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TUNA FISHERIES' IMPACTS ON NON-TUNA SPECIES AND OTHER ENVIRONMENTAL ASPECTS: 2026 Update

Photo: Fabien Forget

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Abstract

This report reviews some of the main impacts caused by different types of tuna fishing methods, particularly on non-tuna species and various other environmental aspects like habitats. It also analyzes the environmental scores obtained by different tuna fishery types certified by the Marine Stewardship Council, showing that most of the main fishing methods have some type of impacts on non-tunas, habitats, or ecosystems. The report then reviews the management measures adopted by tuna RFMOs to mitigate these impacts, and this information is complemented with a description of other conservation measures adopted by ISSF that enable seafood companies and vessels to improve the sustainability of tuna fisheries.

This update includes the tuna RFMO measures adopted in 2025.

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Executive Summary

Tuna fisheries use different types of fishing gears and strategies to catch tunas. All of them have some sort of environmental impact, the most obvious one being the catch of non-tuna species, some of which are highly vulnerable. This report summarizes some of the main impacts for fisheries that catch the major commercial tunas (albacore, bigeye, bluefin, skipjack and yellowfin). In terms of the global tuna catch in weight of these species, 66% of the catch is made by purse seining, followed by longline (9%), pole-and-line (7%), gillnets (3%) and miscellaneous gears (15%) (see the ISSF stock status report). Miscellaneous gears include handline, trolling, mid-water trawling, traps, rod-and-reel and recreational fisheries.

Section 2 of the report reviews, in general terms, the main types of fisheries' environmental impacts, except for impacts on target species, which are covered elsewhere, as in the ISSF Status of the World Fisheries for Tuna report. In the last two decades, much of the focus on impacts has been on "bycatch." But this term means different things to different people, and we try to avoid it in this report. Therefore, the report focuses on impacts of different categories: Impacts on non-tuna species; impacts on Endangered, Threatened or Protected (ETP) species; impacts on habitats; and a few other general ecosystem impacts.

Key Findings:

1. **Summary of the main impacts of different tuna fishing methods on non-tuna species and other ecosystem components.**
2. **Analysis of scores obtained by different fishery types in Principle 2 (environmental impacts) certified by the Marine Stewardship Council**
3. **Summary of the relevant measures to address non tunas and ecosystem impacts adopted by the tuna Regional Fisheries Management Organizations**
4. **Summary of complementary conservation measures adopted by ISSF**

In Section 3, a general overview of the main tuna fishery types is given, together with a summary of their main types of impacts on non-tuna species, especially ETP ones, habitats, and ecosystems.

Section 4 of the report provides an analysis of environmental impacts as measured by fisheries that have been certified against Version 2.0 of the Fisheries Standard of the Marine Stewardship Council (MSC). Fisheries using the major tuna gear types have been certified, except gillnets, and this analysis provides an opportunity for comparison. The results show that troll fisheries score very favourably compared to others. However, they account for only 1.6% of the global tuna catch. The rest of the fishery types tend to score variably depending on the indicator being scored, and it would be misleading to conclude that some are superior to others in every way. Many fisheries scored low on ETP indicators, particularly the information indicator, due to data gaps. Most fishery types scored well on habitat indicators, due to the fact that tuna fishing gears are pelagic and operate in the water column without making contact with the seabed. The exception was for purse seine fisheries that use Fish Aggregating Devices (FADs), because FADs can become lost, discarded or abandoned and potentially impact Vulnerable Marine Ecosystems (VMEs) like coral reefs.

Section 5 reviews the relevant management measures adopted by tuna RFMOs for sea turtles, seabirds, rays, sharks and cetaceans. All RFMOs have measures for sea turtles, rays, and sharks, and cetaceans, but, depending on the species group, some lag behind others in terms of the scope of the measures and the number and type of mitigation options required or encouraged. For the most part, the RFMO measures are specific to a species or taxon.

Section 6 reviews relevant Conservation Measures adopted by ISSF. These are intended to help seafood companies and vessels improve tuna fisheries by meeting best practice standards to reduce environmental impacts. Section 6 also provides links to other relevant resources.

Research Questions

- What questions does this research seek to answer?

  This report summarizes some of the main environmental impacts of tuna fisheries, with emphasis on the catch of non-tuna species.

- Is this original research?

  For the most part, it is a compilation of published literature. However, the analyses of MSC-certified fisheries in Section 4 are ISSF research conducted in 2024.

- Does this report build on prior research?

  Yes. This report builds upon ISSF's Status of the World Fisheries for Tuna report. Until 2023, that report had a section on "bycatch," which is now addressed in this new report.

1. Introduction

When ISSF started its work in 2009, bycatch in tuna fisheries was the focus of many discussions on sustainability and some NGO campaigns. Much of the information presented in such discussions was at times misleading, incomplete, or highly variable. And the discussions were made worse by the fact that "bycatch" means different things to different people (see the next Section). Since then, ISSF and other organizations have done a lot of work to better understand and document the catch of non-tuna species in different tuna fisheries. In recent years, the sustainability discussion has become broader than just non-tuna catch and now also focuses on ecosystem impacts, including habitats.

ISSF updates several times a year the report Status of the World Fisheries for Tuna (the "Status of the Stocks Report"). Until 2023, that report examined the status and management of the 23 stocks of major commercial tunas globally and included relative ratings for impacts by different fishing methods on non-tuna species. The information on stock status and management came from the five tuna Regional Fishery Management Organizations (RFMOs) that assess and regulate tuna fisheries internationally. However, the information on bycatch impacts was from multiple sources and was not stock- or fishery-specific. Because of this, the ISSF Scientific Advisory Committee recommended that, going forward, the Stock Status Report be limited to tuna stock status and management, and that a separate ISSF report be created to summarize bycatch and other ecosystem impacts for major types of tuna fisheries. The current report addresses that recommendation and is a summary of ecosystem impacts, particularly the non-tuna catch, of tuna fisheries. It will be updated annually, especially to include new information on relevant regulations adopted by the RFMOs.

This report reviews the major types of tuna fisheries, their impacts on non-tuna species and the ecosystem, and efforts to mitigate these impacts.

This report reviews the major types of tuna fisheries and their impacts on the ecosystem, particularly on non-tuna species. The report is structured as follows: Section 2 summarizes the various types of environmental impacts from tuna fisheries; Section 3 summarizes the different types of tuna fishing methods; Section 4 examines the environmental impact scores received by tuna fisheries certified under the MSC Standard v2; Section 5 summarizes the management measures adopted by RFMOs for non-tuna and ETP species; and Section 6 summarizes relevant ISSF conservation measures.

This report does not review in any depth fishery impacts on target tunas. Those are covered elsewhere, as in the ISSF Status of the World Fisheries for Tuna report. This report also does not cover every single type of impact in detail, such as carbon footprint or marine debris.

2. Types of Impacts

One of the most important impacts from fishing is the catch of non-tuna species, often known as "bycatch." However simple it sounds, "bycatch" means different things to different people, and it has been defined in different ways. FAO (2011) explains:

> "*It is not possible to develop a standard international definition of bycatch because of the very diverse nature of the world's fisheries, historical differences in how bycatch has been defined nationally, ambiguities associated with bycatch related terminologies and choices of individual fishers on how different portions of their catch will be used. Also, there are functional interpretations of bycatch that include catch that a fisher did not intend to catch but could not avoid, often did not want or chose not to use. There are also regulatory interpretations of bycatch in fisheries management plans and these types of interpretations may not necessarily coincide.*"

In our experience, these different views on "bycatch" often lead to misunderstandings that could be avoided. For example, to some, the catch of juvenile tunas constitutes bycatch while, to others, juveniles constitute targeted catch that is commercialized and therefore not viewed as bycatch.

We therefore believe that it is better to instead assess methodically the various impacts of fishing and to investigate mitigation measures. The environmental impacts of fishing are addressed by the MSC Fisheries Standard's Principle 2, which covers the effect a fishery has on the environment. In version 2.01 of the Standard (MSC, 2018), these impacts are broken down into five components:

- *Indicators for Primary Species.* These usually are species of commercial value to either the Unit of Assessment (the sum of all the elements that are assessed for awarding a given certificate, UoA) or fisheries outside the UoA, for which there are management controls and known reference points such as the biomass associated with Maximum Sustainable Yield (B_{MSY}). Such species may include ones that are targeted by the fishery but not included in Principle 1 (stock status) as candidates for certification per the Fishery Client's decision (for example, the Client may not include a species in P1 because that stock is being overfished, in which case the certification would likely fail).

- *Indicators for Secondary Species*. These are species that are not managed according to reference points and that are not Endangered, Threatened or Protected (ETP). Such species could be landed intentionally for various uses (e.g., mahi-mahi in many tuna fisheries, which are desirable, and consumed or sold), but may also represent incidental catches that are undesired but somewhat unavoidable. Baitfish would also be included here.

- *Indicators for ETP species*. ETP designations are usually from national or international legislation intended to protect highly vulnerable species. In many tuna fisheries these include many of the less resilient shark species, mobulids as well as sea turtles and seabirds.

- *Indicators for Habitats*. These are defined as the chemical and bio-physical environment, including biogenic structures, where fishing takes place. This typically means the sea bottom in non-tuna fisheries. In some tuna fisheries, habitats of concern may also be remote from the fishing grounds, for example, when Fish Aggregating Devices (FADs) end up stranding in coastal and benthic ecosystems.

- *Indicators for the Ecosystem in general*. This covers broader ecosystem elements such as trophic structure and function, community composition, and biological diversity.

Thus, a system like the MSC one allows for all of the catch that is not the candidate for certification to be classified into the first three groups (Primary, Secondary and ETP species), and for other impacts to be addressed under the last two (Habitats and Ecosystems).

There are some impacts that the MSC Fishery Standard does not address. One of them is carbon footprint due to fuel consumption for different fishery types (Tyedmers and Parker, 2012; Tyedmers and Donovan, 2025). Another is marine debris from plastics in lost, discarded or abandoned fishing gear.

We review MSC P2 scores for various types of tuna fisheries under Section 4.

3. Tuna Fisheries and Gear Types

Overview

Tuna fisheries use different types of fishing gears. In terms of the global tuna catch in weight, 66% of the catch is made by purse seining, followed by longline (9%), pole-and-line (7%), gillnets (3%) and miscellaneous gears (15%). Miscellaneous gears include handline, trolling, mid-water trawling, traps, rod-and-reel and recreational fisheries.

Different tuna fisheries have varying impacts on non-tuna species as well as on habitats and ecosystems. While some non-tuna species are common for certain fishing methods, others may have a much lower impact. Similarly, some tuna fishing techniques, such as drifting FADs (dFADs), can affect habitats because they are left adrift to aggregate tuna and may ultimately be lost, discarded, or abandoned. Others have a lower impact, as they do not interact with the seabed unless the main gear is lost or sinks.

There is limited literature comparing bycatch rates among tuna fishing gears. With few exceptions (e.g., Justel-Rubio and Restrepo 2015; Garcia and Herrera, 2018; Murua et al. 2021; Peatman et al. 2023), most literature focuses on a single tuna gear or fishery catch of non-tuna species (Amandé et al. 2010; Clarke et al. 2014 Anderson et al. 2020). For instance, Justel-Rubio and Restrepo (2015) compared the relative fishery impacts on non-tuna species caught in various tuna fisheries and concluded that the relative contribution of non-tuna species bycatch differs among tuna fisheries. As illustrated in **Figure 1** below, some tuna fishing methods have a larger impact on certain species or groups of species, while the same methods have a lower impact on other species.

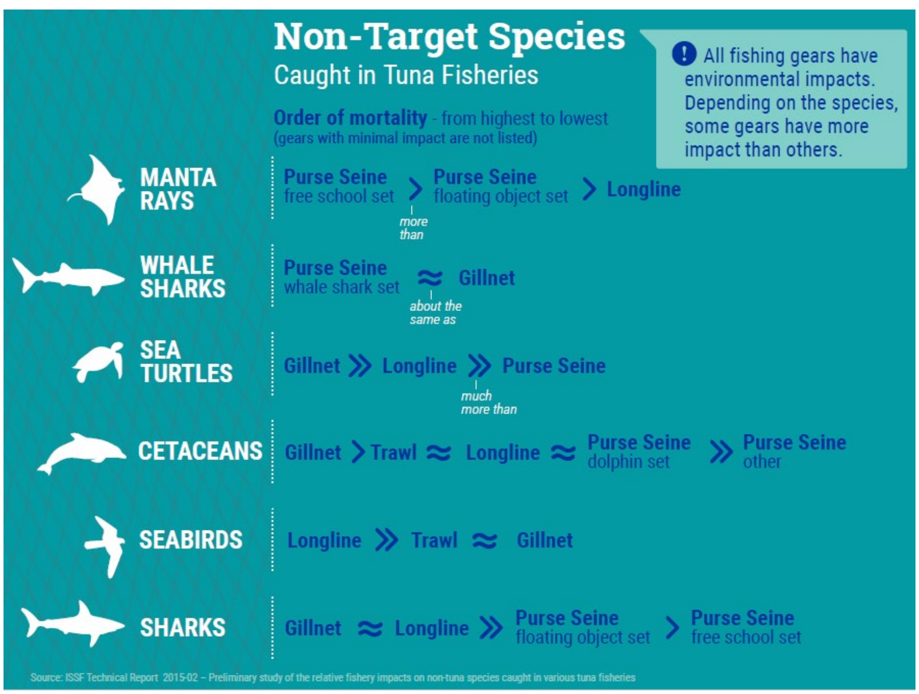

Figure 1*. Relative impact of tuna fishing methods on non-tuna species in tuna fisheries (derived from Justel-Rubio and Restrepo, 2015).*

For **seabirds**, Justel-Rubio and Restrepo (2015) concluded that catch is not a concern in purse seine, handline, and pole-and-line fisheries. However, their catch rates are greater in longline and gillnet fisheries (Clarke et al. 2014; Gilman, 2011; Zydelis et al. 2013).

Marine mammal interactions in tuna fishing are considered high in gillnets (Anderson et al. 2020) while interactions with purse seine fisheries, where mortalities after interaction are very rare, and longline are considered low (Escalle et al. 2015; Peatman et al. 2023). A special case could be the eastern Pacific purse seine fishery targeting yellowfin tuna in association with dolphins (Hall et al. 1992). In this fishery, the cumulative mortality since 1959 has been estimated to exceed 6 million small cetaceans (Smith, 1983; Gerrodette, 2008; Ballance et al. 2021), with the majority of them released alive (IATTC, 2025). The mortalities observed in the past (with a peak of 132,000 individuals in 1986) have been considerably reduced due to the implementation of safe release practices, i.e., the backdown maneuver to release dolphins from the net, and dolphin mortality limits per vessel. In 2022, for example, the estimated dolphin bycatch mortality was 859 individuals (AIDCP, 2025). The relative impact of such mortalities on dolphin populations is not well understood because their population sizes are unknown. This dolphin-yellowfin tuna association does not typically occur in other oceans.

Gillnets are considered the main tuna gear interacting with **sea turtles**, followed by longline (Garcia and Herrera, 2018). For example, Peatman et al. (2023) estimated that the catch of sea turtles by longline fisheries in the western and central Pacific Ocean (WCPO) increased from 9,000 individuals in 2003 to 33,000 individuals in 2009, decreasing afterwards. Sea turtles are caught in small numbers by purse seiners, and most of them are released alive following the application of safe handling and release best practices (Bourjea et al. 2014; Peatman et al. 2023). For instance, Bourjea et al. (2014) estimated that the annual average bycatch of sea turtles was 218 and 250 individuals for the period 1995-2011 in the Atlantic and Indian Oceans, respectively, with more than 75% being released alive. Peatman et al. (2023) also estimated that purse seine sea turtle catch in the WCPO was around 300 individuals on average from 2015 to 2019. Historically, the use of netting in dFAD structures caused entanglement of sea turtles and other large marine fauna. However, the use of netting is now prohibited in all three tropical oceans by IATTC, WCPFC, IOTC and ICCAT, substantially reducing the risk of entanglement at dFADs.

For **sharks**, the main tuna fishing gear catching them is thought to be the gillnet, particularly in the Indian Ocean. Longliners, followed by purse seiners, also have high interactions, although sharks are generally not retained in the latter. Murua et al. (2013) estimated that globally the longline fleet targeting sharks, swordfish, and/or tropical tunas contributed most to the shark catches, accounting for 59%, 86%, and 95% of the total shark catches in the Atlantic and Pacific (east and west), respectively. They also found a different scenario in the Indian Ocean, where gillnets contributed 61% of the total shark catch compared to 18% for longliners. Similarly, Garcia and Herrera (2018) estimated that the annual Indian Ocean shark catch was around 210,000 metric tons (excluding whale sharks) per year during 2014-2016, with gillnets accounting for 50%, longline (both fresh and frozen) for 50%, and purse seiners for less than 1%. In the Pacific, Gilman (2011) indicated that the total catch of silky sharks by purse seiners was about ten times lower than the catch by longliners. More recently, Peatman et al. (2023) estimated the total catch of sharks by purse seiners to be close to 100,000 individuals for silky sharks and around 1,000 individuals for oceanic whitetip sharks in the WCPO in 2019, while the shark catch of the longline fleet was around 1,800,000 individuals (55% blue shark, 13% pelagic stingray, 12% silky shark, 6% shortfin mako shark, and

3% oceanic whitetip shark). Similarly, in the eastern Pacific Ocean, purse seine shark catch (530 tonnes in 2020 and 782 tonnes in 2021) is much lower than the catch by longliners (44,178 tonnes in 2020 and 9,820 tonnes in 2021) (IATTC, 2023).

In the past, purse seine fleets used dFADs whose structure was made up of nets which could entangle sharks and other marine fauna, such as turtles, as noted above (Escalle et al. 2023). Filmalter et al. (2013) estimated that the magnitude of shark mortality due to this type of "ghost fishing" may have been very high in the Indian Ocean at the beginning of the 2010s. Since then, many fleets voluntarily introduced non-entangling FADs (Murua et al. 2017; ISSF 2019), and the IOTC, ICCAT, IATTC and WCPFC now require that newly deployed FADs be fully non-entangling without netting, which reduces or eliminates this source of mortality.

The impacts of tuna fisheries on **habitats and ecosystems** also differ among tuna fishing gears. Because of the surface nature of tuna fishing gears, the direct impact on the habitat is negligible since the gears do not interact with the sea bottom during fishing operations. Therefore, most tuna fishing gear impacts on habitats and ecosystems are related to the risk of Abandoned, Lost, or otherwise Discarded Fishing Gears (ALDFG), which produce ghost fishing, marine litter, and pollution, thus affecting pelagic habitat and ecosystems. Gilman et al. (2021) presented a quantitative assessment of gear-specific relative risks from ALDFG and estimated that the highest-risk tuna gears were driftnet gillnets (2^{nd} in the overall rank) followed by tuna purse seiners drifting FADs (3^{rd}), pole-and-line with anchored FADs (5^{th}), and, to a lesser extent, handline and pelagic longline (13^{th} and 14^{th}, respectively).

Particularly for FADs, abandoned, discarded or lost FADs directly impact habitats when they are stranded in vulnerable marine ecosystems (VMEs), such as coral reefs, seagrass meadows and mangrove forests. Management measures already in place help to reduce these impacts. For example, three tuna RFMOs — ICCAT, IOTC and IATTC — require a stepwise transition toward biodegradable drifting FADs (Gilman et al. 2021; Moreno et al. 2023; Zudaire et al. 2023) and all encourage the fishing industry to retrieve FADs, although retrieval is not yet mandatory. Additional measures could further address this issue, including monitoring systems to detect and recover anchored FADs that break free from their moorings, as well as requirements for best practices to prevent the loss and abandonment of drifting FADs, including FAD structure marking (Moreno et al.2024, 2025).. Currently, three tuna RFMOs (ICCAT, IOTC and IATTC) require the stepwise transition to biodegradable drifting FADs and all encourages fishing industry to retrieve FADs, but this is not mandatory.

A potential impact of drifting FADs has been hypothesized to be the modification of tuna habitat. The large-scale deployment of FADs in a region could alter the surface habitat of tuna and create an ecological trap, potentially retaining tuna around FADs for longer periods than they would naturally spend in areas with fewer floating objects. This habitat change could have an impact on tuna behavior and biology (Marsac et al 2000; Hallier & Gaertner 2008; Dupaix et al. 2024a). However, there is currently no scientific evidence to support the idea that the increased presence of floating objects due to FADs significantly affects tuna behavior and biology in a way that would classify them as an ecological trap (Dupaix et al. 2024b). In addition, natural phenomena such as tsunamis and the accumulation of marine debris can also alter tuna´s surface habitat, creating shifting scenarios that further complicate assessments (Dagorn et al. 2013; Dupaix et al. 2024b). As a result, disentangling the specific impact of FADs on habitat modification from these broader environmental drivers remains a significant challenge.

Lastly, there is the issue of carbon footprint. Parker and Tyedmers (2015) provide estimates of fuel consumption per tonne of fish for various species groups and gear types. In general, fisheries for large pelagics use less fuel per tonne than other fisheries like those for crustaceans and flatfish. Tyedmers and Parker (2012) compared fuel use intensity for different tuna fisheries. While there is much variability across regions and fleets, average fuel use per tonne was ranked as follows, from high to low: Pole-and-line (1,485 L/t), troll (1,107 L/t), longline (1,069 L/t) and purse seine (368 L/t). The higher values of fuel use intensity for pole-and-line given by the authors may not be representative of all types of pole-and-line fishing. For example, Miller et al. (2017a) estimated fuel consumption for the Maldivian pole-and-line fishery to vary between 197 and 328 L/t, values that are five times lower than those of Tyedmers and Parker (2012). In a more recent survey, Tyedmers and Donovan (2025) reported fuel use levels for pole-and-line fisheries, in the order of 750 L/t. Fuel use intensity for different gears probably varies by region, target species, and other factors including a company's fishing strategy.

3.1 Gillnet

Gillnet fisheries take substantial amounts of tunas in various ocean regions, especially in the Indian Ocean, where they account for 15% of the total catch of major commercial tunas (but 24% of the catch of all tunas if neritic species are included). For the most part, these fisheries are poorly monitored — there is no observer coverage — but it is known that they tend to catch many different non-tuna species in high numbers, including seabirds, sea turtles, cetaceans, and sharks (Anderson et al. 2020; Garcia and Herrera, 2018; Murua et al. 2013). Large-scale driftnets have been prohibited on the high seas since 1992 (United Nations General Assembly Resolution 46/215) and in the entire IOTC area of competence since 2022 (IOTC Resolution 17/07), but they continue to be used.

Anderson et al. (2020) estimated that cetacean bycatch by these fisheries in the Indian Ocean totaled at least 100,000 individuals annually during 2004 - 2006 but they estimated lower values after 2006 even though gillnet catches have increased. The authors conclude that this was probably because these catches are not sustainable and cetacean populations were declining. IOC (2014) also reported that Indian Ocean gillnet fisheries caught up to 110,000 tonnes of sharks and 150,000 sea turtles annually. Similarly, Garcia and Herrera (2018) estimated that Indian Ocean gillnets caught up to 105,000 tonnes of sharks, 172,000 individuals of cetaceans, and 31,600 sea turtles per year from 2014 to 2016. Murua et al. (2013) estimated that gillnet fisheries caught around 93,000 tonnes of sharks annually for the period 2000-2011, values that are similar to those from Garcia and Herrera (2018).

It is worth noting that to date, no gillnet tuna fishery has gained certification by the MSC. This is likely due to several factors combined: The very poor level of monitoring, the lack of interest in ecolabels in the countries where catches are consumed, and the illegal nature of large-scale gillnets in the high seas.

Gillnets are the most high-risk gear in terms of potential gear loss at sea, thus leading to (unquantified) ghost fishing and marine debris (Gilman et al. 2021).

3.2 Handline

Tuna handlines represent about 5% of the major commercial tuna catch. They typically have small rates of non-tuna catch and gear loss rate. Many smaller scale vessels switch their fishing practices between handline and pole-and-line during the same trip. Some fleets use both handline and pole-and-line methods.

3.3 Longline

Tuna longline fisheries vary depending on gear configuration, area of operation, and setting strategy, for example. Monitoring is also highly variable depending on the fishery. For example, Ardill et al. (2012) place longline fisheries operating in the Indian Ocean into five categories: Asian tropical and temperate tuna longline; Spanish and Portuguese swordfish longline; French swordfish longline; South African longline; and Indonesian longline.

Longline fisheries tend to have very high catch rates of sharks (in some areas, 30% of the longline catches are sharks) (Clarke et al. 2014). In some cases, the sharks can be a target of the fishing operations, at least for parts of a trip. Some longline fisheries target swordfish and blue shark but also catch tunas in a smaller proportion. The sharks caught include a wide range of species, some of which are thought to be resilient to fishing (e.g., blue shark) and others likely to be more vulnerable because of their low reproductive rates (e.g., porbeagle and thresher sharks) (Clarke et al. 2014).

Sea turtles are also caught in longline operations, and most are released back to the sea, both dead and alive. Roughly a half or more of the turtles caught are alive, so the main mitigation measures aim to dehook them and release them alive. For some scientific analyses and management measures, longline fisheries are classified as either "shallow set" (most hooks at depths shallower than 100 m) or "deep set" (most hooks deeper than 100 m). FAO (2017) found that deep-set mitigation measures lead to stronger reductions in mortality compared to shallow-set measures, even though interaction rates are lower in deep sets. This is because, in the absence of mitigation measures, sea turtles caught in deep sets have a higher probability of at-vessel mortality due to asphyxiation.

Seabirds are also caught in longline operations as bycatch, especially in higher latitudes, particularly South of 25°S (Clarke et al. 2014; Anderson et al. 2011). Most (~90%) seabirds caught are dead when brought onboard, so the best practice for mitigation is to avoid hooking them in the first place, which is the main type of mitigation measure used by the RFMOs (see Section 5). Of particular concern are albatrosses and petrels, whose populations are low and still in decline. Some seabird species are seriously threatened, such as Antipodean albatross, which has declined 62% since 2004, with modeling projecting extinction by 2070 if current trends persist (New Zealand, 2025). After tunas and sharks, longline operations catch several finfish species most frequently. Some of these include very productive species such as dolphinfish ("mahi-mahi") and minor neritic tunas that are not of immediate concern. Longlining also catches billfishes, both in longline fisheries targeting swordfish and tunas, some of which may be overfished.

3.4 Pole-and-line

There are no major concerns with the catch of vulnerable non-tuna species by pole-and-line vessels ("baitboat" is synonymous with pole-and-line). Miller et al. (2017b) report that in Maldives, non-tuna catch by the fishery amounts to 0.65% of the total tuna catch, and the majority of that are species of no conservation concern, which are retained and consumed. However, the fishing method requires the use of live baitfish (small pelagic fishes) to keep tuna schools attracted while they are fished. Nainggolan et al. (2017) report that in Indonesia the tuna-to-bait catch ratio can reach 10.7:1.0. The effects of fishing on these baitfish populations are largely unknown; however, they should be monitored and managed.

Some pole-and-line fisheries, like the Japanese one, purchase the baitfish from other fisheries. Others, like the Maldives or Indonesia ones, catch their own bait. Gillett (2011) notes that the amount of baitfish available in the WCPO limits the amount of pole and line fishing that can occur.

In a few cases, as in Senegal and Ghana, pole-and-line vessels also use drifting FADs to attract tuna schools. In others like Maldives, Indonesia and the Solomon Islands, anchored FADs are used.

3.5 Purse seine

Purse seining accounts for the largest proportion of tuna catches by vessel type. Most of these are for tropical tunas (skipjack, bigeye and yellowfin), and a minor proportion (<1%) are for bluefin tunas.

There are three types of purse seine sets for tropical tunas, generally speaking: Sets on FADs (both drifting and anchored), sets on free swimming schools of tuna also referred to as unassociated tuna, and sets on tuna-dolphin associations. Most fleets use an opportunistic approach during a fishing trip. For example, a fleet that specializes on setting on drifting FADs will also set on free schools if an opportunity arises, e.g., when traveling from one FAD to another. Conversely, fleets that specialize on setting on free-swimming schools will make sets on FADs when they encounter them. It should be noted that the current MSC Fishery Standard does not allow for "compartmentalization," which is the practice of excluding one or more set types from the UoA. Thus, for such fleets, the overall impact of all set types combined is what is evaluated.

All purse seine set types — FAD, free-swimming school (FS) and tuna-dolphin association — result in catch of non-tuna Species (Pons et al. 2023). For instance, sea turtles are caught in both free school and FAD sets. Bourjea et al. (2014) analyzed observer data from the Atlantic and Indian Oceans and estimated catch rates of 0.046 and 0.037 turtles per set for FADs and free school sets, respectively. The number of turtles that die in purse seine fishing operations is very small (Bourjea et al. 2014; IATTC, 2023). Nevertheless, it is relatively easy to release turtles caught alive, and this is the main mitigation measure used by tuna RFMOs. But there can also be unobserved sea turtle mortality from ghost fishing if FADs are constructed with netting material, especially surrounding the FAD rafts. Ghost fishing is easily eliminated by prohibiting netting in the FADs, which all RFMOs have already implemented (see Section 5).

Mortality of other ETP species like seabirds in purse seine operations is almost nonexistent.

PURSE SEINING ON FREE SCHOOLS

This mode of fishing typically results in small bycatch rates of non-tuna species (Amandè et al. 2010). In the Atlantic and Indian Oceans, free school sets tend to target larger individuals of yellowfin. In the WCPO, free school setting on skipjack schools is more common than in other regions because of oceanographic conditions. Free school fishing also has a seasonal component. In some cases, this is due to seasonal changes in tuna availability in the fisheries. In other cases, it is due to regulations, such as seasonal closures on drifting FAD fishing imposed by some of the tuna RFMOs.

Both drifting FAD and free-swimming school (FS) fishing strategies result in catches of non-target species. Data collected by independent scientific observers onboard purse seiners indicate that FAD sets usually have a higher catch of non-target species. In the three oceans, the catch of non-tuna species in FAD sets is two to four times higher than it is on FS sets (Murua et al. 2021).

The average percentage of the total catch (in weight) comprised of non-target species in free school sets is 0.3% versus 1.1% in FAD schools in the western Pacific Ocean, 0.7% versus 1.4% in the eastern Pacific Ocean, 0.8% versus 3.0% in the Indian Ocean, and 1.8% versus 7.4% in the Atlantic Ocean (Murua et al. 2021). The main difference in the Atlantic Ocean comes from the high catches of other minor tuna species that are retained and sold in local markets (e.g., little tunny, bullet tuna; Amandè et al. 2010, 2017a, 2017b).

PURSE SEINING ON FADS

Purse seining on floating objects (anchored FADs, drifting FADs, and natural logs) generally has catch rates of non-tuna species that are higher than those of free school sets (see Amandè et al. 2010; Murua et al. 2021; Restrepo et al. 2019). Justel-Rubio and Restrepo (2017) calculated the non-tuna catch rate to be, globally, 1.4% of the target tunas caught (0.92% if minor tunas and bonitos are excluded), which is low for a large industrial fishery. However, even if it is a small percentage, some of that non-tuna catch are vulnerable or ETP species for which mitigation efforts are necessary.

FAD purse seine fishing operations catch several species of sharks, some of which, based on catch trends, may have been declining in abundance in recent years, such as oceanic whitetip and silky sharks. The shark-to-tuna catch ratio in purse seine fisheries is quite small on average: less than 0.5% in weight. Shark catches on floating object sets (both natural and human-made) tend to be two to six times higher than they are on free swimming schools (Restrepo et al. 2016). However, best practice release techniques are the same for both types of sets (see ISSF Skippers' Guidebook to Sustainable Purse Seine Fishing Practices).

According to Murua et al. (2021), sharks and rays combined make up between 0.19% and 0.44% of the total FAD catches, and they range from 6% to 19% of the total non-tuna catch in FAD sets, which is very small compared to other fishing gears. The authors note that mobulid rays are more commonly caught on free-swimming school sets than in FAD sets.

FAD fishing also results in large catches of other finfish such as bonitos and minor tuna species. Currently, it appears that these catches do not adversely impact the abundance of these species, which are very productive and resilient to fishing. Rather, the main problem with these catches is one of utilization (waste) since, except in some areas of the Atlantic, the majority of them are discarded at sea so that the fish holding tanks can be reserved for the more valuable tunas. In western Africa, there is a market for these fish called "faux poisson" (Amandè et al. 2017b). Lewis (2016) conducted a study of the feasibility of incentivizing similar markets in other regions of the world to reduce waste. The IOTC currently requires retention of some non-tuna species to increase catch utilization (IOTC Resolution 24/06).

PURSE SEINING ON TUNA-DOLPHIN ASSOCIATIONS

Intentional targeting on tuna-dolphin associations only takes place in the eastern Pacific Ocean. Purse-seine fishers have learned to take advantage of the association between yellowfin tuna schools and herds of dolphins that are prevalent in the region. Fishers maximize their catches of yellowfin by setting their nets around these associations. Mortality of dolphins was very high early on, but the IATTC estimates that since the late 1980s mortality has declined by 98% after fishers and scientists developed techniques for releasing the dolphins from the net alive after a set, and retaining the tunas (AIDCP, 2023). However, some scientists believe that there is an unquantified level of mortality after the sets, caused by stress and the separation of dolphin calves from their mothers. This remains a controversial issue. Based on fishery-independent surveys, the abundance of most dolphin populations in the region was estimated to be either stable or increasing, while a few may have been declining at the time (Gerrodette et al. 2008). Unfortunately, the last such survey took place in 2006 — a long time ago — and as a result there is uncertainty on the current status of those cetacean populations.

Catches of other non-tuna species in these operations are very small.

3.6 Troll

Trolling represents about 1.6% of the major commercial tuna catch and 11% of the albacore tuna catch. This mode of fishing typically results in very small bycatch rates of non-tuna species. In terms of carbon emissions, fuel use per tonne of tuna caught is higher for trolling than for other fishing gears (Tyedmers and Parker, 2012).

4. A Comparison of Impacts by Different Types of Fisheries According to MSC Assessments

In this Section, we examine scores received by different tuna fisheries that have been certified under version 2 of the MSC Fisheries Standard (MSC, 2018) as of February 2024. The purpose of this exercise is not to conduct an exhaustive analysis but rather to gain insight into how different fisheries score under Principle 2 of the Standard (environmental impacts).

4.1 Methodology

In February 2024, MSC kindly provided us with scores for all tuna fisheries that have been successfully certified. These data were culled according to the following criteria:

- Only fisheries assessed against the Default Assessment Tree v2 were kept. These correspond to the majority of tuna fisheries certified to date, which received certificates between 2017 and 2024.
- Scores for Scope Extensions were eliminated. Scope Extensions are assessments in which the only change is that a new target species is added to the Unit of Certification (UoC). In the majority of cases, this means that only new scores under Principle 1 for that species are evaluated. Since the focus of this exercise is Principle 2, these scores were excluded.
- In cases where several target species were assessed against P1 but the region was the same RFMO, only scores associated with one of the UoA species were kept. This is because in the majority of cases, the P2 scores in a region will be the same for the various P1 species of that UoA.
- In cases where the UoA included more than one tuna RFMO area, all of the P2 scores by RFMO were kept (but for only one P1 species as per the previous point). This is because P2 scores can vary with RFMO, e.g., due to different conservation measures in place.
- In cases where P2 scores were done separately by set type (as the MSC allowed before the 2020s), all of them were kept as separate scores for the same "Purse Seine" fishery type.
- Pole-and-line (PL) and handline (HL) fisheries for Clients that switch between the two types of fishing that were scored separately were kept as separate scores.
- Reassessments of the same UoA were maintained as separate scores. MSC Certificates last for up to five years, after which the fishery needs to be reassessed. P2 scores can change in this timespan for multiple reasons, which is why all were kept.
- One UoA that used the "greenstick" (a type of pole) method was classified as pole-and-line. One longline fishery that was scored separately for deep and shallow sets was classified as "longline," keeping the two scores.

This resulted in a dataset for 73 different fisheries (see **Table 1**): 4 handline (HL), 26 longline (LL), 12 pole-and-line (PL), 25 purse seine (PS) and 6 troll (TR).

***Table 1**. MSC-certified fisheries included in the analyses. Name corresponds to the fishery and can be used to search for scores in the MSC website (search for Public Certification Reports here). Species is the P1 species for which the UoA P2 scores were kept. UoA Gear corresponds to gear type in the assessment, and Fishery Type corresponds to broader gear groups in these analyses. LL DS and LL SS are deep and shallow longline sets, respectively. GS is greenstick. PS FAD and PS FS are FAD and free school purse seine sets, respectively.*

FISHERY	NAME	SPECIES	UoA GEAR	FISHERY TYPE
1	Indonesia pole-and-line and handline, skipjack and yellowfin tuna of Western and Central Pacific archipelagic waters	YFT	HL	HL
2	JC Mackintosh Greenstick, handline and fishing rod bluefin tuna fishery	BFT	HL	HL
3	North Buru and Maluku Fair Trade Fishing Associations, Indonesian Handline Yellowfin Tuna	YFT	HL	HL
4	Philippine Small-Scale Yellowfin Tuna (*Thunnus albacares*) Handline Fishery	YFT	HL	HL
5	American Samoa EEZ Albacore and Yellowfin Longline Fishery	YFT	LL	LL
6	American Samoa EEZ tuna longline fishery	YFT	LL	LL
7	Australian Eastern Tuna and Billfish Fishery (albacore tuna, yellowfin tuna, bigeye tuna and swordfish)	YFT	LL	LL
8	DFC/HEC Western and Central Pacific longline bigeye, yellowfin and albacore tuna fishery	ALB	LL	LL
9	DFC/HEC Western and Central Pacific longline bigeye, yellowfin and albacore tuna fishery	ALB	LL	LL
10	DFC/HEC Western and Central Pacific longline bigeye, yellowfin and albacore tuna fishery	YFT	LL	LL
11	Fiji Albacore and Yellowfin Tuna longline	ALB	LL	LL
12	Fiji Albacore, Yellowfin and Bigeye Tuna longline	ALB	LL	LL
13	French Polynesia albacore and yellowfin longline fishery	ALB	LL	LL
14	Hawaii longline swordfish, bigeye and yellowfin tuna fishery	YFT	LL DS	LL
15	Hawaii longline swordfish, bigeye and yellowfin tuna fishery	YFT	LL DS	LL
16	Hawaii longline swordfish, bigeye and yellowfin tuna fishery	YFT	LL SS	LL
17	Hawaii longline swordfish, bigeye and yellowfin tuna fishery	YFT	LL SS	LL
18	Kiribati albacore, bigeye and yellowfin tuna longline fishery	YFT	LL	LL
19	MIFV RMI EEZ Longline Yellowfin and Bigeye Tuna	YFT	LL	LL
20	North West Atlantic Canada Swordfish and Tuna	YFT	LL	LL
21	Owasebussan Co. Ltd. North Pacific Longline Fishery for Albacore, Yellowfin, & Bigeye Tuna	ALB	LL	LL
22	Pan Pacific yellowfin, bigeye and albacore longline fishery	ALB	LL	LL
23	SATHOAN French Mediterranean Bluefin tuna artisanal longline and handline fishery	BFT	LL	LL
24	Solomon Islands longline albacore and yellowfin tuna fishery	ALB	LL	LL
25	SZLC CSFC & FZLC FSM EEZ Longline Yellowfin and Bigeye Tuna - Yellowfin	YFT	LL	LL
26	SZLC, CSFC & FZLC Cook Islands EEZ South Pacific albacore, yellowfin and bigeye longline	YFT	LL	LL
27	Tri Marine Atlantic Albacore longline fishery	ALB	LL	LL

FISHERY	NAME	SPECIES	UoA GEAR	FISHERY TYPE
28	Tuna Alliance Atlantic albacore longline fishery	ALB	LL	LL
29	Tuna Alliance Atlantic albacore longline fishery	ALB	LL	LL
30	Usufuku Honten Northeast Atlantic longline bluefin tuna fishery	BFT	LL	LL
31	ACTEMSA-LEAL SANTOS pole and line West Atlantic skipjack fishery	SKJ	PL	PL
32	Indonesia pole-and-line and handline, skipjack and yellowfin tuna of Western and Central Pacific archipelagic waters	YFT	PL	PL
33	Ishihara Marine Products albacore and skipjack pole and line fishery	SKJ	PL	PL
34	Japanese Pole and Line skipjack and albacore tuna fishery	SKJ	PL	PL
35	JC Mackintosh Greenstick, handline and fishing rod bluefin tuna fishery	BFT	GS	PL
36	Katsuo Ippon-zuri Gyogyo albacore and skipjack pole and line fishery	SKJ	PL	PL
37	Kochi and Miyazaki Offshore Pole and Line Albacore and Skipjack fishery	SKJ	PL	PL
38	Maldives pole & line skipjack tuna	SKJ	PL	PL
39	Maldives pole & line tuna	SKJ	PL	PL
40	North Atlantic albacore artisanal fishery	ALB	PL	PL
41	PT Citraraja Ampat, Sorong pole and line Skipjack and Yellowfin Tuna	SKJ	PL	PL
42	Solomon Islands skipjack and yellowfin tuna purse seine and pole and line	SKJ	PL	PL
43	AGAC four oceans Integral Purse Seine Tropical Tuna Fishery - Atlantic Ocean	SKJ	PS	PS
44	AGAC four oceans Integral Purse Seine Tropical Tuna Fishery - Eastern Pacific	SKJ	PS	PS
45	AGAC four oceans Integral Purse Seine Tropical Tuna Fishery - Indian Ocean	SKJ	PS	PS
46	AGAC four oceans Integral Purse Seine Tropical Tuna Fishery - WCPO Component	SKJ	PS	PS
47	ANABAC Atlantic unassociated purse seine yellowfin tuna	YFT	PS FS	PS
48	CFTO Indian Ocean Purse Seine Skipjack fishery	SKJ	PS	PS
49	Eastern Pacific Ecuador Purse Seine Tropical Tuna Fishery (FSC and FAD set fishery)	YFT	PS	PS
50	Eastern Pacific Ocean tropical tuna - purse seine (TUNACONS) fishery	YFT	PS FAD	PS
51	Eastern Pacific Ocean tropical tuna - purse seine (TUNACONS) fishery	YFT	PS FS	PS
52	Echebastar Indian Ocean purse seine skipjack tuna	SKJ	PS	PS
53	Micronesia Skipjack, Yellowfin and Bigeye Tuna Purse Seine Fishery	SKJ	PS FAD	PS
54	Micronesia Skipjack, Yellowfin and Bigeye Tuna Purse Seine Fishery	SKJ	PS FS	PS
55	Nauru Skipjack, Yellowfin, and Bigeye Tuna Purse Seine Fishery	SKJ	PS	PS
56	PNA Western and Central Pacific skipjack and yellowfin, unassociated / non FAD set, tuna purse seine	SKJ	PS FS	PS
57	PNG Fishing Industry Association's purse seine Skipjack & Yellowfin Tuna Fishery	SKJ	PS FAD	PS
58	PNG Fishing Industry Association's purse seine Skipjack & Yellowfin Tuna Fishery	SKJ	PS FS	PS

FISHERY	NAME	SPECIES	UoA GEAR	FISHERY TYPE
59	Sant Yago TF Unassociated purse seine Atlantic yellowfin tuna fishery	YFT	PS FS	PS
60	SI WCPO skipjack and yellowfin tuna purse seine fishery	SKJ	PS FS	PS
61	Solomon Islands skipjack and yellowfin tuna purse seine and pole and line	SKJ	PS	PS
62	Talley's New Zealand Skipjack Tuna Purse Seine	SKJ	PS	PS
63	Tri Marine Western and Central Pacific Skipjack and Yellowfin Tuna	SKJ	PS	PS
64	Tropical Pacific yellowfin and skipjack free-school purse seine fishery	SKJ	PS FS	PS
65	TTKV WCPO skipjack and yellowfin tuna purse seine fishery	SKJ	PS	PS
66	US Pacific Tuna Group Purse Seine FSC and FAD Set Fishery	SKJ	PS	PS
67	WPSTA Western and Central Pacific skipjack and yellowfin free school purse seine	SKJ	PS FS	PS
68	AAFA and WFOA North Pacific albacore tuna	ALB	TR	TR
69	AAFA and WFOA South Pacific albacore tuna	ALB	TR	TR
70	Canada Highly Migratory Species Foundation (CHMSF) British Columbia Albacore Tuna North Pacific	ALB	TR	TR
71	New Zealand albacore tuna troll	ALB	TR	TR
72	New Zealand albacore tuna troll	ALB	TR	TR
73	North Atlantic albacore artisanal fishery	ALB	TR	TR

Thus, five general tuna fishery types were analyzed:

- **HL**: Handline
- **LL**: Longline
- **PL**: Pole-and-line
- **PS**: Purse seine
- **TR**: Troll

Then the scores for the different Performance Indicators (PIs) were summarized and displayed as box-and-whisker plots (also called boxplots) separately by fishery type. Box and whisker plots are explained here.

In the MSC Fishery Standard, at the Performance Indicator level, scores of 80 or above are passing scores. Scores below 60 would fail a certification (since the fisheries analyzed here were all certified, there are no scores below 60). Scores between 60 and 79 pass the certification, depending on other MSC rules, but receive a "Condition" to bring the score to at least an 80 within the 5-year certificate period by taking certain actions. In such cases, we looked in more detail at the Public Certification Reports to examine the reasons behind the low score. These are summarized in the next section.

4.2 Results

The results of the exercise are presented for P2 overall and then for the five groups under P2 (Primary species, Secondary Species, ETP species, Habitats and Ecosystem). In each of the five groups, there are three PIs: One for Outcomes (which evaluates the current status of each component and whether the fishery is posing a risk to the component), another one for Management Strategy (which assesses the management strategies implemented to achieve the outcomes), and a final one for Information (which evaluates whether the information collected from the fishery to assess the outcome and the strategy is adequate). These are presented side by side.

P2 OVERALL

Figure 2 shows the boxplots for Principle 2 overall for the five fishery types. One of the MSC scoring rules is that no Principle (P1, P2 or P3) can have an aggregate score below 80, or the fishery will not achieve certification. Therefore, all fisheries have scores of at least 80. HL, LL and PS fisheries have median scores below 85. PL and TR fisheries had median scores of 88.3 and 94.5, respectively. In general, troll fisheries received the highest Principle 2 level scores.

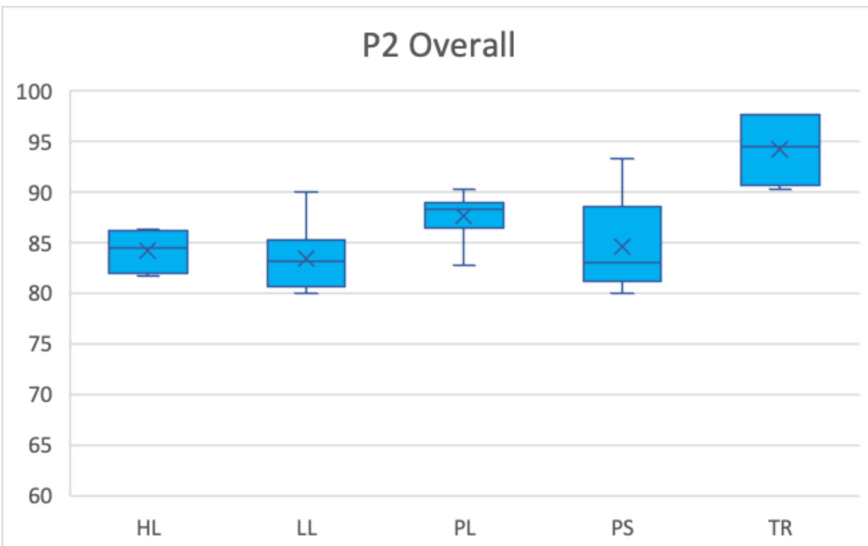

***Figure 2**. Overall P2 scores for MSC-certified Fishery types.*

P2.1.x (PRIMARY SPECIES) SCORES

MSC (2018) explains Primary Species as follows: "Primary species will usually be species of commercial value to either the UoA or fisheries outside the UoA, with management tools controlling exploitation as well as known reference points in place. In addition, the institution or arrangement that manages the species will usually have some overlap in jurisdiction with the fishery in the UoA." Major commercial tunas are sometimes classified as Primary Species under P2 in MSC assessments even when they are targeted by the fishery — for example, because they are experiencing overfishing. This needs to be considered in the context of this report, whose main focus is on non-tuna catches. Thus, the scores summarized below are not that useful for that purpose when it comes to major commercial tunas scored under P2.1.x.

The three PIs in this group are as follows:

- P2.1.1 "The UoA aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI."

- P2.1.2 "There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species; and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch."

- P2.1.3 "Information on the nature and amount of primary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species."

Figure 3 shows the boxplots for the three PIs. In general, LL fisheries scored lower than others.

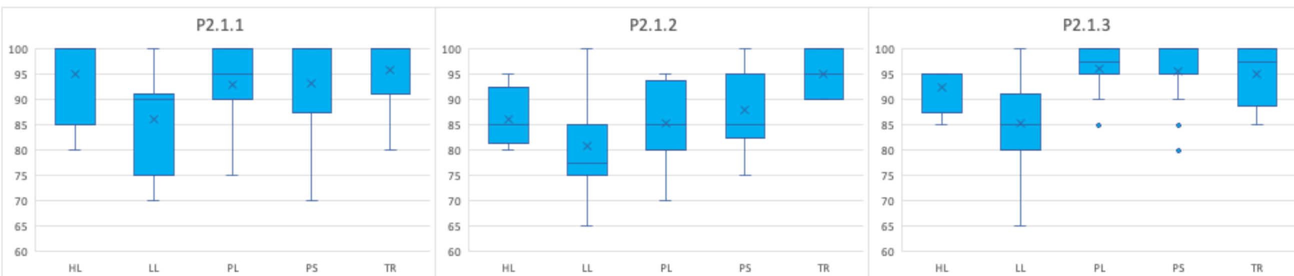

***Figure 3**. Scores for the three Primary Species indicators by fishery type.*

For P2.1.1, 7 of 26 LL fisheries (27%), 1 of 12 PL HL fisheries (8%) and 4 of 25 PS fisheries (16%) scored below 80, resulting in Conditions. All 6 TR fisheries scored at 80 or above. Conditions for PS fisheries had to do with the status of bigeye tuna (*Thunnus obesus*). Conditions for LL fisheries had to do with bigeye tuna, blue shark (*Prionace glauca*), or both. The Condition for the PL fishery had to do with status of the bait species used, Japanese anchovy (*Engraulis japonicus*).

For P2.1.2, 13 of 26 LL fisheries (50%), 1 of 12 PL fisheries (7%) and 2 of 25 PS fisheries (8%) scored below 80, resulting in Conditions. All 6 TR fisheries scored at 80 or above. For 8 of the LL UoAs, the issue was the management of bait species; rebuilding of blue shark stocks was an issue for 3 UoAs, and potential shark finning was an issue for two other UoAs. For the PL fishery the low score was due to the lack of an observer program to support a management strategy. For one PS UoA, it was because bigeye TACs had been exceeded, which suggested the management strategy was not working. For the other UoA, it was overfishing of the bigeye stock.

For P2.1.3, 4 of 26 LL fisheries (15%) scored below 80, resulting in Conditions. All PL, HL, PS and TR fisheries scored at 80 or above. Conditions raised for LL UoAs had to do with the lack of adequate information to determine the risk posed by the UoAs because either logbooks or observer data were insufficient.

P2.2.x (SECONDARY SPECIES) SCORES

MSC (2018) explains Secondary Species as follows: "Secondary species include fish and shellfish species that are not managed according to reference points and birds / mammals / reptiles / amphibians (all species that are out of scope of the standard) that are not ETP species. These types of species could in some cases be landed intentionally to be used either as bait or as food for the crew or for other subsistence uses, but they may also in some cases represent incidental catches that are undesired but somewhat unavoidable in the fishery. Given the often unmanaged status of these species, there are unlikely to be reference points for biomass or fishing mortality in place, as well as a general lack of data availability." Shark finning is scored in these PIs as well as in the Primary Species PIs.

The three PIs in this group are as follows:

- P2.2.1 "The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biologically based limit."
- P2.2.2 "There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species; and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch."
- P2.2.3 "Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species."

Figure 4 shows the boxplots for the three PIs for secondary species. Median scores are relatively high for all fishery types, and troll fisheries again outperform the others.

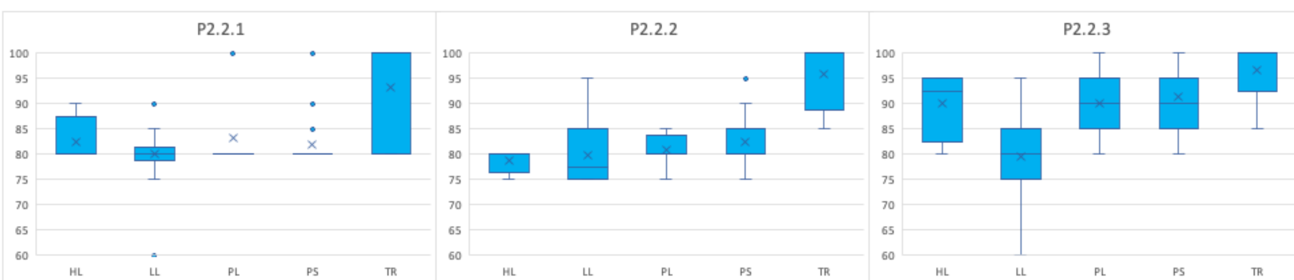

***Figure 4**. Scores for the three secondary species indicators by fishery type.*

For P2.2.1, 6 of 26 LL fisheries (23%) scored below 80, resulting in Conditions. All other fishery types scored 80 or higher (49 of 73 UoAs in the analyses scored exactly 80). Conditions in 4 of the LL UoAs had to do with status of bait species. For the other two LL UoAs, the issue was bigeye opah, a minor species.

For P2.2.2, 13 of 26 LL fisheries (50%), 1 of 12 PL fisheries (8%) and 5 of 25 PS fisheries (20%) scored below 80, resulting in Conditions. All 6 TR fisheries scored at 80 or above. Six of the LL UoA Conditions had to do with bait, 4 had to do with minor species like opah or blue sharks, and 3 had to do with shark finning. The PL UoA received low scores for not having an observer program to support the management strategy. All five PS UoAs scored low because of potential shark finning.

For P2.2.3, 7 of 26 LL fisheries (27%) scored below 80, resulting in Conditions. All PL, HL, PS and TR fisheries scored at 80 or above. Lack of adequate information (observers, logbooks, etc.) was related to bait (2 LL UoAs), or for minor species like opah, pelagic stingrays and others (5 LL UoAs).

P2.3.x (ETP SPECIES) SCORES

ETP stands for Endangered, Threatened or Protected. Under the MSC Fishery Standard v2.x, a range of species are classified as ETP, including (a) those that are designated as ETP by national legislation, (b) those listed in binding international agreements such as Appendix 1 of the Convention on International Trade in Endangered Species (CITES) or others, and (c) species classified as 'out-of-scope' (amphibians, reptiles, birds and mammals) that are listed in the IUCN Red List as Vulnerable, Endangered or Critically Endangered. In tuna fisheries, these often include some shark species, sea turtles, marine mammals and seabirds.

The three PIs in this group are as follows:

- P2.3.1 "The UoA meets national and international requirements for protection of ETP species and the UoA does not hinder recovery of ETP species."
- P2.3.2 "The UoA has in place precautionary management strategies designed to (a) meet national and international requirements; and (b) ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species."
- P2.3.3 "Relevant information is collected to support the management of UoA impacts on ETP species, including: (a) information for the development of the management strategy; (b) information to assess the effectiveness of the management strategy; and (c) information to determine the outcome status of ETP species."

Figure 5 shows the boxplots for the three performance indicators for ETP species.

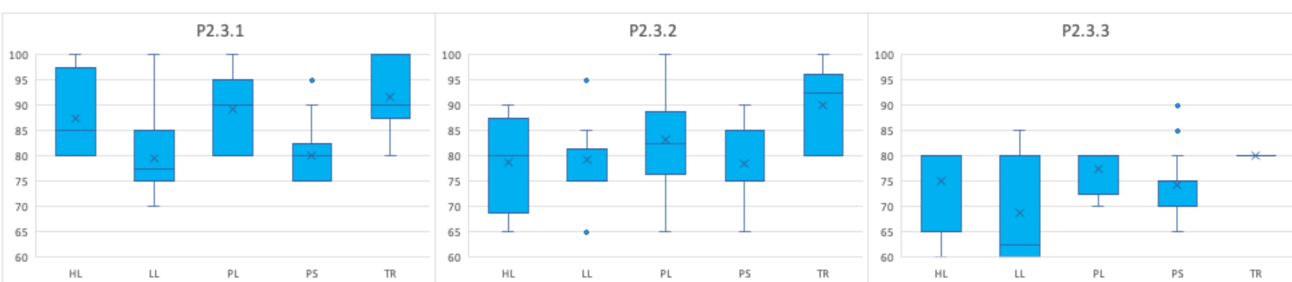

***Figure 5**. Scores for the three ETP species indicators by fishery type.*

All ETP species caught are likely to trigger lower PI scores by virtue of being vulnerable species. Also, rare ETP species or those that have a low rate of interaction with the fishery will be associated with high uncertainty, and assessment teams will often be precautionary in their scoring. In Figure 5, low scores are particularly evident for P2.3.3, the Information PI.

For P2.3.1, 13 of 26 LL fisheries (50%) and 9 of 25 PS fisheries (36%) scored below 80, resulting in Conditions. All PL, HL and TR fisheries scored at 80 or above. For LL UoAs, the species of concern included false killer whales (*Pseudorca crassidens*), sea turtles, seabirds, silky sharks (*Carcharhinus falciformis*), and oceanic whitetip sharks (*Carcharhinus longimanus*). For PS UoAs, the species of concern were similar, except that no seabirds were listed.

For P2.3.2, 1 of 4 HL fisheries (25%), 14 of 26 LL fisheries (54%), 2 of 12 PL fisheries (17%) and 13 of 25 PS fisheries (52%) scored below 80, resulting in Conditions. All 6 TR fisheries scored at 80 or above. For the HL and the PL UoAs, the issue was weak or no direct information about strategies to minimize ETP species mortality. For the LL UoAs, it was a mixture of weak data (incomplete logbooks and low observer coverage); lack of information on compliance with national and international regulation; or weak information on management of shark, turtle and ray interactions. For the PS UoAs, it was lack of information on the management of ETP species, especially cetaceans, sharks, turtles, and rays.

For P2.3.3, 1 of 4 HL fisheries (25%), 17 of 26 LL fisheries (65%), 3 of 12 PL fisheries (25%) and 20 of 25 PS fisheries (80%) scored below 80, resulting in Conditions. All TR fisheries scored 80. This was the PI with the lowest scores in P2, indicating that assessment teams often concluded that fisheries had insufficient information on ETP interactions. For the HL and PL UoAs, it was lack of ETP information in general. For the LL UoAs, insufficient observer coverage and lack of detailed logbook information was often cited, followed by species-specific gaps for turtles, seabirds, and sharks. Similarly for PS UoAs, lack of detailed information on interactions with sharks, rays, cetaceans, and turtles was common. Two PS UoAs noted lack of data on ETP species entanglement in FADs, and one recommended skippers' workshops to train skippers on species identification and handling practices.

P2.4.x (HABITATS) SCORES

MSC (2018) defines Habitats as "The chemical and bio-physical environment, including biogenic structures, where fishing takes place." Habitat scores tend to be quite important in fisheries where the gear contacts a habitat, such as bottom trawling.

The three PIs in this group are as follows:

- P2.4.1 "The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates."
- P2.4.2 "There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats."
- P2.4.3 "Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat."

Figure 6 shows the boxplots for the three performance indicators for habitats.

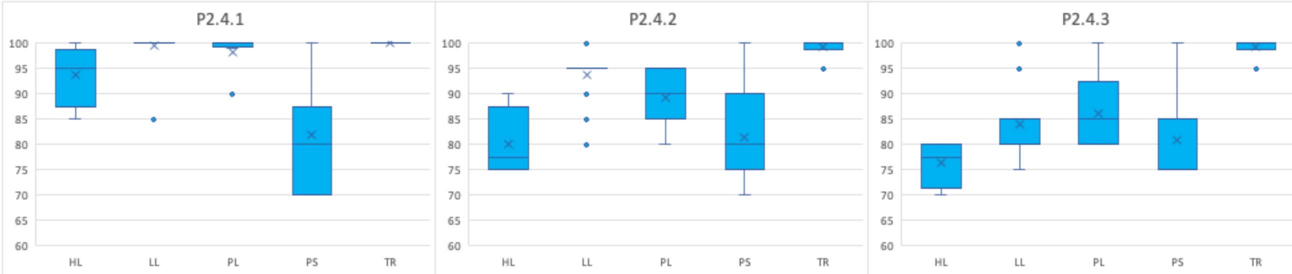

***Figure 6**. Scores for the three habitat indicators by fishery type.*

For P2.4.1, 11 of 25 PS fisheries (44%) received scores below 80. All of the LL, PL, HL, and TR fisheries had scores of 80 or higher. The Conditions for PS UoAs related to drifting FADs and their potential serious or irreversible impacts on Vulnerable Marine Ecosystems (VMEs) like coral reefs when they are lost or abandoned.

For P2.4.2, 2 of 4 HL fisheries (50%) and 11 of 25 PS fisheries (44%) received scores below 80 and had Conditions raised. LL, PL and TR fishery types had scores of 80 or higher. For HL UoAs, the issue was the lack of a strategy to manage impacts by lost anchored FADs; for all the PS UoAs, it was the lack of a strategy to manage drifting FADs so as to minimize loss or abandonment risk.

For P2.4.3, 2 of 4 HL fisheries (50%), 1 of 26 LL fisheries (4%), and 15 of 25 PS fisheries (60%) scored below 80, raising Conditions. PL and TR fisheries scored 80 or higher. As in the previous PI, the low scores had to do lack of information on FADs, both anchored (for HL UoAs) and drifting (for PS UoAs). The LL UoA uses other gears (e.g. rod and reel) and the issue was lack of information on their temporal and spatial use.

P2.5.x (ECOSYSTEM) SCORES

MSC (2018) explains Ecosystems to be "Broader ecosystem elements such as trophic structure and function, community composition, and biological diversity."

The three PIs in this group are as follows:

- P2.5.1 "The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function."
- P2.5.2 "There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function."
- P2.5.3 "There is adequate knowledge of the impacts of the UoA on the ecosystem."

Figure 7 shows the boxplots for the three performance indicators for ecosystems.

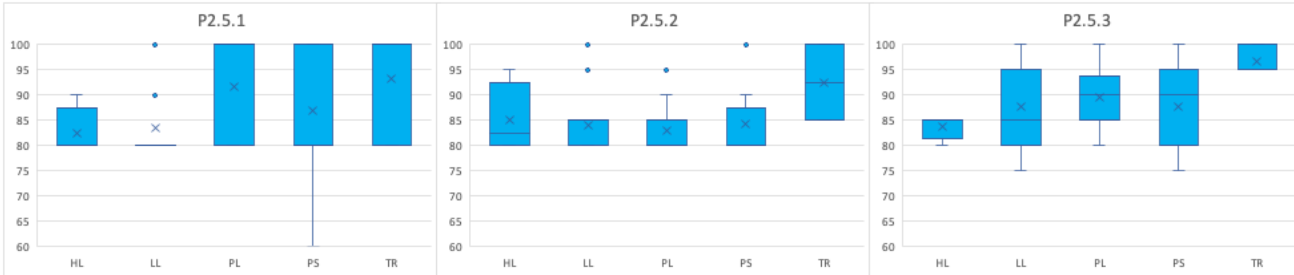

Figure 7. *Scores for the three ecosystem indicators by fishery type.*

With a few exceptions, the ecosystem PIs scored at or above 80 for most fisheries. These PIs tend to be a place for scoring everything that is not covered in PIs 2.1.x, 2.2.x, 2.3.x and 2.4.x, and do not seem to be scored very rigorously.

For P2.5.1, 1 of 25 PS fisheries (4%) scored below 80. All other fishery types scored 80 or higher. For the PS UoA, the issue was lack of evidence that FADs are highly unlikely to cause irreversible damage to ecosystem structure and function to a point where there would be serious or irreversible harm.

For P2.5.2, all 73 fisheries scored at 80 or higher.

For P2.5.3, 1 of 26 LL fisheries (4%) and 3 of 25 PS fisheries (12%) scored below 80, triggering conditions. All HL, PL and TR fisheries scored 80 or higher. For the LL UoA, the issue was insufficient observer data and other data to enable adequate knowledge of impacts. For the three PS UoAs, the issue was lack of information to broadly understand key elements of ecosystem function. Two of these mentioned the so-called "ecological trap hypothesis" (see Dupaix et al. 2024a) in which drifting FADs could alter tuna migration patterns and other biological characteristics.

SUMMARY OF MSC SCORING ANALYSES

Here, we analyzed the scores received by 73 tuna fisheries' UoAs assessed against the MSC Fisheries Standard version 2. The fishery types included handline, longline, pole and line, purse seine, and troll gears. Some general conclusions can be drawn from the results, as follows:

- Troll fisheries outperformed all others in scoring, with none of the 6 fisheries scoring below 80 in any of the 15 Performance Indicators of MSC Principle 2 examined.
- Scores for Primary Species (those species that are managed) were generally lower for longline than for the other fishery types. This was due largely to uncertainty in the status of bigeye tuna and blue sharks.
- Scores for Secondary Species (species not managed with reference points) were also generally lower for longline than for others. Many of these fisheries scored low due to the status of bait stocks from which they source. For several fisheries, including purse seine, the lack of evidence that shark finning was not taking place was the issue of concern.

- Scores for ETP species tended to be the lowest for all fishery types. This was especially the case for the Information PI (P2.3.3): Assessment teams concluded that there was insufficient information from observer programs, logbooks, and other sources to support the evaluation and management of ETP interactions.

- Scores for habitats tended to be low for fisheries that use FADs: mostly purse seine ones that use drifting FADs, but also handline ones that use anchored FADs. The issue was typically the lack of detailed information on impacts of lost or abandoned FADs on VMEs such as coral reefs.

- Scores for ecosystem impacts were the highest of all PIs for most fishery types. A few purse seine fisheries scored low because of lack of information to understand if FADs were having irreversible ecosystem impacts.

5. RFMO Conservation and Management Measures

The five tuna RFMOs have adopted conservation and management measures for non-tuna species and more broadly for ecosystem impacts. These are summarized here (as of April 2026), but readers are encouraged to read the relevant measures in their entirety, as those measures will evolve with time. Links are provided for this purpose.

The summary below also presents information on observer program requirements for different fishery types. As indicated in Section 4, MSC scores for ETP species Information (P2.3.3) tend to be low for many fisheries due to poor observer coverage and/or lack of detailed information from other sources. It should be noted that most of the regulations in this section require RFMO members to report catch of or interactions with non-tuna species, and compliance with these reporting requirements is assessed to varying degrees among the tuna RFMOs. These reporting requirements are not repeated below.

General information on tuna RFMOs is summarized here on the ISSF website. More detailed information is available from each RFMO website (links provided below).

Understanding impacts of FADs, finding solutions for them and advocating for RFMO uptake of those solutions is an important area of work for ISSF. RFMO-specific measures that regulate FAD operations are listed below. This infographic, adapted and updated from Pons et al. (2023), provides a useful up-to-date summary of RFMO implementation status of various proposed solutions to the negative impacts of FADs.

5.1 CCSBT

The area of competence of the CCSBT is the entire geographical range of southern bluefin tuna (southern waters of the Atlantic, Indian and Pacific Oceans).

Data

The target observer coverage rate is 10% for catch and effort monitoring for each fishery, meaning that Members are expected to achieve representativeness in their coverage across all fisheries. Observer monitoring must follow the CCSBT Scientific Observer Standards. The requirement is not area-specific and is instead applied to all fishing activity where southern bluefin are targeted or significantly caught as bycatch regardless of any overlap with other tuna RFMOs.

Species-specific measures

CCSBT is responsible for the management of southern bluefin tuna throughout its range. Southern bluefin is found in the southern hemisphere and therefore there is overlap between fisheries managed by CCSBT and fisheries managed by the other RFMOs, particularly ICCAT, IOTC and WCPFC.

In order to avoid duplication of efforts with the other RFMOs, the Commission adopted the Resolution to Align CCSBT's Ecologically Related Species measures with those of other tuna RFMOs. This measure was adopted in 2018 and has been amended every year since to align it with any new conservation measures of ICCAT, IOTC and WCPFC. The resolution requires that vessels fishing for southern bluefin tuna comply with all ecologically related species management measures of the RFMO where they are operating. The Resolution applies to all vessels on the CCSBT Authorized Vessel Record when operating in the other RFMOs' Areas of Competence, regardless of whether or not the flag state is a member of the other RFMO.

The resulting CCSBT Resolutions are listed here and cover sea turtles, seabirds, sharks, rays, and cetaceans.

When fishing outside the Areas of Competence of the other RFMOs, longline vessels are required to use tori lines South of 30 degrees South.

5.2 IATTC

IATTC's Convention Area covers the eastern Pacific Ocean.

Data

Resolution C-19-08 requires 5% observer coverage on longline vessels greater than 20 m length overall (LOA).

The Agreement on the International Dolphin Conservation Program (AIDCP) requires 100% observer coverage on purse seine vessels with carrying capacity of 363 mt or greater.

Resolution C-22-07 established an Ad hoc Working Group on Electronic Monitoring that is developing an EM program to enhance monitoring in both longline and small purse seine vessels. Resolution C-24-09 establishes interim minimum standards and program requirements for using Electronic Monitoring (EM) to monitor IATTC fisheries

General measures

Resolution C-04-05 (Rev 2) established general guidelines for reducing bycatch and waste.

Sea Turtles

Resolution C-19-04 requires fishers to release sea turtles sighted in purse seine nets or accidentally caught in longlines following the handling and release guidelines detailed in the resolution.

Resolutions C-23-04 require the use of non-entangling FADs without netting in purse seine fisheries to avoid ghost fishing from 1 January 2025 and establishes a timeline for a stepwise transition to using biodegradable FADs from 1 January 2026.

C-24-06 encourages CPCs to initiate dFAD recovery programs.

Seabirds

Resolution C-11-02 requires longline vessels over 20 m LOA North of 23°N, South of 30°S, and around the Galapagos Islands to use at least two of the mitigation measures provided in the Resolution, including at least one of these three: side-setting, night setting, tori lines, or weighted branch lines.

Rays

Resolution C-15-04 requires CPCs to prohibit retaining onboard, transshipping, landing, storing, selling, or offering for sale any part or whole carcass of Mobulid rays and to release all Mobulid rays alive wherever possible. The Resolution also requires prompt and live release wherever possible and includes safe handling guidelines.

Sharks

Resolution C-25-08 consolidates and replaces other previous Resolutions on sharks. The Resolution discourages shark retention and requires that retained sharks (if not prohibited species) are landed with all fins naturally attached, although CPCs may adopt alternative measures through 2026:

1. each individual shark carcass and its corresponding fins are stored in the same bag, preferably a biodegradable one
2. each individual shark carcass is bound to the corresponding shark fins using rope or wire; or,
3. the shark fins and the corresponding shark are identically, uniquely, and numerically tagged in a manner that an authorized inspector can readily identify the matching of the shark fins to the corresponding shark.

Resolution C-25-08 also includes provisions for safe handling and release and establishes a plan on data collection and stock assessment of key shark species. For purse seine, these provisions include prohibiting the use of hooks, or lifting from the tail or gill slits. Longline vessels must use line cutters and leave less than 1 m of branchline. Shark lines are also prohibited.

Resolution C-11-10 prohibits the retention of oceanic whitetip sharks and requires the release of specimens that are alive when caught. Resolution C-19-06 prohibits deliberate purse seine setting on whale sharks and Resolution C-25-08 prohibits lifting whale sharks onboard or towing them from the tail in the release manouver.

Resolution C-25-09 defines other shark conservation measures with an emphasis on silky sharks. It prohibits purse seiners from retaining, transshipping, storing on a fishing vessel, or landing any silky shark, in whole or in part. For longliners, it established catch and bycatch limits and restrictions on the use of steel leaders.

Cetaceans

The AIDCP establishes total per-stock and per-year limits on incidental dolphin mortality (Dolphin Mortality Limits, DMLs), with a structured protocol for allocating and keeping track of DMLs (using observers). A vessel must stop setting on dolphin associations for the rest of the year once its DML has been reached.

5.3 ICCAT

ICCAT's Convention Area covers the Atlantic Ocean, including adjacent seas (e.g., Mediterranean, Caribbean).

Data

ICCAT has specific requirements for reporting data on sharks, sea turtles, and seabirds. Recommendation 16-14 establishes minimum standards for human observers and requires members to have at least 5% observer coverage (for vessels over 15 m) in their national observer programs for longline, purse seine, and pole-and-line fisheries. This coverage is increased in Recommendation 24-01 for vessels targeting tropical tunas (10% for longline and 100% for purse seine). The coverage is also set to 100% in Recommendation 24-05 for purse seiners authorized to catch eastern Atlantic and Mediterranean bluefin tuna. Recommendation 23-18 establishes minimum standards and program requirements for using EM to monitor ICCAT fisheries. Recommendation 11-10 requires CPCs to collect and report data on bycatch and discards either through observer programs and logbooks or via alternative means (for artisanal and semi-industrial fisheries). Recommendation 11-15 establishes penalties for CPCs that do not report annual catch data, including shark species, by prohibiting them from retaining such species in the following year.

Sea turtles

Recommendation 22-12 sets up data reporting requirements and safe handling and release requirements for fisheries that interact with sea turtles. Longliners that make shallow sets (i.e., where the majority of hooks are in depths less than 100 m) have to use one of three mitigation methods: Large circle hooks, only finfish bait, or other approaches found to be effective by the SCRS. Longline operators must be trained in the proper handling and release of live turtles to maximize the animals' survival. Purse seiners are required to avoid encirclement, where practicable and disentangle and release turtles.

Recommendation 24-01 requires the use of non-entangling FADs without netting in purse seine fisheries to avoid ghost fishing and establishes a deadline for a stepwise transition to using biodegradable FADs both starting in 2025.

Seabirds

Recommendation 07-07 requires longliners operating south of 20°S to use tori poles. Recommendation 11-09 applies to longliners fishing south of 25°S, and in the Mediterranean, and requires them to use at least two of the mitigation measures provided: side-setting, night setting, tori lines, or weighted branch lines.

Rays

Recommendation 24-12 prohibits retaining onboard, transshipping, landing or storing any part or whole carcass of all species of mobulid rays (family *Mobulidae*). Mobulid rays should be promptly released unharmed, to the extent practicable, as soon as they are seen in the net, on the hook, or at the vessel.

Sharks

Recommendation 04-10 established a 5% limit on the ratio of fin weight to total shark weight that can be retained onboard a fishing vessel, and encouraged the release of live sharks in fisheries that do not target sharks.

Recommendations 07-06 and 14-06 established data collection and reporting for porbeagle and shortfin mako sharks, respectively.

Recommendations 23-10 and 23-11 establish limits on catches, aim to improve data collection, and encourage scientific research on North Atlantic and South Atlantic blue sharks, respectively.

Recommendation 15-06 requires CPCs to promptly release porbeagle sharks unharmed (where practicable).

Recommendations 09-07, 10-07, 10-08 and 11-08 prohibit the retention on board of bigeye thresher, oceanic whitetip, several species of hammerhead sharks, and silky sharks, respectively.

Recommendations 21-09 and 25-08 set up management plans for North Atlantic and South Atlantic shortfin mako sharks, respectively, including catch and retention limits.

Recommendation 18-06 requires CPCs to submit an annual check sheet with details of their implementation of and compliance with shark conservation and management measures.

Recommendation 23-12 prohibits retaining on board, transshipping, or landing, in whole or in part, any specimen of whale shark. It also prohibits setting a purse seine on a school of tuna associated with a whale shark if the animal is sighted prior to the commencement of the set, and if it is incidentally encircled in the purse seine net, requires it to be safely released.

Recommendation 25-07 prohibits retaining on board, transshipping, or landing, in whole or in part, any specimen of basking shark and great white shark. It also requires their release where practicable.

Cetaceans

Non-binding Resolution 23-15 strongly encourages CPCs to prohibit deliberate purse seine sets around cetaceans, encourages reporting of interactions, and encourages following best practice guidelines for the safe handling and release of cetaceans.

5.4 IOTC

IOTC's Convention Area covers the Indian Ocean.

Data

IOTC Resolution 25/06 superseded prior resolutions establishing a regional observer program that requires at least 5% coverage for vessels over 24 m LOA, and for smaller vessels operating in the high seas. The resolution also calls for sampling of the catches upon unloading. Resolution 23/08 established standards for the use of EM that can be used to fulfill observer coverage requirements. Resolution 15/01 and 15/02 specify the requirements for recording catch in all tuna fisheries.

Sea turtles

Resolution 12/04 requires IOTC members to mitigate sea turtle mortality. The measure has specific requirements for longline and purse seine operators to facilitate the appropriate handling and release of live turtles. Purse seiners are required to avoid encirclement, where practicable; disentangle them from the net or FADs; and follow safe handling and release practices. It requires longline operators to use line cutters and de-hookers to handle and promptly release sea turtles caught or entangled.

Seabirds

Resolution 23/07 (which supersedes various prior measures) requires longliners operating south of 25°S to use at least two of three mitigation measures: Night setting, tori lines, or line weighting. Alternatively, longliners can use hook-shielding devices as a stand-alone mitigation measure.

Rays

Resolution 19/03 prohibits intentional setting of any gear on mobulid rays as well as retaining onboard, transshipping, landing or storing any part or whole carcass. Live release handling procedures are detailed in the resolution.

Sharks

Resolution 25/08 consolidated and replaced a number of previous Resolutions related to sharks. The Resolution prohibits the retention of oceanic whitetip sharks, thresher sharks and whale sharks. The Resolution also prohibits intentional purse seine setting on tunas associated with whale sharks.

Resolution 25/08 also requires sharks landed fresh have fins-naturally attached until the first point of landing. In order to implement the finning prohibition for sharks landed frozen in 2026, 2027 and 2028, CPCs shall ensure their fleets land or transship sharks with fins naturally attached to the carcass or to use one and only one of the alternative measures listed below:

a) Each individual shark carcass is bound to the corresponding fins using rope or wire; or

b) Identical and uniquely numbered tags are attached to each shark carcass and its corresponding fins in a manner that inspectors can easily identify the matching of the carcass and fins at any time. Both the carcasses and fins shall be stored on board in the same hold.

Resolution 25/08 also prohibits the use of shark lines (i.e., branch lines running directly off the longline floats or drop lines) from January 1, 2026, and wire traces north of 20S from January 2028 unless CPCs demonstrates negligible impact on vulnerable shark catches using wire traces.

Resolution 25/09 requires the safe and live release of shortfin mako sharks and longfin mako sharks. Retention is allowed when the fish is dead on haulback and the vessel has an observer or a functioning electronic monitoring system.

Resolution 24/02 (which supersedes Res. 19/02) requires the use of fully non-entangling FADs without netting in purse seine fisheries to avoid ghost fishing since 2020 and establishes a deadline for a stepwise transition to using biodegradable FADs beginning in 2026.

Cetaceans

Resolution 23/06 prohibits deliberate purse seine sets around cetaceans, requires reporting of interactions, and mandates following best practice guidelines for the safe handling and release of cetaceans for all gears.

5.5 WCPFC

WCPFC's Convention Area covers the western and central Pacific Ocean.

Data

Except for sharks, reporting of non-tuna species is not mandatory at WCPFC, and therefore much of the information available comes from observer programs. The WCPFC has a Regional Observer Program in CMM 2018-05 (which replaced previous CMMs) that establishes a target of 5% coverage on longliners in the high seas. CMM 2025-02 requires purse seine vessels that fish on the high seas or between two or more EEZs and between 20°S and 20°N to have 100% observer coverage. The WCPFC adopted interim EM standards in 2024 (see attachment 17 of the WCPFC21 Outcomes). In addition, members with longliners can obtain a higher bigeye quota if they exceed the 5% coverage target through a combination of human observers and EM.

Sea turtles

CMM 2018-04 instructs WCPFC members to implement the FAO guidelines for reducing sea turtle mortality and ensure the safe handling of all captured sea turtles. Purse seiners are required to avoid encirclement, where practicable; disentangle them from the net or FADs; and follow safe handling and release practices. It requires longline operators to use line cutters and de-hookers to handle and promptly release sea turtles caught or entangled. Shallow set longliners must use one of three mitigation methods: large circle hooks with 10 deg offset; use only whole finfish as bait; or any other measure or mitigation plan approved by the Commission as capable reducing the interaction rate.

Seabirds

CMM 2025-05 sets specific requirements for longliners operating in different areas and depending on vessel size. South of 30°S, all longliners are to use at least two of three mitigation measures: Night setting, tori lines, or line weighting. Alternatively, longliners in these latitudes can use hook-shielding devices as a stand-alone mitigation measure. Longliners operating between 25°S and

30°S must use one or two of the measures or hook-shielding devices, depending on whether they are operating East or West of 175ºW. Large-scale longliners operating north of 23°N must use at least two of the mitigation measures provided in the CMM, including at least one of the following: side-setting with bird curtain and weighted branch lines, night setting with minimum deck lighting, tori lines, weighted branch lines, or hook-shielding devices.

Rays

CMM 2019-05 prohibits intentional setting or targeted fishing on mobulid and manta rays, prohibits retention, requires prompt release alive/safe handling, and includes best practice guidelines.

Sharks

CMM 2025-06 covers measures such as full utilization of sharks and prohibition of finning, data reporting of shark retentions and releases by gear type and species, minimizing bycatch and practicing safe release following the adopted Best Handling Practices for the Safe Release of Sharks, and prohibition of retention of silky and oceanic whitetip sharks.

CMM 2025-06 prohibits shark finning by requiring that sharks be landed with their fins naturally attached during 2025-2027. However, during these years, CPCs may authorize their vessels to implement one of two alternative measures:

1. Each individual shark carcass is bound to the corresponding fins using rope or wire; or
2. Identical and uniquely numbered tags are attached to each shark carcass and its corresponding fins in a manner that inspectors can easily identify the matching of the carcass and fins at any time. Both the carcasses and fins shall be stored on board in the same hold.

For longline fisheries targeting tuna and billfish, between 20N and 20S, CMM 2025-06 requires members' flagged vessels to avoid using, or to stow (if carrying), wire trace as branch lines or leaders. They also must not use shark lines or branch lines running directly off the longline floats or drop lines. Also for longline vessels, for sharks that are caught but not retained, members shall ensure that the owners and operators of their fishing vessels release these sharks as soon as possible, taking into consideration the safety of the crew and observer, using these guidelines and actions:

1. Leave the shark in the water, where possible; and
2. Use a line cutter to cut the branchline as close to the hook as possible.

CMM 2025-06 also prohibits deliberate purse seine sets around whale sharks, requires reporting of interactions, and requires safe release following the WCPFC Guidelines for the Safe Release of Encircled Whale Sharks. Whale shark retention is prohibited.

CMM 25-02 requires the use of fully non-entangling FADs without netting in purse seine fisheries to avoid ghost fishing since 2020 and encourage the use of biodegradable material in FAD construction

Cetaceans

CMM 2024-07 prohibits deliberate purse seine sets around cetaceans and requires reporting of interactions. Longliners are required to release, taking into account the safety of the crew, any cetacean that is caught or entangled by its fishing gear as soon as possible and utilizing the Best Practices for the Safe Handling and Release of Cetaceans.

6. Additional Measures and Resources

This section lists relevant ISSF Conservation Measures and other resources on mitigating the impact of tuna fisheries.

6.1 ISSF Conservation Measures

ISSF has a number of science-based Conservation Measures (CMs) to help seafood companies and vessels improve the sustainability of tuna fisheries. These measures must be adhered to by ISSF's Participating Companies (PCs) when sourcing or trading tunas from vessel types covered by the measure. It should be noted that the RFMO measures do not always follow current best practices. This is primarily due to the fact that RFMOs always try to adopt measures by consensus, and it takes just one member to block or weaken a draft regulation. In contrast, the ISSF CMs often choose the adopted RFMO measure that we consider to be the "best practice" and then apply it globally as a requirement.

The following measures address mitigating the impact of tuna fisheries. We provide summaries in this report but encourage the reader to read the ISSF Conservation Measures in full.

CM 3.1 addresses shark finning. Shark finning contributes to waste and causes major uncertainties about the total biomass and species composition of sharks caught. Some tuna RFMOs restrict shark finning through a provision that the weight of fins landed cannot exceed 5% of the total shark catch on board. The fin-to-carcass ratio can vary considerably depending on the species, the dressing of the carcass, and on the different ways fins are cut, therefore creating difficulties in enforcement and accurate data collection. CM 3.1(b) requires that PCs do not conduct transactions with vessels that carry out shark finning and/or do not land all sharks with fins naturally attached, if retained. CM 3.1(c) requires that PCs do not conduct transactions with vessels that do not have a public shark finning policy.

CM 3.2 addresses large-scale driftnets. Large-scale pelagic driftnets are an unselective method of fishing that results in substantial catches of many non-tuna species, including cetaceans and sea turtles, and they have been prohibited in the high seas by the United Nations. CM 3.2 requires that PCs refrain from transactions in tuna caught by this fishing method regardless of the fishing operations area.

CM 3.4 addresses best practices to be followed by fishers. ISSF produces and updates best practice guidelines for purse seine and longline skippers that are delivered in various formats such as in-person workshops, online guides, and videos. CM 3.4 requires that PCs conduct transactions only with those purse seine and longline vessels whose skipper has reviewed these materials.

CM 3.6 addresses specific best practices for large-scale longliners to mitigate their impacts on sharks, sea turtles, and seabirds. As shown in Section 4, this type of fishing tends to obtain low MSC scores for ETP species. Some RFMOs have adopted requirements for the use of certain gear modifications, such as the use of whole finfish bait, circle hooks, and monofilament lines, and/or handling techniques, and/or prohibited the use of “shark lines,” in some longline tuna fisheries, while others have not (see Section 5). ISSF is committed to supporting a transition to the use of such techniques by longline vessels globally. CM 3.6 requires that PCs conduct transactions only with those longline vessels whose owners have a public policy requiring the implementation of a number of best practices for sharks, seabirds, and marine turtles.

CM 3.7 addresses FAD management. As shown in Sections 4 and 5, FADs have a number of negative impacts on non-tuna species and habitats. But all of these can be mitigated if sound management practices are followed. Restrepo et al. (2023) summarize the six elements of management that ISSF considers to be of utmost importance for a proper management of dFAD and aFAD fisheries:

1. Complying with flag state and RFMO reporting requirements by set type
2. Voluntarily reporting additional FAD buoy data for use by RFMO science bodies
3. Supporting science-based FAD limits
4. Using non-entangling FADs to reduce ghost fishing
5. Mitigating other environmental impacts due to FAD loss including through the use of biodegradable FADs and FAD recovery policies, and
6. Implementing further mitigation efforts for silky sharks

CM 3.7 requires that PCs conduct transactions with purse seine and supply vessels that have a public policy that transparently reports what they are doing on each of the six elements. Furthermore, the CM has specific requirements for using only FADs that are fully non-entangling without netting, participating in biodegradable FAD trials or FAD recovery programs, and making FAD positions and FAD echosounder biomass data available to science bodies.

CM 4.3 addresses 100% observer coverage on large-scale purse seine vessels. CM 4.3 requires that PCs only conduct transactions with large-scale purse seine vessels that have 100% observer coverage, either human or electronic. The measure was first adopted in 2012 when two of the four tropical tuna RFMOs (IATTC and WCPFC) required 100% coverage for these vessels. Today, ICCAT also has the same requirement, but IOTC still does not.

The implementation of the above ISSF CMs is audited by a third party, and if a vessel is registered on the ISSF Proactive Vessel Record (PVR), users can verify if it is implementing a measure.

6.2 Other Resources

ISSF and other organizations have policies, best practice guides, or other resources that address the sustainability of tuna fisheries. Some examples are given below.

Purse seine fisheries

ISSF Skippers' Guidebook to Sustainable Purse Seine Fishing Practices (available in several languages).

Shark Release Ramp Guide for Purse-Seine Vessels

Manta Ray Sorting Grid Construction Instructions for Purse-Seine Vessels

ISSF Workshop on Deck Bycatch Release Devices (BRDs) for Vulnerable Species in Tropical Tuna Purse Seiners

ISSF Recommended Best Practices for FAD Management in Tropical Tuna Purse Seine Fisheries

Questions and Answers About FADs and Bycatch

ISSF Recommended Best Practices for Tropical Tuna Purse Seine Fisheries in Transition to MSC Certification, with an Emphasis on FADs

Non-Entangling and Biodegradable FADs Guide.

Biodegradable Jelly-FAD Construction Guide.

Key Outcomes of the International Workshop on Biodegradable Fish Aggregating Devices.

Best Bycatch Release Practices in Tuna Purse Seiners (posters)

Saving the Mobula Rays (posters)

Acoustic Discrimination in Tropical Tuna Purse Seine Fisheries: State of the Art, Ongoing Projects, and Future Directions.

Summary of the First International Workshop on FAD Retrieval: May 8–10, 2024, Galápagos, Ecuador.

Longline fisheries

ISSF Skippers' Guidebook to Sustainable Longline Fishing Practices (available in several languages)

ISSF Responsible Fishing Guidelines for Tuna Longline Fisheries

ISSF Recommended Best Practices for Tuna Longline Fisheries in Transition to MSC Certification

ISSF's Saving Sea Turtles Infographic (ENG, ESP)

ACAP Review of mitigation measures and Best Practice Advice for Reducing the Impact of Pelagic Longline Fisheries on Seabirds

ACAP Seabird Mitigation Factsheets

FAO Good practice guide for the handling of sharks and rays caught incidentally in Mediterranean pelagic longline fisheries.

FAO International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries

FAO Good practice guide for the handling of cetaceans caught incidentally in Mediterranean fisheries, including purse seiners and pelagic longline fisheries

FAO Good practice guide for the handling of sea turtles caught incidentally in Mediterranean fisheries, including pelagic longline fisheries

FAO Good practice guide for the handling of seabirds caught incidentally in Mediterranean pelagic longline fisheries

NOAA Pacific Islands Regional Office Protected species workshop - Handling, Release, and Identification Guidelines

SFP Best Practices in Tuna Longline Fisheries Report

Pole-and-line fisheries

ISSF and IPNLF Skippers' Guidebook to Pole-And-Line Fishing Best Practices.

Sea turtles

FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations.

Sharks

FAO International Plan of Action for Conservation and Management of Sharks.

Seabirds

FAO Best practices to reduce incidental catch of seabirds in capture fisheries

Cetaceans

FAO Guidelines to prevent and reduce bycatch of marine mammals in capture fisheries

ALDFG

FAO Regional workshops on best practices to prevent and reduce abandoned, lost or discarded fishing gear in collaboration with the Global Ghost Gear Initiative

Guidelines for Developing Plans of Action on Managing Abandoned, Lost and Discarded Fishing Gear.

FAO Voluntary Guidelines for the Marking of Fishing Gear.

ECOSYSTEMS

Compendium of ISSF Research Activities to Reduce FAD Structure Impacts on the Ecosystem

Report of the International Workshop on Mitigating Environmental Impacts of Tropical Tuna Purse Seine Fisheries

ISSF Workshop for the Reduction of the Impact of Fish Aggregating Devices' Structure on the Ecosystem

FAO Ecosystem Approach to Fishery Management toolbox

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List of Acronyms

AIDCP	Agreement on the International Dolphin Conservation Program
ALDFG	Abandoned, lost or otherwise discarded fishing gear
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CM	Conservation Measure (of ISSF)
CMM	Conservation Management Measure
CPC	Contracting Party or Cooperating non-Contracting Party
DML	Dolphin Mortality Limit
EM	Electronic monitoring
ETP	Endangered, threatened or protected species
FAD	Fish Aggregating Device (aFAD=anchored; dFAD=drifting)
FAO	Food and Agriculture Organization of the United Nations
FS	Free-swimming school
HL	Handline fishing
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOTC	Indian Ocean Tuna Commission
IUCN	International Union for Conservation of Nature
LL	Longline fishing
MSC	Marine Stewardship Council
NGO	Non-governmental organization
P1	Principle 1 of the MSC Standard (stock status)
P2	Principle 2 of the MSC Standard (environmental impact)
P3	Principle 3 of the MSC Standard (management)
PC	Participating Company (of ISSF)
PI	Performance Indicator
PL	Pole and line fishing
PRI	Point of Recruitment Impairment
PS	Purse seine fishing
RFMO	Regional Fisheries Management Organization
SC	Scientific Committee
TR	Troll fishing
UoA	Unit of Assessment (of an MSC fishery)
UoC	Unit of Certification (of an MSC fishery)
VME	Vulnerable Marine Ecosystem
WCPFC	Western and Central Pacific Fisheries Commission

Version Log

DATE	ISSF NUMBER	UPDATES
April 2026	2026-03	- Update with 2025 RFMO measures - Other changes throughout to improve text
March 2025	2025-02	- Update with 2024 RFMO measures - Other changes throughout to improve text
March 2024	2024-03	- First version. Every section is new

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