of Bangladesh's EEZ and effective conservation measures have yet to be established, its declaration demonstrates the government's commitment towards protecting biodiversity in its coastal marine waters.

The Bangladesh Wildlife Preservation Act 1974 gives the Government of Bangladesh (GoB) the power to establish national parks, wildlife sanctuaries and game reserves. This Act was updated by the Wildlife (Preservation and Security) Act, 2012[1] which in Section 13 reaffirmed the power of the GoB to protect biodiversity in a marine protected area:

"Declaration of sanctuary. (1) The Government may, by notification in the official Gazette, in the light of national forest policy and forest master plan, and considering natural, geomorphological features, biodiversity and environmental significance, declare any Government forests or part of such forests or any Government land or wetland or any specified area as sanctuary, specifying the demarcation, for the conservation of forest and habitat of wildlife.

(2) The sanctuary declared under sub-section (1) may be called as wildlife sanctuary, bird sanctuary, elephant sanctuary or wetland dependent animal sanctuary or, as the case may be, marine protected area.

(3) When a wetland is declared as sanctuary, measures shall be taken to protect the occupational, traditional or the right of livelihood of local community of the area such as – fishermen, boatmen, etc."

The power of the GoB for establishing MPAs is further strengthened by the Marine Fisheries Ordinance, 1983[2], which gives the GoB the power to declare marine reserves in section 28(a) and 28(b):

"The Government may, by notification in the official Gazette, declare any area of the Bangladesh fisheries waters and, as appropriate, any adjacent or surrounding land, to be a marine reserve where it considers that special measures are necessary -

(a) to afford special protection to the aquatic flora and fauna of such areas and to protect and preserve the natural breeding grounds and habitats of aquatic life, with particular regard to flora and fauna in danger of extinction; or

[1] http://www.bforest.gov.bd/site/page/491c4ca3-919d-472c-94f5-46b1dffcfb6e/বন্যপ্রাণী-(সংরক্ষণ-ও-নিরাপত্তা)-আইন-২০১২)

[2] http://fisheries.portal.gov.bd/sites/default/files/files/fisheries.portal.gov.bd/law/8ad73a74_6a15_438c_9988_2d92d2aa2f1b/The%20MARINE%20Fisheries%20Ordinance,1983.PDF

(b) to allow for the natural regeneration of aquatic life in areas where such life has been depleted; or

(c) to promote scientific study and research in respect of such areas; or

(d) to preserve and enhance the natural beauty of such areas."

The establishment of an effectively functioning network of MPAs offers an ideal opportunity to sustain vital fisheries and protect marine biodiversity at global risk of extinction. The potential for MPAs to positively contribute to fisheries enhancement and threatened species protection can be enhanced through rigorous science, community input and collaboration among GoB agencies involved with marine resource management.

BACKGROUND ON SAINT MARTIN'S ISLAND

Saint Martin's Island, locally known as *Narikel Jinjira* (Coconut Island), is located in the far southern waters of Bangladesh about 9.7 kilometers from the mainland at Teknaf. The island is relatively small, covering about eight square kilometers depending on tidal state with about 14 kilometer of beach length of which about two kilometers are suitable for nesting turtles (Islam 2002). There are a series of tiny islets called Cheradia Dwip separated from the far southern portion of the main island during high tide. Freshwater from the Meghna River mouth and more locally from the Naf River influence marine habitat by decreasing salinity and increasing turbidity and deposition of sediments. This most southerly point of land in the country supports high levels of marine biodiversity, including corals.

Although coral cover and diversity is relatively low, 66 coral species representing 22 genera have been recorded around the island extending about 200 meters offshore (Tomascik 1997). A total of 234 fish species have been recorded from the Saint Martin's Island of which almost 100 are coral associated. (Hossain et. al 2006). Additionally, 186 species of mollusks, 12 species of crab and nine species of echinoderms have also been recorded from the St. Martin's Island (Hasan 2009, Islam 2006).

The island is used as a nesting ground by three marine turtle species, including olive ridley (*Lepidochelys olivacea*), green (*Chelonia mydas)* and hawksbill (*Eretmochelys imbricata*) turtles. However, nesting populations using the Saint Martin's Island have declined in recent years due to egg collection and deaths from interactions with fisheries. Almost 30 adult and sub-adult turtles of both sexes were found dead on the beaches during 1996-98 with more than half of the deaths believed to be caused by fishing activities, while 54 dead adult and sub-adult turtles were found washed ashore on the island during the 2000-2001 (Islam 2002a, b).

The island is reported to have a human population of almost 7,000 inhabitants of whom the majority are fishermen (Bangladesh Bureau of Statistics 2014). There are more than 100 mechanized boats from Cox's Bazar that are involved with shark finning trade in the St. Martin's Island's area (BOBLME 2015). Despite a large part of the economy of the island being based on fishing, with an estimated 1,650 metric tons of fish annually caught from the waters adjacent to this island (Haider 2008), there is no management or monitoring of small scale fisheries operating in these waters where fishing pressure has increased dramatically in recent years (BOBLME 2015). Overexploitation of coastal resources (e.g., reef fisheries, corals, shells) and destructive fishing practices including the use of rock-weighted gill nets over boulder reefs are major threats to the ecosystem of Saint Martin's Island (Hossain et. al 2006).

SURVEY PROCEDURES FOR IDENTIFYING SITES FOR POTENTIAL NEW MPAS

Between 21 December 2017 and 31 January 2018, the Wildlife Conservation Society (WCS) Bangladesh Program conducted a survey along the entire coast of Bangladesh to identify potential new sites for MPAs. A strong emphasis was on the role of marine marine megafauna, including dolphins, porpoises, whales, sharks, rays and marine turtles, as umbrella species for marine spatial planning and on investigating fishing practices and catches.

Although the entire coast of Bangladesh was covered during the survey, a priority geographic focus was to investigate the waters around Saint Martin's Island and Nijhum Dwip due the biodiversity and ecological importance of waters surrounding these sites and interest for potentially declaring a new MPAs in these areas (BoBLME 2015 a,b, EcoFish 2018).

Three observers stood watch while searching for cetaceans, marine turtles, and fishing vessels/gears from the main survey vessel. Two observers searched on the port and starboard sides, respectively, with 7X50 binoculars, while the third observer stood in the center searching by naked eye. The center observer also served as the data recorder (Figure 1).

A second vessel was used to collect information on fishing practices and catches through interviews of fishermen onboard vessels we encountered at sea and with their permission documenting their catch. The second vessel often approached boats in the morning before they had set their gear so that we could obtain information on gear soak times and rendezvous when it was time to pull up their gear (Figure 2).

Figure 1. WCS survey team searching for dolphins, porpoises, whales, marine turtles, seabirds and fishing vessels/gears with binoculars along the trackline during a survey conducted in December 2017 - January 2018 in the coastal waters of Bangladesh.

Figure 2. WCS staff interviewing a fishermen (top left) and examining shark catches (top right) on the second survey vessel, medium mesh gillnetters pulling up their net (bottom left), and long line with many hooks being pulled up while catching juvenile sharks (bottom right).

SURVEY RESULTS FOR WATERS AROUND SAINT MARTIN'S ISLAND

Searching effort for marine megafauna and fisheries

Observers from the main vessel searched along 563 km of trackline in the waters around Saint Martin's Island with an average speed of 10.8 km/hr. Of the total distance searched by the survey team, almost three quarters were covered in excellent or good conditions while slightly more than one quarter of the distance was surveyed in medium or poor conditions (Table 1).

Table 1. Sighting conditions along the trackline according to Beaufort sea state and the distance and time spent searching along the trackline.

Sighting Conditions	Beaufort sea state	Distance		Time	
		km	%	hours	%
Excellent	0-1	120.6	21.4	11.4	21.9
Good	2	284.4	50.5	25.9	49.9
Fair	3	100.3	17.8	9.1	17.5
Poor	4	57.5	10.2	5.5	10.7

Environmental parameters

Environmental parameters recorded every 5 minutes along the transect line (N=677 - due to technical issues we were unable to collect data on environmental parameters during the first three days of the survey) indicated a large variation in depth (mean = 25.8 meters, SD = 18.1, range = 1.7-74.7), temperature (mean = 24.2° C, range = 20.5 – 27.3), salinity (mean = 27.6 parts per thousand (ppt), SD = 3.2, range = 0.8 – 31.5) and turbidity (mean = 13.2 nephelometric turbidity units (NTUs), SD = 15.2, range = 0.5 – 180.0).

Cetaceans

While surveying around Saint Martin's Island (Figure 3) observers made three sightings of Vulnerable (VU) Indo-Pacific humpback dolphins (*Sousa chinensis*)for a total of 39 individuals and one sighting of two Data Deficient (DD) Bryde's whales (*Balaenoptera edeni*), probably a mother and calf. [3]

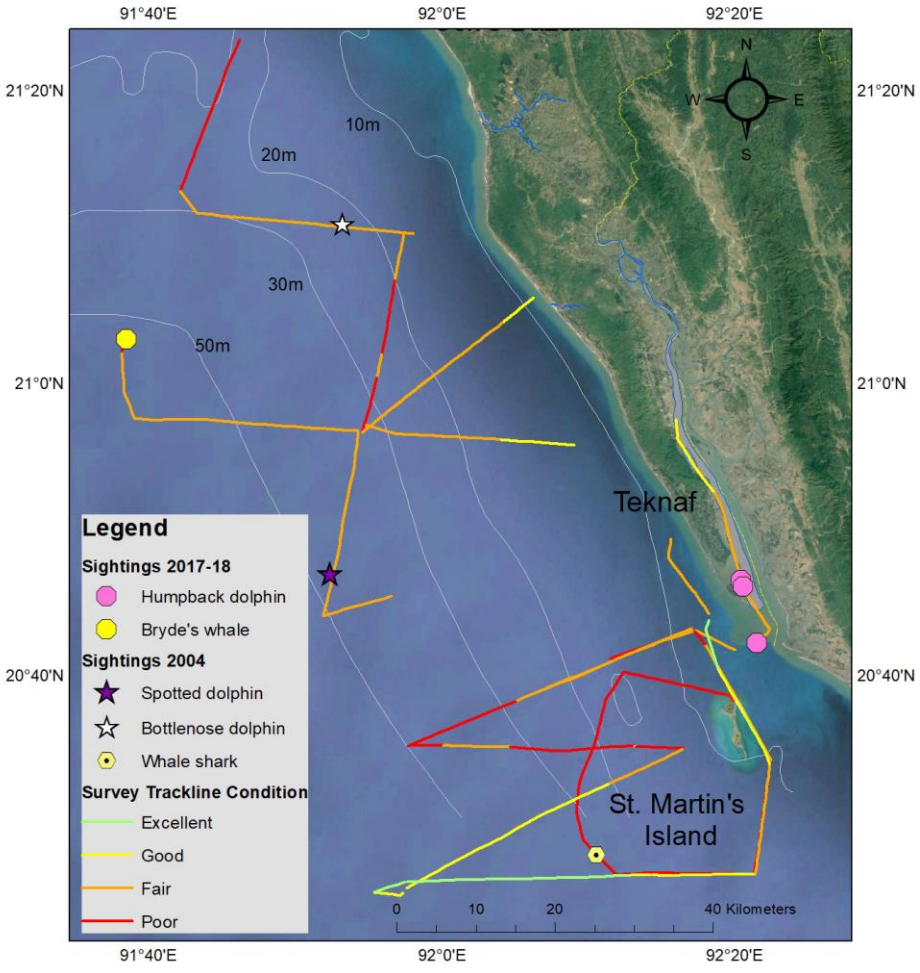

Figure 3. Map of systematic track lines searched during 30 December 2017 to 6 January 2018 and 12 January to 15 January 2018 in the coastal waters around Saint Martin's Island with color codes indicating Beaufort sea state (0-1 = excellent, 2 = good, 3 = fair and 4 = poor) and the locations of pantropical spotted dolphins (*Stenella attenuata*) and bottlenose dolphins (*Tursiops* sp.) made during a similar survey conducted in March 2004. Note the whale shark sighting in the far south.

[3] All classifications of conservation status are from IUCN Red List of Species (http://www.iucnredlist.org/)

The three sightings of humpback dolphin groups (Figure 4) were in the mouth of the Naf River. Photographs of the dorsal fins of humpback dolphins from these sightings are being compared to see if some of the same individuals were present in multiple sightings.

Figure 4. Indo-Pacific humpback dolphins leaping in the waters around Saint Martin's Island (notice the calf in the background and the injured fin (probably from fisheries interactions) on the dolphin half submerged in the foreground of the left picture).

The sighting of a pair of Bryde's whales (Figure 5) in the northern part of the Saint Martin's Island survey area was particularly significant because this was the first confirmed record of a baleen whale in Bangladesh occurring outside of the Swatch-of-No-Ground submarine canyon which is included in the country's first MPA.

Figure 5. The streamlined body and erect dorsal fin (left) and auxillary ridges to the median ridge on the head foreword of the blowhole are diagnostic featured used to identify the probable cow calf pair observed north of Saint Martin's Island as Bryde's whales.

Marine turtles

During the survey around Saint Martin's Island the team sighted 14 groups of 16 turtles. Thirteen were positively identified as olive ridley turtles and three were unidentified. Disturbingly, 62.5% were dead almost certainly from fishing gear entanglements. One mating pair of olive ridley turtles was also observed (Figures 6 and 7).

Figure 6. Live swimming and dead olive ridley turtles offshore of Saint Martin's Island.

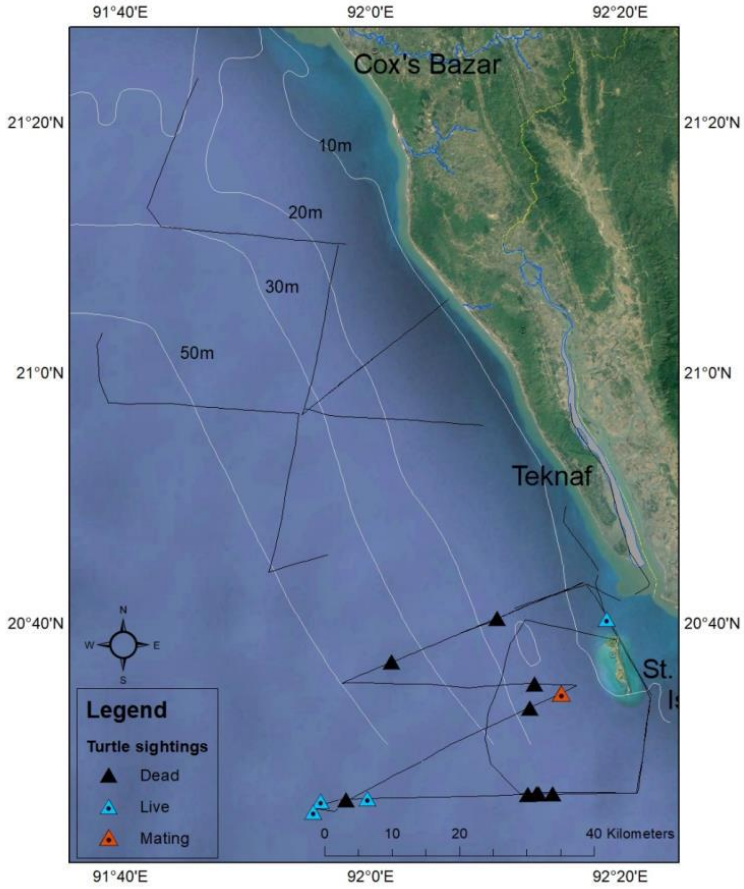

Figure 7. Map of the sighting locations of live and dead turtles and the systematic track lines searched during the December 2017 to January 2018 survey of coastal waters around Saint Martin's Island.

Sharks and rays

Seven ray species were documented in eight catches of gill nets and set bag net in the waters around Saint Martin's Island. Of particular conservation concerns were catches of white spotted whiprays and long-tailed butterfly rays due to their Vulnerable (VU) and Near Threatened (NT) status, respectively. It is important to remember that the Data Deficient (DD) scaly whipray may well also turn out to be threatened (VU, EN or CR) or NT as more information becomes available on its status. Six species were recorded caught in gill nets and two in set bag nets including one unidentified butterfly ray that was caught in both gear types (Table 2, Figure 8).

Table 2. Rays caught in gill nets and set bag nets from 16 catches examined in the waters around Saint Martin's Island.

Common Name	Scientific Name	Local Name	Gear Type	IUCN Red List status
Whitespotted whipray	*Maculabatis gerrardi*	Shapla pata	Gillnet	VU
Long-tailed butterfly ray	*Gymnura poecilura*	Badur mach	Gillnet	NT
Scaly whipray	*Brevitrygon imbricata*	Shapla pata	Gillnet	DD
Brown numbfish	*Narcine timlei*	Badami Biddut	Gillnet	DD
Butterfly ray	*Gymnura sp.*	Podoni	Gillnet & set bag net	N/A
Whipray	*Himantura sp.*	Paissha	Set bag net	N/A

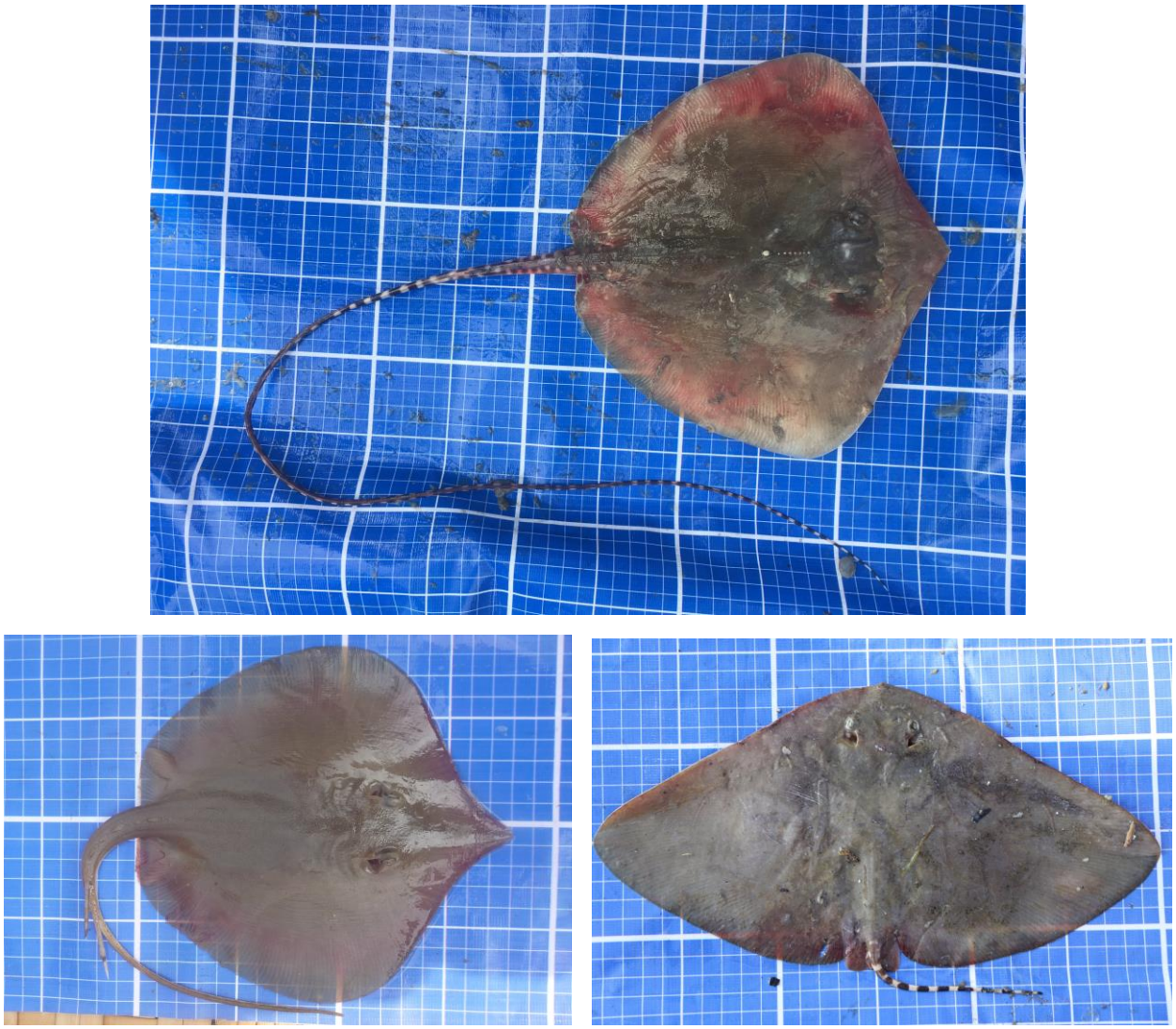

Figure 8. VU Whitespotted whipray (top), DD scaly whipray (left bottom) and NT long-tailed butterfly ray were all found caught in gill nets and set bag nets around Saint Martin's Island.

During the December 2017 and January 2018 survey around Saint Martin's Island, the WCS survey team made a sighting of a whale shark (*Rhincodon typus*) about 28 kilometers south-west of the island (Figure 9). Whale sharks have been documented by WCS as caught in medium mesh net used for catching hilsa shad in the coastal waters of Bangladesh.

Two of fishermen we interviewed on Saint Martin's Island reported catching tiger sharks and selling the meat for 600 BDT/kg and dried fin sets for 2000 BDT/kg. They mentioned that sharks are not consumed on Saint Martin's Island but sent to Teknaf and Bandarban. However, we observed shark meat sold in restaurants on Saint Martin's island.

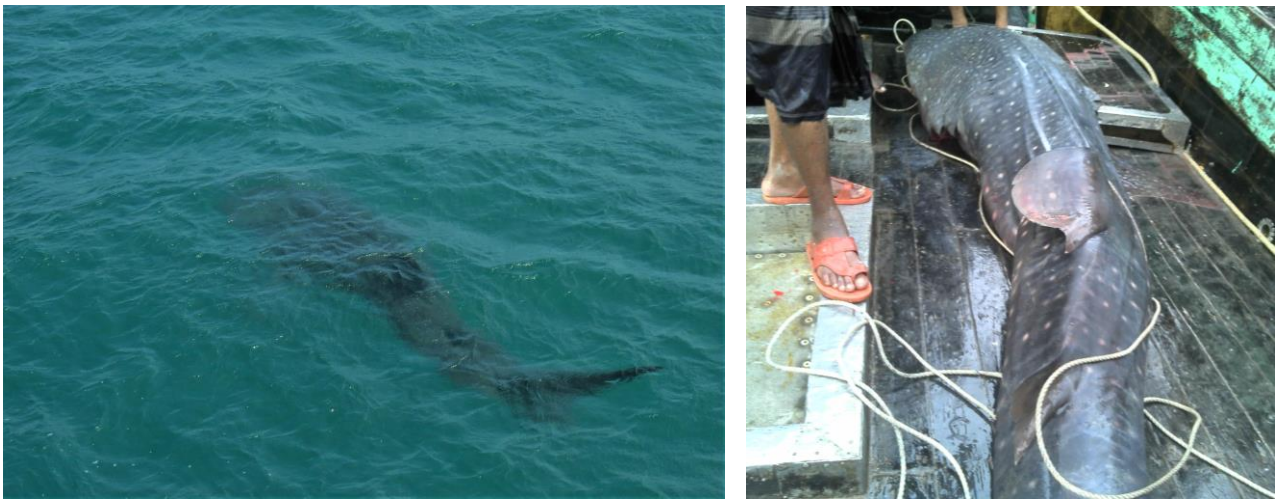

Figure 9. Photograph of a whale shark seen swimming underwater near the Saint Martin's Island (left) and a whale shark caught in a gill net targeting hilsa shad in the coastal waters of Bangladesh (right).

Sea snakes

In less than one hour of survey effort when sighting conditions were excellent (BSS 0 – the water appeared like glass), we sighted and identified four species of sea snakes including Jerdon's sea snake (*Kerilia jerdonii*), Yellow-bellied sea snake (*Hydrophis platurus*), Spine-bellied sea snake (*Hydrophis curtus*) and Annulated sea snake (*Hydrophis cyanocinctus*) (Figures 10 & 11). Although all four species are considered Least Concern (LC) in the IUCN Red List, the high encounter rate of these snake during a relatively short time when sighting conditions were excellent indicates that the deep waters around Saint Martin's Island are particular good habitat for this taxa group. Other sea snakes that we might expect to find around Saint Martin's Island based on their reported range include Gunther's sea snake (*Hydrophis cantoris*), Arabian Gulf sea snake (*Hydrophis lapemoides*), collared sea snake (*Hydrophis stricticollis*) and Daudin's sea snake (*Hydrophis nigrocinctus*) all considered DD.

Figure 10. Annulated sea snake (left) and yellow-bellied sea snake (right) swimming in deep waters offshore Saint Martin's Island.

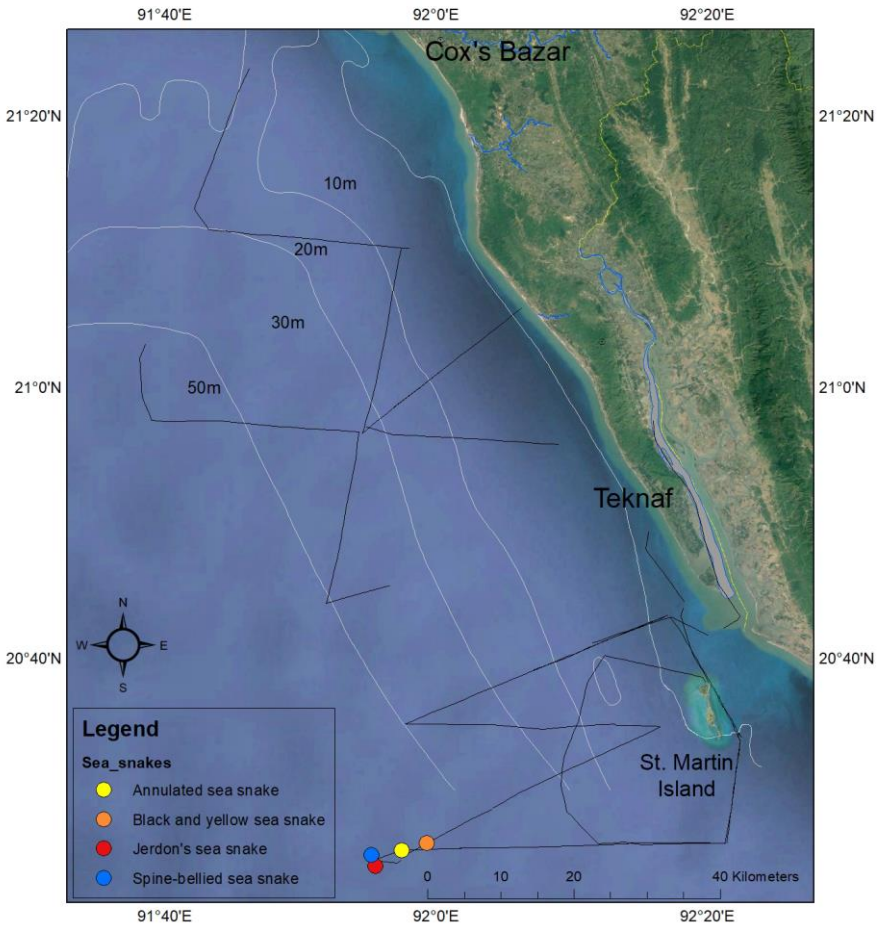

Figure 11. Map of sightings of sea snakes in deep waters (>50 m) offshore of Saint Martin's Island and systematic track lines searched during the December 2017 to January 2018 survey of coastal waters around Saint Martin's Island.

Seabirds

A total of 120 sightings were made of 639 seabirds from 9 species (Table 3, Figures 12 & 13). None were considered threatened and only one (Eurasian curlew *Numenius arquata*) considered NT in the IUCN Red List. However, it should be noted that several globally threatened seabirds are known to occur in the waters around Saint Martin's Island that were not seen during this survey. These include the CR spoon-billed sandpiper (*Calidris pygmaea*); EN Normann's greenshank (*Tringa guttifer*), black-bellied tern (*Sterna acuticauda*) and great knot (*Calidris tenuirostris*); and NT black-headed ibis (*Threskiornis melanocephalus*), Eurasian curlew (*Numenius arquata*), black-tailed godwit (*Limosa limosa*), bar-tailed godwit (*Limosa japonica*) and river tern (*Sterna aurantia*).

Table 3. List of the seabirds observed during the Saint Martin's Island survey including their Red List status, number of sightings and number of individuals.

Common Name	Scientific name	IUCN Red List status	Number of sightings	Number of individuals
Brown Headed Gull	*Larus brunnicephalus*	LC	41	382
Greater Crested Tern	*Thalasseus bergii*	LC	24	34
Whiskered Tern	*Chlidonias hybrida*	LC	18	54
Little Tern	*Sternula albifrons*	LC	14	135
Pallas's Gull	*Ichthyaetus ichthyaetus*	LC	9	13
Tern sp.	*Laridae sp.*	N/A	4	9
Eurasian Curlew	*Numenius arquata*	NT	2	2
Gull sp.	*Laridae sp.*	N/A	2	2
Little Cormorant	*Microcarbo niger*	LC	2	2
Swift	*Apodidae sp.*	N/A	2	3
Common sandpiper	*Actitis hypoleucos*	LC	1	2
White-rumped Needletail	*Zoonavena sylvatica*	LC	1	1

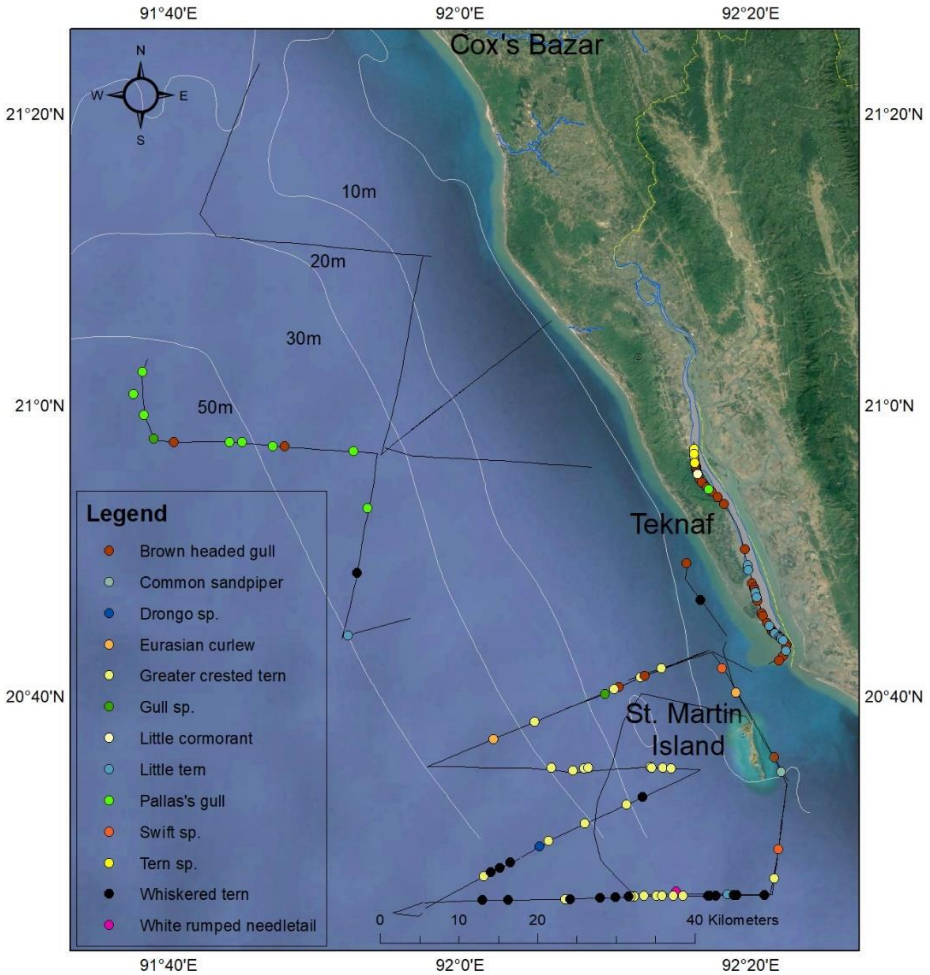

Figure 12. Map of seabird sightings made during a marine megafauna survey and track lines searched during the December 2017 - January 2018 survey of coastal waters around Saint Martin's Island.

Figure 13. Brown headed gull (left) and whiskered tern (right) are two common seabird species in the waters around St. Martin's Island.

Sightings of fishing vessels and gears

During the December 2017 and January 2018 survey around Saint Martin's Island the WCS team documented 153 sightings of 373 fishing gears with 60.1% active, 26.1% traveling, 11.1% inactive (anchored or drifting) and 2.6% unknown (Table 4, Figure 14). Although set bag nets were only observed in eight locations, they were the most commonly observed gear with an average of almost nine nets in each location. With the exception of "unknown," small mesh gill nets were the second most common gear with an average of slightly more than two gears in each location.

Table 4. Fishing vessels and gears recorded during the December 2017 and January 2018 survey around Saint Martin's Island with information on the number of sightings, number of gears and percent active, travelling, inactive or unknown.

Gear Type	Number of Sightings	Number of Gears	% Active	% Travelling	% Inactive	% Unknown
Set bag net	8	87	45.9	45.9	8.1	0.0
Unknown	24	61	74.3	20.0	2.9	2.9
Small mesh gill net	35	55	70.8	8.3	8.3	12.5
Long liner	6	47	29.2	37.5	33.3	0.0
Large mesh gill net	37	46	84.6	15.4	0.0	0.0
Set bag net	24	44	87.5	12.5	0.0	0.0
Medium mesh gill net	6	20	100.0	0.0	0.0	0.0
Stern trawler	13	13	16.7	33.3	50.0	0.0

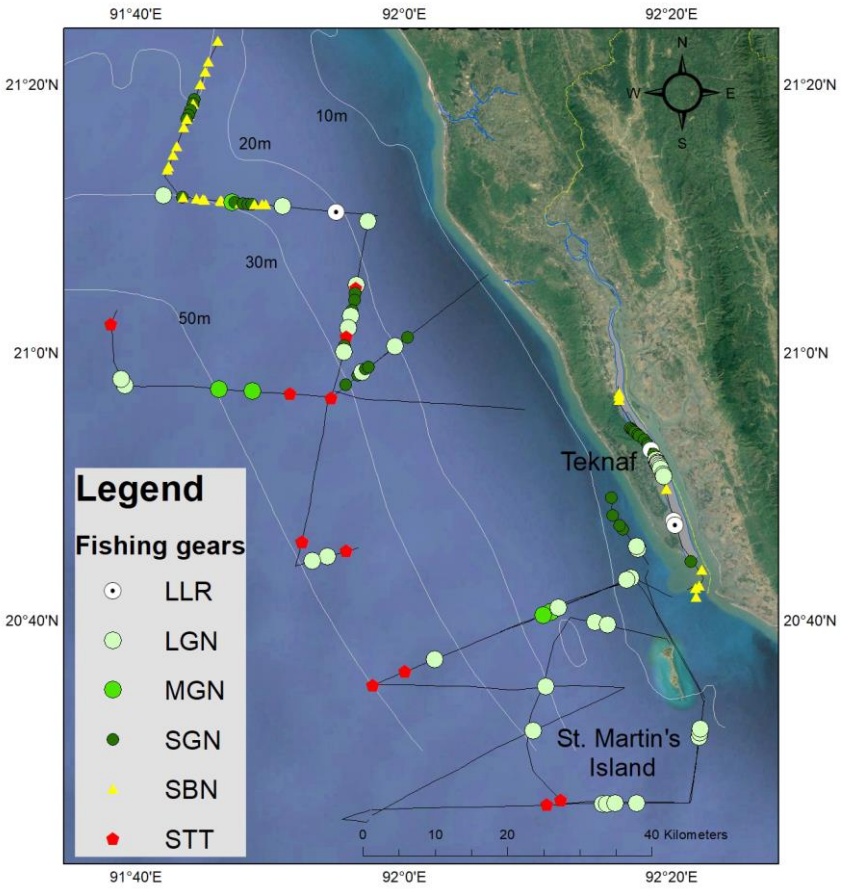

Figure 14. Map of fishing boats and gears observed and systematic track lines searched during the December 2017 to January 2018 survey of coastal waters around Saint Martin's Island.

Examination of fishing gears and catches

We recorded information on the catches of 15 different fishing gears operating near Saint Martin's Island including six medium mesh gill nets, five large mesh gill nets, three small mesh gill nets and one set bag net (Table 5, Figure 15). A total of 37 species were recorded in the catches of these gears including seven rays, 29 finfishes, and one crustacean (Table 6). Three of these species were caught in both gill nets and set bag nets; three species only in set bag nets; and 31 species only in gill nets.

In addition to conservation concern about catches of whitespotted whiprays and long-tailed butterfly rays, considered VU and NT, respectively (see shark and ray section above), catches of bigeye tuna (*Thunnus obesus*) and giant seabass (*Epinephelus lanceolatus)* are also of potential concern due to their VU status.

Table 5. Fishing gears sampled while surveying in the waters around Saint Martin's Island from December 2017 to January 2018 with information on the soak time and length, width and mesh size of net.

Gear Type (English)	Soak time (hours)	Length (meters)	Width (meters)	Mesh size (cm)
Large mesh gill net	5.5	271.3	8.5	9.8
Medium mesh gill net	6.5	113.9	5.8	6.3
Small mesh gill net	2.0	32.9	6.1	5.0
Set bag net	4.0	Unknown	Unknown	Unknown

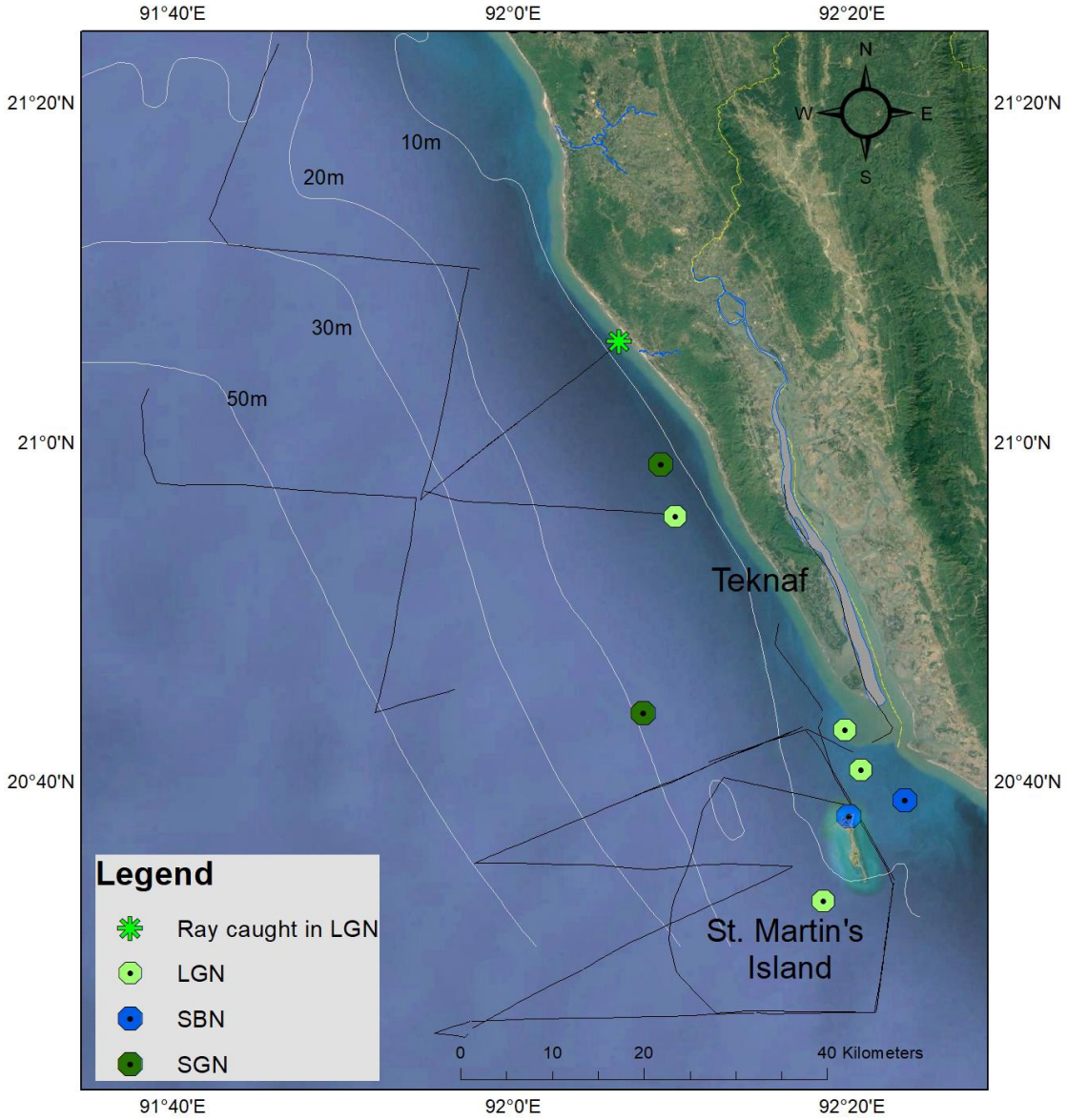

Figure 15. Map of fishing vessels according to type where fish catches were examined during a marine megafauna survey in the waters around Saint Martin's Island.

Table 6. List of finfish and one crustacean sampled by the survey team from gill nets and set bag nets in the area around Saint Martin's Island with information on their common, scientific and local names, gear type and IUCN Red List status.

Common Name	Scientific Name	Local Name	Gear Type	IUCN Red List status
Giant seabass	*Epinephelus lanceolatus*	Bull Mach	Gill net	VU
Bigeye tuna	*Thunnus obesus*	Lejbora	Gill net	VU
Indian mackerel	*Rastrelliger kanagurta*	Maitta	Gill net	DD
Indo-Pacific king mackerel	*Scomberomorus guttatus*	Gorum Maitta	Gill net	DD
Indian threadfin fish	*Alectis indica*	Fokir Chanda	Gill net	LC
Bullet tuna	*Auxis rochei*	Jati Maitta	Gill net	LC
Flying fish	*Cypselurus sp.*	Flying fish	Gill net	LC
Indian scad	*Decapterus russelli*	Chokh bora	Gill net	LC
Rainbow sardine	*Dussumieria acuta*	Khaiya Norom	Gill net	LC
Kawakawa	*Euthynnus affinis*	Maitta	Gill net	LC
Toothed ponyfish	*Gazza minuta*	Kata Chada	Gill net	LC
Indian Ilisha	*Ilisha melastoma*	Choppola	Gill net	LC
Splendid ponyfish	*Leiognathus splendens*	Tia Chanda	Gill net	LC
Mangrove red snapper	*Lutjanus argentimaculatus*	Ranga choi	Gill net	LC
Torpedo scad	*Megalaspis cordyla*	Danda bora	Gill net	LC
Greater lizardfish	*Saurida tumbil*	Achila	Gill net & set bag net	LC
Snubnose pompano	*Trachinotus blochii*	Bolchanda	Gill net	LC
Round spadefish	*Ephippus orbis*	Tin Kata Chanda	Set bag net	NL
Kelee shad	*Hilsha kelee*	Chokkha Faissha	Gill net	NL
Sin croaker	*Johnius dussumieri*	Poka Mach	Gill net	NL
Greenback mullet	*Liza subviridis*	Bata mach	Gill net	NL
Tigertooth croaker	*Otolithes ruber*	Dattuya	Gill net	NL
Chinese silver pomfret	*Pampus chinensis*	Haichanda	Gill net	NL
Black pomfret	*Parastromateus niger*	Kalo chanda	Gill net	NL
Fringescale sardinella	*Sardinella fimbriata*	Chapila	Gill net	NL
Roughscale tongue sole	*Cynoglossus lida*	Pata mach	Gill net	NL
Grunts	*Pomadasys sp.*	Datina	Gill net & set bag net	N/A
Sardine	*Sardinella sp.*	Unknown	Gill net	N/A
Queen fish	*Scomberoides sp.*	Tuna	Gill net	N/A
Lobster	*Panulirus sp.*	Lobster	Set bag net	N/A

Interviews with fishermen

We conducted interviews with 20 fishermen operating in the waters around Saint Martin's Island using large mesh gill nets (11) medium mesh gill nets (6) and small mesh gill nets (3). We were able to examine the catch of eight of these vessels.

Fishermen said they often see dolphins and one reported that they get caught in medium mesh size gill nets used for catching hilsa (*Tenualosa ilisha*). Fishermen reported that even though they used to catch sawfish in shallower waters most had not seen one for 10-15 years. They also reported releasing live marine turtles entangled in their gear and discarding them if found dead.

Interviewees reported that sharks are caught mostly during the monsoon mainly in gill nets and in deeper water. Fishermen reported catching 11 ray species (although only four could be identified to family-level) including EN mottled eagle ray and VU sharpnose whipray, Bowmouth guitarfish and giant guitarfish. Most of the fishermen said they catch large rays in gill nets but they are more commonly caught with bottom set long lines with many hooks (Table 7).

Table 7. List of ray species reported caught by fishermen in the area around Saint Martin's Island using large mesh gill nets (LGN), medium mesh gill nets (MGN), small mesh gill nets (SGN) and long lines with many hooks (LLR).

Common name	Scientific name	LGN (N=11)	MGN (N=6)	SGN (N=3)	IUCN Red List
Mottled eagle ray	*Aetomylaeus maculatus*	0	1	0	EN
Devil ray	*Mobula sp.*	1	1	0	VU/NT/DD*
Eagle ray	*Mobula sp.*	1	1	0	EN/VU**
Sharpnose whipray	*Maculabatis gerrardi*	0	0	0	VU
Bowmouth guitarfish	*Rhina ancylostoma*	0	0	0	VU
Giant guitarfish	*Rhynchobatus djiddensis*	0	1	0	VU
Longtail butterfly ray	*Gymnura poecilura*	0	1	0	NT
Bleeker's whipray	*Pateobatis bleekeri*	1	0	0	NL
Butterfly ray	*Gymnura sp.*	1	1	0	N/A
Unidentified whipray	*Himantura sp.*	3	0	0	N/A
Annandale's guitarfish	*Rhinobatos annandalei*	0	1	0	DD
Records for all species		7	8	0	

*All devils rays confirmed or suspected to occur in Bangladesh are considered EN or NT.
** All eagle rays confirmed or suspected to occur in Bangladesh are considered EN, VU or NT.

Fishermen reported that the average length of their fishing trip was 4.3 days (range = 1-11). They reported catching a total of 29 different species of fish with one caught in all three mesh size gill nets, 11 caught in two different mesh sizes gill nets, and 18 caught in only a single gear. Eighteen species were reported caught in large mesh gill nets, 13 in small mesh gill nets and eight in medium mesh gill nets (Table 8).

Fishermen reported catching much less fish than in previous years. Most mentioned the cause for this decline being large trawlers operating close to land and the high density of set bag nets in shallow waters. Some mentioned “laukka jaal”, a different type of large mesh gill net, as particularly destructive for shark and rays and used mainly near Teknaf. Several of the fishermen reported harassment and extortion for bribes by the Myanmar Coast Guard while fishing near the Naf River mouth.

Table 8. List of fish species reported caught by fishermen during interviews in the area around Saint Martin’s Island using large mesh gill nets (LGN), medium mesh gill nets (MGN) and small mesh gill nets (SGN).

Common Name	Scientific Name	LGN	MGN	SGN
Thread fin scades	*Alectis indica*	1	0	0
Bullet tuna	*Auxis rochei*	1	1	0
Splendid ponyfish	*Eubleekeria splendens*	1	0	1
Kawakawa	*Euthynnus affinis*	0	1	0
Golden trevally	*Gnathanodon speciosus*	1	0	0
Bombay duck	*Harpadon nehereus*	0	0	1
Karut croaker	*Johnius carutta*	1	0	0
Sin croaker	*Johnius dussumieri*	2	0	2
Asian seabass	*Lates calcarifer*	2	1	0
Indian threadfin	*Leptomelanosoma indicum*	0	0	1
Ribbon fish	*Leptunacanthus savala*	1	0	1
Tripletail	Lobotes surinamensis	0	0	1
Mangrove red snapper	*Lutjanus argentimaculatus*	2	0	0
Red snapper	*Lutjanus sp.*	1	2	0
Torpedo scad	*Megalaspis cordyla*	0	0	1
Silver pomfret	*Pampus argenteus*	0	0	1
Chinese pomfret	*Pampus chinensis*	7	3	0
Black pomfret	*Parastromateus niger*	2	2	0
Black spotted croaker	*Protonibea diacanthus*	0	1	0
Indian mackeral	*Rastrelliger kanagurta*	3	0	0
Fingescale sardinella	*Sardinella fimbriata*	1	1	1
Greater lizardfish	*Saurida tumbil*	0	0	1
Talang Queenfish	*Scomberoides commersonnianus*	1	0	0
Hairfin anchovy	*Setipinna sp.*	0	0	1
Scaly hairfin anchovy	*setipinna taty*	1	0	0
Gangetic sillago	*Sillaginopsis panijus*	0	0	1
Spottail needlefish	*Strongylura strongylura*	0	0	1
Hilsa shad	*Tenualosa ilisha*	1	0	0
Bigeye tuna	*Thunnus obesus*	1	0	0
Records for all species		30	12	14

Figure 16. EN hammerhead sharks and NT tiger sharks were reported caught in the waters around Saint Martin's Island.

RECOMMENDATION FOR A NEW MARINE PROTECTED AREA AROUND SAINT MARTIN'S ISLAND

General Description

Multiple use MPAs can be an effective approach to protect marine biodiversity and sustain productive fisheries for local communities and a Blue Economy. The effectiveness of MPAs in achieving these goals is optimized when their location, size and configuration are based on knowledge about the distribution of threatened species and focused on protecting a variety of different taxa groups (e.g. mammals, reptiles, elasmobranches, finfish, corals, crustaceans, etc.) and habitat types (e.g. intertidal mudflats, rocky and coral reefs, turbid river mouth, open estuarine, high water depth and salinity, etc.).

In 2005, International Union for Conservation (IUCN) with support of BOBLIME and FAO, published a National Framework for Establishing and Managing Marine Protected Areas in Bangladesh. About 285 km^3 surrounding St. Martin's Island were proposed for an ecosystem boundary covering the distribution of corals and other vulnerable species as well as the geophysical properties of intertidal and nearshore marine habitat.

A coastal survey along the entire coast of Bangladesh in December 2017 and January 2018 confirmed the importance of the waters around Saint Martin's Island for supporting marine megafauna at risk of extinction. The survey also documented threats to the survival of these iconic species from targeted and accidental catch.

The proposed new MPAs for St. Martin's enlarges the proposed MPA boundaries in to include priority habitat for marine megafauna at risk of extinction and fisheries vital to coastal communities in Bangladesh. A larger MPA covering a total of 1,743 km^2 or 1.5% of Bangladesh's EEZ (Table 9) would provide protection for at least 18 additional threatened or near threatened marine megafauna including two cetacean, four sharks, three rays, three marine turtles, two finfish and five seabirds with another 26 globally threatened marine megafauna species that are probably present in the area based of their known distribution and habitat preferences but have not yet been recorded (Figure 17, Appendix 1).

The proposed St. Martin's MPA includes a wide diversity of habitat types:

(1) Mangrove channels and lagoons
(2) Sandy beach and mudflats
(3) Sub-tidal coral aggregations, sea grass and algal beds.
(4) Shallow channel with strong currents
(5) High salinity cool deep waters

Table 9. Summary information on the proposed Saint Martin's Island MPA

Place Name	Proposed name	Area included in the MPA	Depth of MPA	Comment
Northern Bay of Bengal, Bangladesh	Saint Martin's Island Marine Protected Area	1,743 km^2	0 - 60 m	Covers 1.5% of Bangladesh's EEZ in waters particularly important for marine biodiversity and fisheries.

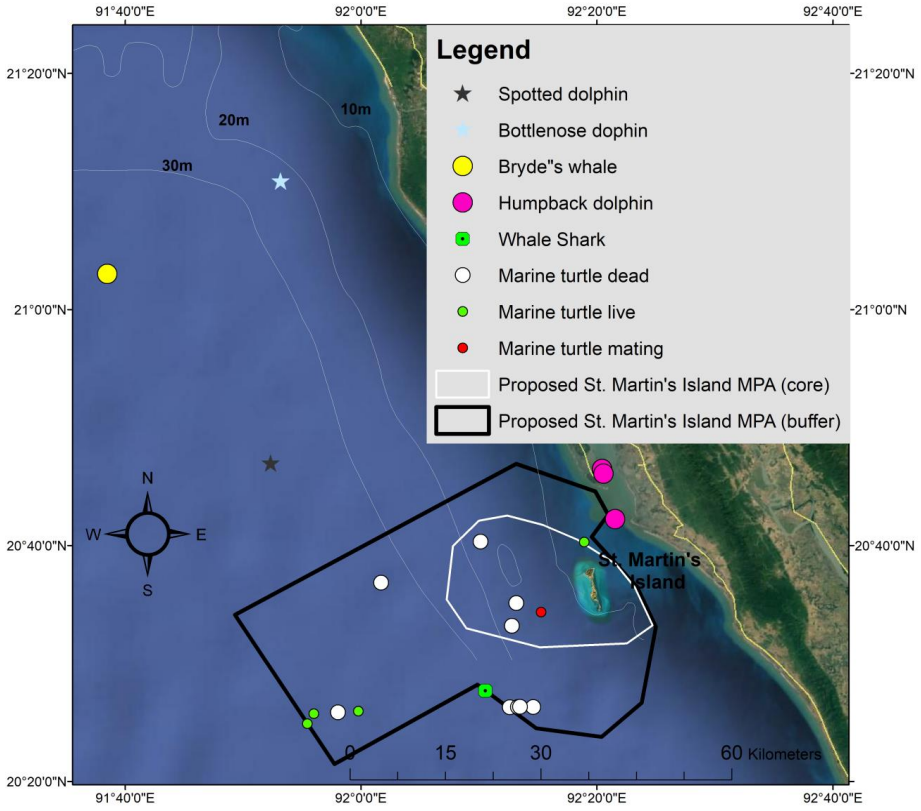

Figure 17. Map of the new proposed St. Martin's MPA which if declared would cover 1.5% of Bangladesh's EEZ and protect a large variety of threatened marine megafauna as well as the country's only coral reef. The map shows sightings and catch records of marine megafauna from surveys in 2004 (cetaceans only -spotted and bottlenose dolphin; see Smith et al 2008) and 2017/18.

MPA location and boundaries

BUFFER AREA

Referencing the corner point numbers in Table 10 and Figure 18, the boundary of the Buffer zone of new proposed MPA for Saints Martin's Island starts from:

Corner Point 1 at the far northwest point of the MPA and heads northeast for 48 kilometers until it reaches
Corner Point 2 at the farthest north point of the MPA and 7 km west from mainland coast heading 13 km southeast towards the Shah Pari Dwip passing Corner point 3 at 2 km southwest from the edge of the mainland to reach

Corner point 4 in the middle of the Naf River mouth on the Bangladesh side of the border where the boundary runs about 4.5 km southwest to reach

Corner point 5 where the border of the MPA follow the Bangladesh-Myanmar border for about 58 km in a rough half circle passing Corner Points 6-10 to

Corner Point 11 where the MPA border runs for about 24.5 km southwest, again following the Bangladesh border to

Corner Point 12 where the boundary turns to the northwest ring for about 27.5 km until it reaches Corner Point 1.

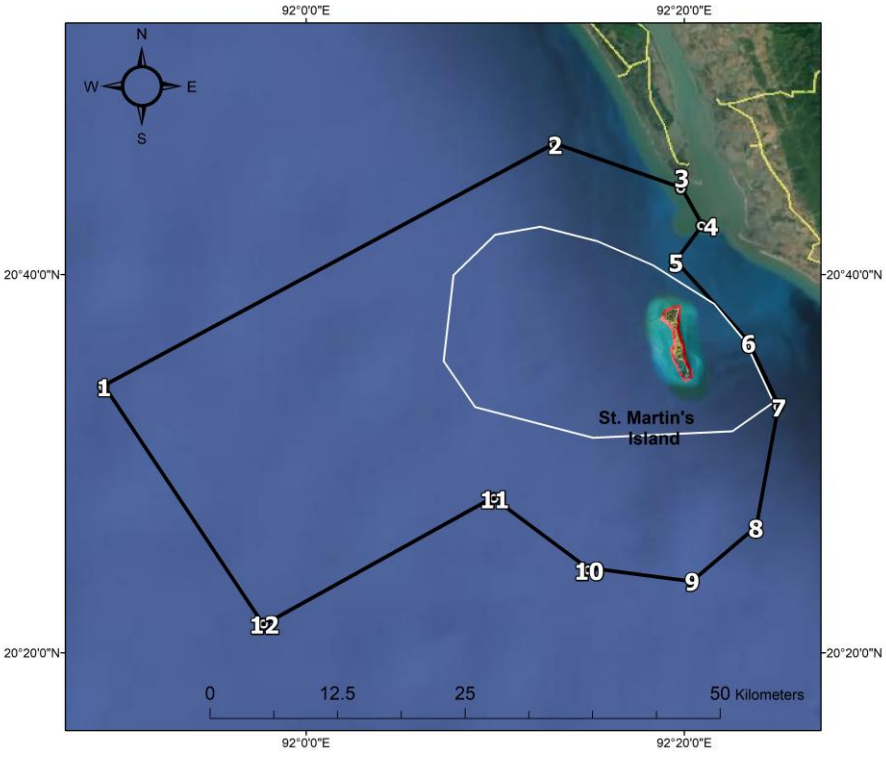

Figure 18. Map of the Saint Martin's MPA showing the proposed **buffer** boundaries (black outline) and numbered locations of the corner points that correspond to the numbers in Table 10 below.

Location Corner	Latitude	Longitude

Point		
1	20°34’07”	91°49’17”
2	20°46’55”	92°13’09”
3	20°44’34”	92°19’51”
4	20°42’37”	92°20’57”
5	20°40’43”	92°19’32”
6	20°36’26”	92°23’23”
7	20°33’03”	92°25’00”
8	20°26’40”	92°23’47”
9	20°23’51”	92°20’25”
10	20°24’25”	92°14’58”
11	20°28’12”	92°09’58”
12	20°21’34”	91°57’47”

Table 10. Location and boundaries of the proposed Saint Martin’s Island MPA **buffer area** according to corner points and their number reference in the MPA map (Figure 18) and latitude and longitude.

CORE AREA

Referencing the corner point numbers in Table 11 and Figure 19, the boundary of the Core zone of new proposed MPA for Saints Martin’s Island starts from:

Corner point 1 at the far west point of the core zone and 21.5 km west from the St. Martin Island heading 14 km north passing Corner point 2 to

Corner point 3 on the farthest northwest boundary of core zone heading southeast in a rough half-circle for about 11 km passing the Corner points 4-6 to

Corner point 7 at about 3.5 km east to the ferry crossing (ghat) of St. Martin’s Island from where the core zone border heading southeast for about 11 km following the buffer zone/ Bangladesh-Myanmar border passing Corner point 8 until it reaches

Corner point 9 at the farthest southeast point of the core zone where the core zone border runs about 5 km southwest reaching Corner point 10 and then about 13 km west to reach

Corner point 11 at the farthest southwest point of the core zone heading about 11.5 km west in a slight arc to the north to

Corner point 12 where the boundary heading 5.5 km northwest to reach the Corner point 1.

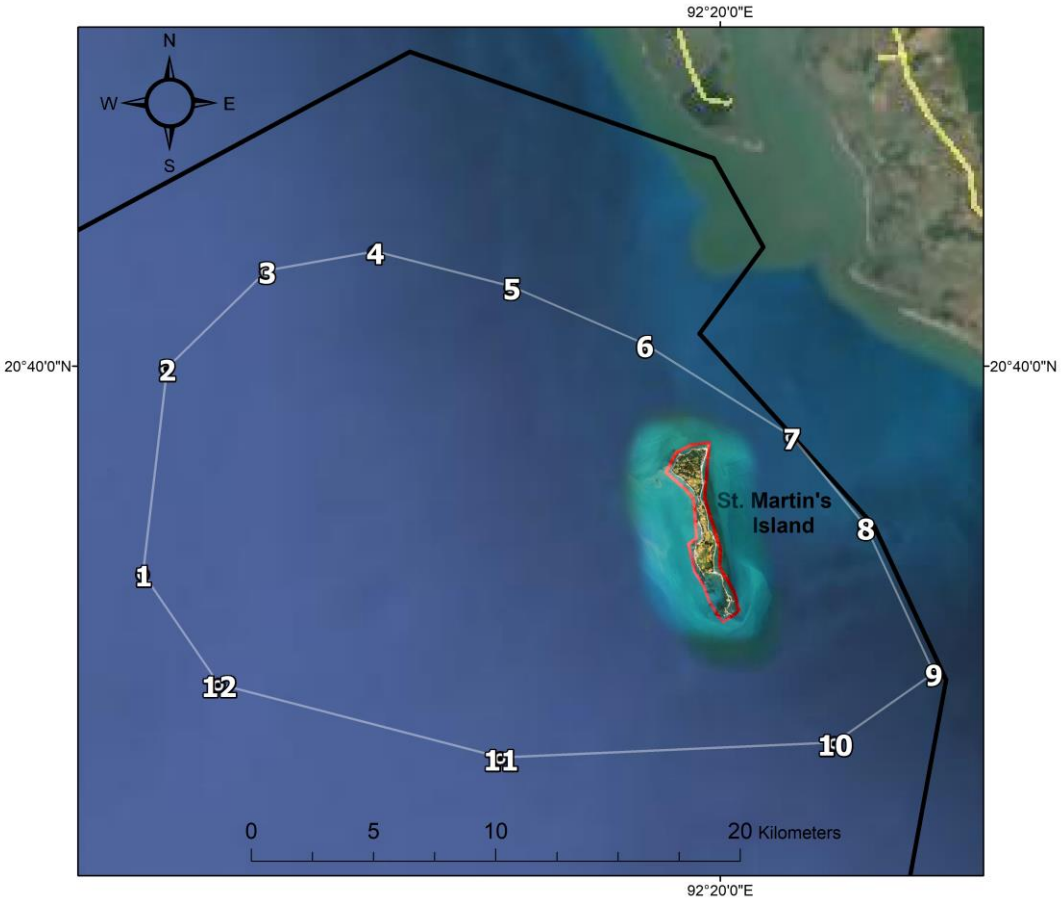

Figure 19. Map of the Saint Martin's MPA showing the proposed **core** boundaries (white outline) and numbered locations of the corner points (red dots) that correspond to the numbers in Table 10 below. The core area is exclusive of the Saint Martin's Island ECA shown in red outline covering 6.81 sq km of land.

Location Corner Point	Latitude	Longitude
1	20°35'25"	92°07'16"
2	20°39'58"	92°07'48"
3	20°42'06"	92°10'00"
4	20°42'31"	92°12'23"
5	20°41'45"	92°15'23"
6	20°40'29"	92°28'20"
7	20°38'26"	92°21'34"
8	20°36'28"	92°23'12"
9	20°33'14"	92°24'42"
10	20°31'41"	92°22'32"
11	20°31'21"	92°15'09"
12	20°32'59"	92°08'56"

Table 11. Location and boundaries of the proposed Saint Martin's Island MPA **core area** according to corner points and their number reference in the MPA map (Figure 19) and latitude and longitude.

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Appendix 1. List of threatened (CR, EN, VU) or NT marine megafauna confirmed (top) and suspected (bottom) to occur in the waters around Saint Martin's Island.

Common Name	Scientific name	IUCN Status
Confirmed		
Whale Shark	*Rhincodon typus*	EN
Green turtle	*Chelonia mydas*	EN
Black-bellied tern	*Sterna acuticauda*	EN
Logger head turtle	*Caretta caretta*	VU
Bleeker's whipray	*Pateobatis uarnacoides*	VU
Indo Pacific humpback dolphin	*Sousa chinensis*	VU
Bigeye tuna	*Thunnus obesus*	VU
Giant seabass	*Epinephelus lanceolatus*	VU
Olive ridley rurtle	*Lepidochelys olivacea*	VU
Ocellated eagle ray	*Aetobatus ocellatus*	VU
Bull shark	*Carcharhinus leucas*	NT
Grey bamboo shark	*Chiloscyllium griseum*	NT
Spadenose shark	*Scoliodon laticaudus*	NT
Longtail butterfly ray	*Gymnura poecilura*	NT
Eurasian curlew	*Numenius arquata*	NT
Bar-tailed godwit	*Limosa lapponica*	NT
Black-tailed godwit	*Limosa limosa*	NT
Pig eye shark	*Carcharhinus amboinensis*	DD
Bryde's whale	*Balaenoptera edeni*	DD
Brown numbfish	*Narcine timlei*	DD
Bluespotted stingray	*Neotrygon kuhlii*	DD
Japanese butterfly ray	*Gymnura japonica*	DD
Suspected		
Largetooth sawfish	*Pristis pristis*	CR
Long Comb sawfish	*Pristis zijsron*	CR
Hawksbill turtle	*Eretmochelys imbricata*	CR
Great hammerhead	*Sphyrna mokarran*	EN
Pointed sawfish	*Anoxypristis cuspidata*	EN
Winged hammerhead	*Eusphyra blochii*	EN
Zebra shark	*Stegostoma fasciatum*	EN
Mottled eagle ray	*Aetomylaeus maculatus*	EN
Giant devil ray	*Mobula mobular*	EN
Big eye thresher shark	*Alopias superciliosus*	VU
Common thresher shark	*Alopias vulpinus*	VU
Silky shark	*Carcharhinus falciformis*	VU
Smooth hammerhead	*Sphyrna zygaena*	VU
Giant shovelnose ray	*Glaucostegus typus*	VU
Bow mouth guitar fish	*Rhina ancylostoma*	VU

Sharpnose guitarfish	*Glaucostegus granulatus*	VU
Giant manta ray	*Manta birostris*	VU
White-spotted whip ray	*Maculabatis gerrardi*	VU
Blotched stingray	*Taeniurops meyeni*	VU
Zonetail butterfly ray	*Gymnura zonura*	VU
Leatherback turtle	*Dermochelys coriacea*	VU
Giant guitar fish	*Rhynchobatus djiddensis*	VU
Blacktip reef shark	*Carcharhinus melanopterus*	NT
Blacktip shark	*Carcharhinus limbatus*	NT
Spot tail shark	*Carcharhinus sorrah*	NT
Tiger shark	*Galeocerdo cuvier*	NT
Whitecheek shark	*Carcharhinus dussumieri*	NT
Bentfin devil ray	*Mobula thurstoni*	NT
Bengal guitarfish	*Rhinobatos annandalei*	DD
Shortfin devil ray	*Mobula kuhlii*	DD
Bengal whip ray	*Brevitrygon imbricata*	DD
Tentacle butterfly ray	*Gymnura tentaculata*	DD
Spinner dolphin	*Stenella longirostris*	DD
False killer whale	*Pseudorca crassidens*	DD
Killer whale	*Orcinus orca*	DD
Annandale's guitar fish	*Rhinobatos annandalei*	DD