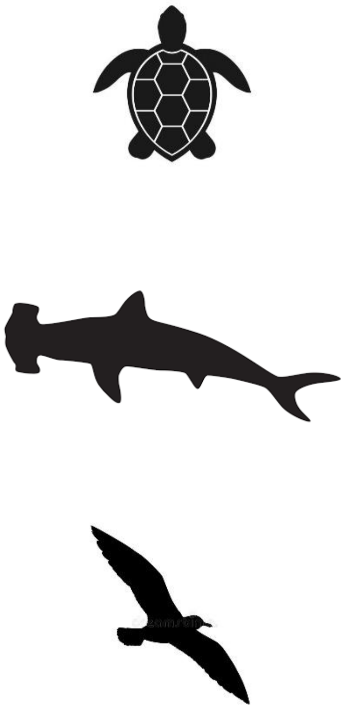
WCPO Purse Seine Tuna FIP (Thai Union)

ETP Management Strategy



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Introduction

The FIP is made up of a fleet of 47 tuna purse seine vessels, flagged to Taiwan, Republic of Korea, the United States, Kiribati, Nauru and the Federated States of Micronesia (FSM). The vessels fish in the WCPO for the three tropical tuna species (with most of the catch being made up of skipjack). They deploy Fish Aggregation Devices (FADs), and fish on FADs and other floating objects, as well as setting on free schools.

The free-school composite of the fishery generally scored well against the P2 Performance Indicators (PIs), which reviews the interactions/impacts of the UoA with the marine ecosystem including associated species, endangered, threatened and protected (ETP) species and the habitat. The majority of scores align with the Public Certification Report (PCR) from the most recent re-assessment of the PNA free-school fishery (Blyth-Skyrme et al., 2018). Although the pre-assessment perceived an issue with whale shark interactions in both the free-school (and FAD-associated fisheries), which was not shared by the PNA free-school assessment. This could be attributed to lack of fishery-specific data, so the scoring applied was in the pre-assessment was precautionary.

For the FAD-portion of the fishery, scorings are aligned with the OPAGAC FIP and includes unobserved mortality of ETP species due to FAD entanglement and ecosystem impacts of FADs. The former only applies if entangling FADs are used, but it is thought that this may be the case in this fishery. Entanglement in FADs is an issue for a range of species, but principally, it is thought, silky sharks (Filmalter et al., 2013) and turtles.

The MSC definition of an ETP species is:

- Any species that is recognised by national ETP legislation.
- Species listed in the binding international agreements given below:
  - Appendix 1 of the Convention on International Trade in Endangered Species (CITES), unless it can be shown that the particular stock of the CITES listed species impacts by the UoA under assessment is not endangered.
  - Binding agreements concluded under the Convention on Migratory Species (CMS), including:
    - Annex 1 of the Agreement on Conversation of Albatross and Petrels (ACAP).
    - Table 1 Column A of the African-Eurasian Migratory Waterbird Agreement (AEWA).
    - Agreement on the Conservation of Small Cetaceans of the Baltic and North Sea (ASCOBANS).
    - Annex 1, Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS).
    - Wadden Sea Seals Agreement.
    - Any other binding agreements that list relevant ETP species concluded under this Convention.
- Species classified as 'out of scope' (amphibians, reptiles, birds and mammals) that are listed in the IUCN Redlist as vulnerable (VU), endangered (EN) or critically endangered (CE).

Scope

This strategy has been created because as a responsible member of the fishing community we recognise ETP species are highly susceptible to overfishing and we endeavour to do our part to reduce the impacts our fishing fleet has on these species by applying best practices. This document acts as a guide for skippers on best practice and the actions they should be taking to reduce interactions with ETP species, and how to deal with any interactions that still occur.

The intention of this document is to improve Principle 2 Performance Indicator Scores explicitly, PI 2.3 ETP PIs to help us meet SG80 and in turn push us towards of achieving Marine Stewardship Council (MSC) certification.

This policy will be approved by the companies participating in the FIP and all skippers should read this document and have a hard copy accessible on the vessel at all times. Note the electronic English version shall be the master. For any issues in translations please refer back to the English version.

This strategy was adopted across the FIP fleet on the 1 November 2020 and shall be verified through both human and electronic observers. This document builds on previous work and details the best practices and management strategy of ETP species within the WCPO PS Tuna FIP using fishery specific catch data and similar MSC certified fisheries. The fishery catches 98% target species with the remaining being secondary and ETP species.

For any issues or amendments please contact the FIP coordinator, Tom Evans at t.evans@keytraceability.com.

Sharks

Despite being incidentally captured by the purse seine fishery, the catch of pelagic sharks in the fishery can be substantial and any efforts to reduce that mortality can contribute towards conservation of this sensitive species group. The main shark species caught by tropical tuna purse seine fisheries are the silky shark (*Carcharhinus falciformis*), representing 90% of the shark catch, followed by the oceanic whitetip shark (*C. longimanus*) (Gillman 2011). It is estimated that around 90% of silky shark catches in purse seine fishing activities occur during sets on floating objects, i.e. FADs. Estimates reported by Gilman (2011) indicate that the catch of silky sharks by purse seiners in the Pacific is about ten times lower than the catch by longliners. However, sharks can become entangled in the underwater netting added to drifting FADs by some fleets. This mortality was first considered to be negligible as there had been few observations of entangled sharks. However, observing entangled animals from the deck (by crews or observers) is nearly impossible. See the additional FIP FAD policy for more information on the fisheries commitments to non-entangling FADs.

ETP Shark species that the fishery are known to interact with using the past 3 years of fishery data are as follows, note blacktip, bronze whaler, grey reef, silvertip and tiger shark are not explicitly ETP species however, they are possibly landed in designated shark sanctuaries due to the nature of aggregated data received from the fishery a precautionary approach was decided to list them as ETP species:

Table 1 - ETP Shark species that the fishery are known to interact with using the past 3 years of fishery data

Common Name	Binomial Name	Justification	% of total (N)
Silky Shark	*Carcharhinus falciformis*	CMM 2013-08	0.038416
Bronze Whaler Shark	*Carcharhinus brachyurus*	Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000663
Blacktip Shark	*Carcharhinus limbatus*	Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000587
Galapagos Shark	*Carcharhinus galapagensis*	Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000455
Oceanic Whitetip Shark	*Carcharhinus longimanus*	CMM 2011-04	0.000404
Silvertip Shark	*Carcharhinus albimarginatus*	Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000271
Sandbar Shark	*Carcharhinus plumbeus*	https://www.iucnredlist.org/ja/species/3853/10130397; Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000234
Shortfin Mako Shark	*Isurus oxyrhinchus*	CMS Appendix II	0.000051
Grey Reef Shark	*Carcharhinus amblyrhynchos*	Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000013
Scalloped Hammerhead	*Sphyrna lewini*	CMS MoU species	0.000013
Dusky Shark	*Carcharhinus obscurus*	CMS Appendix II	0.000000

Issue

Observed Catch

Overall, the shark bycatch to tuna ratio in purse seiners are relatively small, on average, less than 0.5% in weight. However, given the global magnitude of catch of the purse seine fishery, a reduction of mortality incurred by this fishery can contribute towards global conservation efforts. The main species caught by the purse seine fishery is the silky shark (90% of caught sharks) and the oceanic whitetip shark.

Unobserved Mortality due to Entanglement

Sharks can become entangled in the underwater netting added to drifting. This mortality was first considered to be negligible as there had been few observations of entangled sharks. However, observing entangled animals from the deck is nearly impossible. Such observations are only possible with remote cameras or divers making direct observations or when the entire FAD is lifted out of the water to observe the underwater structure. On average sharks do not remain entangled for long, usually around one day before dropping out of the net or being consumed. The magnitude of this issue is not known and not all fleets use the same type of FAD structure and netting; it is likely that netting with smaller mesh sizes will entangle fewer sharks.

Shark Finning

Shark finning is the practice of retaining shark fins and discarding the remaining carcass while at sea. The practice is against the FAO Code of Conduct for Responsible Fisheries and its International Plan of Action for the Conservation and Management of Sharks, as well as the resolutions of a number of other international marine bodies, all of which call for minimising waste and discards. There are major uncertainties about the total quantity and species of sharks caught, and shark finning has added to this problem.

This practice is not only wasteful, but it also reduces the accuracy of catch statistics (amounts, species identifications) that scientists need in order to accurately assess all impacts of fishing on these shark populations. The use of fins to identify the different shark species and extrapolate shark biomass killed in fishing operations is approximate. Moreover, because fins can be very valuable, such practices could represent an incentive for fishers to increase bycatch of sharks (e.g. not releasing live sharks)

Mitigation

Observed Catch

Live release - Following best practices onboard purse seine vessels to release live sharks from the deck can reduce the fishery induced mortality of silky sharks by 15-20%.

Avoid setting on small schools - By avoiding setting on small schools of tuna (e.g. < 10 tons), fishers could significantly reduce their catches of silky sharks by 20% to 40%, depending on the oceans.

Release sharks from the net - Fishing sharks from the net was tested and preliminary results indicate that it could be a relatively simple and low-risk (to the catch and PS vessel's net) way of removing sharks from the net once they are encircled (Sancristobal et al. 2016).

Shift some effort to free schools - Sharks are more commonly found in FAD sets than they are on free swimming schools. For a given amount of fishing effort, shifting to more free-swimming school sets will reduce the overall catch of sharks. For example, a 20% effort shift towards sets on free schools could decrease mortality by 16% in the western and central Pacific Ocean.

Unobserved Mortality due to Entanglement

FAD design - Fishers should use non-entangling materials in the submerged and floating structures of FADs. In order to eliminate entanglement, this simply consists of completely avoiding the use of meshed materials when building FADs. Entanglement can also be substantially reduced by tightly wrapping the submerged nets with ropes, resulting in a tight cylinder. It is noteworthy that the use of non-entangling FADs is likely to have avoided the mortality of between half a million and a million of small silky sharks in the Indian Ocean only.

Shark Finning

The fishery complies with all national and regional legislation including WCPFC's CMM 2010-07 (which is to be superseded by CMM 2019-04 in November 2020). WCPFC prohibits this practice under CMM 2010-07 by introducing the concept of a 5% fins-to-carcass ratio. In order to facilitate on-board storage, shark fins may be partially sliced through and folded against the shark carcass but shall not be removed from the carcass. Fins should not total more than 5% of the weight of sharks onboard.

Fishers should ensure that the information (discarded/retained) is recorded in the logbooks. This record-keeping can be greatly improved by the deployment of on-board observers.

Whale Sharks

Tropical tuna species are known to associate with large, slow moving animals, such as whale sharks (*Rhyncodon typus*). The incidental encircling of whale sharks has been documented in the tropical tuna purse seine fisheries of the Indian, east Atlantic, Eastern Pacific and Western and Central Pacific Oceans. Whale shark interaction rates with tuna purse seine gear are very low. The WCPFC observer database recorded whale shark encounters in 155 of 88,084 observed sets (2008-2012 average) for a set encounter rate of 0.94% (Harley et al. 2013). Although interaction rates are low, any level of fishing mortality is of concern due to their life history and ecological significance.

Table 2 – Whale shark interactions from the past 3 years of fishery data

Common Name	Binomial Name	Justification	% of total (N)
Whale Shark	*Rhincodon typus*	CMM 2012-04	0.000309

Issue

Whale shark interaction rates with tuna purse seine gear are very low. The WCPFC observer database recorded whale shark encounters in 155 of 88,084 observed sets (2008-2012 average) for a set encounter rate of 0.94% (Harley et al. 2013). Although interaction rates are low, any level of fishing mortality is of concern due to their life history and ecological significance. Whale sharks are characterised by slow growth, delayed maturity, extended lifespan with a low reproductive potential (Compagno 1984). Furthermore, this species is listed as vulnerable by the IUCN (IUCN 2013), is listed under CITES and there is concern that whale shark populations are declining worldwide.

Whale shark interactions with purse seine gear result from both setting on tuna schools found in association with whale sharks and accidental encirclement when the sharks and tuna occur together. It has been noted that whale shark-associated sets are likely to be under-reported in vessel logsheet data or misreported as to set type (SPC-OPF 2011). One explanation has to do with the fact that the animals are often not visible at the start of the set which is then logged as an unassociated set. The main concern is that when encircled, the slow-moving animals are not able to evade capture or capable of freeing themselves without considerable interaction from the crew. Release techniques employed by purse seine crews vary widely. Methods that remove sharks from the water or vertically lift the sharks by the tail fin can inflict serious injury and are strongly discouraged by management bodies. Studies examining observer and logbook data report very low encounter rates overall and good condition at release with apparent high survival rates (Capietto et al. 2014). However, post–release survival needs to be scientifically verified with pop-up satellite tags and tested across a variety of release methods in all oceans to develop best practices for release techniques proven to maximise post-release condition.

Mitigation

Avoidance - Avoidance of whale sharks during fishing operations is a simple mitigation concept but often impossible to achieve if the animals are not visible prior to encirclement, which is often the case. The WCPFC currently has management measures that prohibit the intentional setting of purse seine gear around a whale shark if the animal is detected prior to setting (WCPFC CMM 2012-04). In the event that a whale shark is encircled for any reason, the vessel master is required to ensure that all reasonable steps are taken to ensure its safe release and report the incident as required by the relevant authority.

Release from the net - Best practice guidelines for release of whale sharks from the net provide a set of options to apply depending on several factors, including the environmental conditions and sea state; the size/weight of the catch, the size and orientation of the whale shark (facing to bow or stern); and the brailing style employed (with or without skiff). Best practices developed for the release of whale sharks generally propose a list of do's and don'ts considering issues of crew safety and minimising impact to the shark. In some cases, cutting the lacing between the corkline and net or the net itself may be the safest way to release a whale shark if conditions are favourable. Passively rolling the shark out of the sack or bunt end of the net is generally accepted to be a highly desirable, low impact method of releasing whale sharks that is relatively safe for the crew.

Manta Rays

Manta and devil rays are known to concentrate in oceanic areas with high productivity and are incidentally captured by tropical purse seiners when targeting tuna on FADs and free-swimming schools. The giant manta ray (*Mobula birostris*) and spinetail devil ray (*Mobula japanica*) are often cited as uncommon bycatch to purse seine fisheries, but several species of mobulid rays may interact with purse seine gear, i.e. *Mobula tarapacana, M. munkiana, M.* thurstoni (Scott and Hall 2014). Rays are rarely captured in tuna purse seine gear, generally less than 0.1% by weight and therefore considerably less than shark catch (Figure 3). In contrast to other non-target species that interact with purse seine gear, rays are mostly taken in free-swimming school sets in all oceans.

ETP ray species that the fishery are known to interact with using the past 3 years of fishery data are as follows:

Table 3 - ETP ray species that the fishery are known to interact with using the past 3 years of fishery data

Common Name	Binomial Name	Justification	% of total (N)
Mantas, Devil Rays Nei	*Manta birostris*	CMM 2019-05 (In force January 2021)	0.001010
Giant Manta	*Manta birostris*	CMM 2019-05 (In force January 2021)	0.000663
Pelagic Stingray	*Pteroplatytrygon violacea*	CMM 2019-05 (In force January 2021)	0.000152

Issue

Mobulid ray species have slow population growth rates and have been listed by the IUCN as Near Threatened, Vulnerable or Data Deficient (IUCN 2013). Manta rays are known to be targeted by some artisanal fisheries in several locations worldwide for fins, leather products, meat and gill rakers which are used for medicinal purposes and fetch a high market value. Such artisanal fisheries are often poorly monitored and consequently, rarely managed. Large manta and devil rays are also incidentally captured through entanglement in longlines, gillnets, drift and pound net gear. The giant manta can reach 9 m in width and exceed 1,000 kg in weight. Releasing such large animals from purse seiners can be extremely difficult and pose a safety hazard to the crew.

Mitigation

Release from the net or deck - Minimising fishery impacts to manta and devil ray population mirrors efforts to conserve whale sharks through the development and promotion of best practices techniques for safe release. However, in the case of rays, release from the deck is also seen as a viable alternative to releasing from the net, especially for smaller individuals. Most of the recommended best practices for release outline procedures that minimise injury risks for the animals while ensuring the safety of the crew. It is recommended to avoid the use of hooks, wires or tightening slings, lifting or dragging by the gill slits or cephalic lobes. Rays that are scooped onboard the vessel should be returned to the sea as quickly as possible, either by carefully lifting by the side of the wings, using a ramp to an opening on the side of the vessel or lowering to the water using a large-mesh net or canvas cargo net. Purpose-built release nets should be ready in the event that large rays are taken. Direct release of large rays from the brailer is another option. It should be noted that post-release survival of released manta and devil rays has not yet been investigated. Studies using popup satellite tags to verify post-release survival should be conducted to better determine the potential impacts of these interactions in the fishery.

Turtles

Marine turtles have life histories that make them highly vulnerable to fishing. They are also protected by many national and international treaties and regulations. Several turtle species can be found around floating objects depending on area, the most common being the Olive Ridley turtle (*Lepidochelys olivacea*). Sea turtles are caught in very small numbers (from a few tens up to a couple of hundreds of individuals per year in every ocean) by purse seiners and most of them (> 90%) are released alive relatively easily. The mortality of turtles due to being captured by the seine can be considered negligible (Amande et al., 2010, Gilman 2011, Dagorn et al. 2013, Hall & Roman 2013). Nevertheless, while their catches in purse seine fisheries are insignificant compared to other fishing methods, any efforts to avoid fishing mortality will aid in their conservation. Turtles can get entangled in the nets covering the bamboo rafts that form traditional FADs. See the additional FIP FAD policy for more information on the fisheries commitments to non-entangling FADs.

ETP Turtle species that the fishery are known to interact with using the past 3 years of fishery data are as follows:

Table 4 - ETP turtle species that the fishery are known to interact with using the past 3 years of fishery data

Common Name	Binomial Name	Justification	% of total (N)
Green Turtle	*Chelonia mydas*	https://www.iucnredlist.org/species/4615/11037468; CMM 2018-04; CMS Appendix I; CITES Appendix I	0.000032
Loggerhead Turtle	*Caretta caretta*	https://www.iucnredlist.org/species/3897/119333622; CMM 2018-04; CMS Appendix I; CITES Appendix I	0.000013
Olive Ridley Turtle	*Lepidochelys olivacea*	https://www.iucnredlist.org/species/11534/3292503; CMM 2018-04; CMS Appendix I; CITES Appendix I	0.000013
Hawksbill Turtle	*Eretmochelys imbricata*	https://www.iucnredlist.org/species/8005/12881238; CMM 2018-04; CMS Appendix I; CITES Appendix I	0.000006
Marine Turtle (Unidentified)	*Chelonioidea*	CMM 2018-04; CMS Appendix I; CITES Appendix I	0.000006

Issue

Unobserved Mortality due to Entanglement

Turtles can get entangled in the nets covering the bamboo rafts that form traditional FADs. While turtles can get trapped in the submerged netting, they can also entangle when they climb on the floating structure. No estimate of such mortality has been obtained so far, although it is likely to be extremely low compared to mortality from other fishing gears.

Mitigation

Reducing Entanglement in FAD Structures

FAD design - To avoid the entanglement of turtles in FAD netting, fishers should use non-entangling FADs. To reduce entanglement of turtles on the FAD itself, the surface structure should not be covered or only covered with non-meshed material. If the surface structure is covered, log-shaped (i.e. cylindrical) or spherical floats naturally deter turtles from climbing onto the device and should be used in preference to flat rafts.

In addition to this fishers must not set on any historic entangling FADs that are come across at sea.

Release from the net or deck - Releasing turtles alive from the deck is already a well-established practice in industrial purse seine fisheries. The majority of these turtles survive.

Juvenile bigeye and yellowfin

While not really bycatch species in tuna fisheries, we include small bigeye and yellowfin tuna in this report because of concerns that large numbers of small bigeye and yellowfin are caught in association with FAD sets, and how this contributes to overfishing of some bigeye and yellowfin stocks. Bigeye and yellowfin tuna are caught by many tuna fisheries and gear types. Large mature individuals are targeted by longline fisheries while smaller fish (typically juveniles) are caught by purse seine, pole-and-line and handline fisheries. Of the three tropical tuna species, bigeye has slower growth rates, higher longevity and higher age at maturity, which makes this species more vulnerable to fishing pressure. In the last decade, the FAD-based fisheries targeting skipjack tuna have intensified and, consequently, they also yield higher catches of small bigeye and yellowfin. Globally, the catch composition on floating objects contain 10% bigeye, while global catches from free-swimming school sets contain 2% bigeye (Restrepo et al., 2017).

Issue

Practically all fishing gears catch juvenile tunas (immature individuals), but some catch more than others. Bigeye tuna attains sexual maturity around a size of 119 cm and yellowfin at around 97 cm (although actual estimates of size at maturity vary by region and by study). A high percentage of the bigeye and yellowfin tuna catch in purse seine sets on FADs corresponds to juvenile individuals, similarly to pole and line catches in all ocean regions. Juvenile bigeye and yellowfin are also caught in purse seine sets on free-swimming schools and in longline fisheries, but in a lower proportion (Restrepo et al. 2017). There are two potential impacts from catching juvenile tunas: Overfishing and loss in potential yield. Many people believe that catching juveniles automatically leads to overfishing. But this is not necessarily the case. A stock can be overfished by catching too many juveniles, too many adults or too many of both. In a way, catching adults impacts the reproductive potential of the stock in the short term while catching juveniles impacts reproduction at some time in the future. Catching fish of different sizes leads to changes in potential yield. From a theoretical point of view, there is an optimum size at which the maximum sustainable yield (MSY) would be highest if all the fish were caught at that size, depending on the life history of the species (growth, maturity, natural mortality and spawner-recruit relationship). This optimum can never be achieved exactly because it is not possible to design a fishing gear that will catch all the tuna at the same size. But there are fisheries whose size selectivity will be close to this optimum size and, if those fisheries are the main source of fishing for the stock, then MSY will be close to the theoretical optimum. In contrast, if the main source of fishing is from fisheries that catch fish of sizes away from the optimum (either too small or too large), then MSY will be less than the optimum (Restrepo et al. 2017). In order to address this situation, it is necessary that RFMOs establish management objectives for tropical tuna stocks in which the targets and limits for each gear type are clearly articulated. This is largely an allocation exercise, and not a technical one. A study of the management of tuna and billfish stocks by RFMOs found that implementing and enforcing total allowable catches (TACs) had the strongest positive influence on rebuilding overfished stocks (Pons et al., 2017). Similarly, at a Global Science Symposium on FADs, a large number of experts suggested setting catch limits specifically for juvenile tunas caught by purse seine operations, particularly of overfished stocks (Hampton et al., 2017).

Mitigation

The three main tropical tuna species, skipjack, bigeye and yellowfin typically co-occur at FADs. Thus, one of the challenges that purse seine fleets working with FADs are facing worldwide is being able to capture skipjack, the main tropical tuna species targeted and in healthy condition worldwide, while avoiding bigeye and yellowfin, in those areas where there is a need for the conservation of these tuna species. Finding a technical solution for selective fishing at FADs combined with incentives to avoid undesired catches could be the mean to minimise bigeye and yellowfin catches.

Shift some effort to free schools or reduce number of FAD sets - Small yellowfin and bigeye are caught in greater proportion on floating object sets than in free-swimming school sets. Thus, for a given number of sets, shifting to a greater proportion of school sets would result in lower catches of small bigeye and yellowfin. Note, however, that this is not so easy to implement. For example, effort targeted at FADs that is prohibited during a season or in an area could redistribute to other areas and seasons. Also, in some cases, a shift towards more school sets could put more pressure on larger yellowfin which are targeted in free-swimming schools.

Setting catch limits by gear and enforcing them - RFMOs could set TACs for the different fisheries that target yellowfin and bigeye tunas, ensuring they are respected. This would require the setting of clear management objectives for the stocks. A study of the management of tuna and billfish stocks by RFMOs found that implementing and enforcing total allowable catches (TACs) had the strongest positive influence on rebuilding overfished stocks (Pons et al., 2017).

Cetaceans

ETP cetacean species that the fishery are known to interact with using the past 3 years of fishery data are as follows:

Table 5 - ETP cetacean species that the fishery are known to interact with using the past 3 years of fishery data

Common Name	Binomial Name	Justification	% of total (N)
False Killer Whale	*Pseudorca crassidens*	CMM 2011-03	0.001206
Sei Whale	*Balaenoptera borealis*	https://www.iucnredlist.org/ja/species/2475/130482064; CMM 2011-03	0.000246
Short-Finned Pilot Whale	*Globicephala macrorhynchus*	CMM 2011-03	0.000215
Bryde's Whale	*Balaenoptera Edeni*	CMM 2011-03	0.000196
Risso's Dolphin	*Grampus griseus*	CMM 2011-03	0.000139
Indo-Pacific Bottlenose Dolphin	*Tursiops aduncus*	CMM 2011-03	0.000051
Bottlenose Dolphin	*Tursiops truncatus*	CMS Appendix II	0.000044
Pygmy Killer Whale	*Feresa attenuata*	CMM 2011-03	0.000032
Baleen Whales Nei	*Mysticeti*	CMM 2011-03	0.000013
Beaked Whales Nei	*Hyperoodontidae*	CMM 2011-03	0.000013
Melon-Headed Whale	*Peponocephala electra*	CMM 2011-03	0.000013
North Pacific Right Whale	*Eubalaena japonica*	https://www.iucnredlist.org/ja/species/41711/50380694; CMM 2011-03	0.000006
Humpback Whale	*Megaptera novaeangliae*	CMM 2011-03	0.000006
Pygmy Sperm Whale	*Kogia breviceps*	CMM 2011-03	0.000006
Spinner Dolphin	*Stenella longirostris*	CMS Appendix II	0.000006

Issue

Cetaceans generally are reproductively unproductive with single removals of individuals having large effects on populations.

Fisheries bycatch is considered to be one of the most significant causes of mortality for many marine species, including vulnerable megafauna. In the open ocean, tuna purse seiners are known to use several cetacean species to detect tuna schools. This exposes the cetaceans to encirclement which can lead to incidental injury or death. Often due to interference of cetaceans with fishing activities, which can negatively affect fisheries by resulting in loss of bait, damage to fishing gear, decreased catches and increased time spent in fishing operations (Meyer et al., 1992) cetaceans are viewed negatively by fishermen.

The highest interactions are associated with drifting FADs. Marine mammal bycatch estimates had 95% confidence intervals of 54 % for 2003 to 2009, and 17 % for 2010 to 2016. According to the PNA free-school purse-seine PCR (Blythe-Skyrme et al., 2018), free-school sets have a low bycatch and FAD sets a negligible bycatch; >90% are observed to be alive on release.

Entangled marine mammals can also be an issue for crew safety. They can be extremely dangerous because they are powerful and unpredictable.

Mitigation

The incidental capture of cetaceans in purse seine gear is addressed under WCPFC CMM 2011-03 (enforceable from 2013), prohibits CMM-flagged vessels from setting a purse seine net on a school of tuna associated with a cetacean in the high seas and exclusive economic zones of the WCPO. If unintentionally encircled, all reasonable steps should be employed to ensure its safe release. The CMM is reviewed every three years, including CCM's compliance with some CCMs under investigation for not complying including Taiwan (WCPFC, 2018b).

Disentangling Equipment - Have disentangling equipment readily available – somewhere on deck where crew can get it quickly when a whale or dolphin is caught. All disentangling must be done aligned with ISSF protocols and these include:

- Do not enter the water to untangle marine mammals, they are powerful animals and have dehooking and line-cutting equipment ready.
- If whales or dolphins are eating your caught fish, or you catch a marine mammal, consider moving 100 nautical miles or more before making your next set.

For small whales/dolphins:

- Avoid sudden actions, do not use gaffs, and facilitate animal reaching the surface to breathe
- If entangled move vessel close to use a long-handle line cutter and cut as much line as possible.
- Wait for the animal to move away before resuming fishing.
- If hooked move close to vessel but without pulling the line to bring the animal onboard. If superficially hooked use the dehooked if close enough. If you can´t then cut with the long-handled line cutter as close to the hook as possible.

For large whales:

- If the animal poses a threat to the boat or crew, cut the line away from the vessel.
- If it is considered safe then get the animal as close as possible to the vessel and cut the line with long-handled cutters and wait for the whale to move away.

Reporting – Improving reporting is a vital tool to better understand interactions and mitigate against potential future interactions. Any interactions should be described with a description of the animal and its injuries. Take photos if possible. Use your species ID book to try to identify the animal. Record all required information on your logbook form. When skippers have interacted or observed a cetacean, they should notify other captains in the fleet to prevent the same area to set fishing.

Birds

Commonly encountered seabirds in fisheries include shearwaters, storm petrels, and boobies, but the birds most affected are albatrosses and petrels (BirdLife International 2011). Albatrosses and petrels can live for over 60 years and lay only one egg every one to two years. This means that any birds killed have an impact on the population. They also generally mate for life, and one bird's death means that its partner may never reproduce again. There are 22 species of albatross; 17 are threatened with extinction. All bird species must be released as quickly and as safely as possible.

Most birds are affected more heavily through longline gear rather than purse seine however observer data has shown interactions occurring. ETP bird species that the fishery are known to interact with using the past 3 years of fishery data are as follows:

Table 6 - ETP bird species that the fishery are known to interact with using the past 3 years of fishery data

Common Name	Binomial Name	Justification	WCPO FIP Percentage
Black-Footed Albatross	*Phoebastria nigripes*	CMM 2018-03	0.000006

Issue

SC15 noted that some seabirds are captured and released alive, with higher chances of survival when safe handling procedures are implemented. Together with the implementation of effective seabird bycatch mitigation measures, safe handling and release of seabirds will help reduce the impact of fisheries bycatch on these vulnerable seabirds.

Mitigation

The incidental capture of seabirds is addressed under WCPFC CMM 2018-03 where CCMs are encouraged to undertake research to further develop and refine measures to mitigate seabird bycatch including mitigation measures for use during the setting and hauling process.

Non Species Specific

In addition to the species specific strategies mentioned above, the fishery shall:

- Avoid all ETP hotspots and communicate effectively between vessels to tell other fishers where these are.
- Comply with both the shark finning and FAD policies in Appendix A and B
- Keep abreast of new science and promote research to further develop best practices for handling and safe release
- Continue to have 100% observer coverage
- All skippers shall attend and engage in the Skipper Training program being run through the FIP work plan
- Accurately record all ETP interactions including reporting interactions and fate of any releases (e.g. released alive; discarded dead, injuries), and collecting any data requested by scientists (e.g., photographs). Including documenting the inventory and use of equipment for the handling and safe release techniques.
- Collaborate with the RFMO to adopt mandatory handling and safe and live release best practices for ETP species.
- Facilitating research that addresses mitigation of ETP species bycatch, and voluntarily adopt best practices when these become known including participating in research programs that reduce mortality of ETP species outside the fishery — for example, ISSF projects
- Collaborating with other UoA and fleets to estimate overall interaction of ETP species and research on mitigation measure to reduce the cumulative impacts.
- Follow best practices of live release methods to minimise mortality and document their use of all ETP species and support mandatory adoption of these practices by the flag state and RFMO.
- Estimate, monitor and manage potential sources of unobserved mortality (post release, entanglement, etc). When possible, lift FADs out of the water for an appropriate data collection on the type of FAD used and interactions.

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Appendix A

Shark Finning and ETP Bycatch Mitigation Policy

As a responsible member of the fishing community we recognise most Endangered Threatened and Protected (ETP) species are highly susceptible to overfishing. Furthermore, we understand the wasteful practice of shark finning (the removal and retention of shark fins and discarding at sea of the carcass) contravenes many international rules and regulations, including those of all major tuna Regional Fisheries Management Organisations (RFMOs)

To better protect sharks and ETP species, our company and/or vessel(s):

1. Does not actively target sharks
2. Only uses Purse Seine gear types and prohibits the use of wire traces (shark lines)
3. Prohibits the practice of shark finning
4. Promotes the release of elasmobranchs, turtles, cetaceans and birds that are caught alive
5. Does not retain oceanic whitetip or silky sharks
6. For other sharks that are landed, the carcass is retained with fins attached
7. Promotes best practices for bycatch handling and release of elasmobranch, turtles, cetaceans and birds
8. Records the ETP species in the fishing logbook for all that are landed
9. Communicate with other fishers when encountering bycatch “hotspots”
10. Does not engage in trading with the fishing companies which do not observe the above clauses

Company Name (s)	
Fishing Vessel Name	
Fishing Vessel Flag	
RFMO of Fishing area	
Name of Vessel owner and / or Captain	
Signature of Vessel Owner and / or Captain	
Date	

Appendix B

Non-Entangling and Biodegradable Fish Aggregating Devices Public Policy

This Thai Union led Fishery Improvement Project is made up of a fleet of 47 tuna purse seine vessels, flagged either to Taiwan, Korea, Korea (the Republic of), Nauru, Micronesia (Federated States of) or United States of America (the). The vessels fish in the WCPO for the three commercial tropical tuna species (with most of the catch being made up of skipjack). They deploy FADs, and fish on FADs and other floating objects, as well as setting on free schools.

The fishery aims to improve its standard by working towards the objectives below:

- Achieve sustainable stock status' for tuna that is consistent with the Maximum Sustainable Yield (MSY) and management systems strengthened to achieve this.
- To improve the availability of accurate data on catches, retained and especially bycatch by strengthening information systems and training.
- To collaborate with other institutions working on tuna fisheries issues in the country, including working together to improve the management and policy towards sustainable fisheries for example Harvest Control Rules.
- Strengthen ETP and retained species management strategies.
- To promote traceability to ensure that the origins and status of Tuna products purchased are well-known and all coming from legal fisheries by engaging the supply chains that support improvement through the implementation of e-monitoring.
- Improve governance and decision-making process.
- Achieve MSC certification and the objectives above by 2024.

To ensure the participating vessels meet the above objectives the fishery has made this commitment to using only Non-Entangling Fish Aggregating Devices (NEFADs). NEFADs, as defined by the International Seafood Sustainability Foundation (ISSF) are constructed with no netting material to minimise ghost fishing (entanglement of fauna, primarily sharks and turtles). For a FAD to be completely non-entangling, it must use no netting materials either in the surface structure (raft) or the submerged structure.

By not using netting in FADs, tuna-vessel owners and fishers can prevent the entanglement and "bycatch" of sharks, sea turtles, and other non-target marine species. In addition, by choosing vegetal instead of plastic-derived materials for FADs, fishers can avoid contributing to the ocean pollution caused by ghost gear. The fishery intends to engage on minimising habitat and ecosystem impacts by engaging on a number of related actions for Biodegradable FADs and recovery programs.

The fishery recognises this and adopts the following practices and commitments:

- To only deploy Non-Entangling FADs, effective immediately.
- For all skippers to attend training to understand the reason for these changes and agree best practices.
- Develop a FIP strategy for FAD recovery to retrieve and replace any own or foreign entangling FADs when possible and safe to do so and engage with other FIPs for a harmonised implementation.
- Continuously improve procedures in line with best practices.
- All vessels will comply with ISSF Best Practices for FAD management Plans, including the ISSF Guide for Non-Entangling FADs and be listed on the ISSF Proactive Vessel Register (PVR).
- For Biodegradable FADs, they must adopt the following recommendations:
  - Reduce the use of plastics in the FAD structure and document FAD configurations in use

  - Engage in trials for adoption of a FIP Biodegradable FAD configuration with the following guidelines based on ISSF´s recommendations:

- Biodegradable materials to be used in FADs should be made of 100% sustainably harvested vegetal fibres and be sourced from areas close to the fishing ground.
- Biodegradable materials should allow a maximum lifetime of FADs of one year and then degrade as fast as possible.

Recommendations for Biodegradable FAD Configurations are as follows:

- **Raft:** Rafts should be constructed using bamboo, balsa wood or other natural materials that degrade without producing pollution on the marine environment. For FAD flotation, the use of plastic buoys and containers should be reduced as much as possible (e.g., reducing the weight and volume of the FAD structure would require less flotation).

- **Tail:** Only natural and/or biodegradable materials (cotton ropes and canvas, manila hemp, sisal, coconut fibre, etc.) should be used, so that they degrade without causing impact on the ecosystem.

For more information, please contact FIP Coordinator Mr. Tom Evans, Science Manager, Key Traceability Ltd. t.evans@keytraceability.com.

Appendix C
Fishery Catch Data - ETP Species

Table 7 - ETP Interactions Observed from Fishery Specific Catch Data

Common Name	Binomial Name	Justification	% of total (N)
Silky Shark	*Carcharhinus falciformis*	CMM 2013-08	0.038416
False Killer Whale	*Pseudorca crassidens*	CMM 2011-03	0.001206
Mantas, Devil Rays Nei	*Manta birostris*	CMM 2019-05 (In force January 2021)	0.001010
Bronze Whaler Shark	*Carcharhinus brachyurus*	Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000663
Giant Manta	*Manta birostris*	CMM 2019-05 (In force January 2021)	0.000663
Blacktip Shark	*Carcharhinus limbatus*	Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000587
Galapagos Shark	*Carcharhinus galapagensis*	Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000455
Oceanic Whitetip Shark	*Carcharhinus longimanus*	CMM 2011-04	0.000404
Whale Shark	*Rhincodon typus*	CMM 2012-04	0.000309
Silvertip Shark	*Carcharhinus albimarginatus*	Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000271
Sei Whale	*Balaenoptera borealis*	https://www.iucnredlist.org/ja/species/2475/130482064; CMM 2011-03	0.000246
Sandbar Shark	*Carcharhinus plumbeus*	https://www.iucnredlist.org/ja/species/3853/10130397; Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000234
Short-Finned Pilot Whale	*Globicephala macrorhynchus*	CMM 2011-03	0.000215
Bryde's Whale	*Balaenoptera Edeni*	CMM 2011-03	0.000196
Pelagic Stingray	*Pteroplatytrygon violacea*	CMM 2019-05 (In force January 2021)	0.000152
Risso's Dolphin	*Grampus griseus*	CMM 2011-03	0.000139
Indo-Pacific Bottlenose Dolphin	*Tursiops aduncus*	CMM 2011-03	0.000051

Shortfin Mako Shark	*Isurus oxyrhinchus*	CMS Appendix II	0.000051
Bottlenose Dolphin	*Tursiops truncatus*	CMS Appendix II	0.000044
Green Turtle	*Chelonia mydas*	https://www.iucnredlist.org/species/4615/11037468; CMM 2018-04; CMS Appendix I; CITES Appendix I	0.000032
Pygmy Killer Whale	*Feresa attenuata*	CMM 2011-03	0.000032
Baleen Whales Nei	*Mysticeti*	CMM 2011-03	0.000013
Beaked Whales Nei	*Hyperoodontidae*	CMM 2011-03	0.000013
Grey Reef Shark	*Carcharhinus amblyrhynchos*	Possibly landed in designated shark sanctuary (aggregated data from whole WCPO-precautionary ETP)	0.000013
Loggerhead Turtle	*Caretta caretta*	https://www.iucnredlist.org/species/3897/119333622; CMM 2018-04; CMS Appendix I; CITES Appendix I	0.000013
Melon-Headed Whale	*Peponocephala electra*	CMM 2011-03	0.000013
Olive Ridley Turtle	*Lepidochelys olivacea*	https://www.iucnredlist.org/species/11534/3292503; CMM 2018-04; CMS Appendix I; CITES Appendix I	0.000013
Scalloped Hammerhead	*Sphyrna lewini*	CMS MoU species	0.000013
Black-Footed Albatross	*Phoebastria nigripes*	CMM 2018-03	0.000006
North Pacific Right Whale	*Eubalaena japonica*	https://www.iucnredlist.org/ja/species/41711/50380694; CMM 2011-03	0.000006
Hawksbill Turtle	*Eretmochelys imbricata*	https://www.iucnredlist.org/species/8005/12881238; CMM 2018-04; CMS Appendix I; CITES Appendix I	0.000006
Humpback Whale	*Megaptera novaeangliae*	CMM 2011-03	0.000006
Marine Turtle (Unidentified)	*Chelonioidea*	CMM 2018-04; CMS Appendix I; CITES Appendix I	0.000006
Pygmy Sperm Whale	*Kogia breviceps*	CMM 2011-03	0.000006
Spinner Dolphin	*Stenella longirostris*	CMS Appendix II	0.000006
Dusky Shark	*Carcharhinus obscurus*	CMS Appendix II	0.000000