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PROPOSAL FOR THE INCLUSION OF ALL SPECIES OF MOBULA RAYS (GENUS *Mobula)* IN CMS APPENDIX I AND II

Summary

The Government of Fiji has submitted a proposal for the inclusion of all species of Mobula rays, Genus *Mobula*, in CMS Appendix I and II at the 11th Meeting of the Conference of the Parties (COP11), 4-9 November 2014, Quito, Ecuador.

An advanced unedited version of the proposal, as received from the proponent Party, is reproduced under this cover for its early consideration by the Scientific Council. It will be replaced by the final version as soon as possible.

PROPOSAL FOR INCLUSION OF SPECIES ON THE APPENDICES OF THE CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS

A. PROPOSAL: Inclusion of mobula rays, Genus *Mobula*, in Appendix I and II

B. PROPONENT: Government of Fiji

C. SUPPORTING STATEMENT:

1. Taxon

1.1	**Class:**	Chondrichthyes, subclass Elasmobranchii
1.2	**Order:**	Rajiformes
1.3	**Subfamily:**	Mobulinae
1.4	**Genus and species:**	All nine species within the Genus *Mobula* (Rafinesque, 1810): *Mobula mobular* (Bonnaterre, 1788), *Mobula japanica* (Müller & Henle, 1841), *Mobula thurstoni* (Lloyd, 1908), *Mobula tarapacana* (Philippi, 1892), *Mobula eregoodootenkee* (Bleeker, 1859),*Mobula kuhlii* (Müller & Henle, 1841), *Mobula hypostoma* (Bancroft, 1831), *Mobula rochebrunei* (Vaillant, 1879), *Mobula munkiana* (Notarbartolo-di-Sciara, 1987) and any other putative *Mobula* species.
	Scientific Synonyms:	
	M. mobular:	*Raja diabolus (Shaw, 1804)*, *Raja giorna* (Lacépède, 1802).
	M. japanica:	*Mobula rancureli* (Cadenat, 1959).
	M. thurstoni:	*Mobula lucasana* (Beebe & Tee-Van, 1938).
	M. tarapacana:	*Mobula coilloti* (Cadenat&Rancurel, 1960) & *Mobula formosana* (Teng 1962).
	M. eregoodootenkee:	*Mobula diabolus* (Whitley, 1940).
	M. kuhlii:	*Mobula draco* (Günther, 1872), *Cephaloptera kuhlii* (Müller & Henle, 1841) & *M. diabolus*(Smith, 1943).
	M. hypostoma:	*Ceratobatis robertsii* (Boulenger, 1897), *Cephalopterus hypostomus* (Bancroft, 1831).
	M. rochebrunei:	*Cephaloptera rochebrunei* (Vaillant, 1879).
	M. munkiana:	None.
1.5	**Common Names:**	
	M. mobular:	English: Giant Devil Ray. French: Mante. Spanish: Manta.
	M. japanica:	English: Spinetail Mobula, Spinetail Devil Ray, Japanese Devil Ray. French: Manta Aguillat. Spanish: Manta De Espina, Mante De Aguijón.
	M. thurstoni:	English: Bentfin Devil Ray, Lesser Devil Ray, Smoothtail Devil Ray, Smoothtail Mobula, Thurton's Devil Ray. French: Mante Vampire. Spanish: Chupasangre, Chupa Sangre, Diablo, Diablo Chupasangre, Diablo Manta, Manta, Manta Diablo, Manta Raya, Muciélago.

M. tarapacana:	English: Box Ray, Chilean Devil Ray, Devil Ray, Greater Guinean Mobula, Sicklefin Devil Ray, Spiny Mobula. French: DiableGéant De Guinée, ManteChilienne. Spanish: Diabolo Gigante De Guinea, Manta Cornuada, Manta Cornuda, Manta Raya, Raya Cornuda, Vaquetilla.
M. eregoodootenkee:	English: Pygmy Devil Ray, Longhorned Devil Ray.
M. kuhlii:	English: Shortfin Devil Ray, Lesser Devil Ray, Pygmy Devil Ray. French: Petit Diable
M. hypostoma:	English: Atlantic Devil Ray, Lesser Devil Ray. French: DiableGéant. Spanish: MantadelGolfo.*M. rochebru*nei: English: Lesser Guinean Devil Ray. French: Petit Diable de Guinée. Spanish: Diablito de Guinea.
M. munkiana:	English: Munk's Devil Ray, Pygmy Devil Ray, Smoothtail Mobula. French: Mante De Munk. Spanish: Diabolo Manta, Manta Raya, Manta Violácea, Tortilla.

Overview

i. The Genus *Mobula*, (including *Mobula mobular, Mobula japanica, Mobula thurstoni, Mobula tarapacana, Mobula eregoodootenkee, Mobula kuhlii, Mobula hypostoma, Mobula rochebrunei, Mobula munkiana* and any putative species of *Mobula*),a globally distributed and highly migratory group of species, is proposed here for listing on CMS Appendix I and II. All of these ray species would benefit from strict range state protections under a CMS Appendix I listing as well as collaborative management initiated under a CMS Appendix II listing, since they are all low productivity, commercially exploited aquatic species that are in decline. In addition, international cooperation under the Appendix II listing would be greatly facilitated by adding all species of the Subfamily Mobulinae (genus *Manta* and genus *Mobula*) to Annex I of the CMS Sharks MoU. Increasing international trade in Mobulinae gill plates, and to a lesser degree skins and cartilage, and unregulated bycatch in industrial and artisanal fisheries have led to significant rates of decline in population sizes in recent years.

ii. The Genus *Mobula* are slow-growing, large-bodied migratory animals with small, highly fragmented populations that are sparsely distributed across the tropical and temperate oceans of the world.*Mobula* rays are likely to be among the least fecund of all elasmobranchs, however scientific data on the life history strategies of these species is severely lacking to date (Couturier *et al.* 2012, Dulvy *et al.* 2014). Their biological and behavioural characteristics (low reproductive rates, late maturity and aggregating behaviour) make these species particularly vulnerable to over-exploitation in fisheries and extremely slow to recover from depletion.

iii. *Mobula* rays are caught in commercial and artisanal fisheries throughout their global warm water range in the Atlantic, Pacific and Indian Oceans. Directed fisheries primarily utilize harpoons and nets, while significant bycatch occurs in purse seine, gill and trawl net fisheries targeting other species, including on the high seas. A recent surge in demand for mobula ray products (gill plates) in China and reports of increased direct fishing effort in key range states suggests an urgent and escalating threat to these species.

iv. There have been no stock assessments, official monitoring, catch limits or management of *Mobula spp.* fisheries in the waters of range states with the largest fisheries. Regional Fishery Management Organizations (RFMOs) have not taken any measures to minimize high seas bycatch of *Mobula spp.* Incidental landings and discards are rarely recorded at the species level. Several species within the genus are legally protected in a few countries and in some small Marine Protected Areas (MPAs), though throughout most of their range most *Mobula* species have little or no protection.

v. While there are no historical baseline population data for the genus, recent declines have been reported in range states for several species.

vi. While much of the published data on fisheries and trade of *Mobula spp*. refers to *M. japanica* or *M. tarapacana*, the other seven species in the genus: *M. mobular*, *M. thurstoni, M. eregoodootenkee, M. kuhlii, M. hypostoma*, *M. rochebrunei, M. munkiana* and any other putative species of *Mobula* are likely to also be at risk of overexploitation due to their similar biological and behavioural characteristics. The lack of specific records of *Mobula* landings at the species level, mainly as a result of the difficulty in distinguishing between the different *Mobula spp.* in the field makes assessment of the conservation status of individual *Mobula* species extremely difficult.

vii. Following consideration of a taxonomic review prepared by the IUCN SSC Shark Specialist Group (Fowler &Valenti/SSG 2007), the CMS Scientific Council agreed in March 2007 (CMS SCC14) that these threatened migratory species meet the criteria for listing on the Appendices and should be considered by the Conference of Parties to CMS.

viii. *M. mobular* is listed as Endangered on the IUCN Red List of Threatened Species; *M. rochebrunei* as Vulnerable; *M. japanica, M. thurstoni, M. eregoodootenkee,* and *M. munkiana* as Near Threatened; and *M. tarapacana*, *M. kuhlii*, and *M. hypostoma* as Data Deficient. *M. japanica* and *M. tarapacana* assessed as Vulnerable in SE Asia where these species are increasingly targeted (Clark *et al.* 2006, White *et al.* 2006a).It is considered that the IUCN Red List of Threatened Species categories and criteria are sufficiently developed and widely understood as to recommend them for use in assessing the appropriateness of listing a taxon to CMS Appendix I. It is suggested a taxon assessed as “Extinct in the Wild”, “Critically Endangered”, “Endangered” or “Vulnerable” using the IUCN Red List criteria should qualify for listing on Appendix I. It is also suggested that migratory species with a status of EW, CR, EN, VU or NT should ‘automatically’ qualify for consideration for listing to Appendix II. Therefore six of the nine species of *Mobula* rays should ‘automatically’ qualify for one or both of the Appendices, while the other 3 species are assessed as Data Deficient, most likely due to the rarity of observation of these species and lack of data at the species level. Due to the difficulty in distinguishing *Mobula* rays at the species level, assessment of the conservation status of individual *Mobula* species is extremely difficult, and hence both Appendix I and II listing for the genus *Mobula* is strongly recommended as a precautionary measure (and also listed due to the classification of “look-alike species” as used under the current CITES Appendices Listing criteria).

2. Biological data

Genus *Mobula* comprises nine recognized species that attain a WD from 1 to 5 m: the giant devil ray *Mobula mobular* (Bonnaterre, 1788), the spinetail devil ray *Mobula japanica* (Müller & Henle, 1841), the bentfin devil ray *Mobula thurstoni* (Lloyd, 1908), the Chilean devil ray *Mobula tarapacana* (Philippi, 1892), the pygmy devil ray *Mobula eregoodootenkee* (Bleeker, 1859), the shortfin devil ray *Mobula kuhlii* (Müller & Henle, 1841), the Atlantic devil ray *Mobula hypostoma* (Bancroft, 1831), the lesser Guinean devil ray *Mobula* *rochebrunei* (Vaillant, 1879) and Munk's devil ray *Mobula munkiana* (Notarbartolo-di-Sciara, 1987). Although the existence of mobulids has been documented since at least the 17th century (Willughby & Ray, 1686), there is surprisingly little information available on their biology and ecology. The most recent, detailed taxonomic description of the recognized *Mobula spp*. can be found in the study of Notarbartolo-di-Sciara (1987b), although a focused genetic study on the Genus *Mobula* is currently near completion (Poortvliet et al, pers. comm.). While the genus *Mobula* currently comprises nine recognized species, at least 29 different species have been proposed previously (Notarbartolo-di-Sciara, 1987b; Pierce & Bennett, 2003; Froese & Pauly, 2010; Polack, 2011).

Species-specific reports are often mixed and can be confusing without adequate descriptions or photographs. Care should be used when using reports or accounts of one species that they are not referring to another *Mobula spp*., or even a *Manta spp*.

All *Mobula spp.* are large-bodied, migratory, planktivorous and ichthyophagous rays. *M. mobular* is the largest of the genus *Mobula*, but often confused with *M. japanica* whichgrows to a maximum of 3100 millimetres wingspan (disc width or DW; Notarbartolo-di-Sciara 1987), with males maturing at 2016 millimetres wingspan and females at >2360 millimetres (Notarbartolo-di-Sciara 1987). *M. tarapacana* grows to a maximum of 3700 millimetres wingspan (disc width or DW; Compagno & Last 1999), with males maturing at 2340-2522 millimetres wingspan and size at maturity for females is unknown (White et al. 2006), but it is likely to be >2700 millimetres.

All *Mobula spp.* are planktivorous and ichthyophagous with some species favouring certain creatures.*M. thurstoni's* diet is highly specialized with the euphausid Nyctiphanes simplex accounting for the vast majority of observed prey items but mysids (Mysidium spp.) are also common. *M. japanica* feed mainly on euphausiid shrimps (Sampson et al. 2010, Fernando & Stevens, in prep.), while *M. tarapacana and M. eregoodootenkee* appear to specialize in catching small schooling fishes, using rapid acceleration to lunge through densely packed schools of fish (G. Stevens, pers. comm.).

Mobula rays are likely to be among the least fecund of all elasmobranchs, however scientific data on the life history strategies of these species is severely lacking to date (Couturier *et al*. 2012, Dulvy *et al.* 2014). They typically give birth to a single pup with a likely gestation period of approximately one year, placing them into FAO's lowest productivity category.

2.1 Distribution and range states (current and historical)

M. japanica, *M.tarapacana*and *M. thurstoni*have worldwide distributions, with all three species reported from the tropical and temperate waters of the Pacific, Atlantic and Indian Oceans (Clark *et al*. 2006, White *et al*. 2006, Couturier *et al*. 2012, Bustamante*et al*. 2012). Within this broad range populations of all three species are thought to be sparsely distributed and highly fragmented, likely due to their resource and habitat needs. *M. tarapacana* and *M. japanica* have been observed underwater travelling in schools (G. Stevens, pers. comm.) and all three species have been observed underwater as solitary individuals (G. Stevens, pers. comm.).Fishermen often report catching large numbers of *M. japanica* in gill nets during a single set, supporting the underwater observations that this species often travels in groups (Fernando et al. in prep.).

Aggregations of *M. tarapacana* congregate around the seamounts at the Princess Alice Bank in the Azores during the summer months of June-September. Many of the females observed during this time appear to be close to parturition and this site probably serves as an important birthing and mating ground for this species in the North Atlantic Ocean (E. Villa, pers. comm.). Similar aggregations of this species are also reported from the St Peter & St Paul's Archipelago in Brazil (R.Bonfil, pers. comm.) and around Cocos Island of Costa Rica (E. Herreño, pers. comm.).

M. mobular occurs in offshore, deep waters and, occasionally, in shallow waters (Bradai and Capapé 2001) throughout the Mediterranean Sea, in waters ranging in depth from few tens of metres to several thousands (with the exception of the northern Adriatic) and possibly in the nearby North Atlantic. *M. munkiana* is an inshore devil ray which is known to form large aggregations. It is endemic to the Eastern Pacific from the Gulf of California, México to Peru. *M. hypostoma* is endemic to the western Atlantic, found from North Carolina (USA) to northern Argentina, including the Gulf of Mexico, and Greater and Lesser Antilles. It is primarily pelagic in coastal waters, although it occasionally enters oceanic waters. *M.rochebrunei* is found in the eastern Atlantic from Mauritania to Angola along the West African coastline. *M. eregoodootenkee* is widely distributed through the coastal continental waters of the tropical Indo-West Pacific. This species has been reported from the Western Indian Ocean, Eastern Indian Ocean and Western Central Pacific. It occurs in the Red Sea, Arabian Sea and Persian Gulf to South Africa and the Philippines, north to Vietnam, and south to southeast Queensland and northern Western Australia. It has not been recorded from oceanic islands.*M. kuhlii* has a similar range to *M. eregoodootenkee*, although records of its occurrence are sparser, it does occur around oceanic islands, such as the Maldives archipelago in the Indian Ocean.

See Annexes I & II for distribution maps, range states and FAO fishing areas of all *Mobula spp*.

2.2 Population estimates and trends

All species within the genus *Mobula* are slow-growing, migratory animals with small, highly fragmented populations that are sparsely distributed across the tropical and temperate oceans of the world. Global population numbers are unknown, but thought to be declining across their range. Their biological and behavioural characteristics (low reproductive rates, late maturity and aggregating behaviour) make these species particularly vulnerable to over-exploitation in fisheries and extremely slow to recover from depletion.

Global population sizes of all species are unknown and research into mobulid population trends is in its infancy (Couturier *et al.* 2012). Without significant natural markings on which to base photo-ID studies (which are used to determine population sizes in genus *Manta*), efforts to quantify numbers of *Mobula spp.* are effectively limited to fisheries data, aerial surveys and studies that employ conventional tags. Such approaches have yet to be employed on these species or have so far yet to produce reliable population estimates for these species. Though estimates of the world global catch of mobulids have increased from 900 t in 2000 to >3300 t in 2007 (FAO, 2009; Lack & Sant, 2009), dramatic declines in mobulid catches have been documented in some areas (e.g. Philippines: Alava *et al.*, 2002), suggesting serial depletions through over-fishing (Couturier *et al.* 2012).

The IUCN Red List assessments for the nine classified species are: *M. mobular* Endangered (Notarbartolo et al. 2006) with a decreasing population trend, *M. japanica* Near Threatened with an unknown population trend (White et al. 2006), *M. thurstoni* Near Threatened with an unknown population trend (Clark et al. 2006), *M. tarapacana* Data Deficient with an unknown population trend (Clark et al. 2006), *M. eregoodootenkee* Near Threatened with an unknown population trend (Pierce et al. 2003), *M. kuhlii*Data Deficient (Bizzarro et al. 2009) with a decreasing population trend, *M. hypostoma* Data Deficient with an unknown population trend (Bizzarro et al. 2009), *M. rochebrunei* Vulnerable with an unknown population trend (Valenti et al. 2009), and *M. munkiana* Near Threatened with an unknown population trend (Bizzarro et al. 2006).

Significant declines in the number and size of *Mobula spp*. caught in Indonesian target fisheries in Lombok are reported over the past decade (Heinrichs *et al.* 2011, Setiasih *et al.* in prep.) despite evidence of increased directed fishing effort (Setiasih *et al.* in prep). Surveys from 2007 to 2011 estimated annual landings of 908 (Heinrichs *et al.* 2011, Setiasih *et al.* in prep.), compared with 1244 during 2001-2005 surveys (White *et al*. 2006) (27% decline in 6 years).

In Sri Lanka, fishermen have reported declines in *Mobula spp*. catches over the past five to ten years as targeted fishing pressure has increased (Fernando and Stevens in prep, Anderson *et al.* 2010). In India, *Mobulid* catches have declined in several regions, including Kerala, along the Chennai and Tuticorin coasts and Mumbai, despite increased fishing effort (Couturier *et al*. 2012, Mohanraj *et al*. 2009).

2.3 Habitat (brief description and tendencies)

The role of *Mobula spp.* in their ecosystem is not fully known but, as large filter feeders, it may be similar to that of the smaller baleen whales. As large species which feed low in the food chain, *Mobula spp.* can be viewed as indicator species for the overall health of the ecosystem. Studies have suggested that removing large, filter-feeding organisms from marine environments can result in significant, cascading species composition changes (Springer *et al*. 2003).

M. japanica and *M. tarapacana* appear to be seasonal visitors along productive coastlines with regular upwelling, in oceanic island groups, and near offshore pinnacles and seamounts. The southern Gulf of California is believed to serve as an important spring and summer mating and feeding ground for adults *M. japanica* (Notarbartolo-di-Sciara 1988, Sampson et al.2010). Pupping appears to take place offshore (Ebert 2003) suggesting around offshore islands or seamounts. *M. tarapacana* are known to make seasonal migrations into the Gulf of California during the summer and autumn, while sightings are rare in winter months (Notarbartolo-di-Sciara 1988). *M. japanica* and *M. tarapacana* are commonly found in the Indian Ocean waters around Sri Lanka throughout the year (Fernando & Stevens 2011).

Observations of *M. mobular* by Notarbartolo di Sciara and Serena (1988) suggest that in the northern Mediterranean the species gives birth in summer and the gestation period is still largely conjectural, but could be one of the longest known in Chondrichthyans (Serena 2000). *M. munkiana* is a schooling species typically of shallow coastal waters, known to form large, highly mobile aggregations (Notarbartolo-di-Sciara 1987, 1988). Location of copulation is unknown, but parturition has been reported in Bahía de La Paz during May and June (Villavicencio-Garayzar 1991). *M. thurstoni* is usually pelagic in shallow, neritic waters (<100 m) (Notarbartolo-di-Sciara 1988). Mating, parturition, and early life history are reported to take place in the shallow water during summer and perhaps early fall (Notarbartolo-di-Sciara 1988). The southern Gulf of California is apparently an important feeding and mating ground. Segregation by size and sex is seasonal, with all size classes and sexes appearing together during the summer months (Notarbartolo-di-Sciara 1987).

M. hypostoma occurs in coastal and occasionally oceanic waters (McEachran and Carvalho 2002), and travels in schools (Robbins et al. 1986). *M. rochebrunei* is a pelagic species that is usually found at the surface or close to the bottom (McEachran and Seret 1990).*M. kuhlii* is an uncommon inshore, primarily shelf pelagic species found in continental coastal areas and around oceanic islands groups (Compagno and Last 1999, G. Stevens pers. comm.).*M. eregoodootenkee* is not known to penetrate the epipelagic zone. Mating and birthing occur in shallow water, and juveniles remain in these areas. This species feeds on planktonic organisms and small fish (Michael 1993).

2.4 Migration (types of movement, distances, proportion of the population that migrates)

Migrations across national jurisdictional boundaries (both along the coastline between adjacent territorial waters and national EEZs and from national waters into the high seas) combined with predictable aggregations in easily accessible areas, makes all, but especially*M. japanica*, *M.tarapacana* and *M. thurstoni*, vulnerable to multiple fisheries, both targeted and bycatch, in coastal areas and in the high seas (Molony 2005, Perez and Wahlrich 2005, White *et al*. 2006, Zeeberg*et al*. 2006, Pianet*et al*. 2010, Couturier *et al.* 2012). Migrations into offshore environments where fisheries are unregulated could put these species at risk, even if their inshore habitats are protected.

Satellite tagging data from *M. japanica* captured in Baja California Sur documented long-distance movement of these mobulid rays, utilizing a broad geographic range including coastal and pelagic waters from southern Gulf of California, the Pacific coastal waters of Baja California and the pelagic waters between the Revillagigedos Islands and Baja California (Croll *et al.* 2012.).

Specifics of *M. munkiana* migratory patterns are largely unknown or speculative (Notarbartolo-di-Sciara 1988, J. Bizzarro pers. obs). Migrations are likely driven by temporal changes in water temperature with local movements presumed to be associated with the distribution and abundance of planktonic crustaceans, especially mysid shrimp (*Mysidium spp.*).

3. Threats data

3.1 Direct threats to the population (factors, intensity)

The greatest threat to *Mobula spp.* is unmonitored and unregulated directed and bycatch fisheries, increasingly driven by the international trade demand for their gill plates, used in an Asian health tonic purported to treat a wide variety of conditions. A December 2013 survey of mobulid gill plate markets in Guangzhou, China revealed a threefold increase in the estimated number of mobula rays represented and prices up by 30-40% in just the past 2 years (WildAid 2014).A single large mobula can yield up to 2.5 kilos of dried gills that retail for up to US$329 per kilo in China.This rapid escalation of the market for mobula ray products suggests an urgent threat to these slow-reproducing species. The high value of gill plates has driven increased target fishing pressure for all *Mobula spp*., predominantly *M. japanica* and *M.tarapacana*, in key range states, with the largest landings observed in Sri Lanka, India, Peru and Indonesia. Fisheries in other countries (Philippines, Mozambique and China) are also thought to be significant, but landings data from most locations are not readily available. The recent increase in demand for gill plates has resulted in dramatic increases in fishing pressure, with many former bycatch fisheries having become directed commercial export fisheries, and recent reports of mobulas being ‘gilled’ (gills removed and the carcasses discarded at sea).

Artisanal fisheries also target *Mobula spp.* for food and local products (White *et. al.* 2006, Fernando and Stevens in prep., Avila *et al.* in prep.). These species are easy to target because of their large size, slow swimming speed, aggregating behaviour, predictable habitat use, and lack of human avoidance. They are killed or captured by a variety of methods including harpooning, longlining, netting and trawling (White *et al.* 2006, Heinrichs *et al.* 2011, Setiasih *et al.* in prep., Fernando and Stevens in prep). Due to their ichthyophagous diet these species are also captured on baited longlines. Targeting of these rays at critical habitats or aggregation sites, where individuals can be caught in large numbers in a short time frame, is a serious threat (Couturier *et al.* 2012). Their conservative life history also constrains their ability to recover from a depleted state and they are not likely to be able to tolerate high catch levels, given their low reproductive potential (Dulvy *et al.* 2014).

Targeted *Mobula* spp. fisheries have been observed in Peru: ~8,000 per year (Heinrichs *et al.* 2011), China (Zhejiang): ~2,000 per year (Heinrichs *et al.* 2011) and Mexico (Notarbartolo-di-Sciara 1987b).Gill nets and harpoons are used to target mobulids seasonally in the Gulf of California on the West coast of Mexico (Notarbartolo- di-Sciara, 1987b).Targeted fisheries are reported in Sri Lanka: ~48,357 *M. japanica* and 6,691 *M.tarapacana* per year (Fernando and Stevens in prep), India: ~1,215 *M. japanica* per year (Heinrichs *et al*. 2011), Thailand (R. Parker, pers. comm.) and Myanmar (J. Williams, pers. comm.).

M. japanica are directly targeted using harpoons in the Gulf of California and represented 30% of the catch of mobulids observed during a survey of artisanal landings in Bahia de la Ventana, south western Gulf of California (Notarbartolo-di-Sciara 1988). *M. thurstoni* represented 58% of the catch. There is still an active mobulid fishery in the southwest Gulf of California, south of La Paz and devil rays are also landed in nearshore artisanal elasmobranch fisheries throughout the Gulf of California.

M. japanica and *M.tarapacana* fisheries have been observed in Indonesia in Lamakera and Lamalera (Nusa Tenggara) and Tanjung Luar (Lombok), Cilacap (Central Java) and Kedonganan (Bali) (Dewar 2002, White *et al*. 2006, Barnes 2005, Heinrichs *et al.* 2011, Setiasih *et al.* in prep) with ~1915 & ~1273 *M. japanica* and *M.tarapacana* landed respectively per year (Heinrichs *et al.* 2011, Setiasih *et al.* in prep.).

M. rochebrunei was reported to be of commercially important to fisheries throughout its range (McEachran and Séret 1990), but this species has not been recorded since (D. Fernando, pers. comm.). Like all *Mobula spp.* their aggregating habit makes them easy to target in large numbers as they travel in schools. There are no specific data, however, on landings in local fisheries where the species is taken in West Africa.

Although *Mobula spp.* are taken as bycatch in surface gill net, longline, and purse seine throughout much of their range, details of these fisheries are poorly documented. Bycatch data are collected in only a few fisheries and, when they are, *Mobula spp.* are often recorded under various broad categories such as “Other”, “Rays”, or “Batoids”, with a breakdown by species almost never recorded (Lack and Sant 2009, Camhi*et al*. 2009). Numbers of animals released alive are only rarely recorded, while visual identification field guides for *Mobula* and *Manta spp.* have only recently been published (G. Stevens, 2011). As such, *Mobula spp.* have generally been overlooked in most oceanic fisheries reports, with very little effort to properly identify or accurately record the species caught (Chavance *et al*, 2011, G. Stevens, pers. comm.). See Annex III.

High mortality rates are reported for *M. mobular* from accidental takes in swordfish pelagic driftnets in the Mediterranean (Muñoz-Chàpuli*et al*. 1994), to unsustainable levels. *M. mobular* are also accidentally captured in longlines, purse seines, trawls (Bauchot 1987), and fixed traditional tuna traps 'tonnare'. They are also occasionally caught as bycatch in the western central Ligurian Sea, where long line catches have been monitored since 1999, especially from the harbours of Imperia and Sanremo. Devil ray bycatch in the Ligurian Sea is always discarded (Orsi Relini *et al*. 1999). There is also evidence to suggest significant directed fisheries exist for this species in Gaza and Egypt (D. Fernando pers. comm.).

3.2 Habitat

Habitat destruction, pollution, climate change, oil spills and ingestion of marine debris such as micro plastics (Couturier *et al.* 2012) are all major threats to all *Mobula spp.* because of their wide ranging near-shore habitat preferences (Notarbartolo di Sciara 2005, Handwerk 2010).

Chin and Kyne (2007) estimated that mobulid rays (*Mobula* Genus; *Manta* Genus) are the pelagic species most vulnerable to climate change, since plankton, a primary food source, may be adversely affected by the disruption of ecological processes brought about by changing sea temperatures.

Of particular concern is the exploitation of *Mobula spp.* from within critical habitats, well-known aggregation sites, and migratory pathways, where numerous individuals can be targeted with relatively high catch-per-unit-effort (Couturier *et al.* 2012, Heinrichs *et al*. 2011).

3.3 Indirect threats

*Mobula spp.*are also threatened by entanglement (in phantom nets, mooring lines, anchor lines and fishing lines), boat strikes and sport fishing-related injuries.

3.4 Threats connected especially with migrations

3.5 National and international utilization

All utilisation and trade in the products of *Mobula spp.* is derived from wild-caught animals. Records cannot be quantified fully, due to a lack of species and product-specific codes, catch, landings and trade data. However, all available information indicates that many former bycatch fisheries have become directed fisheries primarily in order to supply gill plates to Asian markets (White *et al.* 2006, Fernando and Stevens in prep, Heinrichs *et al.* 2011, Setiasih *et al.* in prep., Dewar 2002).

There is no documented domestic use of *Mobula spp*. gill plates in the three largest *Mobula* fishing range states (Sri Lanka, India and Indonesia) (Heinrichs *et al*. 2011, Fernando and Stevens in prep, Setiasih *et al.* in prep.). The low-value meat of *Mobula spp.* taken in these and other domestic fisheries is used locally for shark bait, animal feed and human consumption or discarded, while high value products (primarily gill plates, also skin and cartilage) are exported for processing elsewhere (Heinrichs *et al*. 2011, Setiasih *et al.* in prep., Fernando and Stevens in prep, Booda 1984,C. Anderson, pers. comm., D. Fernando pers. comm.).

Landings in China, reportedly from the South China Sea and international waters, are not exported for processing. A 2011 survey of a shark processing plant in Puqi, Zhejiang Province in China, which is a major processor of *Mobula spp*. and *Manta spp*., revealed that the gill plates are sold directly to buyers in Guangdong (with wholesale prices for *M. japanica* gills of ~700RMB (US$110) per kg (Heinrichs *et al*. 2011). The carcasses are shipped to another plant in Shangdong, where the meat is ground up for fishmeal and the cartilage is processed to make chondroitin sulfate supplements. The latter are then exported for sale to Japan and Britain.

All international trade in *Mobula spp.* products is unregulated, with the exception of exports from those range states that have protected these species or have banned the possession or export of any ray products(See Annex IV). Illegal landings of *Mobula spp.* have been reported in some range states where protective legislation exists. However it is not known to what extent these illegally landed animals are being traded internationally, because no mechanisms have been implemented to monitor and regulate such trade.

The unsustainable *Mobula spp.* fisheries described above are primarily driven by the high value of gill plates in international markets (Dewar 2002, White *et al*. 2006, Heinrichs *et al*. 2011, Couturier *et al*. 2012). This trade is the driving force behind population depletion throughout most of the range of *M. japanica* and *M.tarapacana* and poses the greatest threat to their survival. Additional trade impacts include the significant economic consequences for existing (and potential) high value, non-consumptive sustainable ecotourism operations, which could yield much larger and longer-term benefits to range states than short-term unsustainable fisheries (Heinrichs *et al*. 2011).

4. Protection status and needs

4.1 National protection status

National and regional protections for *Mobula* species include Croatia (*M. Mobular)*, Ecuador (*M. japanica*, *M. thurstoni*, *M. munkiana*, *M. tarapacana*), Maldives (no export of ray products), Malta (*M. Mobular*), Mexico (*M. japanica*, *M. thurstoni*, *M. munkiana*, *M. hypostoma*, *M. tarapacana*), New Zealand (*M. japanica*), Palau (no commercial fishery exports), the Raja Ampat Regency in Indonesia (genus *Mobula*), and the US states / territories of Florida (genus *Mobula)*, Guam and the Commonwealth of the Northern Mariana Islands (all ray species). However, enforcement is insufficient in some areas and mobulids are still being taken illegally, for example in Mexico (Bizarro *et al.* 2009).

No trade measures prevent the sale or export of landings except in the states that have prohibited *Mobula* ray product trade (Ecuador, Maldives, Mexico, New Zealand, the US state of Florida and the territories of Guam and the Commonwealth of the Northern Mariana Islands) (Heinrichs *et al*. 2011).

The top five *Mobula spp.* fishing countries (Sri Lanka, India, Indonesia, Peru and China), which account for an estimated 95% of the world's documented *Mobula spp*. catch (Heinrichs *et al*. 2011), have no regulations or monitoring of these fisheries. No Regional Fishery Management Organizations (RFMOs) have passed resolutions to regulate or monitor *Mobula spp*. fisheries.

4.2 International protection status

There are no controls, monitoring systems or marking schemes to regulate, track or assess trade in *Mobula spp.*

Two regional conservation bodies in Europe, the Bern Convention and the Barcelona Convention, have listed *M. mobular* as a species requiring strict protection. However, only Croatia and Malta have implemented protective measures. Recent regional legislation (e.g., GFCM, ICCAT) has introduced new basin-wide banning of pelagic driftnets; if implemented, this would eliminate one of the most severe threats to the species.A resolution passed during the 15th Micronesia Chief Executive Summit in 2011, which applies to the Federated States of Micronesia, Palau, the Republic of the Marshall Islands, Guam and the Commonwealth of the Northern Mariana Islands, states that all members will adopt legislation prohibiting the possession, sale, distribution and trade of shark fins, rays and ray parts from the end of 2012.

See Annex IV for table of regional, national and state protective measures for *Mobula spp.*

4.3 Additional protection needs

More research is needed on the exploitation, distribution, biology and ecology of all *Mobula spp.* In particular, catch data are required, and stock assessments should be undertaken where the species is fished. Because of their large size, migratory behavior, extremely low fecundity and large size at maturity, these species are likely highly vulnerable to fishing pressure. However, available life history information is limited and more research is required to make a more accurate assessment of the threat posed by fisheries. Improved clarity in catch records would provide a basis for detecting potential trends in effort and landings.

5. Range states (see Annex II)

6. Comments from range states:

Fiji Islands: the two species that occur across Fijian waters are not targeted species, but have been recorded as bycatch species in other countries within the Western Central Pacific Ocean which have Purseine Fisheries targeting for Tuna and associated pelagic species. Mobula and Manta Rays (both of the Oceanic and Reef Manta Rays are now in the process of being listed into the CITES Appendix ii List, and to come into force from 14 September 2014) are largely not fished or harvested across the waters of the Fiji Islands, but are largely used for ecotourism attractions in a number of targeted dive sites within Fiji’s coastal reef and island systems. Because of the need for precautionary principle and application to the “ look-alike species” consideration, it is incumbent for all range states and parties to CMS, to consider listing all the known nine (9) species of Mobula Rays under Appendix i or ii of the CMS Protected Species List (as an inclusion to the Shark List).

7. Additional remarks

Countries across the South-west Pacific (include Tonga, Samoa, Vanuatu, Fiji , Cook Island, and others) have documented and observed how these species of Mobula, Manta and other rays interact within their local coastal and associated areas of national jurisdictions, and clearly noted from dive operators in a number of the local island systems, that these species are one of the big draw-cards for the dive and snorkel tourists to the region. In Fiji, the local island systems that currently have Mobula and Manta Ray dive tourisms are on the islands of Taveuni, Kadavu and the Lau groups. These rays migrate large distances across the Pacific and seem to come to Fiji's waters for abundant food & mating habitats.

As noted above, the manta rays will also receive protection under CITES listing in September-2014, and including them on CMS List would be a natural progression for these vulnerable species. The devil ray populations within the South Pacific are also on the decline, and the rest of the South Pacific region would also be very supportive if Fiji were able to start some form of protection for these Mobula Rays, even though the CMS is non-binding & voluntary, it is a strong indicator of countries showing willingness to take leadership in their conservation.

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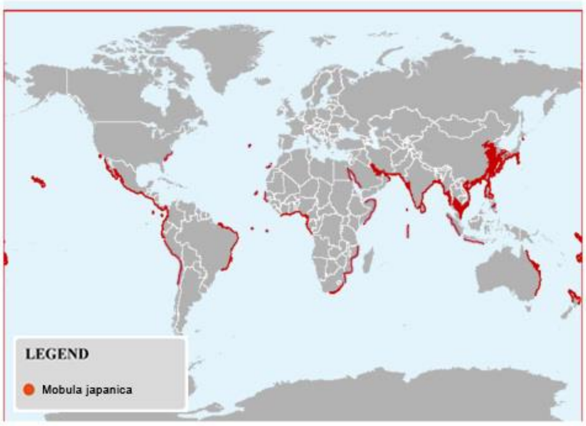
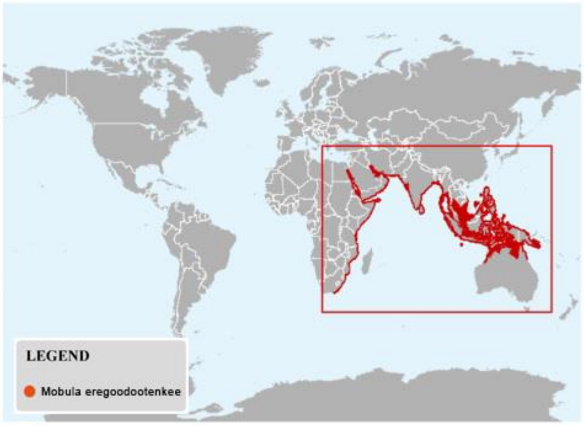
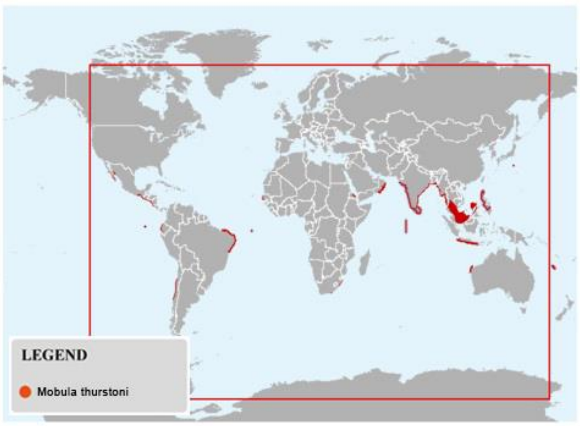
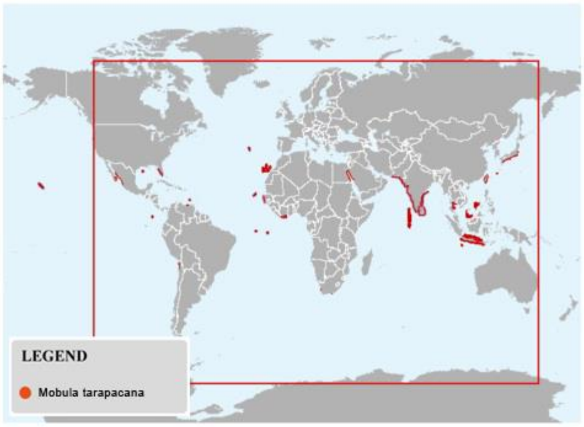
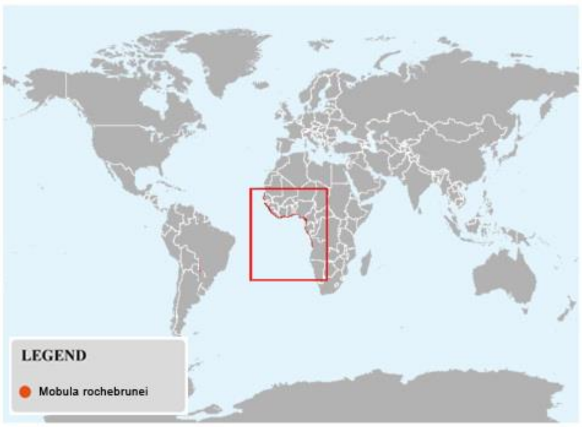
ANNEX I. Distribution maps

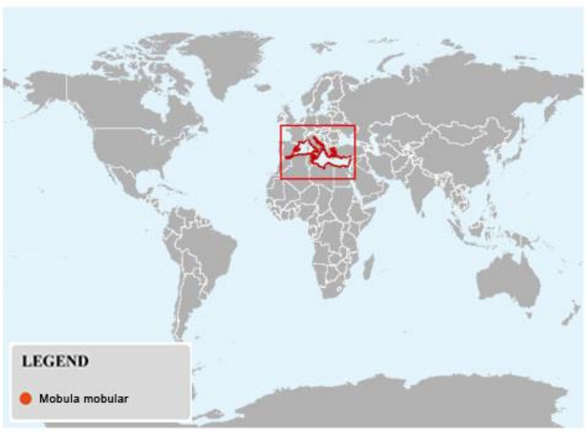


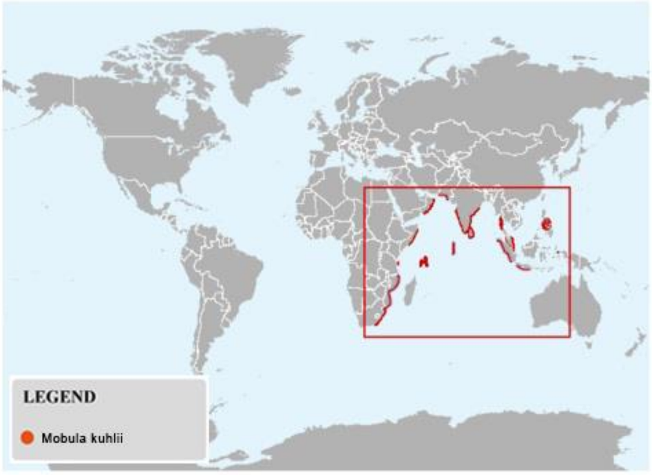












ANNEX II. Distribution table – range states and FAO fisheries areas

Range States and FAO Fisheries Areas	*Mobula mobular*	*Mobula japanica*	*Mobula thurstoni*	*Mobula tarapacana*	*Mobula eregoodootenkee*	*Mobula kuhlii*	*Mobula rochebrunei*	*Mobula hypostoma*	*Mobula munkiana*
FAO Fisheries Areas	37	31, 34, 47, 51, 41, 87, 77, 81, 71, 61	34, 41, 47, 57, 51, 71, 77, 87	31, 51, 57, 61, 71, 77, 87	47, 51, 57, 71	47, 51, 57, 71	34, 47	31, 41	77, 87
Azores & Madeira Islands (Portugal)		x		x					
Canary Islands (Spain)		x		x					
Spain	x								
France	x								
Italy	x								
Croatia	x								
Greece	x								
Malta	x								
Algeria	x								
Israel	x								
Tunisia	x								
Cape Verde Islands		x		x					
Mauritania							X		
Senegal			x	x			X		
Guinea-Bissau							X		
Guinea							X		
Cote d'Ivoire		x	x	x					
Ghana		x							
Nigeria		x							
Gabon		x							
Congo		x							
Democratic Republic of the Congo		x							
Angola		x					X		
Ascension Island (British Oversees Territory)				x					
South Africa		x	x	x	x	x			
Mozambique		x			x				
Madagascar					x				
Seychelles						x			
Kenya					x				
Tanzania					x	x			
Somalia		x			x	x			
Egypt - Sinai (African part)	x	x		x	x				
Sudan					x				
Eritrea		x			x				
Saudi Arabia		x		x	x				
United Arab Emirates					x				
Qatar					x				
Yemen		x			x				
Djibouti					x				
Oman		x	x		x	x			
Kuwait					x				
Iran		x			x				
Pakistan		x			x				

Range States and FAO Fisheries Areas	*Mobula mobular*	*Mobula japanica*	*Mobula thurstoni*	*Mobula tarapacana*	*Mobula eregoodoot enkee*	*Mobula kuhlii*	*Mobula rochebrunei*	*Mobula hypostoma*	*Mobula munkiana*
Maldives		x	x	x		x			
India		x	x	x	x	x			
Sri Lanka		x	x	x	x	x			
Bangladesh		x							
Myanmar (Coco Is. & Mainland)		x			x				
Thailand		x	x	x	x				
Malaysia		x	x	x	x	x			
Cambodia		x							
Vietnam		x			x				
China		x							
North Korea		x							
South Korea		x							
Japan		x	x	x					
South China Sea (incl.Spartly Islands)				x					
Indonesia		x	x	x	x	x			
Australia		x	x		x				
Papua New Guinea					x				
Philippines		x	x		x	x			
Taiwan - Province of China (Main Island)		x		x	x				
Palau				x					
New Zealand		x							
Fiji		x	x						
Tuvalu		x							
Hawaiian Islands (USA)		x		x					
México		x	x	x				x	x
Guatemala		x	x						x
El Salvador		x	x						x
Honduras		x	x						x
Nicaragua		x	x						x
Costa Rica (Cocos I., Costa Rica Mainland)		x	x	x				x	x
Panama		x							x
Colombia (Malpelo Is.)		x							x
Ecuador (Galápagos Islands & Mainland)		x	x	x					x
Peru		x							x
Chile		x	x	x					
United States of America Continent (California, Texas, Florida, South Carolina, Massachusetts)		x		x				x	
The Bahamas								x	
Cuba								x	
Jamaica								x	
Haiti								x	
Dominican Republic								x	
Antigua								x	
Barbuda								x	
Guadaloupe								x	
Dominica								x	
Martinique								x	
St Lucia				x				x	
Barbados								x	
Grenada								x	
Venezuela				x					
Brazil (including St Peter and St Paul Archipelago)		x	x	x				x	
Uruguay								x	
Argentina								x	

ANNEX III. Estimated annual landings from available catch data – individuals

Notes:

- *Most fishery figures listed are extrapolated estimated catches.*
- *Reports by weight have been converted to estimates of number of individuals.*
- *Countries known to have targeted and/or bycatch fisheries for Manta spp. and Mobula spp., but where no catch records or estimates are available include, but are not limited to:*
    - *Southern China (only number from one processing plant included),*
    - *Mexico, Madagascar, Ghana, Tanzania, Thailand and the Philippines.*
- *Some landings estimates included under "Directed Fisheries" are from fisheries that primarily target other species. There is evidence, however, that these fisheries actively target Manta and Mobula spp. and catches should not be considered to be incidental. Organized trade in gill plates in Indonesia has moved some fisheries to actively target Manta spp. along with the original target species.*
- *Much of the bycatch from high seas fisheries is likely to be discarded and may not go into the gill plate trade.*
- *A great deal of the fishery data reported and almost all bycatch data refer only to Mobulids and do not report by individual species. It's suspected that the majority of the unclassified Mobulid catch data refer to Mobula spp.*

Table 1. Directed fisheries – individuals

Country/Region	Reference	Ref Year	International Trade	Annual Mobula spp.	Total Mobulids
Indonesia-Lamakera	Setiasih 2011	2011	Yes	330	990
Indonesia-Lombok	Setiasih 2011	2007-11	Yes	908	1,119
Indonesia-other[1]	White *et al*. 2006	2001-05	Yes	2175	2,535
Sri Lanka	Fernando & Stevens in prep	2011	Yes	55,497	56,552
India	Raje*et al*. 2007	2003-04	Yes	24,269	24,959
China	Hilton 2011, Townsend et al. in prep	2011	Yes	2,000	2,100
Peru	PlanetaOceano 2011	2011	DD	8,000	8,150
Madagascar	Graham pers. comm.	2007	DD	DD	DD
Ghana	Essumuang 2010		DD	DD	DD
Total Estimate				**93,179**	**96,405**

Table 2. Bycatch fisheries - individuals

Country/Region	Reference	Ref Year	International Trade	Annual Mobula spp.	Total Mobulids
Brazil	Perez and Wahlrich 2005	2001	DD	DD	809
Mauritania	Zeeberg *et al*. 2006	2001-04	DD	DD	620
Indian Ocean	Pianet *et al* 2010	2003-08	DD	325	361
New Zealand	Paulin *et al*. 1982	1975-81	DD	DD	39
W. Central Pacific	Molony 2005	1994-04	DD	DD	1,500
Total Estimate				**325**	**3,329**

Annex V. *Mobula spp.*legal protection measures – regional, national, state

Mobula spp. legal protective measures		
Location	**Species**	**Legal protection / conservation measure**
Regional		
Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention)	*M. mobular*	Appendix II – Listed as a strictly protected species which requires that Parties endeavour to carry appropriate measures with the aim of ensuring the species is maintained in a favourable conservation state
Barcelona Convention	*M. mobular*	2001 included in Annex II 'List of endangered or threatened species' to the Protocol concerning Special Protected Areas and Biological Diversity in the Mediterranean
Micronesia: Federated States of Micronesia, Guam, Mariana Islands, Marshall Islands, Palau	All ray species	Micronesia Regional Shark Sanctuary Declaration to prohibit possession, sale, distribution and trade of rays and ray parts from end 2012
National		
Croatia	*M. mobular*	Law of the Wild Taxa 2006 Strictly prohibited
Ecuador	*M. japanica, M. munkiana*	Ecuador Official Policy 093, 2010
Honduras	All elasmobranchs	Full ban on fishing elasmobranchs 2010
Maldives	All ray species	Exports of all ray products banned 1995
Malta	*M. mobular*	Sch. VI Absolute protection
Mexico	*M. japanica, M. thurstoni, M. munkiana, M. hypostoma, M. tarapacana*	NOM-029-PESC-2006 Prohibits harvest and sale
New Zealand	*M. japanica*	Wildlife Act 1953 Schedule 7A (absolute protection)
State		
Guam and the Commonwealth of the Northern Mariana Islands, US Territory	All ray species	Bill 44-31 prohibiting possession, sale, distribution, trade in rays and ray parts
Florida, US State	*Genus Mobula*	FL Admin Code 68B-44.008 – No harvest
Raja Ampat Regency, Indonesia	*Mobula spp.*	Shark and Ray Sanctuary Bupati Decree 2010