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Gymnura poecilura, Longtail Butterfly Ray

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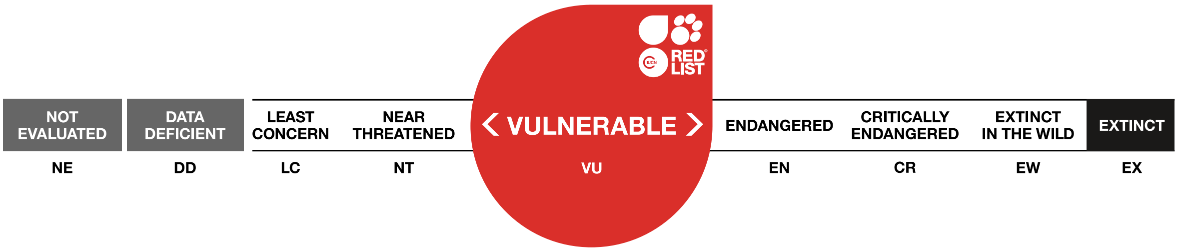

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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Gymnuridae

Scientific Name: *Gymnura poecilura* (Shaw, 1804)

Common Name(s):

- English: Longtail Butterfly Ray

Taxonomic Source(s):

Fricke, R., W.N. Eschmeyer and R. Van der Laan (eds.). 2020. Eschmeyer's catalog of fishes: Genera, species, references. Available at: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. (Accessed: March 2020).

Assessment Information

Red List Category & Criteria: Vulnerable A2d ver 3.1

Year Published: 2021

Date Assessed: September 11, 2020

Justification:

The Longtail Butterfly Ray (*Gymnura poecilura*) is a medium-sized (to at least 104 cm disc width) coastal ray that is widespread in the Indian and Northwestern Pacific Oceans from the Red Sea and Arabian/Persian Gulf to southern Japan. It is demersal in on the continental shelf at depths of 0–75 m. Its meat is considered to be of good quality and is consumed locally and traded internationally. There is a long history of overfishing of inshore populations and fishing pressure remains high, and may be rising, across the species' entire range.

There are no species-specific time series, although reconstructed landings data of all elasmobranchs and whiprays across the region can be used to infer declines of 50–99% over the past three generation lengths (45 years). This level of decline is not species-specific but is informative for understanding the broader levels of decline in batoids in the region. The species is discarded and likely has high post-release survival in parts of the Arabian Sea. This species has minimal refuge from high fishing pressure, yet it is still commonly captured in some areas, which implies some resilience to fishing pressure. It is suspected that the Longtail Butterfly Ray has undergone a population reduction of 30–49% over the past three generation lengths (45 years) due to actual levels of exploitation, and it is assessed as Vulnerable A2d.

Previously Published Red List Assessments

2006 – Near Threatened (NT)
https://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T60117A12305771.en

Geographic Range

Range Description:

The Longtail Butterfly Ray is found from the Red Sea and Arabian/Persian Gulf in the Western Indian Ocean through the Eastern Indian Ocean to the Philippines and north from Indonesia to southern Japan in the Northwest Pacific (Last *et al.* 2010, Last *et al.* 2016). Reports from locations outside this range require confirmation (Muktha *et al.* 2018).

Country Occurrence:

Native, Extant (resident): Bahrain; Bangladesh; Brunei Darussalam; Cambodia; China; Egypt; Eritrea; India; Indonesia (Bali, Jawa, Kalimantan, Sulawesi, Sumatera); Iran, Islamic Republic of; Iraq; Israel; Japan; Kuwait; Malaysia (Peninsular Malaysia, Sabah, Sarawak); Myanmar; Oman; Pakistan; Philippines; Qatar; Saudi Arabia; Singapore; Somalia; Sri Lanka; Sudan; Taiwan, Province of China; Thailand; Viet Nam; Yemen

Native, Possibly Extant (resident): Djibouti

FAO Marine Fishing Areas:

Native: Indian Ocean - eastern

Native: Pacific - western central

Native: Indian Ocean - western

Native: Pacific - northwest

Distribution Map

Legend

EXTANT (RESIDENT)

Compiled by:

IUCN SSC Shark Specialist Group 2020

The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

Population

There is no population trend estimate for this species. Despite the lack of species-specific data, reconstructed catches of sharks, rays, and skates from 1950 to 2014 have been reconstructed for the China Exclusive Economic Zone (EEZ), based on landings data (Zeller and Pauly 2016). Although landings data are not a direct measure of abundance, these can be used to infer population reduction where landings have decreased while fishing effort has remained stable or increased. Across China, the reconstructed catch data showed a 67% decline in landings from around 90,000 t annually in the early 1950s to around 30,000 t in 2014. This represents a reduction of 54% when scaled to three generation lengths of the Longtail Butterfly Ray (45 years). Fishing effort has increased substantially since the 1950s and continues to increase, despite efforts by the Chinese government since the 1980s to restrict effort in response to depletion of inshore fisheries resources due to bottom trawling and stake nets (Pauly and Liang 2019).

In Taiwan, landings data are available on the combined catch of all ray species taken by bottom trawl in Da-xi, Yilan County. The landings increased by 98% over 14 years from 1993 to 2006 (Lee 2008). That is, from ~1 t in 1993 to ~50 t in 2006. There is no detailed concurrent effort data, however the number of trawl vessels operating in the Yilan County area during the latter part of the time-series (1999–2008) were relatively stable (H. Hsu Taiwan National Fisheries Statistics pers. comm. 28/08/2019). This marked increase in rays caught by trawlers in the Yilan County from 1993–2006 is likely a reflection of an increase in reporting of the ray catch over that period, rather than an actual increase in abundance (H. Hans and H. Hsu pers. comm. 28/08/2019). In the Philippines, reconstructed catch data of all combined ray species from municipal and commercial fisheries shows that annual landings rose from 4,160 t in 1976 to a peak of 10,990 t in 1991, then declined to 2,600 t in 2006 (NFRDI 2017). This infers a decline as fishing effort increased during the period and represents a reduction of 99% when scaled to three generation lengths of the Longtail Butterfly Ray (45 years). In Viet Nam, reconstructed catches of sharks, rays, and skates fshowed a 97% decline in landings of sharks, rays, and skates from 1986–2014. Catches gradually rose from 1,560 t in 1950 to ~44,000 t per year in the mid-1960s, fluctuated and then rose steeply during the early-1980s to a peak of 466,445 t in 1986 followed by a fairly steady decline to 14,750 t in 2014 (Pauly *et al.* 2020). These declines in sharks, rays, and skates landings can be inferred to represent reductions in their populations, as the fishing effort has increased substantially since the 1950s and was increasing during the period of a decline in landings (Pauly *et al.* 2020). This represents a reduction of 99% when scaled to three generation lengths of the Longtail Butterfly Ray (45 years).

Reconstructed landings data from 1950 to 2014 are available on combined whipray species from fisheries within the Malaysian and Indonesian EEZs. Butterfly rays have similar ecological traits as whiprays and are likely to be caught in the same gears, thus this is an appropriate taxonomic group to help determine population trends. There are four lines of evidence throughout Malaysia that can be used to infer population trends including catch reconstructions for eastern Peninsular Malaysia, western Peninsular Malaysia, Sabah, and Sarawak. In eastern Peninsular Malaysia, whipray catches increased starting in the late 1960s reaching a peak of over 13,000 t in 1999. Catch since decreased and was ~7,700 t in 2014, a 53% decrease in 15 years (a time-span of one generation length) despite increasing fishing effort. In western Peninsular Malaysia, whipray catches increased throughout the 1960s. Catch oscillated between 7,000 and 13,000 t until 2009 where it stabilized at ~6,500 t for five years, representing a decrease of ~65%. In Sabah, whipray catches steadily increased from 1950 to 1994. In 1995, whipray catch peaked at ~11,550 t. It has since decreased to just over 6,000 t, despite constant effort, equivalent to an inferred population decrease of ~60% over 19 years (Zeller and Pauly 2016). In Sarawak, there was a 37.5-fold increase from ~200 t per year in the mid-1960s to ~7,500 t in the mid-1970s. The catch remained high for less than a decade before declining to under 3,000 t per year for 10 years, despite increasing effort. A population reduction of at least 50% can be inferred through this time. Catch then increased again to over 6,000 t per year, coinciding with a steep increase in effort, before decreasing to ~4,500 t per year since 2004. Since the initial peak of whipray catch in Sarawak in 1997 at 7,700 t, there has been a 52% decrease (Zeller and Pauly 2016). Overall, in Malaysia, whiprays are suspected to have been reduced by over 50% across all regions in the past 10–20 years. When scaled to three generation lengths of the Longtail Butterfly Ray (45 years), this indicates a suspected population reduction of 79–96% in this butterfly ray.

There are four lines of evidence throughout Indonesia that can be used to infer population trends, three catch reconstructions and a research survey trend: catch reconstruction for eastern Indonesia, central Indonesia, and the Indian Ocean portion of Indonesian EEZ specifically western Sumatra and southern Java (hereafter 'Indian Ocean'), and research survey data in 1976 and 1997 in the Java Sea that can be used to show changes in relative abundance. Catch of whiprays increased throughout Indonesia starting in the 1960s. In eastern Indonesia, catch has since decreased 45% between 1998 at 300 t and the early 2000s to the most recent catch estimate of 167 t in 2014 (Zeller and Pauly 2016). In central Indonesia, whipray catch increased by 550% throughout the early-1970s to 2000, from 30 t to >200 tper year (Zeller and Pauly 2016). Catch decreased 45% since the early 2000s (Zeller and Pauly 2016). Catches are still increasing in the Indian Ocean, however, this increase may be related to increasing fishing effort and demand for rays in the area and likely does not reflect the actual population trend (Blaber *et al.* 2009). These rising catches are unsustainable and instead arise from shifts in fishing effort into deeper waters due to decreased catch closer to shore (Dharmadi unpubl. data 2020). Finally, research surveys from 1976 to 1997 shows more than a 90% decline in ray catch-per-unit-effort (CPUE) throughout the Java Sea in 20 years (Blaber *et al.* 2009). With the increased catch through parts of Indonesia there has also been increased effort and therefore, CPUE is likely decreasing, suggesting an overall decrease in the population of chondrichthyans (White and Dharmadi 2007). This butterfly ray is a dominant component of the ray catch in the Karimata Strait (R. Yuneni unpubl. data 2020). Considering these catch trends, the suspected population reduction of Longtail Butterfly Ray in Indonesia is 50–79% over the past three generation lengths (45 years).

There are no species-specific ray landings in Thailand, however, data are available on combined ray landings from 1998–2018. Ray landings peaked in 2003 with over 18,000 t reported but rapidly decreased and have been under 4,000 t since 2011, a decrease of ~78% in 8 years, or 99% when scaled to three generation lengths (Krajangdara 2019). In Myanmar, there is limited species-specific landings data available, and the nation provided no data to FAO on landings between 1956 and 1972, making specific inference on the state of populations difficult. However, reconstructed marine fisheries landings data are available from 1950, including estimates of illegal, unreported, and unregulated (IUU) fishing (Booth and Pauly 2011). In general fisheries catches (all species, not just rays) increased steadily from about 200,000 t in 1950 to about 700,000 t in the late 1990s. From the late 1990s a rapid increase in landings from offshore fishing saw an increase in annual landings to almost 1.5 million t. Estimates of shark and ray landings from 1950 to the late 1990s varied between varied between 15,000 t to 35,000 t with no substantial trend. However, from the late 1990s landings increased to around 40,000 t per year. This increase in landings is assumed to reflect the increase in offshore fishing that occurred during this period. These are substantial catches (this level of catch places then in the top 20 shark fishing nations globally) for a nation with a relatively small EEZ. Despite the increase in shark and ray landings during the period since 1950 there are significant concerns for the status of many species. Trawl surveys in Myanmar undertaken by the Norwegian research vessel 'Dr Fridtjof Nansen' in 1978–80 and 2013 showed a 50% decline in catch rates of elasmobranchs between surveys (Krakstad *et al.* 2014), with a noted shift from larger long-lived species to smaller short-lived species. Declines in ray catch rates declined more than for sharks. Surveys of local markets from 2006 to 2010 (San San Khine 2010) demonstrated that landings are dominated by small short-lived species, which is typical of over-exploited elasmobranch communities (Lam and Sadovy de Mitcheson 2011). These same surveys also reported a 49% decline in the landings during this period, despite no reduction in fishing effort.

In Bangladesh, questionnaires of local fishers revealed a steep decline in rays in the past 10 years (A.B. Haque unpubl. data 2020). Fishers reported that when fishing for larger rays ten years ago, a 7-day trip would yield over 1,000 individuals. Recent 7-day fishing trips now only yield 2–5 large ray individuals. This has led to fishers using other net types because of the large decline in ray catches (A.B. Haque unpubl. data 2020). All size classes of Longtail Butterfly Ray are caught and landed in Bangladesh including young-of-year and pregnant females. This is one of the most commonly landed species in southeast Bangladesh (A.B. Haque unpubl. data 2020).

In Sri Lanka, approximately 75% of individuals landed of this species were mature (D. Fernando unpubl. data 2020). Overall, reconstructed landings have increased 4-fold from 150,000 t in 195 to 500,000 t in the 2000s (O'Meara *et al.* 2011). Coastal fisheries still account for about 67% of the marine fishes caught, but these fisheries are likely to be increasingly overfished because, "*it became clear that the coastal sector had limited capacity for further expansion*" resulting in many attempts to expand the fishing more towards the offshore areas (Dissanayake 2005). The Longtail Butterfly Ray population is suspected to have declined off India and Pakistan due to overall declines in batoids from intense and increasing fishing pressure. For example, the annual average catch of rays landed by trawlers at New Ferry Wharf, Mumbai, between 1990–2004 was 502 t. During this period trawler hours doubled, and consequently, the catch rate declined by 60% from 0.65 kg per hr in 1990 to 0.24 kg per hr in 2004 (Raje and Zacharia 2009). This is an ~95% decline over a period of three generation length (45 years) for the Longtail Butterfly Ray. Although this information is not species-specific, this provides an indication of overall ray declines as a result of heavy (and increasing) fishing pressure on the continental shelf in India (and likely reflects the situation in Pakistan). Ongoing fishing is suspected to result in continuing population declines in the future. Raje and Zacharia (2009) also report an increase in butterfly ray landings in Mumbai from 1990–92 to a peak in 1999–2001 with a drastic drop in 2002–04. Although this study reports these as *G. japonica*, this species is restricted to the Northwest Pacific, and these data could only refer to the Longtail Butterfly or the Tentacled Butterfly Ray (*Gymnura tentaculata*), the only two gymnurids found in the Arabian Sea (Last *et al.* 2016), and most likely refer to the Longtail Butterfly Ray (as there are no recent records in the region of the Tentacled Butterfly Ray). In the Gulf, butterfly rays are often discarded alive, and such severe declines of this species are not expected in that part of the region.

There is a large amount of IUU fishing in the Indo-Pacific region with reported catch estimated to represent only 0.9–19.4% of the true catch (Tull 2014). In some areas, including near marine protected areas (MPAs), IUU catch of sharks was estimated to equal 77% of the reported catch, indicating much higher levels of depletion (Varkey *et al.* 2010). Actual levels of exploitation are high across the range of this species and declines in sharks, skates, and rays and whiprays of 30–99% over three generation lengths (45 years) can be considered representative of population reduction of the Longtail Butterfly Ray. This species is still commonly captured in parts of its range, which may indicate some resilience to fishing pressure. Overall, it is suspected that the Longtail Butterfly Ray has undergone a 30–49% population reduction over the last three generation lengths (45 years) and it is assessed as Vulnerable A2d.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

The Longtail Butterfly Ray is demersal on inshore, sandy and muddy substrates at depths of 0–75 m (Last *et al.* 2016). It reaches a maximum size of at least 104 cm disc width (DW), males mature at ~35 cm DW and females mature at ~41 cm DW (Last *et al.* 2016). Reproduction is aplacental viviparity with litters of 1–7 pups and size-at-birth is 22–26 cm DW (James 1966, Last *et al.* 2016). Spontaneous abortion is, however, common in this species upon capture, which may confound the litter size determinations. It is thought to breed nearly year-round, with a peak in parturition between April and October (James 1966). Generation length is estimated from the Backwater Butterfly Ray (*Gymnura natalensis*) from South Africa that matures at 6 years and reaches a maximum age of 24, yielding a generation length of 15 years (van der Elst 1988).

Systems: Marine

Use and Trade

The meat of the Longtail Butterfly Ray is consumed fresh or dried and salted. Its meat is valuable in Indonesia (Fahmi unpubl. data 2020) but sold at lower costs than other rays in Malaysia (A. Bin Ali unpubl. data 2020). In Bangladesh, ray meat is consumed locally and exported. Smaller individuals are used for local consumption in tribal areas and coastal villages and larger individuals are exported or consumed locally. There has been some demand for ray meat in cosmopolitan and coastal areas and anecdotal information suggests in some restaurants (A.B Haque unpubl. data 2020). In Sri Lanka, this species is used for its meat and as bait for longlines (D. Fernando unpubl. data 2020). In the Gulf of Oman, this species is of low value and likely to be discarded. However, it is utilized in India. The meat is usually sold either fresh or dried for human consumption. In India, there is a specialized market selling only rays in Thalassery, north of Cochin (K.K. Bineesh unpubl. data 2017). In India, ray meat, both fresh and dry salted, is increasing in demand and therefore price.

Threats (see Appendix for additional information)

Throughout its distribution, the Longtail Butterfly Ray is caught in coastal fisheries by demersal trawl, tangle nets, set nets, gill nets, droplines, longlines, and Danish seine (White *et al.* 2006, Blaber *et al.* 2009). It is taken as retained bycatch in industrial and artisanal fisheries for human consumption or fishmeal. In China, the number of powered fishing vessels increased from ~10,000 in the late 1960s to ~200,000 in the mid-1990s, along with an increase in vessel size and more modern fishing gear. Since 1989, the catch-per-unit effort of fish stocks has steadily decreased and large, highly valued species have been replaced by small, less valuable species, with most of the catch now used as feed in aquaculture (MacKinnon *et al.* 2012). The demand for seafood in China is high and increasing, with China among the largest consumers of seafood products globally; a 6 % annual increase per capita fish consumption was evident from 1990–2010 (Fabinyi and Liu 2014).

Taiwan ranks among the top 20 shark fishing nations globally and is a major global shark fin and shark meat trading nation (Oakes and Sant 2019). However, since the 1970s, most of the Taiwan global shark catch is from Taiwan fishing vessels operating in distant waters outside Taiwan exclusive economic zone (EEZ) (H. Hsu Taiwan National Fisheries Statistics pers. comm. 28/08/2019). By the 1950s, the Taiwan coastal fisheries were considered overfished, and fisheries expanded into offshore waters. The fisheries catch within the Taiwan Exclusive Economic Zone (EEZ) continued to rise from the 1950s until 1980, after which it steadily declined (Kuo and Booth 2011). The number of powered vessels operating in Taiwan's EEZ significantly increased from the 1950s (3,215 vessels) to the late 1980s (peaked in 1989s at 15,900), and then slowly decreased to 11,200 vessels in 2017 (Huang and Chuang 2010, Liao *et al.* 2019, H. Hsu Taiwan National Fisheries Statistics pers. comm. 28/08/2019). The artisanal fishing effort has steadily and markedly declined for non-powered sampans (8,283–239 from 1956–2004), but remains steady for fishing rafts (14,273–12,984 from 1956–2004) (H. Hsu Taiwan National Fisheries Statistics pers. comm. 28/08/2019). In Taiwan, the demand for seafood has always been high with per capita fish consumption at 31.2 kg per capita in 2013 (Fabinyi and Liu 2014, Helgil 2019).

There is intense fishing pressure within Viet Nam. Most marine stocks have been declining since the 1990s and are now considered fully or over-exploited with a lack of adequate enforcement leading to essentially unregulated fisheries (Teh *et al.* 2014, FAO 2020). The motorized fishing fleet has been increasing since the 1950s and rapidly expanded in the mid-1980s to 2000s when Viet Nam moved towards a market-oriented economy (Teh *et al.* 2014). The fleet is dominated by small-scale artisanal and subsistence fisheries that have accounted for 60–85% of the fleet since the 1950s (Teh *et al.* 2014, Pauly *et al.* 2020). The artisanal and subsistence motorized fleet has tripled from 1950 (~24,280 vessels) to 2014 (~ 78,000 vessels) but has also substantially increased in effort in terms of engine power, particularly over the last two decades (Pauly *et al.* 2020). This fleet tends to operate in inshore waters at depths less than 50 m, and within 4–5 nautical miles from shore (Teh *et al.* 2014, FAO 2020). The demand for seafood is also high in Viet Nam, with per capita fish consumption steeply increasing over the last two decades to 36.3 kg per capita in 2017 (FAO 2020, Helgil 2020a). Viet Nam is among the top 20 importers of shark meat for 2008–2017 (Oakes and Sant 2019).

In the Philippines, the fishing fleet rapidly expanded in the 1960s and 1970s as small-scale artisanal fisheries became motorized and evolved into commercial fisheries. By the 1980s, overfishing was apparent throughout the Philippines, but government and foreign aid continued to subsidize motorizing of artisanal vessels into the late 1990s (Palomares *et al.* 2014). The commercial fleet operating in the Philippine EEZ tripled from the 1960s (2,100 vessels) to 2014 (6,400 vessels) (Palomares *et al.* 2014). Fishing shifted from mainly inshore demersal to offshore pelagic species during the late 1980s (Palomares and Pauly 2014). 'Baby trawlers' operate intensively in inshore waters and in waters less than 13 m deep, waters traditionally reserved for small-scale artisanal fishers (Palomares *et al.* 2014). The small-scale fleet increased ten-fold from 1950 (~30,500 vessels) to the mid-1990s (~ 338,700 vessels) and while the fleet size has since remained relatively stable, the effort in terms of engine power has continued to rise, as has the number of subsistence vessels (Pauly *et al.* 2020). All incidental catch in Philippines appears to be retained as discards are virtually non-existent (Palomares and Pauly 2014). In the Philippines, the demand for seafood has always been high with per capita fish consumption increasing over the last two decades to 34.1 kg per capita in 2013 (Helgil 2020b).

In Singapore, this species makes up ~2% of the rays landed (N. Clark-Shen pers. comm. 06/05/2020). In Malaysia, fisheries significantly contribute to the national economy through employment opportunities, and protein supply (A. Bin Ali unpubl. data 2020). This species is commonly landed, particularly during the monsoon season (A. Bin Ali unpubl. data 2020). Fishing effort in Malaysia has been increasing since 1950 across subsistence, artisanal, and industrial fisheries (Pauly *et al.* 2020). The number of vessels across all sectors has more than doubled from 22,800 vessels in 1950 to 50,150 vessels in 2014 (Zeller and Pauly 2016). However, the substantial increase over this period has been in engine power which has dramatically increased by ~30 fold (Pauly *et al.* 2020). Consequently, fisheries were fully exploited by the late 1970s (Teh and Teh 2014). Nevertheless, fish consumption continues to rise and most (~85%) comes from the Malaysian EEZ (Fowler *et al.* 2002, A. Bin Ali unpubl. data 2020). Small-scale inshore fisheries provide the main supply for local consumption. Fisheries operating within 30 nm from the coast contribute 85% to the total marine fish landings with vessels <70 GT. In waters beyond 30 nm from the coast, trawls and purse seines are the main fishing gears, deployed form large vessels >70 GT. These fisheries have contributed significantly to habitat destruction and reduced abundances of all commercially important fishes in the area (Teh *et al.* 2009).

In Indonesia, these small-scale fisheries comprise most (~90%) of fisheries production (Tull 2014). In some regions, effort by these small-scale fisheries has tripled when taking population growth into account (Ramenzoni 2017). Sharks and rays are an important resource in Indonesia and are the main livelihood for some communities (Sadili et al. 2015). Indonesia catches the highest number of chondrichthyans in the world with the catch of rays rising as shark fisheries collapse. In 2003, rays comprise over 50% of chondrichthyan landings, up from 32% in 1981 (White em style="font-family: Georgia, serif;">et al. 2006). Stingrays contribute the most (more than 95%) to elasmobranch catch by danish seines (cantrang) operating in the Java Sea (Fahmi *et al.* 2008). In 2009, it was reported that 680 trawlers operated in the Arafura Sea and that catches in inshore waters had declined with vessels travelling further south to maintain catches (Blaber *et al.* 2009). Although the numbers of trawlers currently operating is unclear, this intensive fishing pressure still continues; high levels of Indonesian trawl fishing in the Arafura Sea adjacent to the Australian Fishing Zone has been reported (Heazle and Butcher 2007, Northern Territory Government 2009), in addition to intensive longline and gillnetting throughout the Malacca Strait, with some mini-trawl operations and Danish seines operating throughout Kalimantan and the Java Sea (Fahmi unpubl. data 2020). Thus, the actual level of exploitation of this species could be extremely high throughout the Indonesian portion of its range.

In Thailand, the gulf coast is considered one of the most overfished regions of the world due to the rapid industrialization of their fishing fleet (Sylwester 2014). The number of Thai trawlers peaked in 1989 at ~13,100 boats (Poonnachit-Korsieporn 2000), which was reflected in the catch-per-unit-effort (CPUE) which declined from >300 kg per hour in 1963 to 20–30 kg per hour in the 1990s (Poonnachit-Korsieporn 2000). Fisheries in Thailand have been moving to deeper water for decades due to the overexploitation of the coastal region (Sylwester 2014).

Sharks and rays are captured by a wide range of gears in Myanmar. Since 2004, sharks and rays are largely taken as incidental catch in coastal gillnets, trawls (for fish or shrimp), longlines targeting mackerels, and hookah divers spearing at night (mostly catching rays and carpet sharks) (Howard *et al.* 2015, Mizrahi *et al.* 2020). These inshore fisheries are relatively small-scale and include many subsistence level fishers. At times since 1950, significant numbers of foreign vessels have operated in Myanmar waters targeting fish and shrimp. These vessels have operated in both inshore and offshore

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areas. Offshore fishing that incidentally catches sharks and rays is carried out by a large commercial fleet of mostly trawlers, purse seiners, and longliners. International Labour Organisation (2015) estimated of the number of vessels participating in the small-scale inshore fishery to be about 26,000 in 2013, with about 50% of them unpowered. The number of locally operated larger offshore vessels numbered 2,846 in 2013, having increased nearly 30% since 2009. Foreign fishing vessels numbered 153 in 2013, but had historically been much higher. Foreign vessels were banned in 2014.

Bangladesh has a substantial artisanal fishing fleet that operates throughout the coastal regions. In 2017–2018 there were 67,669 vessels reported to be operating (DoF 2018). All benthic rays in Bangladesh are targeted with non-baited demersal longlines (1–10 km) with 10,000–30,000 hooks that operate in 5–40 m depth (A.B. Haque unpubl. data 2020). Anecdotal reports indicate a steep decline in rays over the past 10 years (Ullah *et al.* 2014, A.B. Haque unpubl. data 2020). This decline is concurrent with steep increases in artisanal and subsistence fisheries effort (Pauly *et al.* 2020). The artisanal fishing vessels land >90% of the total marine catch and generally operate inshore at depths of 0–40 m but can operate to 80 m (Hoq *et al.* 2014, A.B. Haque unpubl. data 2020). The marine capture fisheries of Bangladesh exploit a complex, multi-species resource, and can be subdivided into subsistence (small-scale, non-commercial), artisanal (small-scale, commercial), and industrial (large-scale, commercial) fisheries sectors. Among the commercial catch, more than 90% is landed by artisanal fishing vessels, while industrial fisheries contribute around 6% to the total landed catch (Ahmad 2004). Each trawling vessel is equipped with trawl gear as well as demersal set longline gear to target shark and rays. There has been an increase in fishing vessels over the past 10 years. Many fishing vessels in the southwest region of the country will go out to sea for 5–10 days and sometimes more than 15 days and return with greater landings of larger ray species (A.B. Haque unpubl. data 2020). It is believed that there may be a number of nursery areas around coastal Bangladesh. Sharks and rays landed in the pre-monsoon season are often pregnant and near term. This period overlaps with significant fishing pressure (A.B. Haque unpubl. data 2020).

In Sri Lanka, fishing takes place all around the coast, but primarily within the continental shelf. The potential yield from coastal fish resources has been estimated at 250,000 t per year with 170,000 t(per year) from coastal pelagic species and 80,000 t from demersal species (Blindheim and Foyn 1980). Coastal fisheries still account for about 67% of the marine fishes caught, but there are some uncertainties regarding further expansion of coastal fishing activities (Wijayaratne 2001). Survey catch rate of sharks and rays was 105 kg per hr in 1980 from the Fritjof Nansen survey (Table VI, Sivasubramaniam 1985). Approximately 28,000 fishing crafts are operating in Sri Lanka. Out of this, 87% of crafts operate in the coastal fishery which consists of traditional non-motorised crafts and fiberglass reinforced plastic boats with inboard engines. Both types of vessels are generally day boats, not venturing far from the coast (Wijayaratne 2001). Over 28,000 fishing crafts are now operating, including multi-day boats that remain at sea sometimes for 20–25 days (NARA 2003).

In India, the majority of the geographic distribution of this species in the region overlaps with intense coastal fisheries. There are approximately 24,554 trawl vessels operating in the Indian part of the range (CMFRI 2010). The shallow depth distribution means this species is unlikely to have a depth refuge. There has been a significant increase in coastal fishing effort and power over the past 30 years (two generation lengths). There were about 6,600 trawlers operating in the Indian state of Gujarat in the early 2000s (Zynudheen *et al.* 2004). This number increased to 11,582 trawlers in 2010 (CMFRI 2010). Furthermore, there are over 13,400 gill netters operating along the west coast, with many other types of net gear also deployed in coastal areas (CMFRI 2010). A ray fishery has recently began (2 years) in the Andaman and Nicobar islands and uses demersal set gillnets to catch up to 6 t of rays per trip (3–5 days). There are currently 20–40 boats operating in this fishery (K.K. Bineesh unpubl. data 2020). In Pakistan waters, about 2,000 trawlers operate in shelf waters, targeting shrimp in shallow waters and fish in outer shelf waters (M. Khan pers. comm. 06/02/2017). In Iran, there is increasing fishing effort with the number of fishermen increasing from 70,729 in 1993 to 109,601 in 2002 (Valinassab *et al.* 2006).

The Longtail Butterfly Ray is reported in small numbers (< 1% of total elasmobranch landings) from Kuwait, Qatar and Bahrain (Moore *et al.* 2012, Moore and Peirce 2013). In the United Arab Emirates, this species was commonly caught in research demersal trawl surveys but also represented less than 1% of landed batoids by number observed during intensive landing site and market surveys (R. W. Jabado pers. comm. 20/04/2017). In the Red Sea, information on this species are limited to one report with no details of catch numbers (Bonfil 2003). No records have been confirmed in more recent market surveys from Sudan and the Saudi Arabian Red Sea (Spaet and Berumen 2015), although this could be due to high levels of discards of rays in the Red Sea region (e.g., Sudan and Eritrea (I. Elhassan pers. comm. 07/02/2017))

In the Arabian Sea portion of its range, fishing pressure in places is intense and increasing. For example, in the Indian state of Gujarat, the number of trawlers increased from ~6,600 in 2004 to over 11,500 trawlers in 2010 (Zynudheen *et al.* 2004, CMFRI 2010). Similarly, gillnet fishing (including net length) is increasing in India (Bineesh K.K. unpubl. data 2017). In Pakistan waters, about 2,000 trawlers operate in shelf waters, targeting shrimp in shallow waters and fish in deeper shelf waters (M. Khan pers. comm. 06/02/2017). In Iran, there is increasing fishing effort with the number of fishermen increasing from 70,729 in 1993 to 109,601 in 2002 (Valinassab *et al.* 2006). In the Red Sea, the number of Saudi Arabian traditional vessels operating increased from about 3,100 to 10,000 between 1988 and 2006 (Bruckner *et al.* 2011), while in Eritrea catch and effort data showed that total fishing effort as well as total annual catch increased more than two-fold from 1996 to 2002 (Tsehaye *et al.* 2007). In Somalia, illegal and unregulated fishing by foreign trawlers and longliners is rife and impacting elasmobranch populations (Glaser *et al.* 2015). Butterfly rays are generally discarded in the Red Sea and the Gulf (due to undesirable meat), in contrast to the normal retention in India. Survivorship from released line catches would be higher than trawl where the species may suffer mortality even if released.

This species' preference for inshore coastal waters means it is also threatened by extensive habitat degradation, including pollution and clearing, and destructive fishing practices. Large coastal areas, in particular mangroves, have been lost in Indonesia and Malaysia through land conversion for urban development, shrimp farms, and agriculture. Across Indonesia and Malaysia from 1980 to 2005, the area of mangroves was reduced by >30% (FAO 2007, Polidoro *et al.* 2010). In Viet Nam, dynamite and cyanide fishing, and sedimentation have caused widespread destruction of coral reefs (Jameson *et al.* 1995, FAO 2020). Large areas of the coast are used for brackish-water aquaculture, which may have contributed to the dramatic loss of 45% of mangroves in Viet Nam from 1945–1995 (Jameson *et al.* 1995). Marine habitats in the Arabian Gulf are experiencing high levels of disturbance and quickly deteriorating due to major impacts from development activities (including dredging and reclamation), desalination plants, industrial activities, habitat destruction through the removal of shallow productive areas and major shipping lanes (Sheppard *et al.* 2010) which is likely to impact this species.

Conservation Actions (see Appendix for additional information)

No specific measures are in place. In China, in response to the fish stock depletions, the Chinese national government introduced measures in the 1980s and 1990s, that have since been modified, to reduce inshore fishing effort, including a ban on motorized trawling in close inshore waters, annual closed seasons, gear regulations such as a minimum mesh size, vessel buybacks, and fishing vessel scrapping (Yu and Yu 2008, Rueter *et al.* 2019). However, non-compliance with these measures is high and fishing effort continues to increase (Yu and Yu 2008, Villasante *et al.* 2013, FAO 2019, Pauly and Liang 2019). In Taiwan, there are ~32 Protected Areas which cover ~38% of the Taiwan coastline and ~47% of Taiwan territorial seas, with no-entry and no-take areas accounting for accounting for 0.9% and 4.6% of the territorial seas, respectively (MacKinnon *et al.* 2012, Fisheries Agency 2019, Liao *et al.* 2019). There is a prohibition on using any net fishing gear (e.g. trawls, seine nets) in 68 reef areas (Fisheries Agency 2019). Since 1999, all demersal trawling is prohibited within 3 nautical miles (nm) of the coast and within 12 nm for trawlers larger than 50 Gross Registered Tonnage (Fisheries Agency 2019, Liao *et al.* 2019). Since the mid–2000s, gillnets have been banned within 3 nm in parts of five counties with a policy of gradual removal of gillnets from within 3 nm of the entire coast and government assistance to transition to line and troll fishing (Fisheries Agency 2019, Liao *et al*. 2019).

In Viet Nam, there is a prohibition on destructive fishing practices, and some fisheries regulations, however, enforcement and compliance is limited (Teh *et al.* 2014). There are at least three MPAs (Hon Mun, Cu Lao Cham, and Con Dao) with an aim to preserve 2% of the marine area (FAO 2020).

In the Philippines in 1981, there were 5-year closures of the trawl and purse seine fisheries in the waters of Bohol, Cebu, and Negros Oriental and in 1983 in Batangas (Palomares and Pauly 2014, FAO 2020). These bans and closures imply that 'baby trawlers' became illegal (Palomares and Pauly 2014). In 1998, active fishing gears, including trawlers, 'baby trawlers', purse seines, and tuna longlines, were prohibited within municipal marine waters (<3 nm from shore). In 1998, a ban was also legislated on muro ami gear (an encircling net and pounding devices) and other gear destructive to coral reefs and marine habitats (FAO 2020). Trawlers within commercial waters have been required since 2010 to use Juvenile and Trashfish Excluder Devices under the Fisheries Administrative Order 237 series of 2010 (D. Tanay unpubl. data 2020), which may reduce the retention of larger sharks and rays (Brewer *et al.* 2006). In the Philippines, there are ~>1,800 MPAs (NFRDI 2017, CTI 2020). Some of these MPAs are known to provide shark and ray protection including Donsol, Malapascua, Cagayancillo, and Tubbataha Reefs Natural Park (NFRDI 2017, Murray *et al.* 2018).

In Indonesia in 1980, trawls were banned, however, large numbers of mini or baby trawls (Lampara) are still used throughout the country (Chong *et al.* 1987). In 2015, an additional ban on seine nets (Cantrang) was to be fully implemented in February 2020 (Ambari 2019). There are currently plans in place to lift both these bans in the near future, where the Ministry of Marine Affairs and Fisheries (MMAF) plan will allow the operation of the fishing gear with restrictions on the area of fishing pressure (Dharmadi unpubl. data 2020). Throughout Indonesia there are 196 marine protected areas (MPAs) making up 239,428 km^2 that may provide some refuge to this species (CTI 2020). In Malaysia there are 51 MPAs making up 5,462 km^2 that may provide some refuge to this species (CTI 2020). Most MPAs in the region are not well enforced and unlikely to provide any tangible relief from fishing pressure. In Thailand, all commercial fishing vessels greater than 10 Gross Tonnage are prohibited within three nm from the shore (DoF 2015).

There has been limited management of shark and rays in Myanmar. In 2004, two shark reserves were established in the Myeik Archipelago where targeting sharks is prohibited (Notification 2/2004) (Howard *et al.* 2015). Rays are protected from targeting by the shark reserves. In 2008, a nationwide ban on the targeting of sharks was announced. Despite the nationwide ban sharks and rays continue to be captured in large numbers, partly because there is little or no enforcement, and little knowledge of it in fishing communities (T. MacKeracher pers. comm. 2020).

The United Arab Emirates and Oman have banned trawling in their waters while Iran, Pakistan, and India have seasonal trawl bans that might benefit the species. Furthermore, Sri Lanka does not have trawl fisheries. However, incidental catches likely occur in other fisheries (e.g. gillnetting). In India, the Gulf of Mannar Marine National Park and Sunderbans biosphere reserve could protect this species (K.K. Bineesh unpubl. data 2020). Further research is needed on population size and trends, life history, and catch rates should be monitored throughout this species' range.

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External Resources

For Supplementary Material, and for Images and External Links to Additional Information, please see the Red List website.

Appendix

Habitats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Habitat	Season	Suitability	Major Importance?
9. Marine Neritic -> 9.1. Marine Neritic - Pelagic	Resident	Suitable	Yes
9. Marine Neritic -> 9.4. Marine Neritic - Subtidal Sandy	Resident	Suitable	Yes
9. Marine Neritic -> 9.6. Marine Neritic - Subtidal Muddy	Resident	Suitable	Yes
9. Marine Neritic -> 9.8. Marine Neritic - Coral Reef	Resident	Suitable	Yes
9. Marine Neritic -> 9.9. Marine Neritic - Seagrass (Submerged)	Resident	Suitable	Yes
9. Marine Neritic -> 9.10. Marine Neritic - Estuaries	Resident	Suitable	Yes

Use and Trade

(http://www.iucnredlist.org/technical-documents/classification-schemes)

End Use	Local	National	International
Food - human	Yes	Yes	Yes

Threats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.2. Commercial & industrial areas	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale) [harvest]	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.2. Intentional use: (large scale) [harvest]	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.3. Unintentional effects: (subsistence/small scale) [harvest]	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality		

5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.4. Unintentional effects: (large scale) [harvest]	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality		
11. Climate change & severe weather -> 11.5. Other impacts	Ongoing	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.3. Indirect ecosystem effects		

Conservation Actions in Place

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Action in Place
In-place research and monitoring
Action Recovery Plan: No
Systematic monitoring scheme: No
In-place land/water protection
Conservation sites identified: No
Area based regional management plan: No
Occurs in at least one protected area: Yes
Invasive species control or prevention: Not Applicable
In-place species management
Harvest management plan: No
Successfully reintroduced or introduced benignly: No
Subject to ex-situ conservation: No
In-place education
Subject to recent education and awareness programmes: No
Included in international legislation: No
Subject to any international management / trade controls: No

Conservation Actions Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Action Needed
1. Land/water protection -> 1.1. Site/area protection
3. Species management -> 3.1. Species management -> 3.1.1. Harvest management
3. Species management -> 3.1. Species management -> 3.1.2. Trade management

Conservation Action Needed
3. Species management -> 3.2. Species recovery
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level

Research Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
1. Research -> 1.4. Harvest, use & livelihoods
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.2. Harvest level trends

Additional Data Fields

Distribution
Lower depth limit (m): 75
Upper depth limit (m): 0
Habitats and Ecology
Generation Length (years): 15

The IUCN Red List Partnership

The IUCN Red List of Threatened Species™ is produced and managed by the IUCN Global Species Programme, the IUCN Species Survival Commission (SSC) and The IUCN Red List Partnership.

The IUCN Red List Partners are: Arizona State University; BirdLife International; Botanic Gardens Conservation International; Conservation International; NatureServe; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; and Zoological Society of London.