INTERNATIONAL JOURNAL OF CONSERVATION SCIENCE

ISSN: 2067-533X Volume 15, Issue 4, 2024: 1871-1884 www.ijcs.ro

DOI: 10.36868/IJCS.2024.04.18

IDENTIFICATION, CONSERVATION STATUS, TRADE AND LEGAL PROTECTION BASIS OF CARCHARHINUS SHARK CAUGHT IN THE WATERS OF RIAU ISLANDS PROVINCE, INDONESIA

Irwan EFFENDI[1*], Rika Permata SARI, Mutia Dhiya AMANI[1]

[1] Faculty of Fisheries and Marine Sciences, University of Riau, Binawidya Campus, Pekanbaru 28293, Indonesia.
[2] Padang Coastal and Marine Resources Management Center, Tanjung Pinang Unit, Tanjung Pinang 29113, Indonesia

Abstract

There are currently 35 species of shark in the genus of Carcharhinus and eight of those are extinct. A global population decline of around 70% over the last half-century signals the urgency of shark fisheries regulation. This study aimed to identify and analyze the status, trade and legal protection basis of the Carcharhinus shark in Riau Islands Province waters, Indonesia. Samples were collected from sharks caught by fishermen and landed at Tangseng Port, Tanjung Pinang, Riau Islands Province, Indonesia. Subsequently identified in the Padang Coastal and Marine Resources Management Center (PCMRMC), Tanjung Pinang Work Unit. Five shark species from the Carcharhinus genus were identified, namely the blacktip reef shark (Carcharhinus melanopterus), blacktip shark (Carcharhinus limbatus), sandbar shark (Carcharhinus plumbeus), spot-tail shark (Carcharhinus sorrah) and blackspot shark (Carcharhinus sealei). All of these sharks are still caught, consumed and traded in this area. According to the IUCN, the current population conservation status of the Carcharhinus shark are; blacktip reef shark (Vulnerable), blacktip shark (Vulnerable), sandbar shark (Endangered), spot-tail shark (near threatened) and blackspot shark (Vulnerable). Legally, there is not much that can be expected for the protection of the Charcharhinus shark in the area, given that there is no strong legal basis and the government's weak political will in this matter.

Keywords*: Shark conservation; Identification; Endangered species; Illegal catch; Illegal trade.*

Introduction

Sharks are abundant at depths of up to 2,000 meters and can be found in all oceans. Although there are several well-known outliers, such as river sharks and the bull shark, that may be found in both salt and fresh water, they typically do not reside in freshwater. Sharks have a dermal denticle layer that increases their dynamic pace of movement in the water while shielding their skin from harm and parasites. They have multiple sets of teeth that can fall out and grow back. Some shark species are apex predators in the food chain structure. Humans do nonetheless catch sharks for their meat and shark fins. Human actions are endangering several shark populations. Because of overfishing, the shark population has dropped by 71% since 1970 [1, 2].

* Corresponding author: helpingirwan@gmail.com

Due to the conservative character of their life cycles and ecological sensitivity to fishing pressures, sharks are particularly susceptible to overexploitation. Sharks have been exploited and traded in recent years to satisfy the rising demand for a range of consumer products, including fins, meat and cartilage [3, 4]. As a result, some species have experienced dramatic population decreases and it is currently thought that one in four Chondrichthyan species faces extinction [5]. Due to this, sharks are among the most endangered vertebrate species in the world [6].

With an average yearly landing of 110,737 metric tons between 2007 and 2017, Indonesia, the largest shark fishery country in the world, is home to one-fifth of all known shark species. Interestingly, it was reported by the Wildlife Conservation Society that in 2018 around 86% of Indonesian fisheries caught sharks as bycatch [7]. According to a study, fishery regulations have holes that allow for unreported and illicit commerce. According to scientists, shark populations have decreased globally by around 70% over the past 50 years, which makes it even more urgent to reform fishing laws and land limitations. According to recent studies, there is a significant disparity between shark import and export data for Indonesia and its trading partners. There is a complex network of domestic shark trade and a surge in exports of live sharks [8].

The global decline in population over the past half-century signals a new call and urgency for scientists to synchronize fisheries regulations and catch limits. Since these cartilaginous fish often grow slowly and have few young, they are especially susceptible to overfishing, whether by direct fishing or as a bycatch [9]. There is a trade-off between the goals of shark conservation and the economic and social importance of shark fishing activities in Indonesia. It is estimated that more than 75 species of sharks are found in Indonesian waters and most of these species have the potential to be overfished. Almost all parts of the shark's body can be made into commodities, the meat can be used as a highly nutritious food ingredient (shredded meatballs, meatballs, sausages, dried fish and so on), the fins are for export and the skin can be processed into materials for the high-quality leather craft industry (belts, bags, shoes), jackets, wallets and so on) as well as shark oil as raw material for pharmaceuticals [10].

Sharks are known as a species of cartilaginous fish with high economic value. Apart from consuming the meat and being a source of animal protein, shark skin can also be used as a handicraft material. These conditions make shark hunting very intense in several regions of Indonesia. Fishermen take shark fins and gills for export to foreign countries, such as China, Taiwan, Hong Kong, Japan and Korea. About 15 percent of the entire supply of shark fins and manta gills in the world comes from Indonesia. Shark fins are usually made into soup, while gills are used in traditional Chinese medicine [11].

Data findings from WWF Indonesia state that there are at least 10 million sharks caught in Indonesian waters. This figure is still relatively small when compared to a report from the BBC which states that at least 100 million sharks are caught each year. Meanwhile, it is reported that nearly 30 million sharks are caught every year in European waters, with several species caught including the Atlantic Ocean and the Mediterranean Sea being on the Red List compiled by the International Union for Conservation of Nature (IUCN). Some species of sharks are endangered, namely the spurdog, porbeagle shark and basking shark and the vulnerable include the blue shark and hammerhead shark [12, 13].

In Indonesia, some laws, government regulations, ministerial regulations and even regional regulations have been issued concerning these sharks. Includes Law Number 45 of 2009 [14], Presidential Regulation Number 2 of 2017 [15], Decree of the President of the Republic of Indonesia Number 43 of 1978 [16] and Minister of Marine Affairs and Fisheries

Regulation Number 5/Permen-KP/2018 [17]. This study aimed to identify and analyze the status, trade and legal protection basis of the Carcharhinus shark in Riau Islands Province waters, Indonesia.

Experimental part

Time and Place

This research was conducted from February to May 2022 in the waters of Bintan Island, Riau Islands Province, Indonesia (Figure 1). The sharks were caught by fishermen from around the marine waters of Bintan Island and then landed at Tangseng Harbor, Tanjung Pinang in Bintan Island. Identification of the sharks was carried out at this port and the Padang Coastal and Marine Resources Management Center (PCMRMC), Tanjung Pinang Work Unit, Indonesia. In addition, observations and identification were also carried out at several places selling processed shark fins on this island as well.

Research Methodology

This research was conducted by survey method. The shark caught by fishermen in the waters surrounding Bintan Island landed at Tangseng Harbor. Then observed and identified at the port and PCMRMC, Tanjung Pinang Unit. In addition, observations and identification were also carried out at several places selling processed shark fins in this area. The tools used to identify the species of shark are an identification book, camera, laptop, ruler and meter. The material used is fresh sharks caught in the waters of the Bintan Islands and its surroundings and also processed shark fins. Identification was carried out by observing the overall physical characteristics and certain parts of the body or fins of the shark [18-20].

Data Collection

Data collection was carried out by direct observation of the species of sharks that were trafficked every day at the port location as well as to the commodity trading business. Secondary data was obtained from the PCMRMC agency, Tanjung Pinang Unit and added with reports, journals, theses, dissertations and books.

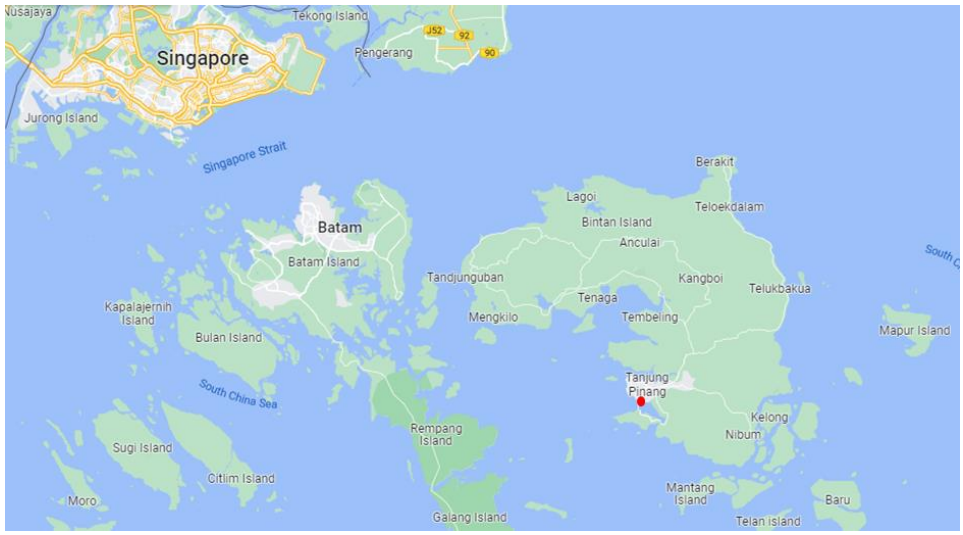

Fig. 1. Location of the research area on Bintan Island, Riau Islands Province, Indonesia

Results and discussion

In this study, five shark species from the genus of Carcharhinus were identified which were caught around the waters of Bintan Island, Riau Islands Province, Indonesia. The sharks are; blacktip reef shark (*Carcharhinus melanopterus*), blacktip shark (*Carcharhinus limbatus*), sandbar shark (*Carcharhinus plumbeus*), spot-tail shark (*Carcharhinus sorrah*), blackspot shark and (*Carcharhinus sealei*). These sharks are traded in Bintan Island and also brought to other areas both in Indonesia and outside Indonesia. Detailed results of each species and their conservation status are described in more detail as follows.

Blacktip reef shark

Blacktip reef shark (*C. melanopterus*) can be recognized by the distinctive pattern on its fins, namely black at the tip of the first dorsal fin, second dorsal fin and both ends of the caudal fin (Fig. 2-1). The base of the fin near the tip is grayish-white (Fig. 2-2). All fins have black tips (Fig. 2-3). This shark is generally found in shallow waters and islands, often also found in shallow reef waters. Due to their typical slow growth and small progeny, these cartilaginous fish are especially susceptible to overfishing, whether by direct fishing or bycatch [9]. The existence of the blacktip reef shark in this water area is following the condition of the waters around Bintan Island which has a tropical climate, dominated by shallow, clear waters and overgrown with coral reefs.

Some researchers [21] agree with the aforementioned viewpoint and claim that blacktip reef sharks are typically found on sandy plains and coral margins, while they have also been observed in brackish and freshwater settings. They often grow to be 1.6 meters long. They are one of the three shark species most frequently found on coral reefs in the Indo-Pacific. While the other two are more frequently found in deeper areas, this species is more abundant in shallow habitats. The blacktip reef shark is a swift and energetic swimmer that can be seen alone, in pairs, or small groups while they are hunting.

Fig. 2. Blacktip reef shark *C. melanopterus* and fin cut

Blacktip shark

The blacktip shark (*C. limbatus*) is a requiem shark species and a member of the Carcharhinidae family. One may tell that a fin belongs to a blacktip shark just by looking at it. The black patterns at the end of each fin can be used to identify them, but they are not always visible and are practically imperceptible (Fig. 3-1). The first dorsal fin has a short free hind end and is high and curved (sickle-shaped). There is no ridge running between the first and second

dorsal fins and the tip of the inner base of the fin has a rather large arch (Fig. 3-2). The large pectoral fin is pointy and falcate.

The blacktip shark has a long, pointed snout, small eyes and a robust, slender body. Compared to other requiem shark species, this one has five pairs of gill slits. The first dorsal fin has a short free hind end and is high and curved (sickle-shaped). There is no ridge between the first and second dorsal fins. The broad pectoral fin is pointed and falcate. With two symphysis teeth in the upper jaw's midline and one in the lower jaw's midline, the jaw has 15 rows of teeth on either side. The teeth have a jagged edge, a high, narrow cusp and a broad shape [17, 20]. The blacktip shark has a stocky, fusiform body, long gill slits and no protrusions between the dorsal fins. It also has a pointed snout. On the pectoral, dorsal, pelvic and caudal fins, the majority of individuals have black tips or edges. usually grow to be 1.5 meters long [22, 23].

Fig. 3. Blacktip shark *C. limbatus* and fin cut

Blacktip sharks are generally found in the ocean in tropical temperatures. Its habitat is mostly in corals and estuaries. This is following the condition of the waters around Bintan Island which has a tropical climate, dominated by shallow, clear waters and overgrown with coral reefs. Around the world, brackish ecosystems as well as coastal tropical and subtropical waters frequently have it. Although they can dive as deep as 64m, most of them are found in areas less than 30m deep above the continental shelf and islands lagoons, muddy bays and drop-offs close to coral reefs are preferred environments; they can also tolerate low salinity and can enter estuaries and mangrove swamps. Blacktip sharks do not live in offshore marine environments, even though some can be located some distance from the coast [5, 24].

Sandbar shark

The sandbar shark (*C. plumbeus*) also known as *C. taurus* is also known as the brown shark or thick skin shark. The results of this study indicate that this sandbar shark has characteristics that are easily recognizable in the field. Body color can vary from bluish to brownish gray and with white or pale underparts (Fig. 4-1). The color of the fin is grayish with a slightly rough texture with salt-like denticles. The hind end of the fin is free, short and narrow at the apex (Fig. 4-2). The color of the ventral surface is absent or white and consists of a faint blackish area at its apex and along the posterior edge (Fig. 4-3). The pectoral fin is extremely long and the dorsal fin is triangular and very tall. The first dorsal fin and inter-dorsal ridge are very high. Sharp edges and wide, irregular protrusions can be seen on the top teeth. The anal and second dorsal fins are nearly equal in height.

One of the biggest beach sharks in the world, the sandbar shark is closely related to the bull shark, great white shark and black shark. It has a large body and a small, rounded snout

compared to most sharks. Sharp edges and wide, irregular protrusions can be seen on the top teeth. The anal and second dorsal fins are nearly equal in height [25, 26]. With an average fork length (tip of the nose to fork on tail) of 154.9cm, females mature sexually around the age of 13, whilst males typically mature sexually around the age of 12 with an average fork length of 151.6cm. Males may reach heights of 1.8m, while females can reach heights of 2-2.5m. With white or pale underparts, the body color can range from bluish to brownish-gray to bronze.

Fig. 4. Sandbar shark *C. plumbeus* and fin cuts

As its name suggests, it is typically found in shallow coastal areas like bays, estuaries, harbors, or river mouths on muddy or sandy bottoms, though it can sometimes be found swimming in deeper seas (200m or more). Around the world, this shark can be found in areas that are both warm and cold; in the western Atlantic, its range extends from Massachusetts to Brazil. Shark nurseries can be found from Delaware Bay to South Carolina and juvenile sharks are reportedly generally abundant in the Chesapeake Bay. Other nurseries include the Florida Keys and Boncuk Bay in Marmaris, Mula, Turkey [27, 22]. The existence of this shark in the waters of Bintan Island and its surroundings is not surprising. These waters have a tropical climate, dominated by shallow waters, some of the clear waters also have a cloudy and muddy side. This condition is an ideal habitat for the sandbar shark.

Spot-tail shark

The spot-tail shark (*C. sorrah*) has a relatively long, pointed snout and big eyes. can be recognized by some traits. The dorsal fin (Fig. 5-1), tip, second dorsal fin, pectoral fin and bottom of the caudal fin are all black and there is a streak between them (Fig. 5-2). Long and slightly pointed, the snout (Fig. 5-3). The second dorsal fin is short and low, while the first dorsal fin is big and curved. The belly is white with a long white stripe on the sides and a gray back and sides.

The majority of the spot-tail shark's range is subject to commercial fishing and the IUCN rates it as near threatened. The spindle-shaped spot-tailed shark has a length of about 1.6 meters. The eyes are fairly huge and the nose is quite long and pointed. The second dorsal fin is short and low, while the first dorsal fin is big and curved. The belly is white with a long white stripe on the sides and a gray back and sides. The shark belongs to the family Carcharhinidae and is a species of requiem shark that may be found in the tropical Indo-West Pacific Ocean between the latitudes of 31°N and 31°S, from the surface to a depth of around 72m. throughout the waters of the Indo-West Pacific. It can be found on coral reefs and continental shelves, from tidal areas to 140 meters below the surface [28, 20].

Fig. 5. Spot-tail shark *C. sorrah* viewed from the side and chest.

The shark is found in the tropical Indo-Pacific on the continental shelf and islands, often to a depth of around 73 meters and even to a depth of 140 meters, according to other researchers. They are ubiquitous from the Red Sea, Madagascar and East African coasts to northern Australia, Malaysia, China and the Philippines. They spend the daytime close to the ocean floor and the evenings on the reef's surface. This animal is a predator that eats crustaceans, bony fish like bonito and sea bass and cephalopods. It is not surprising that this spot-tail shark can be found in the seas near Bintan Island. The shallow, clear waters that make up these waters' tropical climate are covered in coral reefs [29, 30].

Blackspot shark

Blackspot shark (*C.sealei*). The following keys can be used to identify this shark. On the dorsal surface, the body is brown or silvery gray, while on the ventral surface, it is pale gray. Along the sides of the body, there are distinct limits between the pale and not pale. The posterior edge of the other fins is pale, but they lack distinguishing patterns. Grayish white, relatively small (less than 1 meter). The first dorsal fin has a short hind end and is rather high, thin and falcate. It starts directly above the pectoral fin's free posterior end. The second dorsal fin has a huge triangular black patch that spans at least half of the fin (Fig. 6-1). The second dorsal fin is quite broad, has a short hind end and begins slightly behind the origin of the anal fin. It has a stripe between its dorsal fins (Fig. 6-2) and is blackish or black at the tip (Fig. 6-3). The snout is highly distinctive and is long, pointed, or slightly rounded at the end. The underside of the eyes' wide, oval, horizontally longitudinal shape is covered by a nictitating membrane. Short furrows appear on the upper lip and the skin flaps next to the nostrils have a triangular appearance (Fig. 6-4).

The upper and lower jaws of the blackspot shark each have 11–13 rows of teeth, though the exact number varies. The lower teeth have beveled valves that might be smooth or serrated,

whereas the higher teeth have sharply beveled protrusions and smooth edges. There are no spiracles visible in the rearmost of the five-gill slits, which are located at the base of the pectoral fins. The pectoral fin is flaccid, long, slender and bluntly pointed. The caudal peduncle lacks a fleshy keel along its sides. The caudal fin accounts for around one-fifth of the shark's total length; it features an extensive dorsal lobe with a depression at the lower border towards the tip and a smaller, falcate ventral lobe with a more rounded tip.

Fig. 6. Blackspot shark *C. sealei* viewed from the side chest and abdomen.

The blackspot shark was described as a somewhat skinny species with a slender look, rising to a length of about 95cm, by [29, 30]. Long, pointed, or slightly rounded at the end, the snout is highly distinctive. The underside of the eyes' wide, oval, horizontally longitudinal shape is covered by a nictitating membrane. The top lip has small wrinkles and triangular skin flaps near the nostrils. On both sides of the upper and lower jaws, there are typically 12 rows of teeth, however, this number can range from 11 to 13. The lower teeth feature oblique valves that are either smooth or serrated, whereas the upper teeth have severely serrated oblique protrusions and smooth edges. There are no spiracles visible in the rearmost of the five-gill slits, which are located at the base of the pectoral fins.

Furthermore, the first dorsal fin was characterized as being long, slender, curved (falcate) and having a short posterior end. The second dorsal fin is a sizable structure. Its origin is a little behind the anal fin's origin and it similarly has a short hind end. The pectoral fin is flaccid, long, slender and bluntly pointed. The caudal peduncle lacks a fleshy keel along its sides. The ventral lobe is smaller, falcate and has a more rounded tip whereas the dorsal lobe is longer, elongated and has an indentation at the bottom border towards the tip of the shark. The caudal fin makes up around one-fifth of the shark's total length. The dorsal surface of the body is brown or silvery gray, while the belly surface is pale gray, with an unnoticeable pale stripe running along the sides. The second dorsal fin has a huge, triangular black patch that spans at least half of the fin. The other fins have a pale posterior border but no distinguishing marks [31].

This shark is a native of the Indian and Pacific Oceans and it can be found in shallow seas surrounding islands from surf lines to depths of about 40 meters on the continental shelf. Usually absent from estuaries and may be sensitive to low salinity water. It can be found in the Indian Ocean along Africa's east coast, from South Africa and Madagascar to Kenya. Further east, they can be found in the waters around Pakistan, India and Sri Lanka. They are also present in the waters of the Seychelles and Mauritius. Along the shores of Thailand, Vietnam, China, Indonesia, New Guinea and northern and western Australia, in the western Pacific Ocean [5, 32].

Trade of Charcharhinus shark

On Bintan Island, Riau Islands Province, Indonesia, the fin is the most valuable part of the shark. This body part is usually used as shark fin soup. However, on the island of Bintan

shark meat is also consumed by the community. Usually fried and covered in flour it tastes so delicious. These two conditions have allowed the shark trade in this area to continue. This trade will of course result in suppression of the shark population due to shark fishing in the sea. Sharks in their whole form or dried fins appear to be commercially available in this area (Fig. 7). The author himself at the time this research was carried out did not experience significant difficulties in finding shark landing sites and also stalls selling shark fins. Likewise, restaurants selling shark soup were also not difficult to find.

Fig. 7. A view of a shark market on Bintan Island, Riau Islands. Indonesia

Located in Senggarang, precisely on Pasar Kota Tanjungpinang Street. Swi Kim has been selling various fried foods for more than 15 years, from otak-otak to sausages. But the most famous menu is the fried shark, which is made from sliced fish meat that is often found there. Swi Kim admitted that he got the shark he used at the seaside market. People call it sua he pia, a species of shark that doesn't attack humans. He continued, for the price range, Swi Kim set a price of 5 thousand rupiah for one piece of fried shark. It tastes good, like chicken, only a little fishy, if you eat it with rice, it might be more appropriate.

Shark items are typically distributed in Indonesia as partially processed (i.e., dissected and dried or frozen), frequently with a significant degree of morphological similarity amongst the various species. There isn't much species-specific desire for shark items among Indonesian consumers, which restricts the market's demand for products with verifiable and sustainable sourcing. This makes it more difficult for dealers, customers and law enforcement officials to confirm that shark goods come from ethical and sustainable sources, which can result in fraud such as intentional species substitution and mislabeling. As a result, intentional species substitution and/or fraudulent labeling are made easier. Inaccurate seafood labeling poses a hazard to consumers' health and safety, endangered and protected species, sustainable fisheries management and IUU (illegal, unreported and unregulated) fishing [4, 11].

Conservation status

Sharks and their relatives are one of the most threatened species groups in the world, with an estimated one in four species threatened with extinction. Every shark product will have its traffic recorded in the international trade in shark fin and shark meat. According to data taken from FAO, the market for shark fin and shark meat has a distinct market. The majority of

shark fin is for consumption in several countries, especially in East and Southeast Asia such as China, Hong Kong, Taiwan, Singapore, Malaysia and Vietnam. From 2000 to 2011, China and Hong Kong became the most important centers of the shark fin trade, followed by Thailand from 2007 to 2011 as the world's largest exporter of shark fin [8, 33].

The sandbar shark (*C. plumbeus*) is an endangered species by the IUCN. The decline in the number of shark populations is already very worrying. The blackspot shark (*C. sealei*) is listed as vulnerable by the IUCN on the Red List of Threatened Species. So far, a detailed survey of population size has not been carried out, but the population is believed to be declining. Shallow waters where fish live are fished intensively with longlines and gillnets and blackspot sharks can be overexploited through overfishing. It is sold in local markets and the meat is used for human consumption [6]. Likewise, the blacktip reef shark (*C. melanopterus*) and the blacktip shark (*C. limbatus*) both belong to the endangered population group. While the Spot-tail shark (*C. sorrah*) is also included in the group of nearly threatened species.

The legal status of Charcharinus shark

Marine scientists are urging the government of Indonesia to enact regulations to protect the sharks, which have experienced a declining population, according to Ministry of Maritime Affairs and Fisheries data. Sharks have biological characteristics that make them grow more slowly, which makes them vulnerable to fishing. In addition to their slow growth, sharks also reproduce slowly and only give birth to a few young sharks. This causes several species of sharks to be included in endangered groups, such as freshwater sharks. It is therefore important to issue fisheries regulations to protect sharks from extinction.

To promote sustainable shark fisheries the trade in shark fins should be prohibited, gear sizes should be limited and regulated and there should be quotas and catch management, as well as protection for endangered sharks. Fishing gear must be selected properly and limited to large-scale fishing gear, nets and nets. Many pregnant sharks are caught. Sharks only start the mating process after reaching the age of 30 years. Sharks also play an important role in marine ecosystems by maintaining the balance of the food chain. Data from the IUCN shows that sharks are under threat of extinction. It is estimated that the current population of sharks is only around 31%. Two hundred and fifty of the 1,250 vertebrate fish species live in Indonesia. In Indonesia, shark fishing began around the 1980s and the demand for sharks in the international market increased [34, 35].

In Indonesia, as mentioned before, the legal basis for shark protection is linked to several laws and government regulations. Some laws and regulations in Indonesia pay a lot of serious attention to the protection of protected and endangered animals, including the protection of sharks and rays. In Government Regulation Number 7 of 1999 concerning the Preservation of Plants and Animals, the large-tooth sawfish (*Pristis pristis*) is fully protected and cannot be used for any purpose. The same provision is also contained in the Decree of the Ministry of Maritime Affairs and Fisheries Number 18 of 2013 which stipulates the protection status of the whale shark, followed by the stipulation of protection for the Oceanic whitetip shark and hammerhead shark as in the Decree of the Minister of Maritime Affairs and Fisheries Number 57 of 2014. Unfortunately, from about 200 species In Indonesia, only the large-tooth sawfish has been designated as a nationally protected fish species. Whaleshark (*Rhyncodon typus*) is still in the process of establishing its protected status at the Ministry of Maritime Affairs and Fisheries [36].

The Indonesian Ocean Tuna Commission (IOTC) as one of the organizations engaged in saving fisheries in Resolution 10/12 has also massively banned the activities of catching rat sharks/monkey sharks known as thresher sharks (*Alopias pelagicus*, *Alopias superciliosus* and

Alopias vulpinus) in Indonesian territory. However, this prohibition is not legally binding and is only limited to socialization because it does not get a legal umbrella from the Indonesian government. Of all the regulations and laws mentioned above, none regulates the prohibition of catching sharks, including the Charcharinus shark. What exists only regulates the prohibition of sending Oceanic whitetip sharks (*Carcharhinus longimanus*), both whole and parts of their bodies outside the Republic of Indonesia [37].

Conclusions

In this study, 5 shark species from the Carcharhinus genus were identified, namely blacktip reef shark (*C. melanopterus*), blacktip shark (*C. limbatus*), sandbar shark (*C. plumbeus*), spot-tail shark (*C. sorrah*) and blackspot shark (*C. sealei*) in the waters of Bintan Island, Riau Islands Province, Indonesia. All of these sharks are still caught, consumed and traded in this area. According to the IUCN, the current population conservation status of the Carcharhinus shark is; blacktip reef shark (Vulnerable), blacktip shark (Vulnerable), sandbar shark (Endangered), spot-tail shark (Near Threatened) and blackspot shark (Vulnerable). Legally, there is not much that can be expected for the protection of the Charcharhinus shark in Riau Islands Province, Indonesia, given that there is no strong legal basis and the government's weak political will in this matter.

Acknowledgments

We would like to say thank you to the Faculty of Fisheries and Marine Sciences, University of Riau, Pekanbaru, Indonesia and Padang Coastal and Marine Resources Management Center, Tanjung Pinang Work Unit, Indonesia for supporting this research.

References

[1] P. Klimley, *A "sweet spot" in shark biology: Shark: Biology and Conservation*, **Environmental Biology of Fishes, 103**(12), 2020, pp. 1619–1621. DOI: 10.1007/s10641-020-01043-x.

[2] J.C. Carrier, J.A. Musick, M.R. Heithaus, *Biology of Sharks and Their Relatives*, **CRC Press.** 2004, pp. 52–53. DOI: 10.1201/b11867.

[3] S.C. Clarke, J.E. Magnussen, D.L. Abercrombie, M.K. McAllister, M.S. Shivji, *Identification of shark species composition and proportion in the Hong Kong shark fin market based on molecular genetics and trade records*, **Conservation Biology**, **20**(1), 2006, pp. 2001-2011. DOI: 10.1111/j.1523-1739.2005.00247.x.

[4] E. Muttaqin, A. Abdullah, M. Nurilmala, M. Ichsan, B.M. Simeone, I. Yulianto, H. Booth, *DNA-barcoding as a molecular marker for seafood forensics: Species identification of locally consumed shark fish products in the world's largest shark fishery*, **IOP Conference Series: Earth and Environmental Science, 278,** 2019, Article Number: 012049. DOI: 1755-1315/278/1.

[5] N.K. Dulvy, S.L. Fowler, J.A. Musick, R.D. Cavanagh, P.M. Kyne, L.R. Harrison, J.K. Carlson, L.N.K. Davidson, S.V. Fordham, M.P. Francis, C.M. Pollock, C.A. Simpfendorfer, G.H. Burgess, K.E. Carpenter, L.J.V. Compagno, D.A. Ebert, C. Gibson, M.R. Heupel, S.R. Livingstone, J.C. Sanciangco, J.D. Stevens, S. Valenti, W.T. White,

Extinction risk and conservation of the world's sharks and rays, **eLife, 3,** 2014, Aarticle Number: e00590. DOI: 10.7554/eLife.00590.

[6] N.K. Dulvy, A. Bin Ali, K.K. Bineesh, D. Derrick, L. Seyha, D. Tanay, W.J. VanderWright, V.Q. Vo, R. R. Yuneni, A. Maung, J.A.T. Utzurrum, *Carcharhinus sealei*. **IUCN Red List of Threatened Species**. 2021. p. 139. Retrieved from: https://zsi.gov.in/uploads/documents/importantLinks/english/Annual_Report_2021-22.pdf.

[7] K.R. Adams, L.C. Fetterplace, A.R. Davis, M.D. Taylor, N. Knott, *Sharks, rays and abortion: The prevalence of capture-induced parturition in elasmobranchs*, **Biological Conservation, 217,** 2018, pp. 11-27.

[8] F. Dharmadi, F. Satria, *Fisheries management and conservation of sharks in Indonesia*, **African Journal of Marine Science, 37**(2), 2015, pp. 249–258. DOI: 10.2989/1814232X.2015.1045431.

[9] I.C. Stobutzki, M.J. Miller, D.S. Heales, D.T. Brewer, *Sustainability of elasmobranchs caught as bycatch in a tropical prawn (shrimp) trawl fishery*, **Fishery Bulletin, 100**(4), 2002, pp. 800–821. https://spo.nmfs.noaa.gov/sites/default/files/pdf-content/2002/1004/stobut.pdf.

[10] U. Mardhiah, H. Booth, B.M. Simeon, E. Muttaqin, M. Ichsan, Dharmadi, Fahmi, A.P. Prasetyo, I. Yulianto, *Quantifying vulnerability of sharks and rays species in Indonesia: Is biological knowledge sufficient enough for the assessment?* **Earth and Environmental Science, 278**. 2019, Article Number: 012043. DOI:10.1088/1755-1315/278/1/012043.

[11] N. Clark-Shen, K.X. Tingting, R. Madhu, S. Cosentino-Roush, R. Sandrasegeren, A.R. Gajanur, D.D. Chapman, E.L.X. Ying, K.I. Flowers, K.A. Feldheim, B.M. Manjaji-Matsumoto, S.Ng Z. Hui, *The sharks and rays at Singapore's fishery ports*, **Fisheries Research, 235**, 2021, Article Number: 105805. DOI:10.1016/j.fishres.2020.105805.

[12] W. T.White, J. Giles, Dharmadi, I.C. Potter, *Data on the bycatch fishery and reproductive biology of mobulid rays (Myliobatiformes) in Indonesia*, **Fisheries Research, 82**(1–3), 2006, pp. 65–73. DOI:10.1016/j.fishres.2006.08.008.

[13] H. Booth, D. Squires, I. Yulianto, B. Simeon, Muhsin, L. Adrianto, E.J. Milner-Gulland, *Estimating economic losses to small-scale fishers from shark conservation: A hedonic price analysis*, **Conservation Science and Practice, 3**(9), 2021. DOI:10.1111/csp2.494.

[14] * * *, Law of the Republic of Indonesia No. 45/2009 concerning Fisheries, 2009. The Republic of Indonesia, Jakarta. [in Indonesian]

[15] * * *, Presidential Regulation Number 2 of 2017 concerning the Ministry of Maritime Affairs and Fisheries (State Gazette of the Republic of Indonesia of 2017, Number 5. Jakarta.

[16] * * *, Decree of the President of the Republic of Indonesia Number 43 of 1978 concerning Ratification of the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Jakarta. [in Indonesian]

[17] * * *, Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 5/Permen-Kp/2018 concerning the Prohibition of the Export of Oceanic whitetip shark (Carcharhinus longimanus) and Hammerhead Sharks (Sphyrna spp.) from the Territory of the Republic of Indonesia to Outside the Territory of the Republic of Indonesia. Jakarta. [in Indonesian]

[18] L.J.V. Compagno, **Sharks of the Order Carcharhiniformes**, Blackburn Press. Series. 2003, p. 486.

[19] D. Fernando, C. Rigby, G. Sant, *The Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora*, **Shark News, 04**, 2022. IUCN SSC Shark Specialist Group.

[20] S.J. Joung, Z.Y. Hsu, K.Y Su, K.M. Liu, *Age and Growth of the Spot-Tail Shark, Carcharhinus sorrah, in the Taiwan Strait*, **Journal of Marine Science and Engineering, 10**(3), 2022, Article Number: 413. DOI:10.3390/jmse10030413

[21] D. A. Ebert, M. Dando, S. Fowler, **Sharks of the World: A Complete Guide**. Series: Wild Nature Press, Princeton University Press, 2021, p. 608.

[22] A. Ferrari, A. Ferrari, **Sharks,** A Firefly Books Ltd. New York. 3680 Victoria Park. Toronto, 2002.

[23] A.P. Klimley, **The Biology of Sharks and Rays**, The University of Chicago Press, Ltd. 2013 p. 512.

[24] M.D. Doan, S.M. Kajiura, *Adult blacktip sharks* (*Carcharhinus limbatus*) *use shallow water as a refuge from great hammerheads* (*Sphyrna mokarran*), **Journal of Fish Biology, 96**(6), pp. 1530-1533. DOI: 10.1111/jfb.14342.

[25] C. Rigby, D. Derrick, M. Dicken, A.V. Harry, N. Pacoureau, C. Simpfendorfer, *Carcharhinus plumbeus-Sandbar Shark*, **International Union for Conservation of Nature and Natural Resources Red List 2021**, 2021. DOI:10.2305/IUCN.UK.2021-2.RLTS.T3853A2874370.en

[26] J.L. Y.Spaet, R.W. Jabado, A.C. Henderson, A.B.M. Moore, M.L Berumen, *Population genetics of four heavily exploited shark species around the Arabian Peninsula*, **Ecology and Evolution, 5**(12), 2015, pp. 2317–2332. DOI: 10.1002/ece3.1515

[27] I.E. Baremore, F.H. Loraine, *Reproduction of the Sandbar Shark in the Western North Atlantic Ocean and Gulf of Mexico*, **Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science. American Fisheries Society, 4**, 2012, pp. 560–572. DOI: 10.1080/19425120.2012.700904.

[28] M. Imron, I.M. Tawaqal, R. Yusfiandayani, M.S. Baskoro, A. Susanto, *Analysis of spot-tailed shark and Indo-Pacific sailfish landed at Palabuhanratu fishing port as longline bycatch in the Eastern Indian Ocean*, **AACL Bioflux, 13**(6), 2020, pp. 3470–3481.

[29] H. Bornatowski, *A parturition and nursery area for Carcharhinus limbatus (Elasmobranchii, Carcharhinidae) off the coast of Paraná, Brazil*, **Brazilian Journal of Oceanography, 56** (4), 2008, pp. 317–319. DOI: 10.1590/S1679-87592008000400008.

[30] D.D. Chapman, B. Firchau, M.S. Shivji, *Parthenogenesis in a large-bodied requiem shark, the blacktip Carcharhinus limbatus*, **Journal of Fish Biology, 73** (6), 2008, pp. 1473–1477. DOI: 10.1111/j.1095-8649.2008.02018.x

[31] E.Nurdin, D.D. Kembaren, Tirtadanu, *Stock assessment and management strategies for shark fisheries in the Arafura Sea: A length-based analysis of Carcharhinus sealei*, **Egyptian Journal of Aquatic Research, 49**(2), 2023, pp. 261–267. DOI: 10.1016/j.ejar.2023.02.001

[32] M. D. Amani, R. P. Sari, I. Effendi, *Endangered Shark Species Identified in Bintan Island Waters, Riau Islands Province, Indonesia*, **Tropical Marine Environmental Sciences**, **1**(1), 2022, pp. 8–17. https://tromes.ejournal.unri.ac.id/index.php/Tromes/article/view/3.

[33] F. Dent, S. Clarke, **State of the Global Market for Shark Products**, FAO Fisheries and Aquaculture Technical Paper, 2015 p. 187.

[34] F. Dharmadi, *Pelagic shark fisheries of Indonesia's Eastern Indian Ocean Fisheries Management Region*, **African Journ**

[35] **al of Marine Science, 37**(2), 2015, pp. 259–265. DOI: 10.2989/1814232X.2015.1044908.

[36] S. A. Budiharjo, A.D. Setyawan, A.J. Lymbery, D. Morgan, *Sequence variation among populations of sawfishes (Pristiformes: Pristidae) from Indonesia and Australia*, **Biodiversitas, 18**(2), 2017, pp. 850–856. DOI: 10.13057/biodiv/d180259.
[37] W.T. White, P.R. Last, J.D. Stevens, G.K. Yearsley, F. Dharmadi, *Economically important sharks and rays of Indonesia*, **Monographs, Australian Centre for International Agricultural Research,** 2006, Article Number: 114072. DOI: 10.22004/ag.econ.114072
[38] E. Techera, J.N. Klein, **Sharks: Conservation, Governance and Management**, **1st Edition,** Routledge. London. 2014 p. 351. DOI: 10.4324/9780203750292.

Received: December 20, 2023
Accepted: November 10, 2024