NOTIFICATION TO THE PARTIES

No. 2024/133

Geneva, 4 December 2024

CONCERNING:

ECUADOR

Consultation with range States on a proposal to transfer *Mobula* rays and any other species of the family Mobulidae from Appendix II to Appendix I

1. This Notification is being published at the request of the Government of Ecuador.

2. In accordance with Resolution Conf. 8.21 (Rev. CoP16) on *Consultation with range States on proposals to amend Appendices I and II*, the Government of Ecuador wishes to consult range States.

3. The government of Ecuador has submitted a proposal for consideration at the 20th meeting of the Conference of the Parties to transfer Mobula rays (*Mobula alfredi, M. birostris, M. tarapacana, M. mobular, M. thurstoni, M. eregoodoo, M. kuhlii, M. hypostoma,* and *M. munkiana*) and any other species of the family Mobulidae from Appendix II to Appendix I, based on the criteria adopted in Resolution Conf. 9.24 (Rev. CoP17) Annex 1, Criterion C.

4. Accordingly, the Government of Ecuador requests range States to provide any available information on the conservation status (distribution, population size, structure, and trends), and on legal domestic and international trade of specimens, parts, and derivatives, as well as information on illegal trade (seizures and confiscations).

5. All range States are invited to submit their responses to this Notification by **15 December 2024**, directly to the CITES Management Authority of Ecuador (not to the Secretariat) by email to: cites@ambiente.gob.ec.

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CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Twentieth meeting of the Conference of the Parties

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Transfer of the mobulids (manta and devil rays), *Mobula alfredi, M. birostris, M. tarapacana*, *M. mobular, M. thurstoni, M. eregoodoo, M. kuhlii, M. hypostoma,* and *M. munkiana*, and any other putative species within the monogeneric Mobulidae family, from Appendix II to Appendix I in accordance with Article II, paragraph 1 of the Convention and satisfying Criterion C (i & ii) in Annex 1 of Resolution Conf. 9.24 (Rev. CoP17) due to their populations declining severely because of unsustainable harvest, some of which enters international trade.

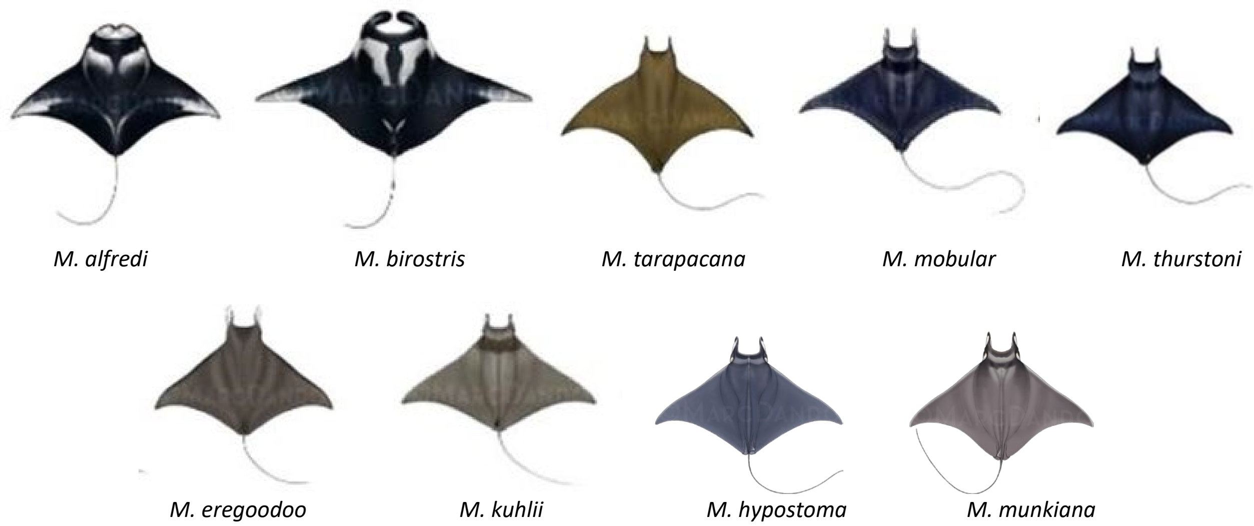

Figure 1. Illustrations of the nine valid mobulid species. Copyright Marc Dando.

B. Proponent

Ecuador and XX*

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C. Supporting statement

1. Taxonomy

1.1 Class: Chondrichthyes (Subclass: Elasmobranchii)

1.2 Order: Myliobatiformes

1.3 Family: Mobulidae

1.4 Genus and species, including author and year:

Mobula mobular (Bonnaterre, 1788), *M. birostris* (Walbaum, 1792), *M. hypostoma (*Bancroft, 1831), *M.kuhlii* (Müller & Henle, 1841), *M. eregoodoo* (Cantor, 1849), *M. alfredi* (Krefft, 1868), *M. tarapacana* (Philippi, 1892), *M. thurstoni* (Lloyd, 1908), and *M. munkiana* (Notarbartolo di Sciara, 1987*)*.

1.5 Scientific synonyms:

See Annex 1. (White et al. (2018); Hosegood et al. (2020); and Notarbartolo di Sciara, et al. (2020))

1.6 Common names:

In English, the family Mobulidae are called manta and devil rays (collectively, mobulids). In French, they are mante and raie diable. In Spanish: manta diablo. For the nine species' common names see Annex I.

1.7 Code numbers: Not applicable.

2. Overview:

Global trade in mobulid products has continued to grow and diversify over the last decade despite their CITES Appendix II listings, and is unsustainable. Overfishing of these biologically vulnerable rays, partly driven by legal and illegal trade, is exacerbating persistent and significant population declines around the world and resulting in suspected commercial extinction and local extirpations (Venables et al. 2024; de Boer et al., 2024; Laglbauer et al. [In Press]; Diamant et al. [In Press]; Palacios et al. [In Press]). All mobulids are listed as Endangered or Vulnerable on the IUCN's Red List of Threatened Species, with declining trends. Listing under Appendix I is needed to halt commercial international trade for all mobulid species.

Manta and devil rays (the mobulids, family Mobulidae), are nine highly migratory species found in tropical and subtropical waters worldwide (Stevens et al. 2024). This monogeneric family is characterized by unique filter-feeding adaptations (White et al. 2018; Hosegood et al. 2020; Notarbartolo di Sciara, et al. 2020). They are extremely biologically vulnerable due to their conservative life history traits, such as slow growth and late maturation (Notarbartolo-di-Sciara 1988; Marshall & Bennett 2010; Pardo et al. 2016), and are among the least fecund of all elasmobranchs. After reaching maturity at an average of 10 years, they typically give birth to only one pup every two to three years (up to eight years in some subpopulations). Additionally, their coastal and pelagic habitat and aggregatory behaviours expose them to target capture and bycatch across most artisanal and industrial fisheries ((Dulvy et al. 2014; Croll et al. 2016; Alfaro-Cordova et al. 2017; Stewart et al. 2018; Fernando & Stewart 2021; Palacios et al. 2023; Laglbauer et al. [In Press]).

Historically, mobulids were discarded in commercial fisheries because their meat is generally considered low quality. In recent decades, targeted fisheries driven by demand for dried mobulid gill plates, marketed as traditional medicines, has led to an expansion of international trade into key hubs in Asia (Croll et al. 2016; O'Malley et al. 2017; Palacios et al. [In Press]). Consequently, all mobulids have been listed on CITES Appendix II since 2013–2016. Despite these listings, persistent population declines of up to 92% have continued (Ward-Paige et al. 2013; Lewis et al., 2015; Moazzam, 2018; Fernando & Stewart, 2021; Carpenter et al., 2023; Venables et al. 2024; Rojas-Perea et al. [In review]; Laglbauer et al. [In Press]), and mean reduction in body size (disc width) – another indicator of high fishery pressure – has been documented in multiple species and locations (Fernando & Stewart 2021; Laglbauer et al. 2024 [In Press]).

In the decade since listing on Appendix II, trade in mobulid gill plates has not been effectively regulated or limited to sustainable levels (Palacios et al. [In Press]). Very few mobulid non-detriment findings and no legal acquisition findings have been shared. Only five Parties (less than 5% of range States) have reported trade to CITES, but analysis of the CITES Trade Database (2017 – 2021) has highlighted a concerning increase and high volume in the reported trade of gill plates globally, resulting in the first Review of Significant Trade for these taxa. Additionally, there is significant illegal and unreported trade from an additional 22 range States, and mobulid products retail for higher prices than before the Appendix II listings, with no observed reduction in supply or demand (see section 6.4). Previously overlooked international trade in mobulid meat (not reported in the CITES Trade Database) is also fuelling fisheries mortality and population declines (Palacios et al. [In Press]).

While improved capacity for fisheries management, enforcement, and data collection are crucial, these efforts alone will not halt continued population declines. Transferring these species to Appendix I will more effectively reduce trade pressure, strengthen international cooperation between enforcement authorities to prevent illegal trade, thereby enabling these species to begin their recovery. Transfer to Appendix I would also complement actions taken by the Convention on the Conservation of Migratory Species of Wild Animals (CMS) which lists mobulid rays on Appendix I, prohibiting their take from the wild, along with the non-retention measures in place by the four main tuna Regional Fisheries Management Organisations (see section 8.1).

3. Species characteristics

3.1 Distribution

Mobulids are distributed globally, primarily in tropical and subtropical waters. *Mobula birostris, M. tarapacana, M. mobular, and M. thurstoni* are distributed circumglobally in the Atlantic, Pacific, and Indian Oceans; seasonally also venturing into the temperate regions of these oceans (Notarbartolo di Sciara, 1987). *Mobula alfredi*, *M eregoodoo,* and *M. kuhlii* are restricted to the Indo-West Pacific. *Mobula hypostoma* is restricted to the Atlantic Ocean, and *M. munkiana* is restricted to the Eastern Pacific Ocean (Stevens et al. 2024). Within this broad range populations of all mobulid species are sparsely distributed and highly fragmented, likely due to their resource and habitat needs (Stewart et al. 2018) in addition to over-exploitation. Range maps are presented in Annex II.

3.2 Habitat

Mobulids occur in a wide range of marine habitats, from shallow coastal waters to oceanic waters. *Mobula alfredi* is primarily neritic, typically resident in productive coral reef habitat of island groups, atoll archipelagos, and continental coastlines, but also moves offshore to forage (Marshall *et al.* 2009; Kashiwagi et al. 2011; Stewart et al. 2018; Harris et al. 2020; Venables et al. 2020; Harris & Stevens 2021; Harris et al. 2024; Braun et al. 2015; Andrzejaczek et al. 2020). *Mobula birostris* is more oceanic in its habitat use than *M. alfredi,* however it also aggregates along coastlines, at oceanic islands, offshore pinnacles, and seamounts (Stewart et al. 2016; Stevens *et al.* 2018; Harty et al. 2022). Like *M. birostris*, *Mobula mobular*, *M. thurstoni,* and *M. tarapacana* are more oceanic, occurring at oceanic island groups, near offshore pinnacles and seamounts, and seasonally along productive coastlines with regular upwelling (Clark et al. 2006a, b, 2010; Thorrold et al. 2014; Mendonça et al. 2018; Lezama-Ochoa et al. 2019a, 2020; Palacios et al. 2023, 2024; Pate et al. 2023). *Mobula munkiana* prefers warm, shallow coastal waters, it is often found in bays, estuaries, and along continental shelves in the Eastern Pacific, including the Gulf of California (Notarbartolo di Sciara, 1988; Palacios et al., 2021, 2024). *Mobula hypostoma*, *M. kuhlii* and *M. eregoodoo* are also neritic zone species, preferring coastal and continental shelf waters (Notarbartolo di Sciara, 1987; Notarbartolo di Sciara et al. 2017, 2020; Bucair et al., 2024; Stevens et al. 2024; Boggio-Pasqua et al. [In Review]).

3.3 Biological characteristics

Mobulid species reproduce via aplacental viviparity and have extreme K-selective traits, such as the lowest reported fecundity among elasmobranchs (Dulvy et al. 2014; Pardo et al. 2016), making them highly vulnerable to exploitation and incidental capture (Couturier et al. 2012; Croll et al. 2016). This vulnerability is increased by their migratory and predictable aggregatory behaviour in easily accessible areas (Palacios et al. 2023).

All mobulids are slow growing and long-lived, with low fecundity and long generation times (e.g., estimated at 25 years for the manta rays). For manta rays, longevity is estimated to be at least 40 years and natural mortality is thought to be low. Manta rays bear only one pup per pregnancy, which, on average, occurs every two to five years in the wild for *M. alfredi*. Gestation period is 12 – 13 months for *M. alfredi* and maturation occurs at ~10 years marking them among the least fecund of all elasmobranchs. With such conservative life history characteristics, a female manta ray can produce no more than 5 – 15 pups over her lifetime (Homma *et al*. 1999; Marshall et al. 2011b, c; Couturier et al. 2012; Deakos et al. 2012; Dulvy et al. 2014; Kashiwagi 2015; Stevens, 2016; Armstrong et al. 2020). Detailed life history parameters for *M. birostris* are likely to be similar to *M. alfredi*, although data is lacking (Stewart et al. 2018). The intrinsic growth rate of the oceanic larger devil ray species (*M. mobular, M. tarapacana*, and *M. thurstoni*) is estimated to be similar to manta rays, as the median maximum intrinsic rate of population increase (rmax) for *M. mobular* equals 0.077 year-1, indicating that there is the potential to drive devil rays to local extinction under even low levels of fishing mortality (Pardo et al. 2016; Fernando & Stewart 2021). Although most of the pygmy devil ray species (*M. hypostoma, M. kuhlii, M. eregoodoo*, and *M. munkiana*) are poorly studied, data suggests they share the same life history traits as their larger relatives. Studies on *M. kuhlii* and *M. eregoodoo* indicate that these species have a very low reproductive output; uniparity and potentially biennial or triennial parturition (Broadhurst et al. 2018). Subpopulations of all mobulid species are therefore exceptionally vulnerable to extirpation, are slow to recover once depleted, and the possibility of successful re-colonization is low.

Most mobulid species primarily feed on zooplanktonic organisms, such as euphausiids, copepods, mysids, decapod larvae and shrimp, but some studies have noted their consumption of small and moderate-sized fishes as well (Stewart et al. 2018a). The two exceptions are *M. tarapacana* and *M. eregoodoo,* which both appear to specialise in catching small schooling fishes (White *et al*. 2006b; Notarbartolo di Sciara et al., 2020). Previously thought to feed mainly at the surface during daytime, recent studies have shown that most mobulid species have a more complex foraging pattern, also exploiting prey in deeper waters (Couturier et al. 2014; Stewart et al. 2016, 2018b; Burgess et al. 2019; Peel et al. 2019; Armstrong et al. 2020; Harris et al. 2021). Both *M. birostris* (max. depth 1,246 metres) and *M. tarapacana* (max depth 1,637 metres) have been documented diving to the bathypelagic zone, possibly in search of prey (Thorrold *et al*. 2014). Pygmy devil rays, although generally more coastal in habitat use, can also dive quite deep, with *M. munkiana* diving to a maximum depth of 126 metres (Andrzejaczek et al. 2022).

Mobulid rays undertake significant migrations (>1,000s km) across broad geographic ranges and between oceanic and coastal waters For example, satellite tagging data from *M. tarapacana* showed straight-line travel distances up to 3,800 km in several months, while tagged *M. mobular* travelled 1,400 – 1,800 km, crossing through oligotrophic tropical and subtropical waters *Mobula alfredi* in the Maldives regularly travel hundreds of kilometres between aggregation sites seasonally (Harris & Stevens, 2021), and transnationally over 500 kilometres between sites in Mozambique and South Africa (Jaine *et al*. 2014; Thorrold *et al*. 2014; Francis & Jones 2016; Aruaz et al. 2019; Marshall et al. 2023; Setyawan et al. [In Review]).

Mobulids have been documented forming seasonal aggregations in small and extremely large groups around the world, with numbers ranging from a few individuals to tens of thousands (Palacios et al. 2023; Stevens et al. 2024). The aggregations often relate to accessing concentrated food sources, courtship and reproduction, predator avoidance, and other functions (Bucair et al. 2021; Palacios et al. 2023). This migratory behaviour, combined with predictable aggregations in easily accessible areas, makes them vulnerable to coastal and high seas fisheries (Couturier et al. 2012, Croll et al. 2012, Thorrold et al. 2014). In some cases, hundreds of aggregating mobulids have been incidentally captured in the same fishing event (Lezama-Ochoa et al. 2019). This risk is heightened for the lesser-studied and lesser-protected devil rays, which are more likely to aggregate in large numbers (Palacios et al. 2023).

3.4 Morphological characteristics

Mobulids are distinguished from other rays by their large diamond-shaped bodies with elongated wing-like pectoral fins, laterally placed eyes, wide mouths and paired cephalic lobes that extend anteriorly beyond the head (Notarbartolo di Sciara, 1987). Manta rays have terminal and forward facing mouths, while devil rays have subterminal mouths, located on the underside of the head (Stevens et al. 2024).

Each mobulid ray has five pairs of gill arches (the skeletal structures supporting the gills and gill plates), each of which is encircled internally by a pre-branchial appendage, or gill plate. These structures act as filters, straining their planktonic food from the water column, enabling rays to feed (Paig-Tran et al. 2013;

Stevens et al. 2018). Dried mobulid gill plates can be differentiated visually using three simple characteristics: size, colour patterning (uniform vs bicoloured) and lobe edging (smooth vs jagged).

3.5 Role of the species in its ecosystem

Like the large baleen whales, which also feed low in the food chain, mobulid rays are indicator species for the overall health of the ecosystem (Roman et al. 2014; Stevens, 2016; Dulvy et al. [In Review]). Studies have proposed that removing large filter-feeding organisms from marine environments can result in significant, cascading species composition changes (Springer et al. 2003). As marine megafauna, on death, mobulids also contribute significantly to food falls, supporting fauna in deep water environments, increasing the transfer of carbon from the ocean surface to the deep sea and the sequestration of carbon in the deep ocean (Higgs *et a*l. 2014; Mariani *et al*. 2020). *Mobula alfredi* have been observed to travel offshore to feed on mesopelagic zooplankton before returning to inshore coral reefs during the day where they excrete waste products (Couturier et al. 2013; Braun et al. 2014). In this way, *M. alfredi* create links between shallow coral reefs and deeper water ecosystems, potentially facilitating the horizontal transport of nutrients between these environments (Peel et al. 2019; Harris et al. 2021).

4. Status and trends

4.1 Habitat trends

Overfishing can indirectly affect mobulid rays by disrupting the marine food web, reducing zooplankton and fish populations through the removal of predators that keep plankton-eating species in check, and by degrading overall ecosystem health, which diminishes suitable habitat. Other overarching indirect threats like climate change and localized direct anthropogenic threats, such as noise pollution, sedimentation, and oils spills also contribute to habitat degradation (Stewart et al. 2018). As pelagic zooplanktivores, mobulid rays are also particularly vulnerable to the impacts of climate change, through the disruption of ecological processes brought about by rising sea temperatures and ocean acidification, resulting in increasing broad-scale fluctuations and general declines in the abundance of their zooplanktonic prey (Richardson, 2008; Dam & Baumann 2017; Armstrong et al. 2021; Heneghan et al 2023). Furthermore, the global degradation and loss of coral reef habitats, which provide food, cleaning stations, thermal refuges, and reproductive areas, are likely to have negative impact on mobulid rays, which depend on these important ecosystems; notably the manta and pygmy devil ray species (Pandolfi et al. 2003; Sale & Hixon 2014; Stewart et al, 2018; Eddy et al. 2021). Alterations to terrestrial ecosystems have also been shown to affect mobulid populations (McCauley et al. 2012).

4.2 Population size

Global manta ray population numbers have been roughly estimated at ~150,000 for *M. birostris* and 80,000 for *M. alfredi* (Stevens et al. [In Press]). Most identified subpopulations are small (~100 to 2,000 individuals) (Luiz et al. 2009, Kashiwagi et al. 2011; Deakos et al 2011; Marshall et al. 2011; Couturier et al. 2014; Kashiwagi 2014; Carpentier et al. 2019; Germanov et al. 2019; Beale et al. 2019; Setyawan et al. 2022; Knochel et al. 2022; Lassauce et al. 2024; Hilbourne et al. [In Review]). A few regions have estimated super-populations: 4,901 in the Maldives (*M. alfredi*, Nickoson-Jack et al. 2021; Strike et al. 2022) and estimated to be 22,316 in Ecuador (*M. birostris*, Harty et al. 2022). Locally, abundance of mobulids varies substantially and is likely based on food availability and the degree to which sub-populations have been, or currently are, being fished (Stewart et al. 2018). For example, in the Maldives where all mobulids are protected, aggregations of up to 250 individual *M. alfredi* can be found at key foraging sites (Stevens, 2016; Harris et al., 2020; Armstrong et al. 2021; Harris & Stevens, 2021). However, there is often low connectivity between widely separated sites and a high degree of residency, rendering *M. alfredi* particularly vulnerable to local depletion and regional extinction (Whitney et al. 2023; Setyawan et al. 2024; Harris et al. 2024). There are no global population estimates for any of the devil ray species. Genus-wide declines are suspected based on declining sightings-per-unit-effort (SPUE) data from monitored populations, catch landings data, and evidence of depletion (Fernando & Stevens 2011, Couturier et al. 2012, Hall & Roman 2013, Ward-Paige et al. 2013, Lewis et al. 2015, Croll et al. 2016, Rohner et al. 2017). Abundance estimates have been attempted with aerial surveys in some regions, like the northwest Mediterranean Sea, where the population of *M. mobular* was estimated at up to 12,700 individuals (Fortuna et al. 2014, Notarbartolo di Sciara et al. 2015).

4.3 Population structure

Baseline data to assess population structure is lacking for most mobulid species throughout their range. Some genetic and photo-ID studies indicate certain species (e.g., *M. alfredi*) have small and highly fragmented populations (Kashiwagi et al. 2014; Humble et al. 2023). As a result, fishing can rapidly deplete sub-populations, with recovery hindered significantly by their conservative life history traits.

Researchers studying *M. birostris* aggregations in many locations (e.g., Mozambique, Mexico, Fiji, Raja Ampat, French Polynesia, and Philippines) observed a female bias, while, in other locations (e.g., the Maldives, Ecuador, and New Caledonia) populations are biassed towards males (see Hilbourne et al. [In Review]). Identified individuals at some aggregation sites across the world are on occasion re-sighted frequently, but at other locations are typically re-sighted only many years later, if at all (Marshall et al., 2009; Harty et al. 2022; Hilbourne et al. [In Review]). Nursery sites have been proposed for *M. birostris* in several locations in the Western Atlantic Ocean (Stewart et al. 2018c; Pate et al. 2020). Demographic variations have also been recorded by researchers studying *M. alfredi* populations. In Mozambique, a significant female bias has been observed, with most of these females mature (Marshall et al. 2011a). However, in the Maldives and Hawaii, the sex ratio is close to parity with juveniles and adults present (Deakos et al. 2011; Stevens, 2016). These studies also found that juveniles segregate from the adult population, residing in areas where they are less vulnerable to predation. In Ningaloo, Australia, the distribution of males to females and adults to juveniles fluctuates throughout the year, but mature females consistently dominate (McGregor 2009, unpublished data). Of three *M. alfredi* aggregation sites surveyed in eastern Australia, only the largest site exhibited a significant female bias (Couturier et al. 2011).

Very little research has been undertaken on the population structure of devil rays. Recent research on *M. mobular* in the Lesser Sunda Seascape, Indonesia, using microsatellite and mtDNA revealed that within the study area *M. mobular* are divided into two distinct subpopulations, highlighting species fragmentation (Malik et al. 2022). Extensive population studies from seasonal aggregations of *M. tarapacana* in the Saint Peter and Saint Paul Archipelago clearly indicated segregation by size, probably related to reproductive migration, as suggested by the presence of mating scars (Mendonça et al. 2020). The predominance of females at this location, in turn, also suggests the occurrence of sexual segregation. A study evaluating the population structure of *M. thurstoni* in the South Indonesian Sea concluded that this stock represents a single genetic pool (Wardana et. al 2023). However, a study on the same species in Tanzania revealed significant genetic differences between the populations of Tanzania and Brazil, and genetic isolation between the Tanzanian and Malaysian populations (Rumisha et al. 2024).

4.4 Population trends

Table 1: Estimated declines of mobulids that meet the CITES Appendix I listing criteria.

Reference(s)	Study Region	Study Period	Species	Decline
White et al., 2015	Costa Rica	1993-2013	*M tarapacana, M. mobular, M. thurstoni*	78%
White et al., 2015	Costa Rica	1993-2013	*M. birostris*	89%
Rojas et al. 2024 [In Review]	Peru	2000-2023	*M. mobular, M. munkiana, M. thurstoni*	75%
Lewis et al., 2015	Lakamera, Indonesia	2001-2014	Mobulids	75%
Lewis et al., 2015	Tanjung Luar, Indonesia	2001-2014	Mobulids	94%
Rohner et al., 2013	Mozambique	2003-2011	*M. alfredi*	88%
Rambahiniariason et al., 2022	Phillipines	2004-2020	*M. alfredi; M. mobular*	80%
Fernando & Stewart, 2021	Sri lanka	2011-2018	*M birostris, M. Mobular, M. tarapacana, M thurstoni*	92%
Moazzam, 2018	Pakistan	2013-2018	Mobulids	92.50%
Laglbauer et al. 2024 [In Review]	East Java	2015-2024	*M. mobular*	89%

Despite listing on CITES Appendix II (and Appendix I and II of CMS) over a decade ago and national protections in place in at least 34 range nations (Stevens et al. 2024; Laglbauer et al. 2024 [in press]), mobulid populations have continued to show steep declines worldwide (Ward-Paige et al. 2013; Rohner et al. 2017; Fernando and Stewart 2021; Venables 2020; Carpenter et al. 2023; Venables et al. 2024). These declining population trends combined with their life history vulnerabilities have resulted in the threatened status of all nine mobulid species being uplisted on the IUCN's Red List (IUCN 2024 - see Annex I). Recent studies have shown persistent population declines of up to 92.5% (study periods between five and 21 years) in several locations worldwide (Ward-Paige et al. 2013; Lewis et al., 2015; Moazzam, 2018; Fernando & Stewart, 2021; Rambahiniarison et al. 2022; Carpenter et al., 2023; Venables et al. 2024; Rojas-Perea et al. [In review] – Table 1 and Annex III), with commercial extinction and local extirpation occurring in certain areas (Venables et al. 2024; de Boer et al., 2024; Diamant et al. [In Press]).

These rates of decline exceed the 80% decline from historical baseline threshold for listing a low productivity commercially-exploited aquatic species in Appendix I (see footnote in Annex 5 of Conf. 9.24 (Rev CoP17)). Additionally, since mobulids are amongst the slowest growing marine species, members of this family fall outside the typical range of marine species productivity and qualify for listing following a lesser decline. In fact, the estimated generation length of mobulids ranges from 29 years in *M. birostris* and ~13 years in the four pygmy devil rays (IUCN, 2022), which means the majority of declines observed above have occurred in less than one generation length, exceeding the CITES listing criteria.

Recent studies across multiple ocean regions have revealed ongoing and alarming declines in mobulid ray populations (Table 1; Annex III), with the most recent data highlighting the continuing nature of this trend. In the Indian Ocean, East Java experienced an 89% decline in overall mobulid catch rates over nine years from 2015 to 2024 (Laglbauer et al., 2024; in Press). Mozambique studies showed dramatic declines of 88-99% for M. alfredi, 92.5-94.2% for *M. birostris*, and 81.3-98.8% for *M. kuhlii* over X years between 2003 and 2023 (Rohner et al., 2013, 2017; Venables et al., 2024). In the Pacific Ocean, the Philippines documented an 80% decline in *M. birostris* sightings over 20 years from 2004 to 2020 (Rambahiniarison et al., 2023), while Peru reported a 75% decline in *M. mobular, M. munkiana*, and *M. thurstoni* over 23 years from 2000 to 2023 (Rojas et al., 2024; in review).

These recent declines build upon previously reported reductions, including severe declines in Indonesia over 13 years (from 2001 to 2014), with *M. tarapacana* landings declining by 99% in Tanjung Luar, 77% in Cilacap, and 75% in Lamakera (Lewis et al., 2015). Other significant catch declines were noted in South Africa over 20 years from 1981 to 2021 (Carpenter et al., 2023), as well as marked decreases in Sri Lanka and Pakistan over 7 years between 2011 and 2018, with a reported decline of 75% in *M. birostris* (Fernando and Stewart, 2021) and a 92.5% decline in mobulids (Moazzam, 2018), respectively. The Atlantic Ocean has also seen substantial declines, with Cocos Island, Costa Rica, experiencing a 78% decrease in *M. tarapacana* and other mobulid species over 20 years from 1993 to 2013 (White et al., 2015).

Examination of photo archives from the Chagos Archipelago collected during enforcement operations revealed that *M. tarapacana*, *M. mobular* and *M. thurstoni* are being caught illegally within the archipelago's vast no-take marine protected area (Harris et al. 2024). Throughout most of its range, populations of *M. mobular* and *M. thurstoni* appear to be in decline, due to directed fishing and incidental capture as bycatch (Couturier et al. 2012, Ward-Paige et al. 2013, Croll et al. 2016). Declines can be inferred in many regions based on declines in landings or sightings concurrent with increasing effort (Couturier et al. 2012, Ward-Paige et al. 2013, Croll et al. 2016). A recent study analysing landings data from Tanzania revealed that *M. thurstoni* composed 71% of the countries' devil ray landings (Rumisha et al. 2024), most-likely leading to a steep local decline of this species. In Muncar, Esta Java (2015 – 2024), *M. mobular* (1,228 ind.) and *M. thurstoni* (957) accounted for 95% of the mobulid species landed (Laglbauer et al. [In Press]). This study highlights a declining trend in the catch rate of *M. mobular* over 9 years compounded by mobulid ray declines reported by fishers, and a majority of immature specimens across Muncar's fisheries indicate that mobulid rays are likely overfished in East Java. Another recent study from Congo identified five species of devil rays caught by artisanal fisheries and stated that given the heavy and unregulated fishing pressure which exists throughout the African range of *M. hypostoma*, together with this species' very low reproductive potential (e.g., Couturier et al. 2012), it is likely that populations in the northern part of its range have been heavily impacted and have been fished to near extinction (de Boer et al., 2024).

Another strong indicator of declining populations is mean disc-width reduction. A study analysing nine years of fisheries landings data (2011 – 2020) from Sri Lanka (Fernando & Stewart 2021) found evidence of this for *M. mobular* (N = 956): 2.8 cm/year, *M. tarapacana* (N = 285): 2.4 cm/year, and *M. thurstoni* (N = 68): 2.2 cm/year. A significant decrease in mean disc width size (2015 – 2024) was also found for *M. mobular* (N = 510) in East Java (Laglbauer et al. 2024 [In Press]). This is an indicator of demographic shifts in populations (smaller individuals), reflecting impacts of overfishing and challenges in population recovery. Furthermore, reports from fishers and traders of devil ray gill plates indicate that they are becoming harder to source, with prices escalating as the supply continues to decline (O'Malley et al. 2017, Palacios et al. [In Press]). Regional extinction is suspected in areas with intense and increasing fishing pressure (Lewis et al. 2015).

5. Threats

The main threats to Mobulids are unsustainable target and retained bycatch fishing pressure from industrial and both large- and small-scale artisanal fleets (Dulvy et al., 2014; Croll et al., 2016; Haque et al. 2022; Pacoureau et al. 2021; Fernando & Stewart 2021; Venables et al., 2024; Laglbauer et al., [In Press]). These fisheries are at least partly driven by legal and illegal international trade demand for meat and gill plates (Palacios et al., [In Press]), posing a very high extinction risk to intrinsically vulnerable species, and some documented extirpations.

It is challenging to quantify many of these fisheries, owing to inconsistent data, reporting at higher taxons or aggregating data with other ray species, species misidentifications, the global, pelagic, and sympatric distribution of most species, and the large number of fisheries with which they interact (Camhi et al., 2009; Laglbauer et al., [In Review]). The highest reported mobulid bycatch among industrial fisheries is an estimated 13,000 individuals caught annually by tuna purse seiners (Hall and Roman 2013). Nonetheless, some of the largest mobulid landings come from large-scale artisanal fisheries. In India, mobulids comprise up to 8% of total elasmobranch catch at landing centres (Thomas et al. 2022). In Indonesia, mobulid rays are caught in small-scale fisheries, particularly by drift gillnets, which poses a significant threat to their populations, and has led to declines of up to 89% over 9 years in Muncar, East Java (Laglbauer et al., [In Press]).

Mobulid meat derived from tuna purse seine bycatch and artisanal fisheries is often retained and consumed locally (although recent data does demonstrate some international trade of meat as well – see section 6.4), while the high demand for mobulid gill plates in Southeast Asian markets (mainland China, Hong Kong SAR, Singapore, South Korea, and Thailand) incentivises retention for export (Palacios et al., [In Press]).

The FAO Capture Production Database for mobulids lists nine countries reporting catch from 2000 to 2021: Indonesia, Kenya, Liberia, Mauritania, Pakistan, Spain, Sri Lanka, Ecuador, and Peru. However, findings of country-focused online surveys and interviews conducted in 2023 reveal that mobulids are caught and landed in at least 43 countries, of which 36 do not appear in the FAO Database. These are: Angola, Bangladesh, Benin, Brazil, Cameroon, China, Cyprus (de facto Northern Cyprus), France, Gabon, Ghana, Greece, Guatemala, India, Iran, Italy, Madagascar, Malaysia, Mexico, Mozambique, Myanmar, Oman, Palestina, Philippines, Republic of Congo, São Tomé and Príncipe, Saudi Arabia, Senegal, Seychelles, Sudan, Taiwan, Tanzania, Tunisia, United Arab Emirates, Venezuela, Vietnam and Yemen. Furthermore, findings show mobulids appear as discarded bycatch in 13 countries/territories, including in European Union countries, Thailand, USA, Australia, New Zealand, Costa Rica, French Polynesia, Maldives, Turkey and South Africa. *Mobula mobular* (n = 37 countries) and *M. birostris* (n = 22 countries) emerged as geographically the most recorded species in landings (Palacios et al., [In Press]). This discrepancy underscores the pervasive issue of national underreporting in FAO capture production data (Cashion et al. 2019; Fowler et al. 2021), raising concerns over the accuracy and transparency of official national fisheries data.

6. Utilisation and trade

All commercial utilisation and trade in the products of mobulids is derived from wild-caught animals. Mobulids are utilised for their meat and dried prebranchial appendages (commonly called gill plates). Despite CITES Appendix II listings in 2013 and 2016, demand for mobulid products has not reduced, international trade has expanded worldwide, and prices are higher than a decade ago (Palacios et al., [In Press]).

Mobulids were historically utilised domestically, primarily for meat and sometimes derivatives (e.g., cartilage and skin). Their meat is generally considered low quality in most regions and does not drive target fisheries; it is often dried and labelled generically as “fish” (Palacios et al., [In Press]). In recent decades, a supply chain expansion driven by demand for the dried gill plates of mobulids has led to a drastic increase of international trade into key hubs in Asia (Croll et al. 2016; O’Malley et al. 2017). For instance, the estimated annual increase in weight of gill plates sold in Guangzhou (China) between 2011 and 2013 was 9% for manta rays (*M. birostris* and M. *alfredi* at 21,876 kg to 23,811 kg), 107% for *M. tarapacana* (20,324 kg to 42,165 kg), and 204% for *M. mobular* and other mobulids (17,952 kg to 54,493 kg) (O’Malley et al. 2017). While some practitioners have asserted that mobulid gill plates are a part of traditional treatments, the first reference in traditional Chinese medicine literature to mobulid gill plates is dated 1976 (O’Malley et al. 2017).

Demand for gill plates has led some fishers to switch from discarding mobulid bycatch to targeting the rays (Fahmi & Dharmadi, 2015; White et al. 2006a, Fernando & Stevens 2011, Heinrichs et al. 2011, Dewar 2002). For example, fishers in Sri Lanka used to avoid setting their nets where mobulids were known to occur and any rays caught incidentally were released, often alive, at sea. However, following the rapid growth of the gill plate trade over the past decade fishers now land all mobulids (D. Fernando, pers. comm.).

6.1 National utilisation

Mobulid meat is consumed locally in at least 34 countries (Ghana, Oman, Republic of Congo, Yemen, Fiji, French Polynesia, Bangladesh, Brazil, Cameroon, Gabon, Greece, Guatemala, India, Indonesia, Iran, Madagascar, Malaysia, China, Mauritania, Mexico, Mozambique, Myanmar, Pakistan, Peru, Philippines, Tunisia, São Tomé and Príncipe, Senegal, Seychelles, Sri Lanka, Sudan, Venezuela, Vietnam and United Arab Emirates). Mobulid meat may be eaten fresh, but is usually frozen, salted or sun-dried. In some countries, it is processed into fish meal. Mobulid gill plates are extracted and/ or consumed locally in at least 14 countries (Republic of Congo, Chagos (British Indian Ocean Territory), China, Bangladesh, Benin, Gabon, India, Indonesia, Mozambique, Myanmar, Philippines, Senegal, Sri Lanka and Vietnam), but are usually exported after processing. (Palacios et al., [In Press]).

6.2 Legal trade

A recent analysis of the CITES Trade Database (2017 – 2021) prepared for the Review of Significant Trade (RST) process (see AC32 Doc. 14.2) highlighted the increase and high volume in trade of the gill plates and fins of these endangered species globally, notably in Sri Lanka (12,761.65 kg of gill plates and 880 kg of fins, India (6,054.7 kg of gill plates) and Yemen (1,418 kg of fins) (CITES Secretariat and UNEP-WCMC, 2023) - see Annex IV.

CITES trade data list only five CITES Parties, 3 of whom are also Party to CMS, with reported trade of one or more mobulid species for commercial purposes from the wild between 2017 – 2021, whether as an exporter or origin country (CITES Trade Database, accessed May 2024) (Palacios et al., [In Press]). None of these reports identified the original source of the specimens traded as taken in the marine environment not under the jurisdiction of any state (i.e., high seas). During this period, trade reports in the CITES Database were 7 trade records for fins and 32 for gill plates, all destined for Hong Kong, but no records of meat trade. Sri Lanka accounted for 64% of all traded gill plates and fins, and has entered RST.

There are no reports for meat trade in the CITES Database despite growing evidence that this is a threat to these species (Palacios et al., [In Press]) – see section 6.4.

6.3 Parts and derivatives in trade

Mobulid rays are processed at fish markets, at landings sites, and occasionally at sea by the fleets of at least 35 range States. The most desirable meat from the pectoral fins is separated from the gill plates and the rest of the carcass. The pectoral fin meat is further processed into smaller strips before often being washed, salted, and hung or laid in the sun to dry for several days to weeks before sale. Fresh meat is also sold for direct consumption (or frozen), and in some locations the fresh meat from the pectoral fins is filleted instead of being processed into fish steaks. The meat is consumed in several traditional dishes, such as Machaca de Mantarraya (Mexico) and Tortilla de Raya (Peru), but also used more generally as unspecified dried fish in dishes. Records also exist of meat being processed into fish meal (Pakistan) (Palacios et al. 2024 [In Press]).

The mobulid gill plates, once dried, are known by the retail name of Peng Yu Sai ("膨魚鰓", in Mandarin) and are a high value product that is imported from at least 14 range States to at least 5 import hubs (O'Malley et al., 2017; Palacios et al., [In Press]). The gill plates are used in a range of TCM medicines purported to aid detoxification, anti-inflammation, exanthem treatment; cure child measles, boils, and having anti-cancer and prolactin functions (Wu, 2016; Zeng et al, 2016; O'Malley et al. 2017; Palacios et al., [In Press]). There is no scientific evidence to suggest any medicinal properties, but recent research documents that gill plates accumulate heavy metals and are therefore detrimental when consumed in large quantities (Ooi et al. 2015).

6.4 Illegal trade

Despite the listings in CITES Appendix II, the international gill plate trade and the fisheries that supply trade demand have not reduced to sustainable levels. Indeed, the trade is growing and migrating to online platforms, incentivised by high economic values for demand-country traders. This results in a less transparent sales system where it becomes more challenging for authorities to trace and regulate traders, and given that most trading countries are not reporting that trade to CITES much of it is likely illegal (Palacios et al. [In Press]).

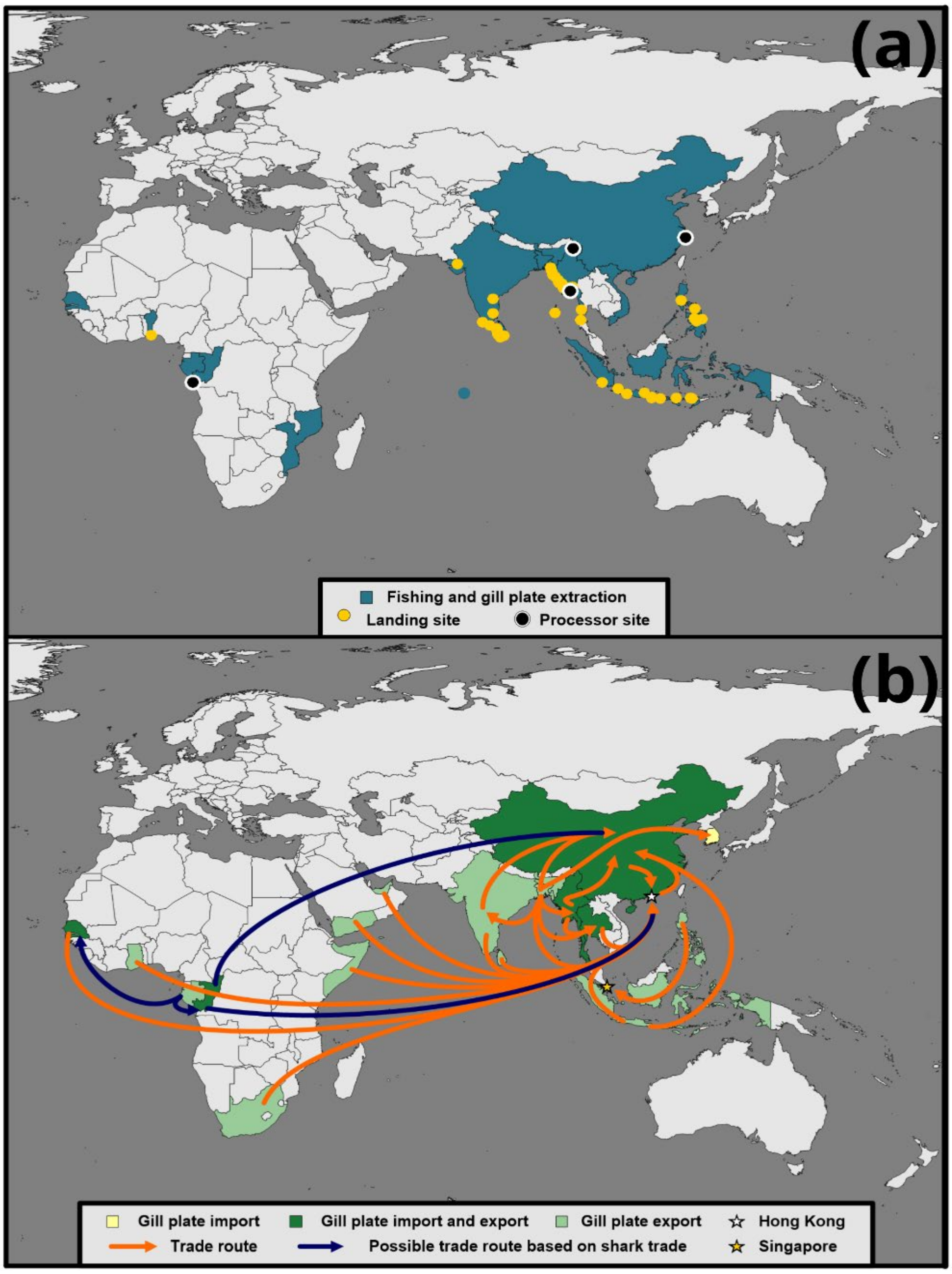

Figure 2: Mobulid gill plate global trade map: (a) The map indicates countries where mobulids are fished and gill plates are extracted. Specific landing sites are highlighted in yellow although landing can occur along the entire coastal range. Processing sites for mobulid gill plates are highlighted in black. (b) Export and import routes of gill plates, exporting countries are highlighted in green, importer countries in yellow and exporters and importers countries in dark green. Trade routes are indicated by arrows. Confirmed trades are in orange, while possible routes based on dried? shark products are in blue. More maps revealing the geographical extent of gill plate consumption and trade are presented in Annex V.

Illegal gill plate trade: A recent global reassessment of mobulid meat and gill plate consumption and trade (Palacios et al., [In Press]) revealed the trade in mobulids to be much higher and widespread than records in the CITES trade database suggest – with widescale illegal trade compounding the impacts of legal trade that is likely unsustainable. The study conducted more than 100 expert interviews covering 75 countries and revealed that mobulid gill plates (notably, from *M. mobular*, *M. tarapacana*, *M. thurstoni* and *M. birostris*) are exported from at least from 14 Parties (15 countries/territories: mainland China and Hong Kong SAR, Indonesia, Myanmar, Bangladesh, Sri Lanka, India, Philippines, Yemen, Thailand, South Africa, Senegal, Somalia, Ghana, and United Arab Emirates; gill plate extraction has been recorder in other countries/territories such as Chagos archipelago, Vietnam, Mozambique, Benin, Gabon and Republic of Congo) and exported internationally across Asia and Africa, with five major destinations/four Parties in Asia identified for the gill trade (China and Hong Kong SAR, Singapore, South Korea, and Thailand) (Figure 2). This compares with four exporting Parties (Sri Lanka, India, Oman, Yemen – the last two declaring only fins) and one importer (Hong Kong SAR) recorded in the CITES Trade Database. Gill plates are being transported and concealed with other products, likely taking similar routes as shark fins. This discrepancies between the CITES Trade Database and the findings of Palacios et al. [In Press] reveal widespread non-compliance with the CITES Appendix II listings and a significant and unsustainable illegal trade in mobulid products which is threatening these species' survival.

Palacios et al (in press) examined known physical retailers in Guangzhou and online retailers across five platforms in China (Figure 3 and Annex VI). While numbers of physical retailers offering gill plates declined from 2013 to 2023 in Guangzhou (60 to 41) and Hong Kong SAR (110 to 95), the number of online retailers increased significantly over the same timeframe (2014 – 2023), from 56 to 94. In combination, the number of shops increased threefold from 41 (physical retailers) to 135 (physical and online retailers) between 2011 and 2023, during which time all mobulids were listed in CITES Appendix II.

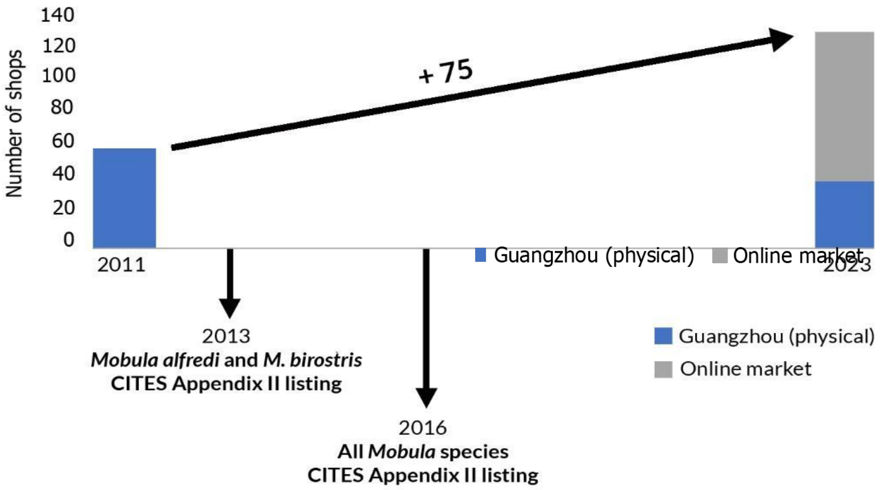

Figure 3: Gill plate retailers. Blue bars indicate survey results from the Guangzhou market field survey. Grey bars indicate the number of online retailers on five major Chinese platforms (Palacios et al. [In Press]).

Market surveys in Hong Kong in 2022 (Hau & Shea 2023) found prices for gill plates to be significantly higher than in 2015, especially for manta gill plates that can achieve prices around 450USD/kg, and that the availability of gill plates in the Hong Kong market hadn't reduced significantly after the CITES listings. Indeed, these values are very likely to be underestimated due to the presence of illegal, unreported and unregulated fisheries and trade. Additionally, recent online research in 2024 identified five Chinese platforms selling mobulid gill plates,with prices starting at 249 USD/Kg and reaching up to 1,260 USD/Kg (see Annex VII). The average price across 94 online retailers was 511.81 USD/Kg (Palacios et al. [In Press]).

Illegal meat trade: Mobulid meat is consumed locally in at least 35 countries and exported internationally over land or sea by ten countries (Bangladesh, Ecuador, India, Madagascar, Mauritania, Myanmar, Oman, Senegal, United Arab Emirates and Yemen) (Palacios et al. [In Press]).

In six of these countries, mobulids are protected nationally (Laglbauer et al. [In Review]). The exported meat is imported by five major destination countries (mainland China, Myanmar, Thailand, Peru and United Arab Emirates). Meat price varies significantly based on country and presentation type, ranging from as low as 0.35-1 USD/kg to 8-10 USD/kg. Mobulid meat consumption remains a cultural tradition in some countries/regions like Peru, Guatemala, Mexico, Bangladesh and the Philippines. This international meat trade is not reported to CITES and recorded in the CITES Trade Database, in violation of the Convention. This illegal meat trade also constitutes a previously largely disregarded factor fuelling fisheries-related mortality and population declines worldwide (Palacios et al. [In Press]). Maps of the geographical extent of meat consumption and trade are in Annex V.

6.5 Actual or potential trade impacts

Trade in and consumption of mobulid meat is widespread, domestic and international, while gill plate trade is almost entirely international. Indeed, the latter trade is growing in value, expanding in scale, and migrating to less-transparent online platforms (Palacios et al. [In Press]). Since 2017, all mobulid species have been have moved to a higher threatened category on the IUCN's Red List of Threatened Species, all of them being currently in the threatened categories, confirming that species population declines have not been halted and many are still continuing.

The continued growth of the trade in mobulid products is largely in violation of CITES Appendix II (i.e., illegal, unsustainable, and unreported trade), CMS Appendix I listings, tRFMO retention bans, and other regional and national measures (i.e., trading species without positive legal acquisition finding in place). This has resulted in declining population trends for all mobulid species. An up-listing to Appendix I for all mobulid species would complement and support international protective legislation and enforcement actions in these other international bodies.

7. Legal instruments

While international, regional, national and state protective legislation for manta and devil rays has improved in recent years, there is still a continued need for well managed protections throughout the global ranges of all mobulid species, to address continuing unsustainable fisheries and trade.

7.1 National

In recognition of the critical status of these species, many national-level policies were implemented to protect mobulid rays between 2006 and 2023, although the level of enforcement varies widely (Laglbauer et al. [In review]). Indeed, currently at least 34 countries have developed policies or legislation providing full or partial protection to the mobulid species inhabiting their waters (Laglbauer et al. 2024 [in review]). Uplisting of mobulids to Appendix I will not add additional policy or enforcement burdens for these Parties and would support monitoring and regulation of any illegal trade that may be occurring.

7.2 International

Both species of manta ray (*M. birostris* and *M. alfredi*) were listed in CITES Appendix II in 2013, in response to population declines and the increasing threat of the gill plate trade. The remaining mobulid ray species were listed in Appendix II in 2016. All mobulids are listed in Appendices I and II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS); mantas rays in 2011, and the remaining mobulid rays in 2014. The CMS Appendix I listing requires the 63 CMS Parties that are range States for mobulid species to prohibit their take, domestic sale, and international export, suggesting that it is not possible to issue CITES LAFs. Two UNEP Regional Seas Conventions and Action Plans (RSCAP) also include mobulid species in their annexes: the Mediterranean population of *M. mobular* is listed in Annex II (Endangered or Threatened Species) of the Barcelona Convention, and *M. birostris* is listed in Annex III of the SPAW protocol of the Cartagena Convention. The EU also has a strict prohibition on all catches of mobulid rays under the EU TAC & quota regulation (COM (2021) 661 final 2021/0345/NLE). Annex VIII of this proposal shows world and regional maps highlighting national and international protective measures by species and species group.

8. Species management

8.1 Management measures

At a regional level, mobulids require strict national protection under the retention bans adopted by Regional Fisheries Management Organizations (RFMOs). In 2015, the Inter-American Tropical Tuna Commission (IATTC) prohibited retention on board, trans-shipping, landing, storing, selling, or offering for sale any part or whole carcass of mobulid rays caught in the IATTC Convention Area, and required the release unharmed of any mobulids caught as bycatch, to the extent practicable and in a manner that will result in the least possible harm to the mobulid rays. If mobulid rays are unintentionally caught and frozen, the vessel must surrender the whole mobulid ray to the responsible authorities at the point of landing. In 2019, the Indian Ocean Tuna Commission (IOTC) adopted a similar regulation, which prohibits vessels from retaining onboard, transhipping, landing, storing any part or whole carcass of mobulid rays caught in the IOTC area, and requires their release if caught and the recording of all accidental catches. Also in 2019, the Western and Central Pacific Fisheries Commission (WCPFC) adopted the wording of the IATTC retention ban for all mobulids, to be effective from 2021. In 2023, the International Commission for the Conservation of Atlantic Tunas (ICCAT) provisionally adopted a similar measure. This recommendation shall enter into force in 2025, if consensus is reached on the interpretation of the Standing Committee Research and Statistics (SCRS) advice at the 2024 Annual Meeting of the Commission.

A recent study assessed post-release mortality in mobulid rays (Stewart et al 2024), using satellite tags (n = 89) to estimate survival rates of four species, *Mobula birostris*, *M. mobular*, *M. tarapacana* and *M. thurstoni*. released from tuna purse seine vessels in three global regions. The observed survival rates of mobulids with known fates were 50% for *M. birostris,* 74.2% for *M. mobular*, 33.3% for *M. tarapacana*, and 20% for. *M thurstoni*. The median predicted survival probability under optimal handling conditions was 83.7% for *M. birostris*, 95.3% for *M. mobular*, 82.2% for *M. tarapacana*, and 53.7% for *M. thurstoni*, highlighting the importance of formally adopting robust safe handling and release guidelines and protocols for these endangered species in global fisheries, which coupled to an Appendix I listing can most rapidly reduce the unsustainable mortality they continue to suffer in these fisheries.

When mobulids occur in Marine Protected Areas (MPA), they have de facto protection whilst utilising these protected habitats (Stevens et al., 2018). However, MPAs alone do not offer adequate protection for these highly mobile and migratory species (Harris & Stevens, 2024). Some countries have regulations encouraging responsible mobulid tourism, including restrictions on scuba and freediving activities and numbers of boats at mobulid aggregation sites (Murray et al. 2020). These measures can certainly assist the conservation status of these species, if enforcement is effective.

8.2 Population monitoring

There are very few government fishery or population monitoring programmes for mobulids. However, long-term monitoring at some fishery landing sites and the collection of sightings on living mobulids has been undertaken by independent research groups for several decades. For example, it is possible to identify every individual manta ray because of their unique pattern of black spots on its predominantly white belly (Marshall & Pierce, 2016) which do not change throughout their lives enabling researchers to track each individual as it is sighted over the decades (mantas live for more than 40 years). The Manta Trust's Mantabase is a global manta ray photo-identification database platform in which automated visual biometric photo-ID technology is linked to a global relational database accessible to both manta and devil ray scientists and the public. The Wild Me platform performs a similar function for a wide variety of species. These platforms are a massive data source for scientists, enabling research organisations to monitor and learn about the mobulid populations around the world. Mantabase alone receives over 5,000 photo-ID submissions each year and, since its global roll-out in 2012, has identified over 10,000 individual *M. alfredi* and *M. birostris*, through more than 100,000 photographed sightings from over 70 countries. Using these photo-ID tools, populations of *M. birostris*, *M. alfredi* and *M. tarapacana* have been subject to regular direct population monitoring in over two dozen countries, resulting in over a hundred peer-review publications in the scientific literature (https://research.mantatrust.org/).

Many countries conduct regular monitoring of the ichthyofauna (fish species) in MPAs and other coastal areas using scuba divers or remotely operated vehicles (ROVs), and data on the species in this proposal are collected as part of these surveys. Dedicated research and increased awareness of the vulnerability of this group of species has also improved data collection in industrial tuna fisheries (notably in the IATTC Eastern Tropical Pacific region).

Monitoring mobulid landings can also provide valuable population data. Extensive survey work has been done in mobulid landings in Sri Lanka, covering 1346 surveys at 38 landing sites between 2010 and 2020 (Fernando and Stewart 2021); as well as in East Java, Indonesia, where landing data for all elasmobranch species were recorded over 1,446 surveys in Muncar, during four continuous study periods between 2017 and 2024 (Laglbauer et al. [In Press]). Both these studies confirmed the overexploitation of *M. mobular*, a situation likely similar for the other mobulids in the Northern Indian Ocean based on similar life histories and fishing effort. To corroborate this, In Kenya, recent data points out that *M. mobular* composes 20% of the elasmobranch biomass landed in 3 selected shark and ray landing sites (WCS Tanzania, unpublished data).

8.3 Control measures

8.3.1 International

There are no controls, monitoring, or marking schemes to regulate, track, or assess trade in mobulid species outside of the CITES Trade Database, and seizures are sporadic. One of the largest ever documented interceptions of manta and devil ray gill plates was seized at Hong Kong International Airport on the 23rd of October 2020, with an estimated market value of HK $900,000 (USD $116,000). In this seizure, around 330 kilograms of dried mobulid ray gill plates were discovered in a consignment labelled as ‘dried fish gills’ and confiscated on arrival from Sri Lanka by customs agents.

8.3.2 Domestic

No review of domestic control measures was conducted in the 110 range States for mobulid rays.

8.4 Captive breeding and artificial propagation

There is no commercial captive breeding or artificial propagation of any mobulid ray species. There are records of *M. munkiana, M. hypostoma, M. mobular*, *M. kuhlii, M. birostris,* and *M. alfredi* held in captivity in small numbers for aquarium display (currently or previously), with a few instances of reproductive activity (Nozu et al., 2017; Murakumo et al., 2020).

8.5 Habitat conservation

All range States of the species in this proposal have some coastal areas and/or shallow parts of the continental shelf designated with various levels of protection, including MPAs or areas with restricted fishing or trawling, to protect marine species and habitats (Laglbauer et al. [In Review]). The enforcement and effectiveness of these measures varies.

8.6 Safeguards

Not relevant.

9. Information on similar species

Mobulid rays are elasmobranchs - cartilaginous fishes in the Class Chondrichthyes. Mobulids belong to a group of rays called the Myliobatiformes, which contains about a dozen families comprised of roughly 370 species. Mobulids (Mobulidae) are most closely related to the eagle rays (Myliobatidae and Aetobatidae) and cownose rays (Rhinopteridae). All are characterised by diamond-shaped bodies and wing-like pectoral fins, which they use to propel themselves through open water, but the cephalic foils of whole mobulids are very distinctive when compared with seabed-feeding Eagle and cownose rays.

Distinguishing between some mobulid species can be challenging for fishers, enforcement personnel and researchers, due their visual similarities, and highly variable patterning and colouration, which also changes significantly upon death (see Annex IX). Mobulid gill plates, once extracted and dried for trade, can only easily be grouped in four species groups based on morphological characteristics: two (indistinguishable species of 'Manta'; *M. tarapacana*; *M. mobular*; and *M. thurstoni/other devil rays* (Stevens et al. 2024 – see Annex X).

A new Field Guide to the Manta and Devil Rays of the World was published in 2024 (Stevens et al. 2024), with four regional versions per ocean-basin to follow in 2025. This new set of mobulid field guides features updated species accounts, ID keys, key species features, data collection protocols, safe handling and release guidelines, and post-mortem colour change illustrations, as well as revised ecology, plates, threats assessment, and protective legislation. These guides will be translated into at least four languages and be a valuable tool to contribute to better enforcement of protective legislation. An updated mobulid gill plate ID key was also made available in this publication, highlighting these gill plates' features within the mobulid family and clearly demonstrating that manta and devil ray gill plates can be easily distinguished and separated from other elasmobranch species or products in trade.

10. Consultations

11. Additional remarks

12. References

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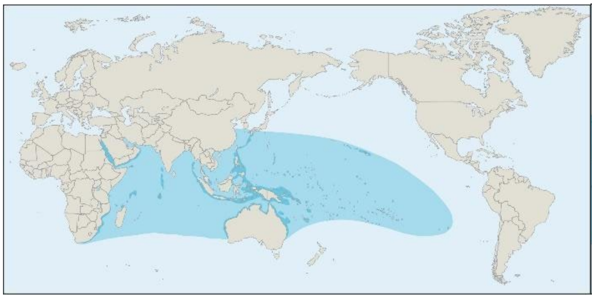
Annex I: Supplementary Table 1 - Mobulid species and their IUCN Red List global status.

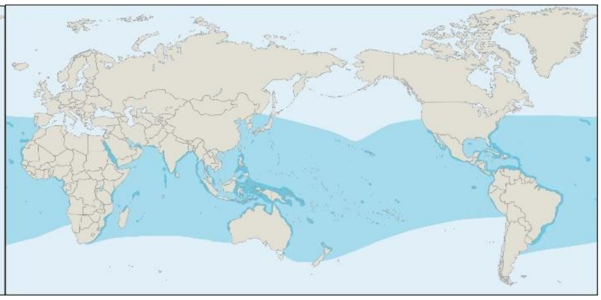
Species, including author and year	Scientific synonyms	Common names (English)	IUCN Red List Global status: year published	IUCN status trend
Mobula birostris , (Walbaum 1792)	*Manta brevirostris,Manta hamiltoni, Brachioptilon hamiltoni, Manta ehrengergii, Raja birostris, Raja manatia, Cephalopterus vampyrus, Cephalopterus manta, Manta americana, Ceratoptera ehrenbergii, Ceratoptera johnii, Cephaloptera stelligera*	Oceanic Manta Ray, Chevron Manta Ray, Giant Manta Ray, Pacific Manta Ray, Pelagic Manta Ray	EN; 2019	Decreasing ↓
Mobula alfredi (Kreft 1868)	*Deratoptera alfredi, Manta alfredi, Manta fowleri, Ceratoptera alfredi, Manta pakoka, Manta pakota*	Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray	VU; 2018	Decreasing ↓
Mobula tarapacana (Philippi, 1892)	*Cephaloptera tarapacana, Mobula coilloti, Mobula formosana*	Sicklefin Devilray, Box Ray, Chilean Devilray, Greater Guinean Mobula, Spiny Mobula	EN; 2019	Decreasing ↓
Mobula mobular (Bonnaterre, 1788)	*Squalus edentulus,Raia mobular,Raja vespertilio, Aodon cornu, Raia aurita, Raja fabroniana, Raia cornuta, Cephaloptera japanica, Cephaloptera edentula, Mobula rancureli, Raja cephaloptera, Raja giorna, Raja diabolus, Mobula auriculata, Apterurus fabroni, Cephalopterus massena*	Spinetail Devil Ray, Giant Devil Ray, Spinetail Devilray	EN; 2022	Decreasing ↓
Mobula thurstoni (Lloyd, 1908)	*Dicerobatis thurstoni, Mobula lucasana*	Bentfin Devil Ray, Lesser Devil Ray, Smoothtail Devil Ray, Smoothtail Mobula, Thurton's Devil Ray	EN; 2022	Decreasing ↓
Mobula eregoodoo (Cantor, 1849)	*Dicerobatis eregoodoo, Cephaloptera eregoodootenkee, Mobula diabola,Mobula diabolus, Mobula eregoodoo, Mobula eregoodootenkee*	Longhorned Pygmy Devil Ray, Pygmy Devil Ray	EN; 2022	Decreasing ↓
Mobula kuhlii (Müller & Henle, 1841)	*Cephaloptera kuhlii, Dicerobatis draco*	Shorthorned Pygmy Devil Ray, Kuhl's Devil Ray, Shortfin Devil Ray	EN; 2022	Decreasing ↓
Mobula munkiana (Notarbartolo-di-Sciara, 1987)	*Mobula munkiana*	Munk's Pygmy Devil Ray, Manta De Monk, Munk's Devil Ray, Pygmy Devil Ray, Smoothtail Mobula	VU; 2022	Decreasing ↓
Mobula hypostoma (Bancroft, 1831)	*Mobula rochebrunei, Cephalopterus hypostomus, Cephaloptera olfersii, Cephaloptera massenoidea, Cephaloptera rochebrunei, Ceratobatis robertsii*	Atlantic Pygmy Devil Ray, Atlantic Devil Ray, Lesser Devil Ray	EN; 2022	Decreasing ↓

Annex II: Supplementary Figure 1 - Distribution Maps (Source: Stevens et.al 2024)

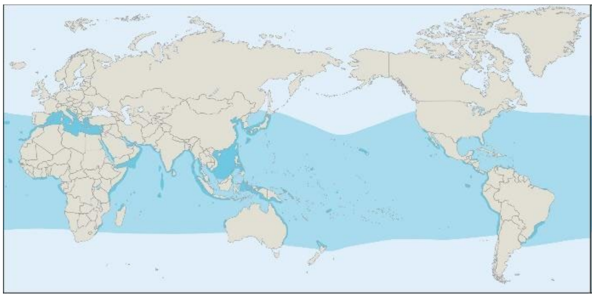
Mobula alfredi



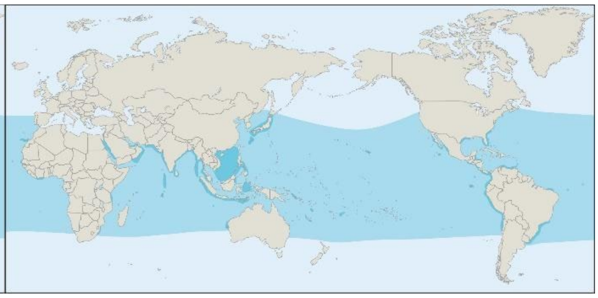
Mobula birostris



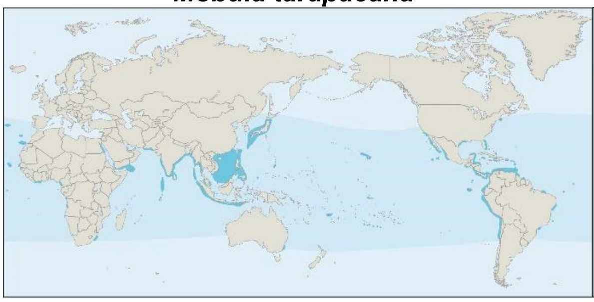
Mobula mobular



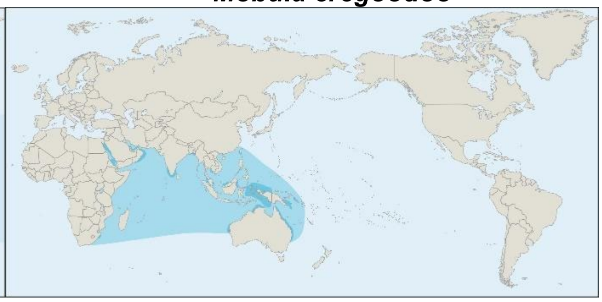
Mobula thurstoni



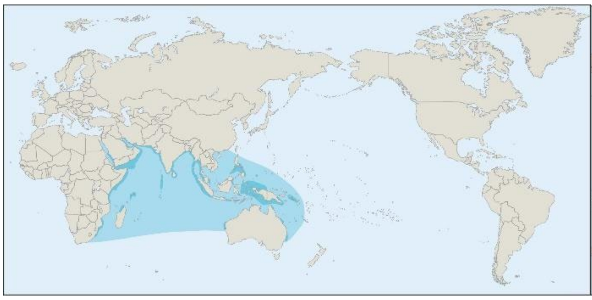
Mobula tarapacana



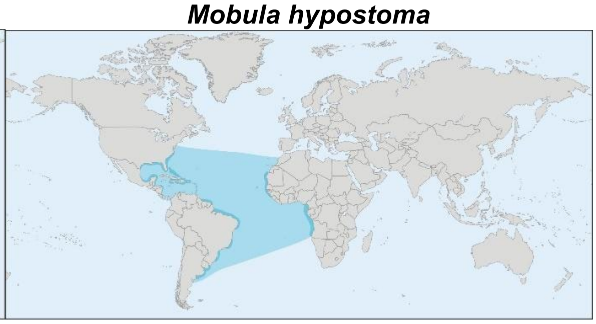
Mobula eregoodoo



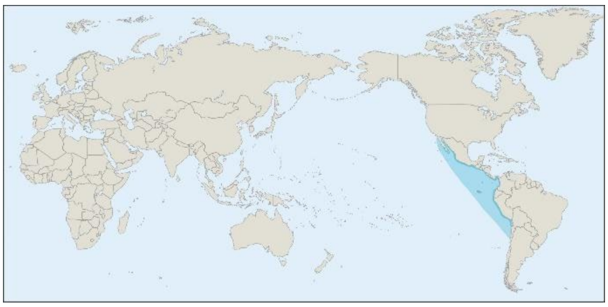
Mobula kuhlii



Mobula hypostoma

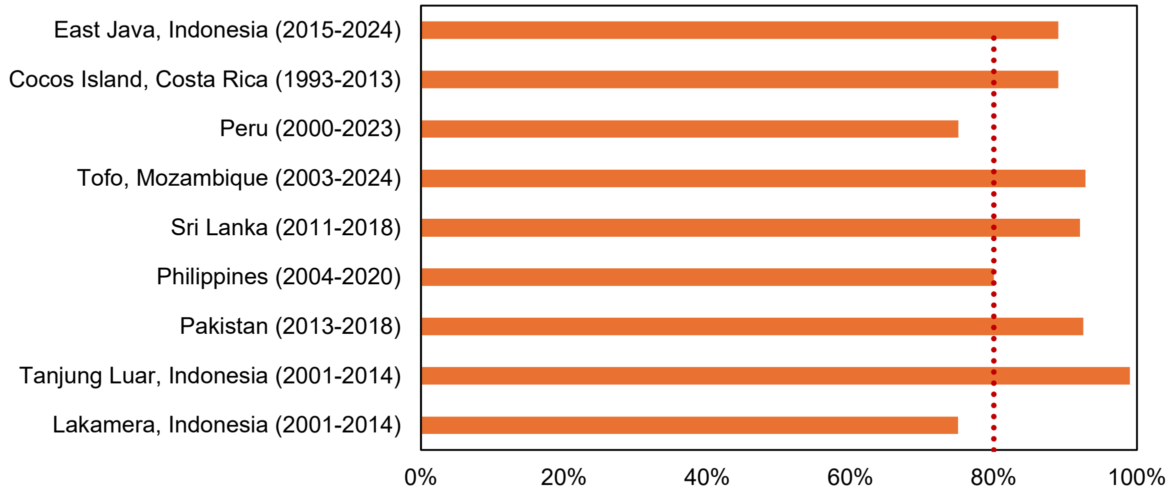


Mobula munkiana



Annex III: Supplementary Figure 2 - Examples of mobulid population declines that meet the CITES Appendix I listing criteria (Sources: White et al. 2015; Lewis et al. 2015; Moazzam 2018; Venables et al., 2024; Rambahiniarison et al. 2022; Fernando and Stewart 2021; Laglbauer et al. [In Press]; Rojas et al. [In Review]). See table 1 (section 4.4) for detailed information.

Note that since mobulids are amongst the slowest growing marine species, members of this family fall outside the typical range of marine species productivity and qualify for listing following a lesser decline that the ranges stipulated in the footnote to 9.24 (Rev CoP17), and further note that declines documented here are within less than three generations.



Annex IV: Supplementary Table 2 - CITES trade database: mobulids gill plate and fin data (2017 – 2021). From Palacios et al. 2024 [In Press].

CITES trade database: mobulid ray data (2017 - 2021)

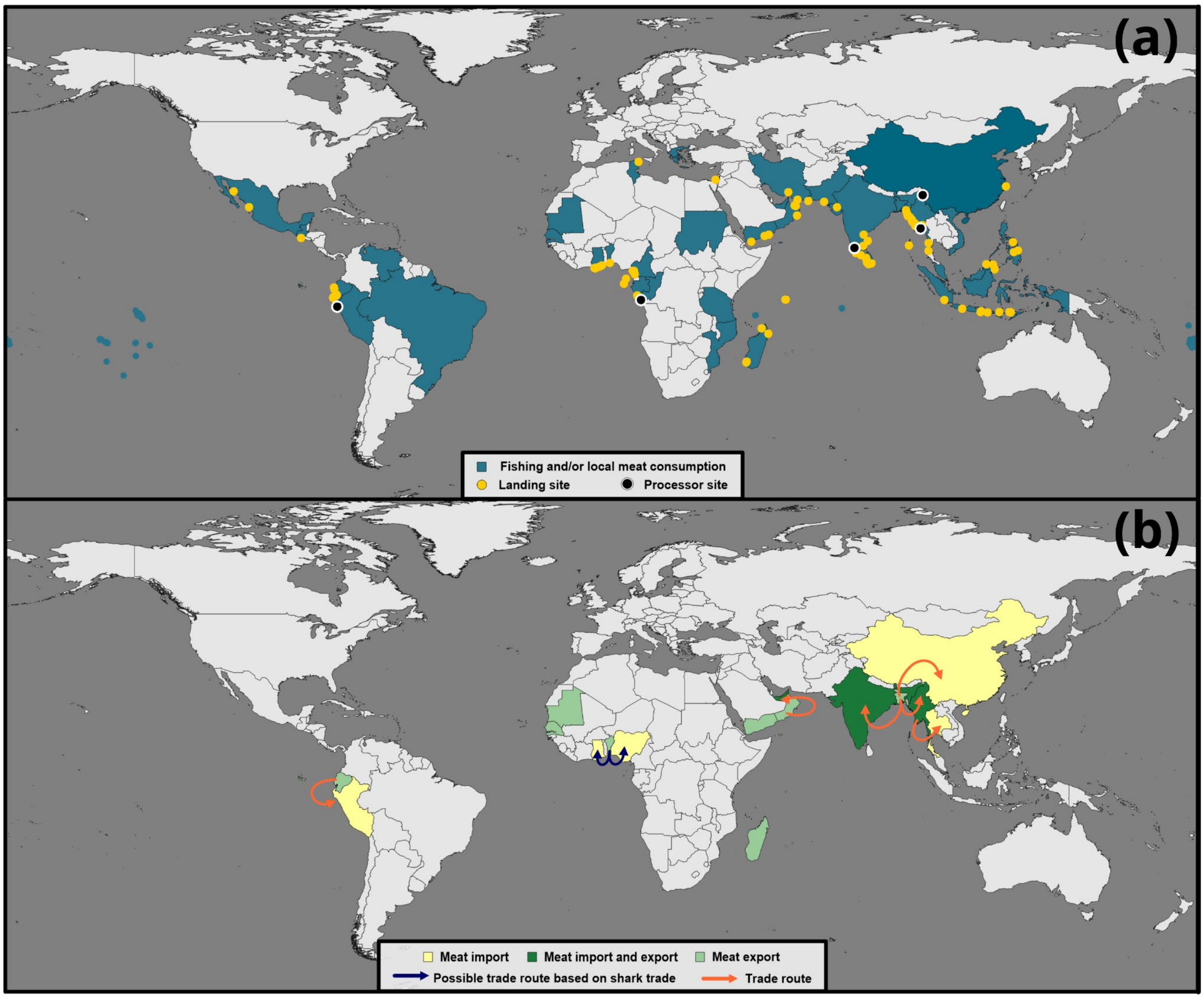
	Gill plates		**Fins**		**Total**	
	kg	**%**	**kg**	**%**	**Kg**	**%**
Exporter						
Sri Lanka	12,761.65	0.68	880.00	0.37	13,641.65	0.64
India	6,054.70	0.32	0.00	0.00	6,054.70	0.29
Yemen	0.00	0.00	1,418.00	0.59	1,418.00	0.07
Oman	0.00	0.00	88.00	0.04	88.00	0.00
Species						
Mobula spp.	5,716.65	0.30	1,418.00	0.59	7,134.65	0.34
Mobula birostris	1,165.50	0.06	0.00	0.00	1,165.50	0.05
Mobula mobular	7,486.15	0.40	718.00	0.30	8,204.15	0.39
Mobula tarapacana	4,448.05	0.24	250.00	0.10	4,698.05	0.22
Year						
2,017.00	0.00	0.00	0.00	0.00	0.00	0.00
2,018.00	4,718.65	0.25	0.00	0.00	4,718.65	0.22
2,019.00	5,609.25	0.30	880.00	0.37	6,489.25	0.31
2,020.00	4,432.20	0.24	500.00	0.21	4,932.20	0.23
2,021.00	4,056.25	0.22	1,006.00	0.42	5,062.25	0.24
Total	**18,816.35**	**1.00**	**2,386.00**	**1.00**	**21,202.35**	**1.00**

* Where both export and import kg were reported for the same shipment, the import weight was used.

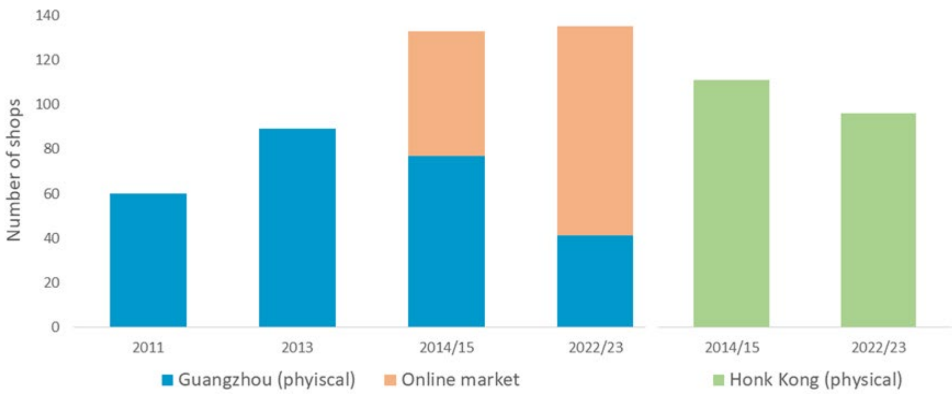
***Mobula mobular* records were combined with *M. japanica* .

*** All imports to Hong Kong.

Annex V: Supplementary Figure 3 - a) Countries where mobulids are landed and meat is locally consumed. Specific landing sites are highlighted in yellow although landing can occur along the entire coast range. Reported processing sites for mobulid meat are highlighted in black. (b) Export and import routes of mobulid meat, exporting countries are highlighted in light green, importer countries in yellow and exporters and importers countries in dark green. Confirmed trade routes are indicated by orange arrows while possible trade routes based on shark trade are indicated in blue. From Palacios et al. 2024 [In Press].



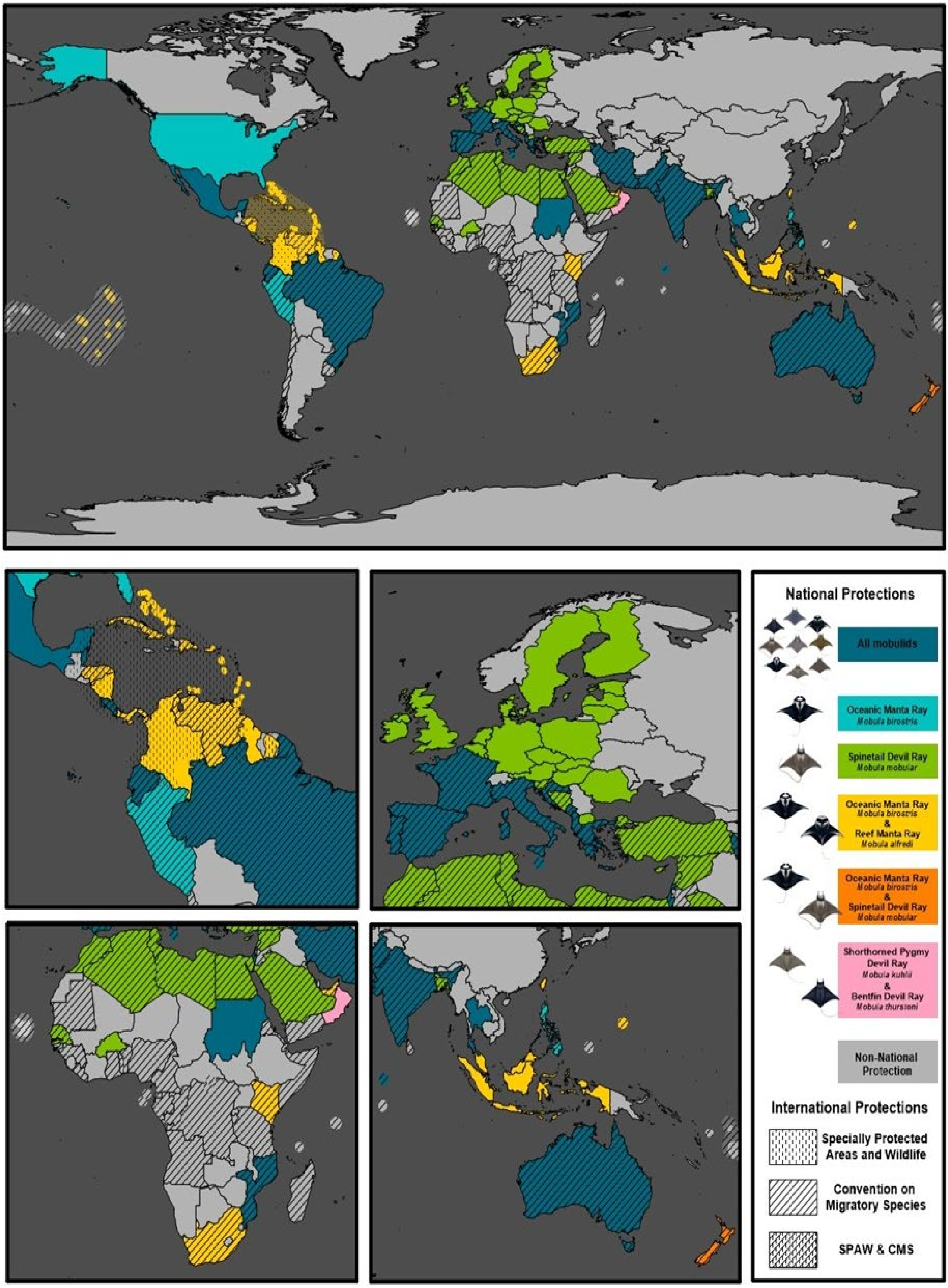
Annex VI: Supplementary Figure 4 - Gill plate retailers. Blue bars indicate survey results from the Guangzhou market based on field survey and O`Malley et al. (2017). Orange indicates the number of online retailers on five major Chinese platforms. Green bars based on Hong Kong SAR physical retailer surveys. From Palacios et al. 2024 [In Press].



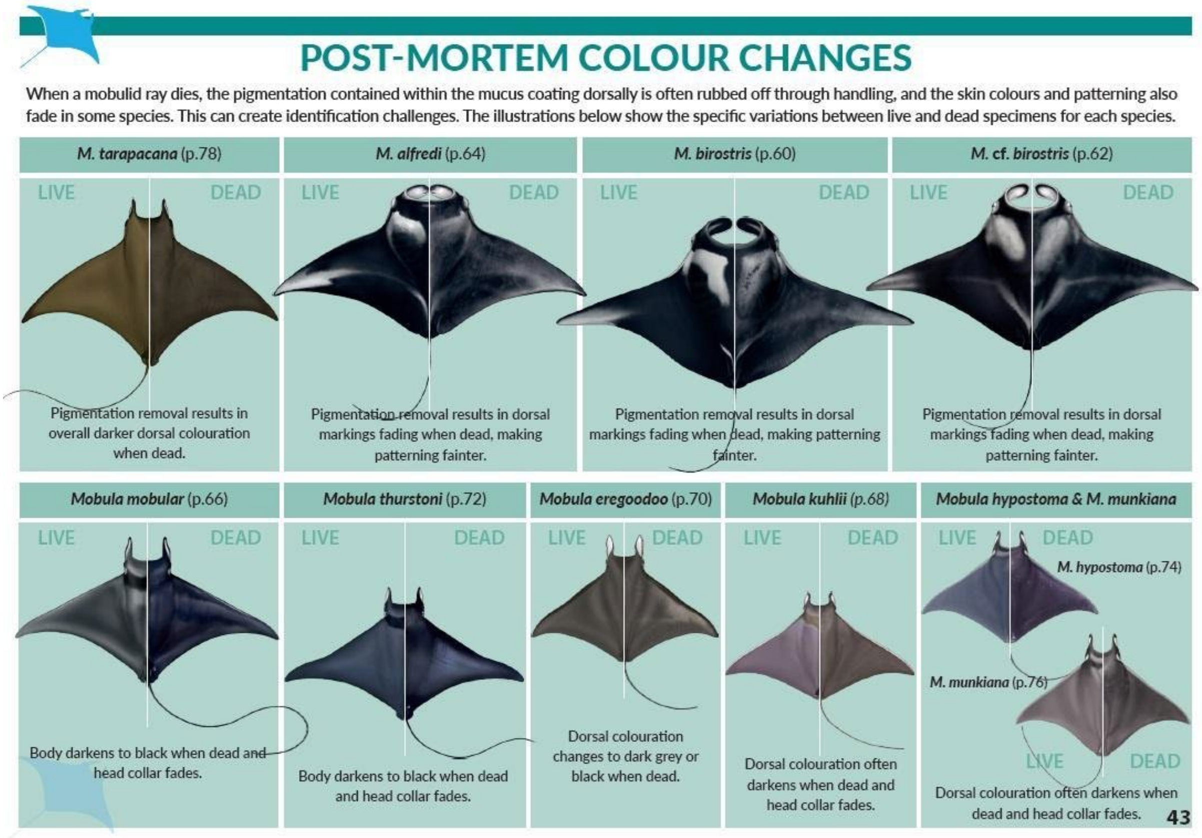
Annex VII: Supplementary Table 3 - Gill plate price per species group (USD/Kg) for Hong Kong SAR, Guangzhou (*based on O´Malley et al. 2017) and Chinese online retailers. Accumulative inflation was used to adjust prices from the base year (source: International Monetary Fund, International Financial Statistics and data files).

	Physical retailers					Online retailers
	Hong Kong SAR	Guangzhou market				China
	2016 - 2021	**2011***	**2013***	**2015***	**2023**	**2023**
Manta ray	$404.93	$277.00	$325.00	$329.00	$456.00	
Sicklefin devil ray	$313.67	$194.00	$256.00	$286.00	$379.00	
Spinetail devil ray/other	$251.44	$141.00	$193.00	$189.00	$283.00	
Average	$323.35	$204.00	$258.00	$268.00	$372.67	$511.81
Acc. inflation (%)		0	10.80%	14%	28.30%	28.30%
Adjusted price		**$204.00**	**$230.14**	**$230.48**	**$267.20**	**$366.97**

Annex VIII: Supplementary Figure 5 - Mapping mobulid national and international protective legislation worldwide. From Laglbauer et al. [In Review]).



Annex IX: Supplementary Figure 6 - Post-mortem colour changes plate.



Annex X: Supplementary Figure 7 - Gill plate ID key.