Photo: Jeff Muir

Skippers' Guidebook to Sustainable Longline Fishing Practices

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An International Seafood Sustainability Foundation (ISSF) Publication
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ISSF INTERNATIONAL SEAFOOD SUSTAINABILITY FOUNDATION

Contents

Chapter 1: **Sustainable Longline Tuna Fisheries**

INTRODUCTION

Welcome to the International Seafood Sustainability Foundation's guide to best practices in longline tuna fishing. Our goal is to share the state of the art in responsible fishing operations, review the reporting requirements and other obligations to Regional Fisheries Management Organizations (RFMOs), and inform participants about the related ISSF Conservation Measures for the management of tuna and its larger marine ecosystem.

About ISSF

The International Seafood Sustainability Foundation (ISSF) — a global coalition of seafood companies, fisheries experts, scientific and environmental organizations, and the vessel community — promotes science-based initiatives for long-term tuna conservation, FAD management, bycatch mitigation, marine ecosystem health, capacity management, and illegal fishing prevention. Helping global tuna fisheries meet and maintain sustainability criteria to achieve the Marine Stewardship Council certification standard is ISSF's ultimate objective.

CHAPTER OBJECTIVES

1. **Introduce ISSF's mission and approach**
2. **Provide examples of ISSF's ongoing activities and outreach**
3. **Provide information about ISSF's Participating Companies**

ISSF APPROACHES TO IMPROVING TUNA SUSTAINABILITY

ISSF is a science-driven organization focused on the continuous improvement of global tuna fishery sustainability and seeks to achieve this by:

- Advancing tuna fisheries science
- Implementing direct industry improvements

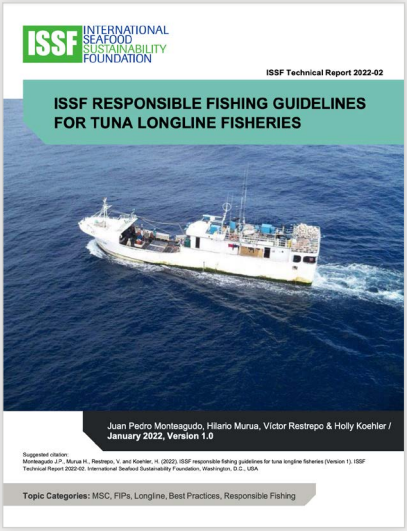
ISSF's mission is to undertake and facilitate science-based initiatives to continuously improve the sustainability of global tuna fisheries and the health of the ecosystems that support them.

- Providing scientific guidance and tools
- Working with, and advocating to, RFMOs
- Partnering with supportive organizations and experts

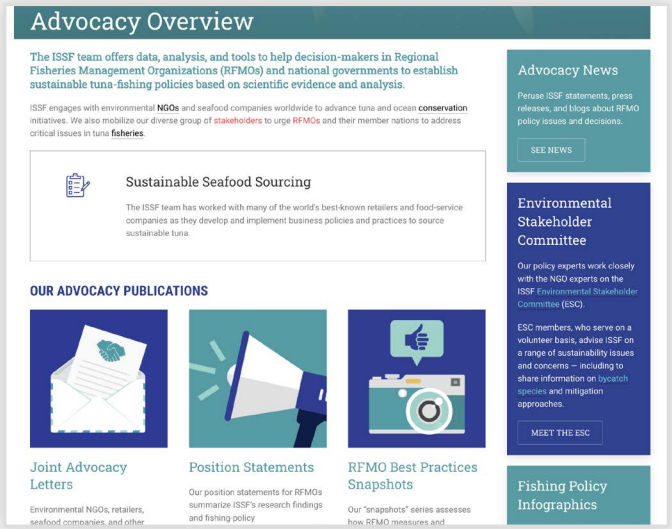
Further, it's important to note:

- ISSF advocacy to RFMOs is grounded in what the best current science requires.
- Simultaneously, ISSF continuously works to improve the science.
- The intended result of our efforts is the adoption and implementation of science-based management measures by industry and RFMOs.
- We recognize that comprehensive and sustainable management requires continuous improvement.

Gallery 1.1



ISSF Technical Report 2022-02 ISSF Responsible Fishing Guidelines for Tuna Longline Fisheries



[“Advocacy Overview” webpage]

Images from ISSF field research to improve fishing methods

Photo: Gala Moreno

At Skippers Workshop, practicing hook-removal techniques on a piece of meat using the different dehookers

A Skippers Workshop directed at longline fishers and managers to increase post-release survival of incidentally captured sea turtles

ISSF ACTIVITIES

ISSF conducts educational and advocacy activities, funds major research on fisheries to reduce bycatch (the unintended catch of non-targeted species), and uses direct-market action by its Participating Companies.

Gallery 1.2

ISSF-sponsored scientist observing fish behavior during a bycatch research cruise in the Indian Ocean

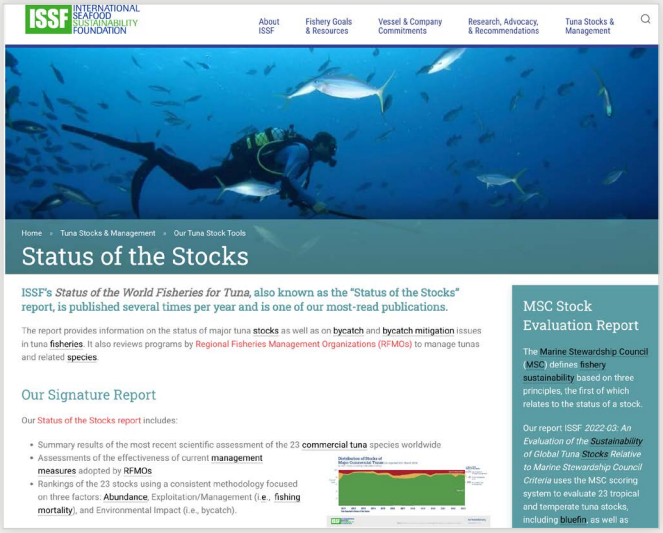
Photo: Fabien Forget

ISSF-sponsored scientist tagging a tuna during a bycatch research cruise in the Western Pacific Ocean

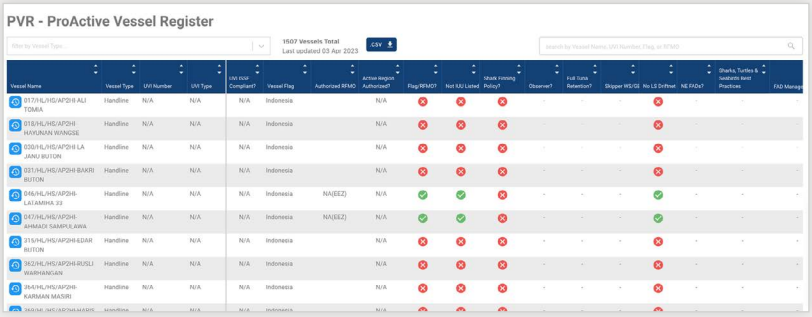
ISSF Skippers Workshops, where scientists and fishers share ideas to improve the sustainability of tuna purse seine and longline fisheries

Advocating for science-based conservation and management of the tuna stocks and their ecosystems at the meetings of the tuna RFMOs

Sponsoring, in addition to Skippers Workshops, symposiums for scientists and fisheries managers to share information on fisheries and bycatch research



Publishing a regularly updated "Status of the Stocks" report, with information on abundance, mortality, and related bycatch issues for every major tuna stock



Working with the tuna industry to encourage the adoption of best fishing practices by tuna fleets through the ISSF ProActive Vessel Register

ISSF PROACTIVE VESSEL REGISTER

The ProActive Vessel Register, or PVR, is one of the public vessel lists that ISSF provides to foster transparency in tuna fishing. This list connects responsible fishers and seafood companies. Fishing vessels can register on the PVR to show how they are following practices that support sustainable tuna fisheries.

The PVR tracks detailed vessel information, including with respect to certain fishing activities. MRAG Americas, a third-party independent auditor, audits all vessels that join the PVR.

Longline and purse seine vessels that register on the PVR also need to ensure that their skippers do one of the following:

1. Attend an in-person and/or online ISSF Skippers Workshop on bycatch mitigation practices, or
2. Attend an in-person Skippers Workshop provided by a tuna Fishery Improvement Project (FIP) and conducted by a trainer that has been accredited by ISSF to conduct these workshops; or
3. View an ISSF Skippers Workshop video online; or
4. Review the relevant ISSF Skippers' Guidebook, which contains information on bycatch handling and mitigation, RFMO requirements, and other useful information about fishing sustainably. Skippers' Guidebooks can be read online at or downloaded from issfguidebooks.org

If you are assigned to a longline vessel on the PVR, the following website will display those actions that the vessel has committed to undertaking as part of joining the PVR: www.iss-foundation.org/vessel-and-company-commitments/proactive-vessel-register/proactive-vessel-register-pvr/pvr-vessel-list/.

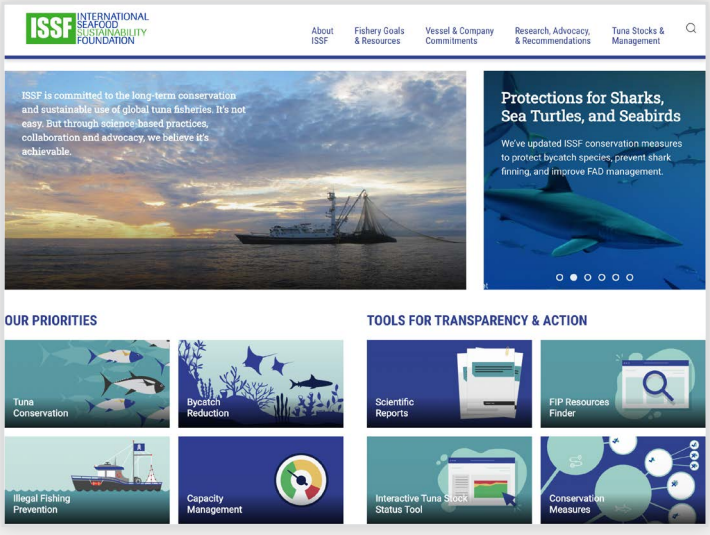
These actions, known as ISSF Conservation Measures, are detailed in the following section.

Other ISSF Public Vessel Lists

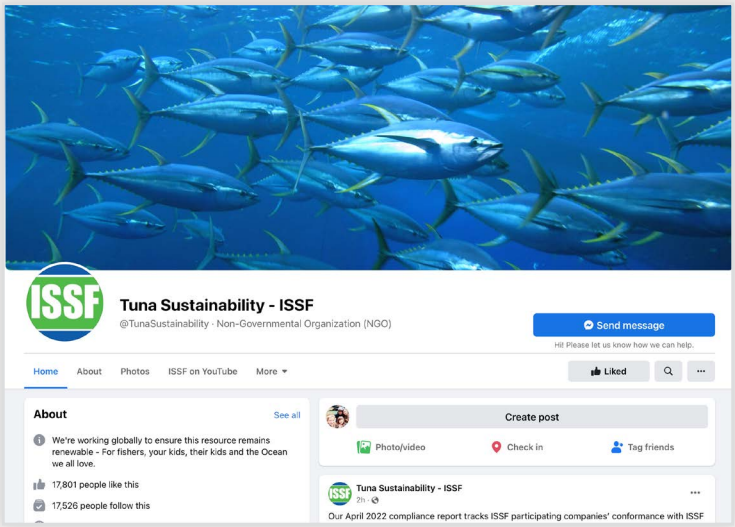
Other ISSF public vessel lists are:

- **Vessels in Other Sustainability Initiatives (VOSI):** The VOSI is the only publicly available list of tuna fishing vessels that are part of a Fishery Improvement Project or fishing in an MSC-certified fishery. Other voluntary efforts by fishing vessels are also displayed, such as having Electronic Monitoring systems (EMS) that meet the minimum standards. This list is a tuna-sourcing tool for seafood companies.
- **Tuna Vessel IMOs and Other UVI Numbers (IMO/UVI):** This comprehensive list shows tuna vessels with either International Maritime Organization (IMO) or other Unique Vessel Identifier (UVI) numbers. IMO and UVI numbers help to reduce illegal fishing activities.
- **Record of Large-Scale Purse Seine Vessels (LSPSR):** The LSPSR lists all large-scale purse-seine vessels fishing for tuna that are compliant with ISSF capacity conservation measures. This consolidated global view of the large-scale purse-seine fleet supports both ISSF and RFMO efforts to prevent overfishing.

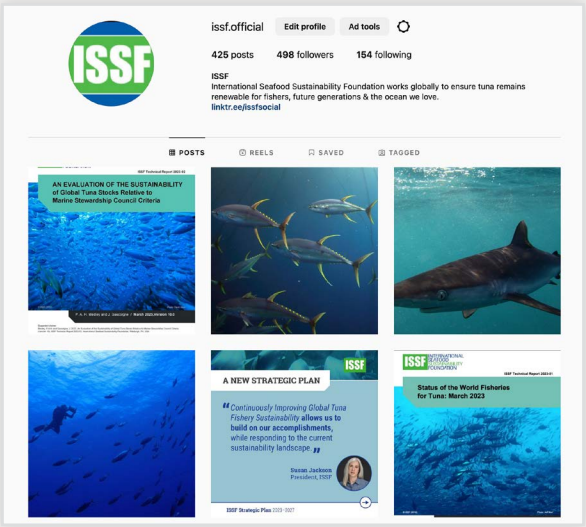
Gallery 1.3



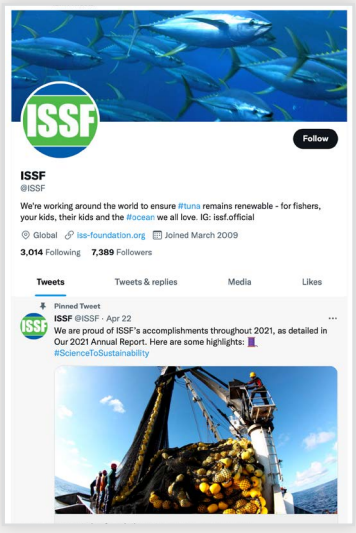
ISSF website: iss-foundation.org



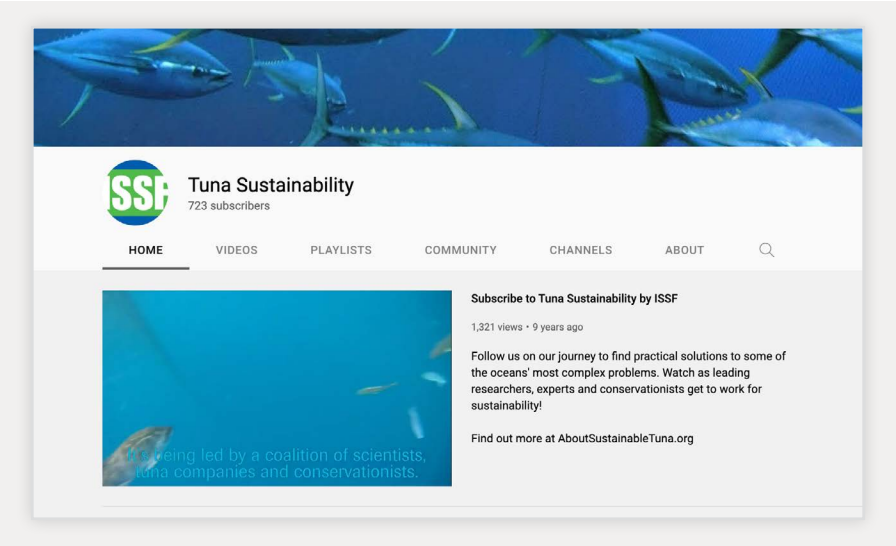
ISSF Facebook page:
facebook.com/TunaSustainability



ISSF Instagram page:
instagram.com/issf.official



ISSF Twitter page:
twitter.com/issf



ISSF YouTube page: youtube.com/user/TunaSustainability

ISSF PARTICIPATING COMPANIES

ISSF Participating Companies are tuna processors or traders (primarily purchasers of raw tuna for processing, or purchasers of raw tuna or finished tuna products for resale) that are members and associate members of the International Seafood Sustainability Association (ISSA).

The Participating Companies can purchase tuna only from vessels (and vessel-owning companies) that are compliant with the relevant ISSF Conservation Measures.

CONSERVATION MEASURES

To be compliant, **all PVR-listed vessels** must:

- Not appear on an IUU List
- Have an IMO number (when meeting IMO minimum requirements)
- Have a company policy prohibiting shark-finning (and provide proof of implementation)
- Not have a finning finding within 2 years
- Be on an RFMO authorized record, if required

- Be flagged to an RFMO member or Cooperating Non-Member (CNM)
- Not use large-scale pelagic driftnets

Longline vessels listed on the PVR also must:

- Ensure that their skippers are trained in best practices for tuna longline fisheries, as described above
- Be required by Company public policy on Longline best practices to implement (and provide proof of implementation):
    (a) the use of circle hooks and only monofilament lines (e.g., the use of wire trace is prohibited)
    (b) the use of whole finfish bait
    (c) best practice handling techniques for sharks, seabirds and marine turtles
    (d) no use of “shark lines” at any time

Chapter 2: **Bycatch Mitigation and Handling Best Practices**

INTRODUCTION

Bycatch and discards have become a serious issue for tuna fisheries, both because of their very real impact, particularly on sensitive species, and because of consumers' increasing awareness, which creates demand for sustainable seafood choices. In addition to bycatch being a major consideration for the tuna-buying public, RFMOs are increasingly concerned with taking an Ecosystem Approach to Fisheries Management (EAFM), which includes reducing the mortality of nontarget species.

The goal of this guide for longline tuna fisheries is to describe the "state of the art" in responsible fishing operations and also to review the reporting requirements and other obligations to RFMOs for the sustainable management of tuna and its larger marine ecosystem. This guide will help longline tuna fisheries involved in Fishery Improvement Projects (FIPs), seeking MSC certification, or MSC-certified fisheries designing client action plans to implement the most sustainable strategies at sea to achieve the standard requirements.

Most of the best practices and recommendations provided in the following sections relate to large industrial and semi-industrial vessels targeting tuna species, with lesser research attention given to small vessels and gear configurations and methods used in artisanal fisheries.

CHAPTER OBJECTIVES

1. **Provide basic information on species identification for bycatch species of most concern,** including turtles, seabirds, and sharks
2. **Summarize best practices for reducing the bycatch of species of concern**
3. **Detail techniques for the safe handling and release of bycatch**

Bycatch Mitigation and Handling in Tuna Longline Fisheries

It is well known that longline gear hooks a number of different species, depending on where and how the gear

is deployed. In some cases, many nontarget species (also known as bycatch or incidental catch) are caught. But by using some simple and inexpensive strategies to avoid the capture of nontarget or unwanted species, and knowing the proper techniques to release any that are caught, fishers can make longlining sustainable. A healthy ocean benefits us all.

It must also be noted that some "best practice" methods to mitigate bycatch might result in unintended conflicts across species from pelagic longlines. Priority improvements should be adopted after careful consideration of these potential conflicts, based on well-sampled data from every specific fleet. For all of the methods discussed below, be sure to have the crew prepared ahead of time. This includes having the right tools readily available at the time of haul, and instructing fishers about proper and safe techniques. ISSF has published on YouTube several bycatch-mitigation-technique videos for longline fishers, including on seabirds and sea turtles.

1. Sea Turtles

All sea turtles are protected internationally, as these long-lived animals face a number of environmental challenges (breeding ground destruction, boat collisions, ingestion of marine debris, disease linked to ocean pollution), including interactions with fishers. The most common names of sea turtles are used in the following section, although they can be named differently depending on the ocean.

There are seven species of sea turtles. The loggerhead (*Caretta caretta*), the green turtle (*Chelonia mydas*), the hawksbill (*Eretmochelys imbricata*), the olive ridley (*Lepidochelys olivacea*), and the leatherback turtle (*Dermochelys coriacea*) are distributed in temperate and tropical waters of all oceans.

The less common Kemp's ridley (*Lepdochelys kempi*) and the flatback (*Natator depressus*) have a restricted distribution to northwest Atlantic and shallow coastal waters of

Australia, respectively. However, the following five species are commonly encountered during tuna fishing, and Kemp's ridley is more occasionally found as bycatch in longline fisheries of the Atlantic Ocean.

Sea Turtle Identification

Each species of sea turtle has a few distinguishing features that will help fishers identify it. For example, different species have different numbers of prefrontal scales — the small, paired scale found behind a turtle's nostrils and between its eyes. A turtle's top shell (or carapace) can also have a different number of plates (or scutes) arranged in a unique pattern.

Leatherback turtle

Leatherback turtles are the easiest to identify, as they are the only sea turtle that does not have a hard shell. The shell is black with white spots, and the turtle has 5 to 7 ridges that run down its back. They can grow quite large – up to 1.8 m (6 ft) long and 680 kg (1,500 lbs). The leatherback populations of the Pacific are most at-risk for extinction.

Loggerhead turtle

Photo: NOAA

The **loggerhead turtle** has a wide, blocklike head, and four prefrontal scales (two pairs) between its eyes. Its top shell has 5 central plates going down its back, with 5 lateral plates on each side. They tend to be found in more temperate (subtropical) waters.

Olive ridley turtle

Olive ridley turtles are the smallest and one of the most commonly encountered sea turtles in pelagic, deep-set tuna longline fisheries. Its shell is gray-green, with 5 central plates, and 5 to 9 pairs of lateral plates (the other turtles will never have more than 5). They are more common in tropical waters.

Hawksbill turtle

Photo: Caroline Rogers, USGS

The **hawksbill turtle** is the most endangered species of sea turtle. It has a sharp, hawklike beak. This is the only turtle whose plates on its top shell overlap, like shingles on a roof. There are 5 central plates, and 4 side pairs.

Green turtle

Photo: Andy Bruckner, NOAA

Green sea turtles have just two prefrontal scales between their eyes, unlike the other turtles that have 4 or 5 scales. Despite their name, green sea turtles' smooth oval shells are a mix of colors (brown and yellow-green in younger individuals, and darker green in adults). They have 4 lateral plates on their shell. They are usually found in warmer waters.

Kemp's ridley turtle

Photo: Jereme Phillips, USFWS
www.fws.gov/bonsecour/

Kemp's ridley sea turtle is the smallest sea turtle species. Its head is triangular-shaped with a slightly hooked beak. A Kemp's ridley turtle's carapace is usually as wide as it is long, with olive-gray color. The front flippers have one claw, while the back flippers may have one or two.

Mitigating Turtle Bycatch

While there are many fishing methods and gear modifications that can reduce sea turtle interactions in longline fisheries, the following practices are known to be highly effective in reducing turtle bycatch without compromising the catch rates of target tuna species (Gilman et al., 2007; FAO, 2009a; Pacific Islands Regional Office, 2013):

- Use wide circle hooks (18/0 or larger for shallow-set fisheries).
- Use small, forage fish species (e.g., mackerel/opelu/saba/sanma), rather than squid or pieces of larger incidental bycatch, for bait.
- Set hooks deeper than turtle-abundant depths (>100 m).
- Use monofilament for the main line to reduce sea turtle entanglement and facilitate the release of sea turtles.

Circle Hooks

Wide circle hooks appear to reduce the capture of turtles if they are wider at their narrowest point than J-shaped hooks, tuna hooks, and teracima hooks, making it difficult for the circle hook to fit inside a turtle's mouth.

Furthermore, circle hooks are circular, with the point turned perpendicularly back toward the shank, less exposed in comparison to J or tuna hooks. Thus, if a turtle does bite a circle hook, they are less likely to be deeply hooked (where the hook is swallowed down the throat or pierces the roof of the mouth), making dehooking easier.

Lightly hooked turtles also have a greater chance of surviving than deeply hooked turtles.

From left, circle, J-shaped and tuna hooks, the 3 most common hook types used in pelagic longline fisheries.

Other Mitigation Methods

Turtles eat squid differently than they eat fish. With squid, they tend to swallow the whole animal in one gulp, whereas with fish they take several, smaller bites. For this reason, tuna fishing with squid-baited hooks captures turtles at a higher rate than fishing using mackerel or other baitfish, where turtles are more likely to eat around the hook instead of ingesting it.

If economically feasible, setting gear deeper than 100 m is a good way to avoid turtle interactions (as turtles tend to

prefer shallower water). There are several ways to set gear more deeply:

- Make the branch lines next to buoys longer, as those lines are effectively the shallowest set hooks.
- Leave a longer gap on each side of the buoy line before adding branch lines.
- Increase the length of buoy lines rather than having short buoy lines and longer branch lines (however, this may make it difficult for turtles and other air-breathing species hooked on these branch lines to reach the surface to breathe during the gear soak, so having branch lines longer than float lines is preferable for these shallowest hooks).

Other longline turtle bycatch mitigation methods that could reduce sea turtle bycatch include:

- Avoid the use of lightsticks or light-emitting devices on the longline gear.
- Shorter soak duration may reduce sea turtle bycatch and at-vessel mortality rates.

Best Practices Infographic

This infographic for fishers in English and Spanish highlights sea turtle bycatch-mitigation prevention, de-hooking, and release techniques, information which can also be found in Pacific Islands Regional Office (2022).

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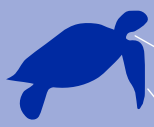
During
Hook Removal



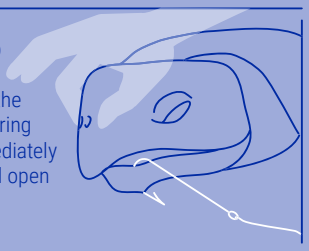
If the hook is in the mouth, always try to remove it.

If the hook is swallowed, do not attempt removal; it will only make injuries worse.

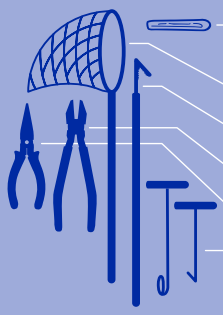
If the hook is external, remove it if easy; leave it if you do not succeed after 2 attempts.

To Open the Mouth

Place your thumb and index finger on both sides of the nostrils (not covering them). This immediately makes the animal open its mouth.

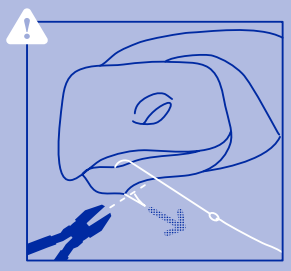


Essential Tools

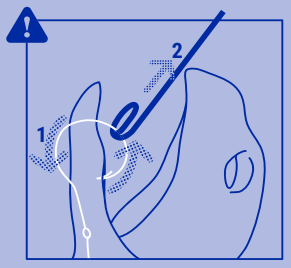


- mouth-gag (such as a piece of wood)
- net
- long-handled line-cutter
- wire-cutter
- pliers to grab the hook
- two type of de-hookers

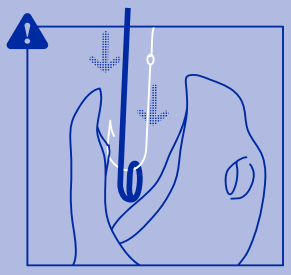
99%
of marine turtles captured by surface longlines are found alive by fishermen*



To reduce injuries: When possible, cut the hook prior to removal.



To remove a Circle hook: Rotate the hook, then pull out with the angle of the skin.



To remove a J hook: Push or Pull downward.

To learn more about sea turtle handling and hook removal, watch: https://www.youtube.com/watch?v=diRa7wAxW0Y

*Andraka, S., Mug, M., Hall, M., Pons, M., Pacheco, L., Parrales, M., Rendón, L., Parga,M.L., Mituhasi, T., Segura, A., Ortega, D., Villagrán, E., Pérez, S., de Paz, C., Siu, S.,Gadea, V., Caicedo, J., Zapata, L.A., Martínez, J., Guerrero, P., Valqui, M., Voguel, N.,2013. Circle hooks: developing better fishing practices in the artisanal longlinefisheries in the Eastern Pacific Ocean. Biol. Conserv. 160, 214–223

Examples of Hooked Turtles

Leatherback turtle hooked externally with a J hook

Photo: Pretoma

Turtle with a circle hook lodged around the commissure of the mouth, where the mandible joint is located

Photo: NOAA

Turtle with hook lodged in its mouth

Dehooking or Untangling a Turtle

Though avoiding sea turtles is preferable, fishers inevitably will encounter some hooked or tangled turtles. With a few tools, quick action, and some helpful techniques, they can ensure that the turtle has its best chance at survival.

As soon as you see a hooked or entangled turtle, bring the boat to a stop (if you are not stopped already) while releasing tension on the mainline. Using constant pressure, pull the branchline or main line in gently to bring the turtle alongside the vessel. Never use a gaff or other sharp object to handle a turtle.

You must make a decision about whether to bring the turtle on board, which will be influenced by the size of the turtle, the freeboard of your vessel, available tools, and the conditions at sea.

Gear removal is easier if a turtle can be brought on board, but if for size or safety reasons it is not practical to bring the turtle on board, assess the placement of the hook to decide if it is possible or not to remove the gear (i.e., whether it is a lightly /deeply ingested hook) using the appropriate long-handled dehooking device. If it is lightly ingested, use a long-handled dehooking device to dehook the sea turtle.

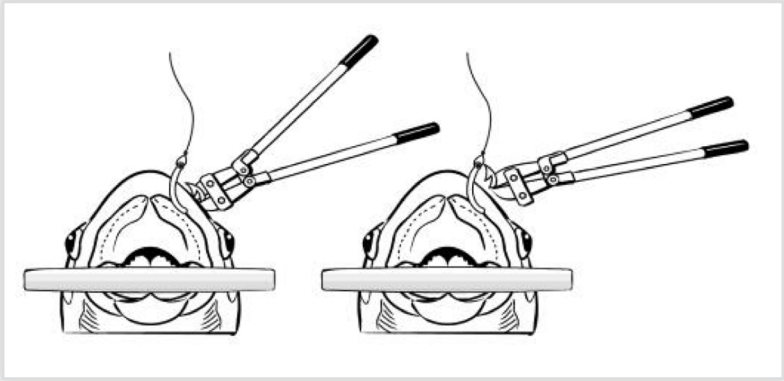
Do not pull on the line of a deeply hooked turtle; this will only cause further injury. Often, help from a crew member is needed to maneuver the turtle and operate the dehooker. If it is not possible to dehook the turtle, use long-handled line cutters to cut the line as close as possible to the animal.

Tools for Turtle Handling

Long-handled dehookers: for turtles that have lightly ingested a hook or are externally hooked (such as on a flipper) and cannot be brought on board. Dehookers minimize injury to hooked turtles and save you time rerigging your gear. If it is not possible to dehook the turtle, use long-handled line cutters to cut the line as close as possible to the animal.

Short-handled dehookers: to remove hooks in the mouth or external hooks entangled in a turtle.

Photo: Mariluz Parga, SUBMON



Bolt cutters, hand tools, and line clippers: for when you cannot or do not need to use a dehooker. Long-nosed ("needle-nosed") pliers are good for removing hooks that are only lightly embedded. Bolt cutters can be used to remove the barb or eye of a hook so that the remaining metal can be easily pulled out

Photo: www.WCPFC.int

Bolt cutters

Dip nets: use to bring small- and medium-size turtles on board.

Photo: D. Byron White, SCDNR, NOAA

(A) Tires: a good platform on which to set the turtle while dehooking, and a place to keep it safe and secure while it recovers on deck.

Photo: Paul Zoeller

(B) If you have no tire on board, you can use a coiled-up rope to stop the turtle from sliding up and down the deck.

Photo: Mariluz Parga, SUBMON

Mouth gags and openers: aid in the removal of lightly ingested hooks.

These prop a turtle's mouth open to allow the removal of hooks, line or both. They can include PVC splice couplings, a wooden brush handle, a hank of rope, or even a dog's chew toy.

Dehooking or Untangling Techniques in Water

Entangled Turtle in the Water

- Secure the loose hook with a long-handled device, such as a dehooker or gaff (but never gaff the animal itself).
- Cut the line with the long-handled line cutters as close to the hook as possible.

Entangled and Hooked Turtle in the Water:

- Use a long-handled dehooker or gaff to pull on the portion of line as close to the hook as possible.
- Pull the line into an inverted V-shape.
- Remove the hook using a long-handled dehooker.
- Cut away excess line to free the turtle.
- If dehooking is not possible, cut the line with the long-handled line cutters as close to the hook as possible, or bring the turtle on board.

Dehooking or Untangling Techniques on Board

Turtle Is Brought on Board

If you are able to bring a turtle on board, assess its general health and determine whether it is deeply or lightly hooked.

- When handling, do not lift the turtle by its flippers or use sharp objects (e.g., gaffs), or pull it by the line, to bring it aboard.
- Use a dip-net to bring the turtle aboard in high freeboard vessels. On smaller vessels, grab the animal from the carapace (both sides, or front and back) to bring it on board.
- An active turtle can be placed on a tire or similar platform to immobilize it.

For a lightly hooked turtle, use a dehooker and/or other hand tools like long-nosed pliers. You might also want to use a mouth gag or opener to prop the turtle's mouth open and allow room to remove the hook.

In order to open the mouth of a turtle, place your thumb and index fingers at both sides of the nose. This immediately triggers the opening of the mouth in turtles.

Dehooking Demonstration

If you are holding a mouth gag in your other hand, you can use this response to quickly place it at the commissure of the mouth to keep it open and easily check the mouth and the hook.

If you are holding the line in your left hand and the dehooker in your right, use the following procedures:

- Lay the dehooker on the line with the open end of the pigtail facing up.
- Pull the dehooker toward you to engage the line, and then turn the dehooker a quarter turn clockwise.
- Slide the dehooker down the leader until it engages the shank of the hook.
- Bring your hands together; make sure the line is tight and parallel with the dehooker.
- Give a slight thrust downward.
- Pull the dehooker out with the hook.

In the following "deep-hooked" situations, do not remove the hook, as doing so could cause more damage to the turtle than allowing the hook to remain in place:

- The hook is entirely swallowed.
- The hook's barb is not clearly visible.
- The hook is in the glottis (the opening at the back of the tongue that leads into the windpipe).

A video demonstration of dehooking is available on YouTube at https://youtu.be/Sy_ldZZ4wlU

- The hook could be in the braincase or roof of the mouth.

In these situations, and in other cases when the hook cannot be removed, use line cutters to cut the line as close to the hook as possible. Leaving line/leader trailing may cause further injuries and mortalities (e.g., line entanglement around flippers stopping blood supply and or digestive infections when the line is swallowed). If you can, use bolt cutters to cut the hook near the barb or the eye and then pull it out.

Remember — disentanglement at the earliest possible stage maximizes a turtle's chance at survival!

Turtle Recovery and Release

A newly dehooked and/or disentangled turtle may be stressed or exhausted by its ordeal. Thus, allow it to rest (for example, on a tire) for a few hours until it starts moving again before releasing it.

- Keep the animal at a temperature above 15°C (59°F) but never over 30°C (86°F).
- Also keep it moist (cover the body — but not nose and mouth — with a wet towel, or spray it periodically with water) and under shade when the temperature is above 24°C (59°F).

Turtle release in Alcantara, Cebu, Philippines

Photo: Steve De Neef

When you are ready to return the turtle to sea, take the following steps:

1. Check that there is no fishing gear in the water.
2. Bring the vessel to a stop.
3. Put the engine in neutral to disengage the propeller.
4. Ease the turtle into the water headfirst while holding it by the sides of its shell. If your vessel has a side door, releasing the turtle from the open door is a good option.

Do not drop or throw the turtle from a great height. Make sure the turtle is a safe distance from the boat before you reengage the propeller.

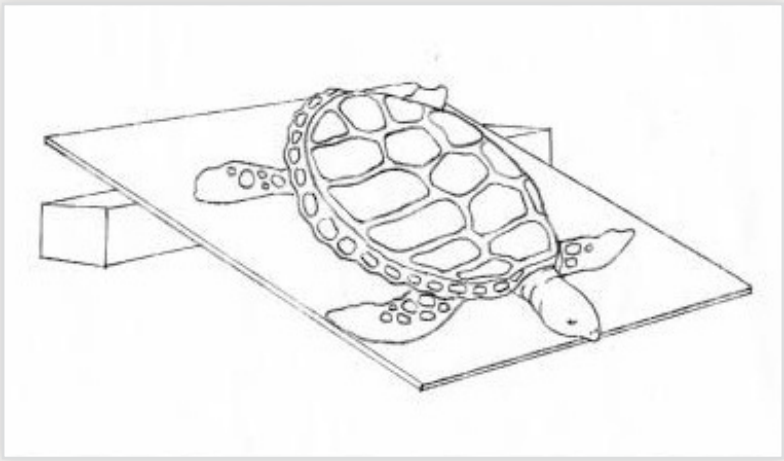
If the turtle appears unconscious (possibly due to entanglement underwater), place the turtle on a tilted surface so that its hindquarters are approximately 15 cm (6 in) higher than its head. This allows water to drain out of its lungs.

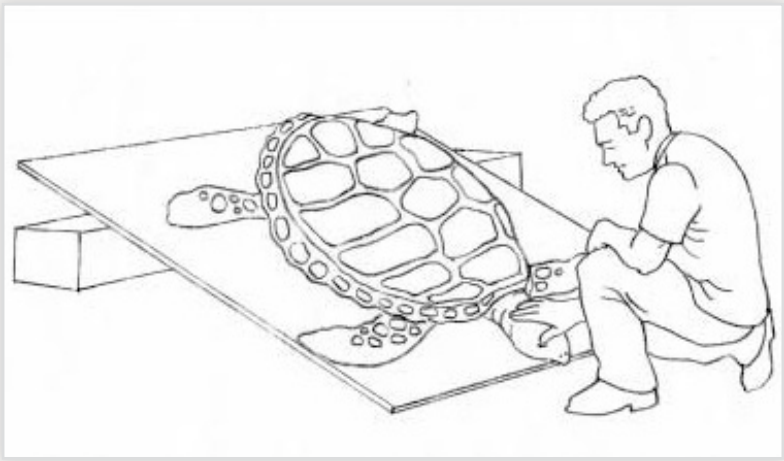
Never place an unconscious turtle on its back. The lungs in turtles are located immediately under the carapace. As a result, turning a turtle upside down will cause all the organs (stomach, intestines, liver, etc.) to fall over the lungs, preventing the animal's breathing.

Never place an unconscious turtle on its back.

Keep the animal moist (with a damp towel over its shell) if temperatures are over 24° C (75° F), or keep it inside if cold. Check the turtle's reflexes by touching its tail or eyelid every three hours.

Once the animal recovers and starts moving and breathing, release it gently into the water. An unconscious, but live, turtle may not react. If, after 24 hours, the turtle still shows no reflex reaction, it is likely dead.





If the turtle appears unconscious (possibly due to entanglement underwater), place the turtle on a tilted surface so that its hindquarters are approximately 15 cm (6 in) higher than its head. Check the turtle's reflexes by touching its tail or eyelid every three hours.

As a skipper, you are already familiar with handling tools and animals. But instead of landing fish, you can use this knowledge to ensure the survival of these vulnerable sea turtles.

2. Seabirds

Seabirds will try to steal bait from hooks on the line, ingesting the bait and ending up hooked. Many of the encountered seabirds are endangered. Those are two good reasons to try to avoid hooking birds.

This section will describe the measures most commonly recommended as effective at reducing seabird bycatch, the combinations of measures required by different tuna Regional Fisheries Management Organizations (RFMOs), and the areas in which these apply. This section will also briefly cover the types of seabirds, and the best techniques for dehooking and releasing birds (for more details, see FAO 2009b).

Commonly Encountered Seabirds

Commonly encountered seabirds include shearwaters, storm petrels, and boobies, but the birds that are affected most by longline gear are albatrosses and petrels.

Albatrosses and petrels can live for over 60 years and lay only one egg every one to two years. This means that seabird bycatch during fishing operations has a lasting impact on the population. They also generally mate for life, and one bird's death means that its partner may never reproduce again. There are 22 species of albatross; 15 are threatened with extinction, making them the most endangered group of birds in the world.

Albatrosses fly thousands of kilometers on a single feeding trip, mostly in cooler, higher-latitude waters including the North and South Pacific, the southern Indian Ocean and the south Atlantic Ocean.

Many albatross species travel across different oceans, and some complete circumnavigations of the world. But other seabirds are found in warmer waters or are specific to a region. In the next section, we cover the major types of seabirds.

Identifying Seabirds

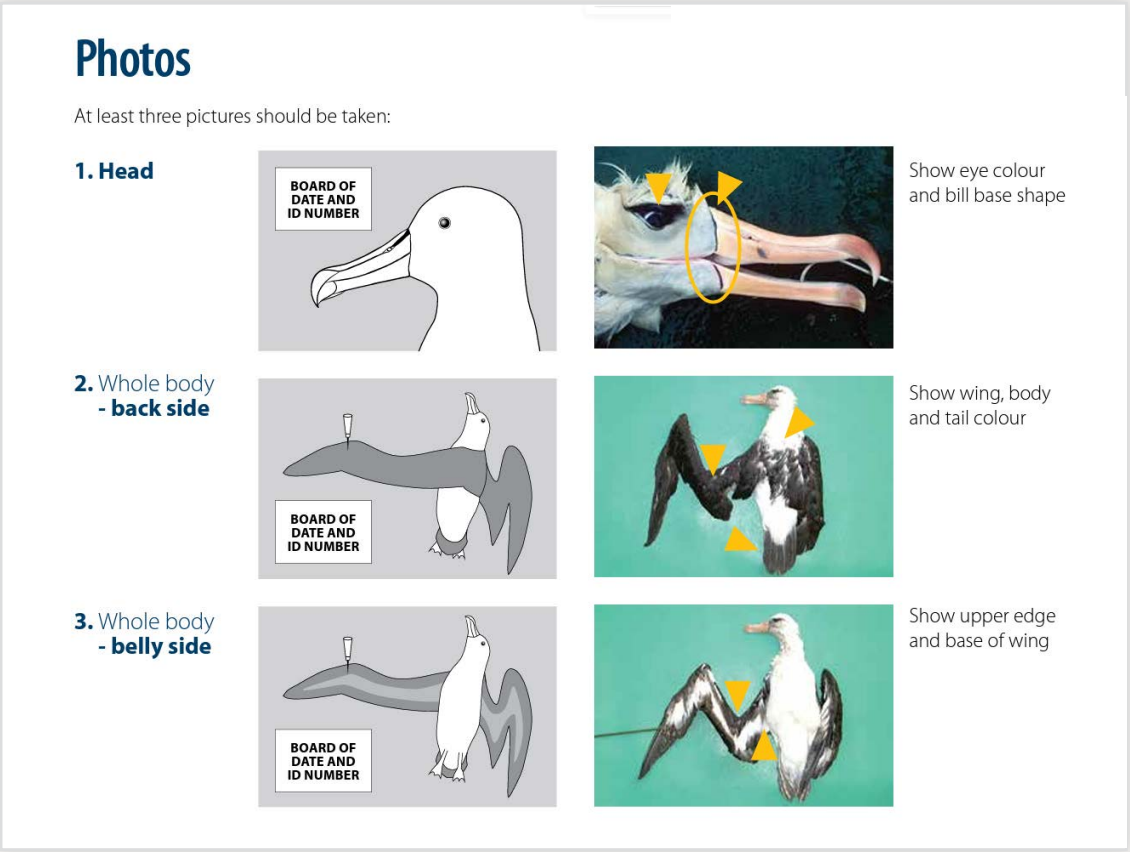
Although it is difficult to identify seabirds at the species level without experience, it is important to at least attempt to identify any seabirds you accidentally catch. To do so, use the ACAP Seabird Bycatch Identification Guide (which is available in several languages).

If you are unable to identify them at the species level, then record them to group level — for example, great albatross, petrel, etc. Take photographs to include with the data to be reported to the national authorities or corresponding RFMO.

See the instructions below, taken from the ACAP Seabird Identification Guide, for how to photograph bycaught seabirds. If possible, also take a few feathers (pluck them out; do not cut with scissors) to send for testing to determine the species.

ACAP has a **Seabird Bycatch Identification Guide** to assist fishers and observers with seabird identification.

It is available in English, Chinese, Traditional Chinese, Portuguese, French and Spanish at www.acap.aq/bycatch-mitigation/seabird-bycatch-id-guide



ACAP Seabird Bycatch Identification Guide

Seabird Species

Wandering albatross

Photo: Dimas Gianuca, Projeto Albatroz

Great Albatrosses: The great albatrosses comprise several species including the largest of all flying birds, the Wandering Albatross. The wingspan of these birds surpasses 3.5 m (11.5 ft), and the bird can weigh over 9 kg (20 lbs.). The great albatross group is found across the southern oceans, particularly south of 30°S but also farther north in cold water currents off the coast of Chile and southwestern Africa. Great albatrosses are typically white birds with black upper wings. Older birds are generally whiter. It is very difficult to distinguish the different great albatross species, so if you are unsure, then record them as 'great albatross' and take photos. More information can be found in the ACAP Seabird Identification Guide.

Black-browed albatross

Photo: Oliver Yates, BirdLife International

Mollymawks and Sooty albatrosses: This group includes all of the albatross species other than those in the Great albatross group. In general, they are smaller than the great albatrosses, but are still very large birds, with wingspans of around 2 m (6.5 ft) and weigh about 3-4 kg (8 lbs.). Many species are distributed across the southern seas, with three species in the North Pacific.

White-chinned petrel

Photo: Oliver Yates, BirdLife International

Petrels and Shearwaters: Petrels and shearwaters are a diverse group of seabirds. Many species travel vast distances on annual migrations. In contrast to the albatrosses and petrels, which tend to migrate east and west following air currents in temperate waters, some shearwaters migrate north to south, from pole to pole, such as the short-tailed shearwater in the Pacific. Some species have a wingspan of around 1 m (3.3 ft) and weigh as much as 1.4 kg but typically less than 1 m and 1 kg (2.2 lbs.). All species have a tube (fused nostrils) along the top of the bill. Many species are totally dark, while others have a mix of gray and white feathers.

Southern giant petrel

Photo: Oliver Yates, BirdLife International

Giant petrels: There are two species of giant petrels, which are as large as the mollymawks and can weigh as much as 5 kg (11 lbs). These large petrels have a prominent, large tube on the top of the bill and are dark colored, with gradually lighter gray shading as they age. There is a white version found in about 10 percent of the population. Giant petrels are scavengers and will go after offal (fish parts such as heads and guts) discards. They are found in the Southern Ocean (typically below 30°S).

African penguins

Photo: John Paterson, ATF Namibia

Penguins: Penguins are flightless seabirds. They are unmistakable at sea, typically surfacing only for short periods before diving again. They are found in the Southern Ocean and also around South Africa, southern Australia, New Zealand, and the coast of South America.

Gull

Photo: Luis Cabezas, ATF Chile

Gulls: Gulls are typically associated with coastal waters and have broader wings than petrels. Gulls lack the tubes on the bill that albatrosses and petrels have.

Storm petrel

Photo: JJ Harrison

Storm petrels: Storm petrels are the smallest of the seabirds, weighing only 50 g (1–2 oz) or so, and can be found across all oceans. Storm petrels have dark coloring above and white or dark below, often with a white rump. These little birds flutter just above the sea surface with their long legs dangling in the water as they filter-feed on small plankton, organic particles, and oil droplets.

Gannet

Photo: John Paterson, ATF Namibia

Boobies and gannets: Boobies and gannets are medium-sized seabirds with extremely pointed heads and bills, heavy bodies, wedge-shaped tails, stout legs, and long, slender wings. These birds perform impressive plunging dives from great heights to capture small fish near the surface. These birds are found mainly in tropical and subtropical waters, and also lack tubes on the bill.

Skua

Photo: Dimas Gianuca, Projeto Albatroz

Skuas: Skuas are similar to gulls in appearance, but larger, and have dark feathers with white patches on the wings. These birds can be found far out to sea but typically in lower numbers than the petrels and albatrosses.

Seabird Bycatch Mitigation Measures

All five tuna RFMOs have established requirements for longline fishing vessels to use a combination of bycatch reduction measures in areas overlapping with albatross and petrel distribution to reduce the number of birds killed accidentally as bycatch.

The simultaneous use of different seabird bycatch mitigation measures (e.g., weighted branch lines, bird-scaring lines, night setting, and others) depending on the ocean/region is considered best practice and is the most effective approach to mitigate seabird bycatch in pelagic longline fisheries (ACAP, 2021; Løkkeborg, 2011).

Latitude Considerations

In addition to helping to reduce the bycatch of seabirds, these techniques can also help to minimize bait loss and ensure that baited hooks are available to the target species. In higher latitudes of the southern Indian (25ºS), southern Atlantic (25ºS) and SW Pacific oceans (30ºS), longline vessels must use two of the following seabird bycatch mitigation measures:

- **Bird-scaring lines** (also known as streamer lines or tori lines) — consisting of a line with streamers, towed as a scaring device over the area behind a vessel where sinking baited hooks are within range of diving seabirds, and attached to a tori pole (boom) at the vessel's stern
- **Weighted branchlines.** When weight is added close to the hook on a branchline, the baited hook sinks faster and reduces the time that seabirds can access it.
- **Night setting.** Setting all hooks between nautical dusk and nautical dawn avoids birds' feeding activity on baited lines.

ICCAT

Moreover, in ICCAT, longline vessels are also required to use a bird-scaring line between 20ºS and 25ºS. And in the WCPFC, longline vessels can use a hook-shielding device south of 30°S instead of two of the above measures. In the WCPFC, between 25ºS and 30ºS, longline vessels must use one of the following seabird bycatch mitigation measures: (i) weighted branch lines; (ii) tori lines; or (iii) hook-shielding devices.

WCPFC and IATTC

North of 23ºN in the Western Pacific Ocean (WCPFC) and north of 23ºN and south of 30ºS in the Eastern Pacific area (IATTC), longline vessels must also use two seabird bycatch mitigation measures from a wider selection that includes side-setting with bird curtains, night setting with minimum deck lighting, bird-scaring lines, weighted branch lines, hook-shielding devices (from which at least one should be used) and blue-dyed bait, offal management, underwater setting chute and line shooter.

Avoiding certain areas (possibly at certain times) is also a potential strategy for avoiding the incidental capture of seabirds.

ACAP and ISSF Advice

Moreover, the Agreement for the Conservation of Albatrosses and Petrels (ACAP) publishes up-to-date Best Practice Seabird Bycatch Mitigation advice based on the latest scientific data. This information is used to inform the tuna RFMOs on what mitigation measures should be adopted.

In the following sections, these seabird mitigation best practices as well as other possible mitigation measures are described in more detail.

ISSF recommends simultaneously using the three mitigation measures described above as best practice to reduce seabird bycatch, or using hook-shielding devices or an underwater baiting setting device as a standalone measure.

Bird-Scaring Lines

A bird-scaring line (BSL), also known as tori line or bird streamer line, is a line (often 100 meters long) that is towed from a high point near the stern. On the BSL, brightly colored streamers are suspended at regular intervals to deter birds from reaching the baited hooks and sinking baits, dramatically reducing seabird attacks and bycatch. The streamers flap as the vessel pitches and rolls, and this deters the birds from flying near the stern of the vessel.

It is recommended to attach BSLs to the vessel with a barrel swivel to reduce rotation of the line from torque created as it is dragged behind the vessel, and to attach long streamers with a swivel to prevent them from rolling up onto the BSL. The bird-scaring line is most effective when the streamers are flapping directly above the baited hooks.

- The wind must be taken into consideration; if crosswinds blow the streamers to the side of the longline, then the baited hooks are exposed to the seabirds.
- If feasible, the most effective setup is to fly two tori lines, one to port and one to starboard of the baited hooks.
- It is also recommended to attach the BSL to the vessel with a weak link to allow it to break away if it is tangled with the main line. In this case, a secondary attachment between the bird-scaring line and the vessel is recommended that will allow recovering the tangled BSL during the haul.

Given the operational differences in pelagic longline fisheries by vessel size and gear type, ACAP bird-scaring line specifications are different for vessels greater than 35 meters overall length (LOA) and those less than 35 meters in LOA.

Bird-scaring lines

Photo: Sebastian Jimenez, Albatross Task Force, Uruguay

Recommendations for Vessels ≥ 35 m (≥ 114.83 feet) Total Length

The use of two BSLs simultaneously, one on each side of the sinking longline, provides maximum protection from bird attacks under different wind conditions. It is recommended to install BSLs as follows:

- To achieve the minimum recommended aerial extent of 100 m (328.08 feet), they should be attached to the vessel suspended from a point a minimum of 8 m (26.24 feet) above the water at the stern.
- They should contain a mix of brightly colored long and short streamers placed at intervals of no more than 5 m (16.40 feet). Long streamers should be attached to the line with swivels and should reach the sea surface in calm conditions.
- Baited hooks should be deployed within the area bounded by the two BSLs. If large vessels use only one BSL, it should be deployed windward of the sinking baits. If baited hooks are set outboard of the wake, BSL vessel attachment point should be positioned several meters outboard of the side of the vessel where the baits are deployed.

Recommendations for Vessels < 35 m (< 114.83 feet) Total Length

On these vessels, two BSL designs have proven effective:

- A design with a mix of long and short streamers, with long streamers placed at 5 m (16.40 feet) intervals over at least the first 55 m (180.44 feet) of the BSL
- A design with only short streamers (no less than 1 m (3.28 feet) in length) placed at 1 m (3.28 feet) intervals along the length of the aerial extent

In both cases, streamers should be brightly colored. To achieve a minimum recommended aerial extent of 75 m (246.06 feet), they should be attached to the vessel and suspended from a point a minimum of 8 m (26.24 feet) above the water at the stern.

Deploying a Bird-Scaring Line

Videos about deploying a bird-scaring line are available on YouTube:

- Tori lines: Mitigation measures in the commercial fishing industry
- Saving Albatrosses - How to Reduce Seabird Bycatch - Tuna Longline Fisheries - English
- ISSF Guidebooks - Seabirds II

Night-Setting

Since many seabirds, including the vulnerable albatross, do not feed at night, you can minimize interactions by setting your gear then. Night-setting involves starting to set gear after nautical dusk and finishing setting before nautical dawn.

Deck lighting should be kept to a minimum; use only as much vessel light as you need to comply with navigational rules and best safety practices.

Be aware that night-setting is less effective on clear nights with a full moon.

Night setting

Photo: Ricardo Hoinkis, Projeto Albatroz

Weighted Branchlines

When weight is added to a branchline, the baited hook sinks faster and reduces the time that seabirds can access it. This is commonly done using weighted swivels on the branchline.

Best Practice line weighting recommended by ACAP is to have at least 40 g (1.41 oz.) within 0.5 m (1.64 feet) from the hook, at least 60 g (2.11 oz.) within 1 m (3.28 feet) of the hook, or at least 80 g (2.82 oz.) within 2 m (6.56 feet) of the hook. RFMOs have not adopted the most recent scientifically backed evidence on line weighting yet, and have a lesser requirement of at least 45 g (1.58 oz.) within 1 m (3.28 feet) of hook, at least 60 g (2.11 oz.) at less than 3.5 m (11.48 feet) from hook, and at least 98 g (3.45 oz.) at less than 4 m (13.12 feet) from the hook. In the SW Pacific, there is also the option of making one weight greater than or equal to 40 g (1.41 oz.) within 50 cm (1.64 feet) of the hook.

Some fishers have expressed a reluctance to use leaded swivels due to safety concerns, as weighted swivels could cause serious injury if they recoil back at the crew in the event of a line breakage. By employing “safe leads,” which are designed to slide off the branchline in the event of a breakage, this risk can be minimized.

Weighted branchlines

Photo: Sebastian Jimenez, Albatross Task Force, Uruguay

Line Weighting Smart Gear Prize

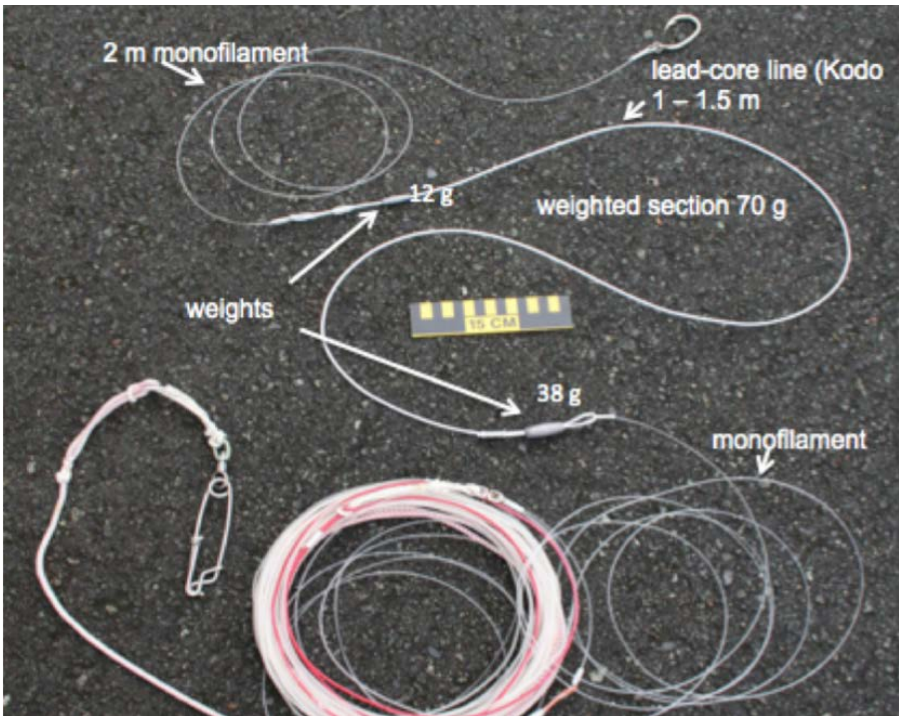
Kazuhiro Yamazaki, Fishing Master of the F/V Fukuseki Maru No 5, won the 2011 Smart Gear award for developing an effective way to weight the line while ensuring crew safety if a hook comes free while under tension during landing. When tested against unweighted branchlines, this "double-weighted" configuration reduced the incidental catch of seabirds by 89 percent with no effect on fish catch rates.

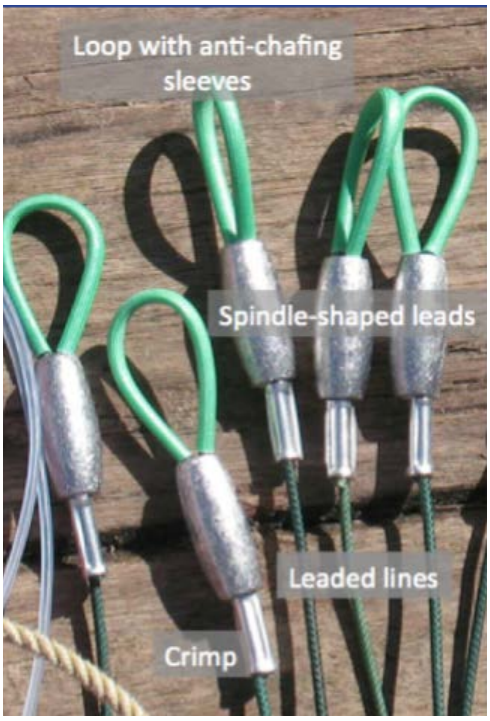
How to Build the Yamazaki Double-Weighted Branchline

The double-weighted branchline is simply a weighted section of line that is inserted into the branchline 2 m above the hook.

Materials Needed

- 2 spindle-shaped leads per branchline
- Lead core line or wire — as heavy as is practical
- Crimping tool and crimps
- Scissors or knife
- Anti-chafing sleeves matching the diameter of lines used





Creating the Weighted Section

Cut 1 to 1.5 m lengths of weighted line. Use either wire or coated, monofilament lead core line (Kodo).

Slide the spindle-shaped lead onto the weighted line, and bend the end of the weighted line into a loop. Slide the spindle-shaped lead over the tail of the loop. Note: The hole running through the spindle-shaped lead should be twice the diameter of the weighted line to allow room for the weighted lines to be inside the lead. Crimp the tail of the loop below the weight. This fixes the position of the weight above the crimp and below the loop.

Repeat this process on the other end of the weighted line, but place the second spindle-shaped lead below the crimp, allowing the spindle-shaped lead to slide the full length of the weighted line.

Inserting the Weighted Section into a Tuna Branchline

Cut the monofilament of an existing branchline 2 m above the hook, and create loops using crimps on both ends created by the cut. Insert the weighted section between

the cut sections of the branchline using the loops to secure them. Pull knots tight and smooth to minimize tangles with the monofilament.

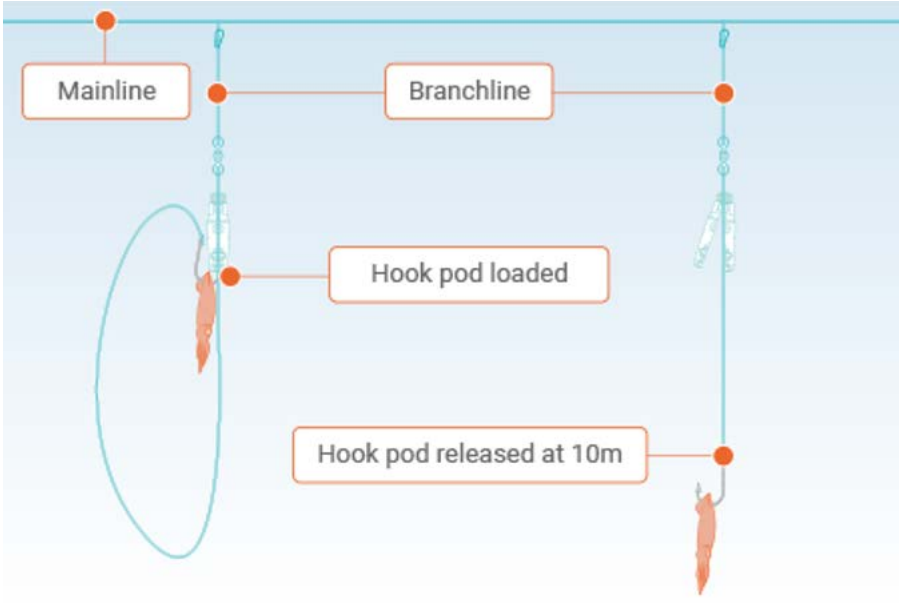
Tips

- The loops should be as small as possible to tie the sections together. If the loops are larger than necessary, they can be a source of tangles.
- The weighted section should weigh a minimum of 60 g. The heavier the weighted section, the faster and closer to the boat it will sink, making bird-scaring lines easier to manage. Fishers should consider this configuration a starting point for innovation — more than two leads? Heavier leaded line? Or both?
- If using wire for the weighted section, consider placing an anti-chafing sleeve inside the loop to minimize abrasion with the monofilament.

Hook Shielding Devices – the Hookpod

The Hookpod-LED and Hookpod-mini devices are polycarbonate capsules that encase the point and barb of baited pelagic longline hooks to prevent seabirds from becoming hooked and drowning during line-setting operations. A research project testing hookpod effectiveness has demonstrated that it does not negatively affect the catch rate of target species (Sullivan et al., 2017).

See this video for an introduction to Hookpods



Hookpod working diagram
www.hookpod.com

Both the Hookpod-LED and the Hookpod-mini have been included on ACAP's list of best practice measures for mitigating seabird bycatch in pelagic longline fisheries (ACAP, 2021) and are currently being used by various commercial longline fisheries in Brazil, South Africa and New Zealand. Currently the only RFMO permitting the use of Hookpods is the WCFPC, in which case it can be used as a standalone measure.

Underwater Bait Setting Devices

Underwater Bait Setting devices deploy baited hooks individually underwater down along a track installed on the transom of the fishing vessel enclosed in a capsule or similar device to eliminate any visual stimulus to seabirds following the vessel.

The capsule is submerged underwater at a predetermined target depth that can be adjusted in response to the dive capabilities of seabirds around the vessel during line setting to prevent interactions.

Other Measures

Note that the measures described below are generally not permissible for use in all of the RFMOs, so you should check which areas they apply to before using as a mitigation measure.

Management of Offal Discharge

North of 23ºN in WCPFC and IATTC areas, vessels may use offal management as one of the seabird bycatch mitigation measures. Vessels should ensure there is no offal discharge during setting, and during hauling they can continue to not discharge offal, or use strategic offal discharge from the opposite side of the boat from setting/hauling, to actively encourage birds away from baited hooks.

However, available scientific evidence indicates that vessels that use strategic offal discharge during setting may have higher seabird catch rates relative to vessels that do not (Gilman et al, 2021). Therefore, ACAP's seabird bycatch mitigation best practices do not recommend strategic offal discharge during setting of the longline (ACAP, 2021).

Of course, if there are no seabirds present, offal discharge management is not necessary. If you intend to use this technique, remember to keep enough offal on hand between the set and the haul.

Strategic offal discharge

Side-Setting

Unlike traditional stern setting, setting off the side of the vessel (at least 1 meter forward of the stern, or more if possible) reduces the time that baited hooks are near the surface and visible to seabirds.

By tossing the baited hook forward and close to the hull, under the protection of a bird curtain, the hope is that by the time the baited hook has passed the stern, it has sunk beyond the reach of the birds.

Another advantage of side setting is that it requires only one work area, and eliminates the chore of moving gear and bait between setting and hauling stations. Tests in the North Pacific have recommended using side-setting in combination with other mitigation measures.

However, side-setting has not been tested in Southern Hemisphere fisheries, and hence it is not currently recommended in these areas.

Bird-Curtains

Bird curtains during haulback and during setting in combination with side-setting could reduce longline seabird bycatch risk.

Dye Baits

The WCPFC and IATTC currently have blue-dyed bait as a mitigation option in some areas, with the idea that bait might be more difficult to find if seabirds' ability to visually identify bait is impaired. Dyeing bait blue so that it is hard for them to see against the water may therefore reduce bait loss and seabird bycatch (Boggs, 2001). However, ACAP does not recommend dyed bait as a mitigation measure, as testing results have been inconsistent across studies and available data shows this may only be effective using squid as bait (ACAP, 2021).

ACAP does not recommend dyed bait as a mitigation measure.

Handling and Release of Hooked and Entangled Birds

Most seabirds are caught during line setting and are therefore dead by the time gear is hauled. However, if you discover a live seabird on the line, release the tension on your mainline by slowing your vessel to a stop. Ease the bird to the side of the vessel by steadily bringing in the line. Do not make sudden jerks. It is recommended to carry out and use a long-handled dip net to bring the bird on board.

Seabirds can be quite large and will bite, so gloves, eye protection, long sleeves and the help of a crewmember are all useful to have. The following are helpful tips for the correct way to hold a bird:

- Hold it behind the head at the top of its neck.
- Fold the feathers and wings back into their natural position against the body.
- Do not accidentally restrict its breathing by covering its nostrils or squeezing the body too tightly.
- Cover its body with a clean towel (without any sign of oil or petrol) to protect the bird's feathers from oils and other things that could damage it during handling.

Seabird Dehooking

A video about seabird dehooking is available on YouTube at youtu.be/eLK1BPV_Wic

Or check ACAP Guidelines on how to dehook a bird at www.acap.aq/bycatch-mitigation/hook-removal-from-seabirds-guide

Hook Removal and Seabird Recovery

How to CORRECTLY hold a bird

Photo: John Paterson, ATF Namibia

How NOT to hold a bird

Photo: Juliano Cesar, Projeto Albatroz

Hook Removal Techniques

If the bird is lightly hooked in the bill, leg or wing, and you can see the barb of the hook, you should remove the excess line, cut off the barb with bolt cutters, and then back out the rest of the hook. If the hook cannot be broken because it is large/wide, remove the line from the hook eye, and pull from the point of the hook, rather than the other way around.

Hooked bird

Photo: Dimas Gianuca, Projeto Albatroz

If the bird is deeply hooked in the body or throat (that is, you cannot see the barb), cut the line as close to the hook as possible, leaving the hook in the bird. Removing a deeply embedded hook can cause more harm than good. Never try to pull on the leader to remove a hook.

Bird Recovery and Release

A bird's feathers must be dry for it to fly properly, and it can take between 30 minutes and 4 hours for them to dry when wet. A cardboard box with a dry and clean towel or blanket is a good place for the bird to rest and recuperate before being released. Do not give the bird food or water.

To assess the bird's health, note that a fully recovered bird can:

- Stand on its feet
- Hold its head up
- React to sound
- Breathe without making noise
- Retract its wings into a normal position against its body

Bird in recovery box

Photo: Bronwyn Maree, ATF South Africa/ BirdLife South Africa

To release a bird, stop the vessel and set the bird on the water's surface. If the freeboard is high, drop the seabird into the water. Do not throw it into the air. Wait until the bird is clear of the vessel before reengaging the motor.

Seabird Interactions and Best Practices

If you encounter a banded (tagged) bird, record its number, the time and place of its capture, and note the mitigation measures that were employed at the time. This information can help scientists evaluate which mitigation measures are most effective.

Remember that seabirds, and albatrosses in particular, are highly vulnerable bycatch species.

- For albatrosses in particular, the actions you take to avoid their capture and to release them if they are caught are critical to their long-term survival.
- They mate for life and produce only a single egg every one to two years. If one member of a pair is killed, the other cannot raise the chick alone.
- The loss of one adult can lead to the loss of a chick and any future chicks from the pair.

Take the time to do your part to keep this part of the marine ecosystem healthy.

ACAP Best Practice Guide

For a more comprehensive and up-to-date compilation of seabird bycatch mitigation handling techniques and recommendations, refer to ACAP´s Review and Best Practice Advice for Reducing the Impact of Pelagic Longline Fisheries on Seabirds, which can be downloaded here: www.acap.aq/bycatch-mitigation/mitigation-advice/3956-acap-2021-pelagic-longlines-mitigation-review-bpa/file

3. Sharks

Globally, pelagic longlining has the highest rate of shark catch (as a target and nontarget species) of any fishery. Most shark species are quite vulnerable to this practice, since several aspects of their biology make them highly susceptible to overfishing, including (i) slow growth rates, (ii) late maturation, (iii) long pregnancies, (iv) low fertility, and (v) long lifespans.

Millions of sharks are caught with longline gear every year. It is increasingly evident that at least a few of these species are in steep decline because of this intense fishing pressure: despite increases in effort, catches are decreasing, and those individuals that they are catching are smaller in size. One of the reasons why data collection about longline shark bycatch is important is that it allows scientists to determine which stocks are healthy and which require additional measures to ensure that they remain a functional part of the marine ecosystem.

There are a few simple actions that you can take to reduce the incidental catch of sharks, and fewer hooked sharks mean more open hooks for tuna and less time spent struggling with sharks during hauling. We will briefly review the most commonly encountered sharks, effective ways to avoid catching sharks, and how to handle and release them when they are caught.

Commonly Encountered Sharks

Though the species of sharks that are encountered during pelagic longline tuna fishing can depend on your location and the time of year, these are some of the most commonly seen sharks.

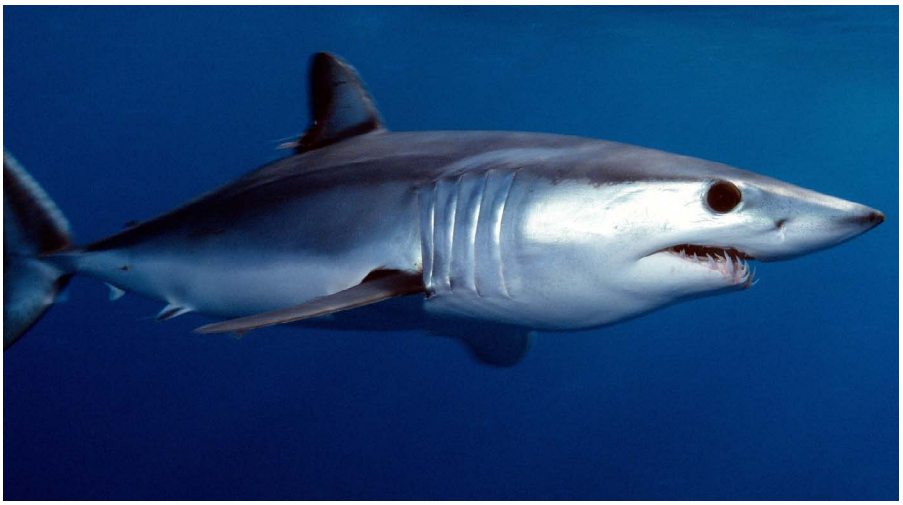
Silky shark

Photo: Fabian Forget, ISSF

Silky shark: Silky sharks have a smooth brownish body, with a white underside. The pectoral (side) fins are much closer to the head than the dorsal (top) fin, which has a spine at its base. A ridge runs from the dorsal fin to the tail. The underside of the otherwise white pectoral fins has a dark gray tip.

Oceanic whitetip shark

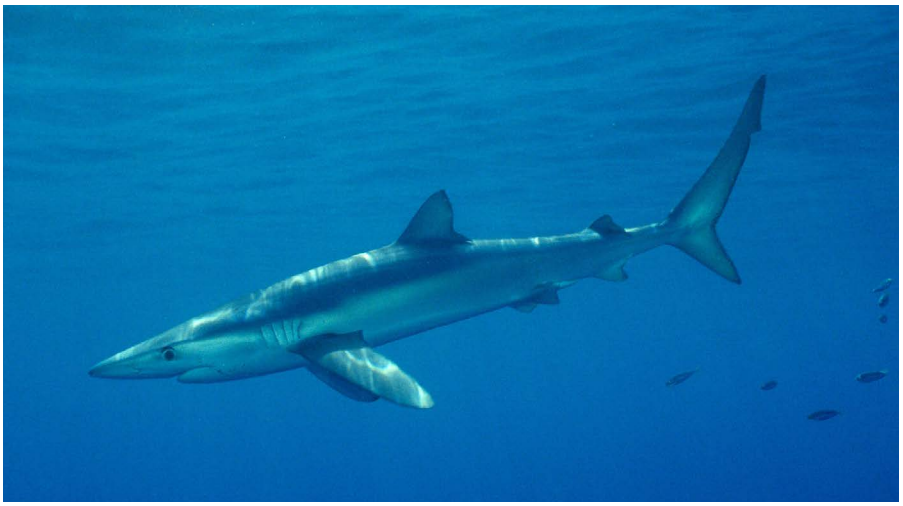
Oceanic whitetip shark: This shark has a large and rounded dorsal (top) and pectoral (side) fins that are white at the tips. It can have black marks on the ends of its other fins. Its head looks flattened, with a rounded snout. The body is mostly brown with a white underbelly.



Shortfin mako shark

Photo: Jeremy Stafford-Deitsch, IUCN

Shortfin mako shark: Shortfin makos have a pointed, cone-shaped snout with long gill slits behind the head. The teeth are long and exposed, without serrations. The body is a dark, deep blue on the back, with a white belly. The pectoral fins are shorter than the head is long. There is also a longfin mako, and its pectoral fins are as long or longer than the length of its head.



Blue shark

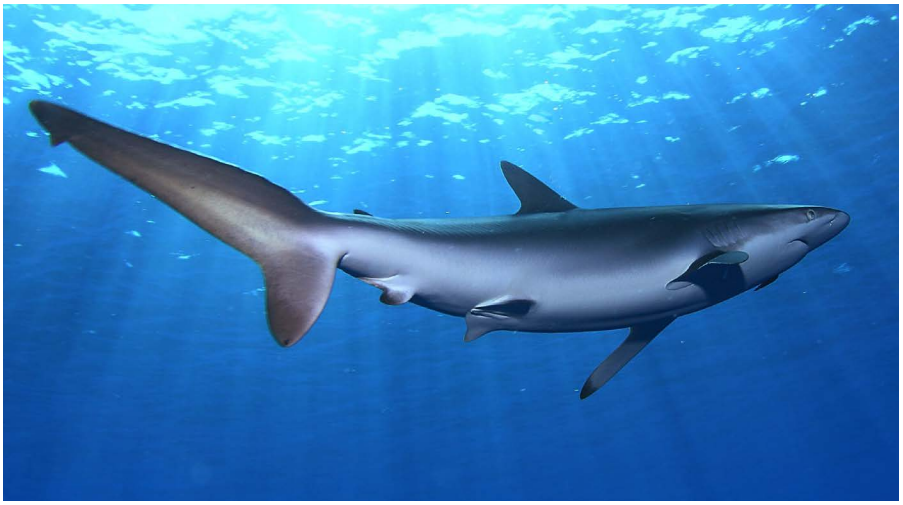
Photo: Jeremy Stafford-Deitsch, IUCN

Blue shark: The blue shark has a long, slender, soft-looking body, with a long and pointy snout. The top of its body is a deep and pearly blue that fades to white on its sides.

Common thresher shark

Photo: Pfleger Institute of Environmental Research

Common thresher shark: This is the largest and most common of the three thresher shark species, with a length up to 6 m (20 ft), half of which is composed of the long upper section of the tail fin. With a streamlined body and short pointed snout, the common thresher resembles (and is often confused with) the pelagic thresher. The common thresher's white belly extends in a band over the bases of its pointed pectoral (side) fins, while the pelagic thresher has a dark blue-gray color at the base of its pectoral fins.



Pelagic thresher shark

Photo: Fabian Forget, ISSF

Pelagic thresher shark: Though similar in appearance to the common thresher, the pelagic thresher is smaller (3 m/10 ft). The body is an intense dark blue above and white below; the white does not extend above the pectoral fins. This color rapidly fades to gray after death. The dark coloring above

the pectoral fins and the rounded pectoral fin tips distinguish this shark from the common thresher.

Bigeye thresher shark
Photo: NOAA

Bigeye thresher shark: The body looks similar to the pelagic thresher, though the bigeye thresher's upper tailfin is not as long. Unlike the pelagic thresher, however, the bigeye has an unusual groove that runs from the top of the head to above the pectoral fins, and its prominent eye socket extends to the top of the head.

Shark Bycatch and RFMOs

All five tuna RFMOs have established some requirements for longline fishing vessels to reduce shark bycatch. For example, all tuna RFMOs prohibit the practice of shark finning, require the application of best practices for shark safe release, and prohibit the retention of particular shark species depending on the Ocean.

Some tuna RFMOs require landing the sharks with fins naturally attached. Others require longline vessels targeting tuna and billfish to choose between either not using wire trace as branch lines, shark lines, or both, depending on the area.

Shark Finning

Shark finning is the practice of retaining shark fins and discarding the remaining carcass while at sea. The practice is against the FAO Code of Conduct for Responsible Fisheries and its International Plan of Action for the Conservation and Management of Sharks, as well as the resolutions of a number of other international marine bodies including the tuna RFMOs, all of which call for minimizing waste and discards.

There are major uncertainties about the total quantity and species of sharks caught, and shark finning has added to this problem.

While there are several strategies for shark bycatch mitigation currently being promoted, RFMOs have not advocated the use of one mitigation measure over another. Here we list some of the techniques that have been shown to be effective in reducing the catch of sharks.

ISSF Conservation Measure 3.1 has called on the fishing industry to adopt policies prohibiting shark finning and to land sharks with fins naturally attached, if retained. All tuna fishery operators should prohibit shark finning, and should retain, land, and report all sharks caught with fins naturally attached, except for species that are prohibited by national law or RFMO regulations, or those individual sharks that are released alive.

Shark Bycatch Mitigation Measures

Hooked shark
Photo: NOAA

Fish Bait

Sharks appear to favor squid over fish as bait, as indicated by both scientific trials and reports from fishers (Gilman et al., 2008). Using fish bait, such as mackerel, can reduce

shark catch rates considerably, particularly for blue sharks. Remember that to reduce turtle catch, the use of fish bait is also recommended, so now you have two good reasons to consider using fish instead of squid as your bait.

Circle Hooks

A structured review of scientific research (i.e., meta-analyses of all accumulated research findings) has found that shark catch rates are higher on circle hooks relative to J-shaped hooks, but there are lower at-vessel mortality rates (Gilman et al., 2016; Reinhardt et al., 2017).

This is because animals caught using circle hooks are not hooked as deeply, are less likely to suffer internal injury, and therefore have a higher likelihood of survival. In fisheries where sharks are not retained, there will be a higher shark fishing mortality on circle hooks. However, the benefit of very large reductions in marine turtle catch rates on wide circle hooks may outweigh the tradeoff of increased shark mortality.

Set Depth

Shark bycatch rates are significantly higher on shallow-set longlines than deeper-set (deeper than 100 m) longlines. Some studies have found shark bycatch rates with shallow-depth hooks to be 3 to 10 times higher than the rate of bycatch with deeper-set hooks (Beverly and Robinson, 2004; Beverly et al., 2003).

Nylon Leaders

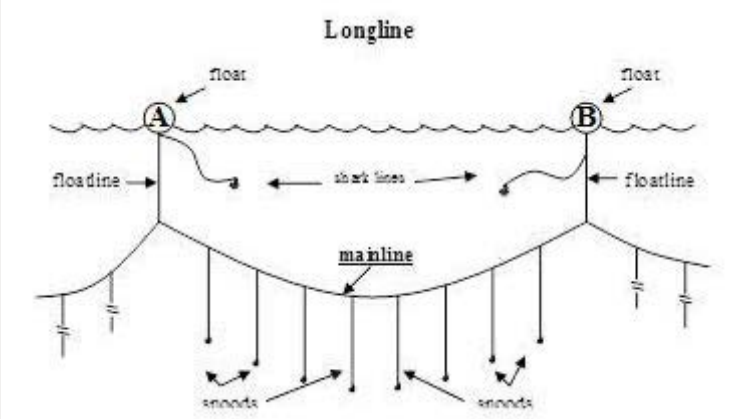
It has long been known that the use of metal wire leaders maximizes the retention of hooked sharks. This is because sharks, of course, are unable to cut the wire and escape (Alfonso et al., 2012). For this reason, some countries have banned the use of wire leaders in pelagic longlining and

require the use of nylon (monofilament and multifilament) leaders instead.

But another reason to use nylon over wire leaders is that catch rates of bigeye tuna are significantly higher using nylon leaders. Bigeye tuna have good eyesight, so they likely are able to see wire — but not nylon-leaders. Even when factoring in the extra cost of replacing lost hooks and nylon leaders, the financial benefit of the additional bigeye tuna catch makes the use of nylon leaders more profitable than the use of wire leaders (Ward et al., 2007).

Prohibition of Shark Lines

To reduce shark bycatch, do not use branch lines running directly off the longline floats or floatlines, known as shark lines.



Schematic diagram of a shark line

IATTC, CMM-16-05

Limit Soak Duration

Reducing total soak time could reduce at-vessel mortality rates of all shark species. Increased soak time is related to a decrease in the post-capture survival of sharks in longline fisheries.

Shark Anatomy, Handling, and Release

By all appearances, sharks look hardy, and it would be easy to assume that they can sustain long "soak times," rough handling, or extensive exposure and still survive when returned to the sea.

But sharks have a few biological weaknesses that make them susceptible to stress and injury, which can reduce their chances of post-release survival.

Shark Anatomy

Most sharks must swim to breathe effectively, so long soak times in the water while attached to a hook could hinder their breathing. This causes stress, and in more extreme cases, suffocation and reduces post-release survivorship.

Unlike other fish, these animals do not have a hard skeleton of bone to protect their internal organs. When out of water, the weight of gravity can tear their connective tissue, resulting in crushed or damaged organs. This same tissue holds the spinal cord in place, and for this reason, animals handled from the head or tail can suffer damage as a result.

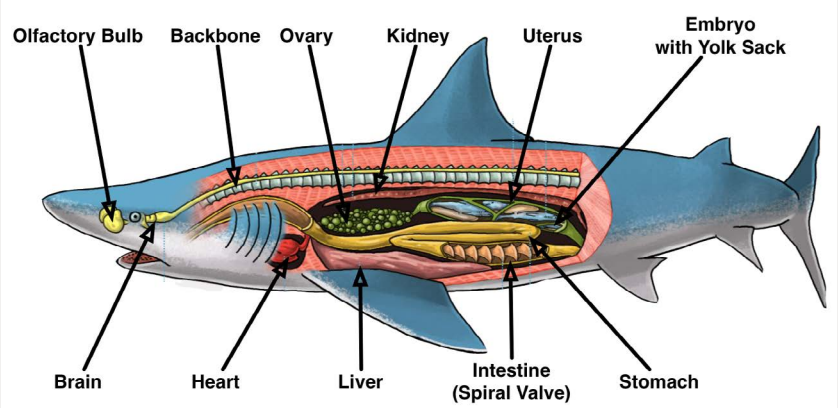
A shark's head also holds a number of sensitive and fragile organs used to detect prey, and if handling damages these, then the shark — once released — could be unable to locate prey and starve.

Handling and Hook Removal

Thus, considering these facts about shark biology, the handling techniques should be developed to minimize further injury to the animal (see for example Pacific Islands Regional Office (2022)). Of course, crew safety always is paramount, so employ these best practices only when they can be done safely and securely.

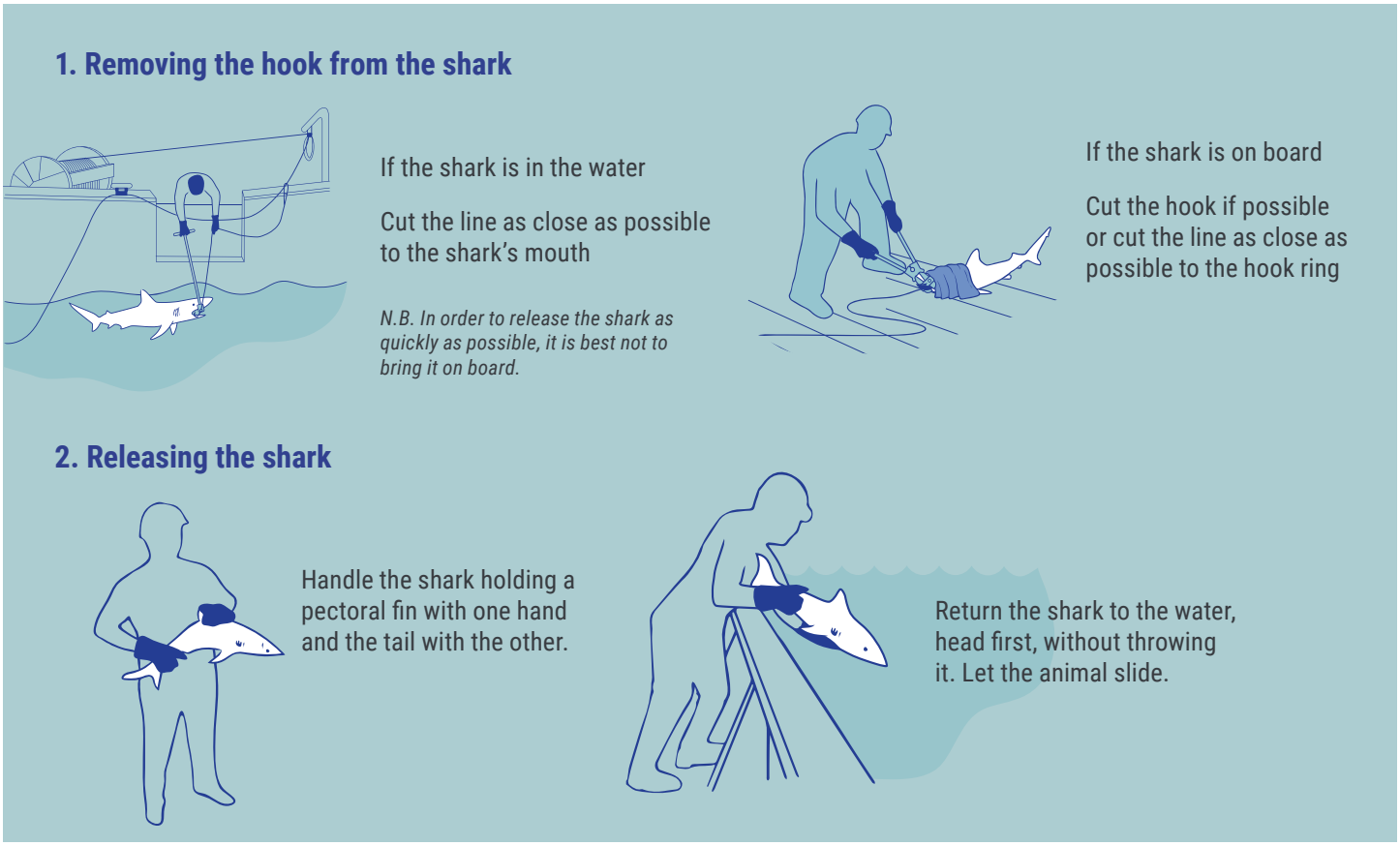
To release the shark as quickly as possible to increase its post-survivorship, it is recommended not to bring the shark on board.

- Thus, for sharks that are hooked or entangled, the use of long-handled line cutters and dehookers while the animal remains in the water is recommended.
  Bring the shark close to the vessel without putting much tension on the branchline and, if the hook is visible in the body or mouth, use a dehooking device or long-handled bolt cutter to remove the hook bard, and then remove the hook.
- If the hook is not observed, cut the line of the leader as close as possible to the shark's mouth (and/or hook) leaving as little line/leader trailing as possible.



Shark anatomy

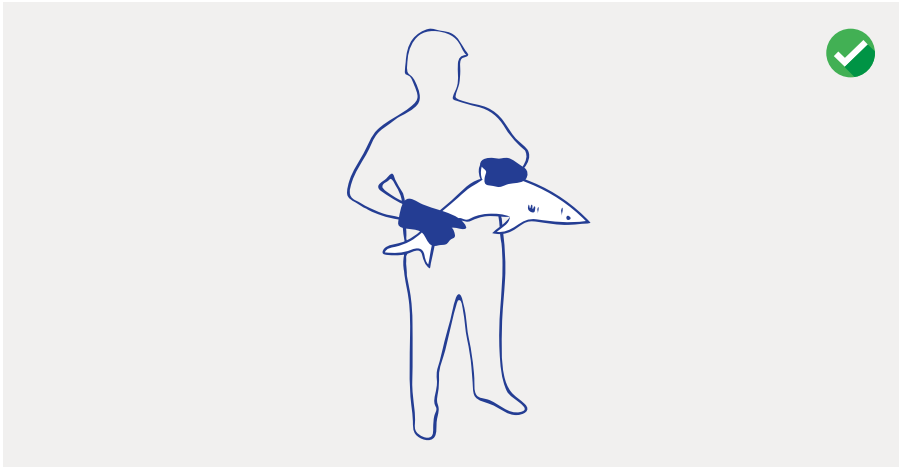
Releasing Sharks Caught in Pelagic Longline Fisheries



Releasing sharks from pelagic tuna longline fisheries

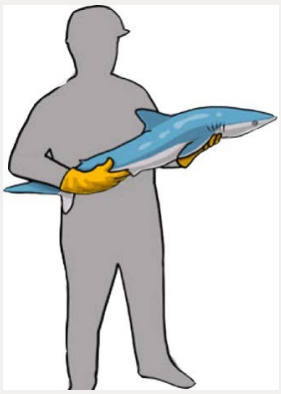
FAO and ACCOBAMS, 2018

Proper Handling of Small Sharks (One Person)



One hand on the dorsal (top) fin and the other holding the body from below

Poisson et al, 2012



Both hands holding the body

Poisson et al, 2012

One hand on the pectoral (side) fin and the other holding the tail

Poisson et al, 2012

Release the fish by pointing its head down toward the water and dropping it

Poisson et al, 2012

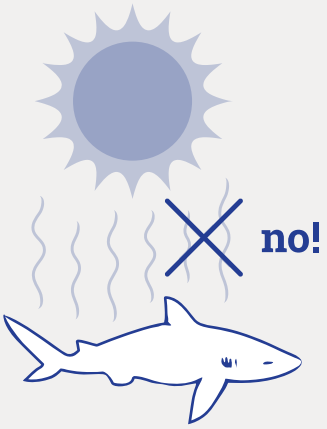
Incorrect Shark Handling and Release

DO NOT lift the animal by its head or tail, as this can severely damage the spinal cord.

Poisson et al, 2012

DO NOT throw, hit, or squeeze the animal. Prevent the animal from battering itself against the deck or other hard objects.

Poisson et al, 2012

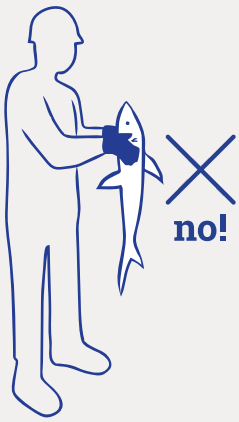


DO NOT leave the animal in the sun. If possible, handle the animal in the shade or otherwise reduce its exposure to the sun.

Poisson et al, 2012

DO NOT yank or push the animal sharply.

Poisson et al, 2012



DO NOT insert hands or objects into the gill openings.

Poisson et al, 2012

DO NOT insert a gaff, hook, or other pointed object to drag or lift the animal.

Poisson et al, 2012

Final Notes

These bycatch mitigation and handling guidelines were developed with the input of scientists, skippers, crew, and fisheries managers. However, best practices are always evolving, and if new information becomes available, ISSF will update this guidance.

Also, if your experience as a skipper suggests alternative methods of successful bycatch mitigation and handling, we are always eager to test such techniques during our research cruises. There will be a place to share such information at the end of this module, and ISSF encourages you to do so.

Chapter 3: **Fisheries Management**

INTRODUCTION

The ability of Regional Fisheries Management Organizations (RFMOs) to manage tuna stocks is only as good as the quality of compliance by its many members. When vessels do their part to meet the RFMO obligations, they make a vital, fundamental contribution to the success and sustainability of the fishery.

INTERNATIONAL ORGANIZATIONS AND INSTRUMENTS

Tuna is an international resource, since tuna species strand and migrate across oceans and countries. Moreover, it can be caught in one country by a vessel flagged to another, processed in a third country, and consumed in a fourth.

As a result, there are a great variety of organizations that shape the fishing process and management, from global (the United Nations), to regional (RFMOs), subregional (the parties to the Nauru Agreement in the western Pacific), and national (coastal and flag state) levels.

The United Nations Convention on the Law of the Sea (UNCLOS) established rules for the use of, and operation on, the world's oceans. It governs all aspects of ocean space, such as demarcation, environmental control, marine research, commercial activities, and the settlement of disputes relating to ocean matters.

CHAPTER OBJECTIVES

1. **Summarize the major organizations and instruments responsible for tuna fisheries management** at the global, regional, and national levels
2. **Outline general vessel-level actions necessary for compliance with RFMO obligations,** such as fishing measures, data reporting obligations, observer requirements, and contribution to tagging programs and tag recovery

Relevant Information for Fishers

Here are the aspects of UNCLOS most relevant to tuna fishers:

- Coastal states have sovereign rights to their territorial sea (12 nautical miles), and to the resources in their exclusive economic zone or EEZ (200 nm).
- All states are allowed the traditional freedom of navigation, research, and fishing on the high seas, as well as "innocent passage" of their vessels through other Coastal states' waters.
- All states undertaking activities that affect living marine resources on the high seas are obligated to adopt or cooperate with other states in adopting measures to manage and conserve those resources.

To implement this last point, the United Nations Fish Stocks Agreement (UNFSA) was conceived. Specifically, UNFSA does the following:

- Establishes principles for the conservation and management of highly migratory fish stocks that must be based on the precautionary approach and the best available scientific information
- Requires the management of those other species in the same ecosystem that are affected by fishing activities (i.e., bycatch)
- Requires both coastal and distant water fishing States to ensure compatible conservation measures between EEZs and the high seas
- Specifies the duties of flag States to exert control over their fishing vessels
- Contains rules on the establishment of RFMOs, including the obligation of fishing states to become members and comply with all measures

There is some variation among the RFMOs' conservation and management measures, but the primary mechanisms used are these:

- Catch and/or effort limits
- Catch and/or effort reporting
- Spatial and/or temporal closures, and gear restrictions
- Controls on at-sea transshipments
- Observer and Vessel Monitoring System (VMS) requirements
- Scientific data provisioning, reporting, and handling

Each RFMO has different ways of tackling these subjects, but in all cases, high levels of monitoring and compliance are key to successful management. Without compliance, excess catch drives down fish stocks, poor reporting and data provisioning prevents accurate assessment, and violating closures or observing requirements weakens necessary protections. Decisions about stock assessments, catch limits, and management strategies are only as good as the quality of data received by the RFMOs' scientists, and vessels play a critical role in this process.

Conservation and management measures are then adopted by the tuna RFMOs and implemented in the various flag and coastal states' laws and regulations. Fishers must be familiar with RFMO management measures and both the vessel's flag state's laws and the laws of the coastal state in which they are fishing. Fishers are encouraged to contact their flag state for more information on the applicable requirements for the RFMO in which they are fishing, and should consult the RFMOs databases for the full text of the measures.

This section contains descriptions of the main tuna RFMOs.

For more info on the tuna RFMOs and their member countries please visit: www.iss-foundation.org/tuna-stocks-and-management/fisheries-management/regional-fisheries-management-organizations-rfmos/

INTER-AMERICAN TROPICAL TUNA COMMISSION (IATTC)

The Inter-American Tropical Tuna Commission (IATTC) area of jurisdiction is the eastern Pacific Ocean. IATTC was founded in 1949, making it the oldest tuna commission in the world. The RFMO is relatively small. Its different working groups usually meet on an annual or biannual basis, although smaller groups meet on an ad-hoc basis as required. The IATTC manages transboundary stocks of temperate tuna in coordination with the International Scientific Committee of Tuna and Tuna like species in the Northern Pacific Ocean (ISC), while tropical tuna are coordinated with the WCPFC.

The Commission applies the precautionary principle to fisheries management. The Commission interprets MSY as a limit reference point and, thus, if catches for target species reach MSY limit, management measures are sought.

Mandatory fisheries data submitted to the Commission include catch-and-effort data and length frequency data. In addition, the Commission holds information on gear, flag, and fish-carrying capacity for several fisheries. IATTC has an extremely comprehensive observer program covering 100% of large purse-seine vessels, although coverage on longline and small purse seine vessels is not carried out by the secretariat.

Detailed information and full text resolutions and measures can be found at: www.iattc.org/HomeENG.htm

WESTERN AND CENTRAL PACIFIC FISHERIES COMMISSION (WCPFC)

The management of fish resources in the WCPFC area is a complex task due to the diverse interests of coastal states and distant water fishing nations that share highly migratory resources.

Effective management rests on the provision of science by two scientific bodies external to the Commission that in turn require timely and accurate provision of data by

Detailed information and full text resolutions and measures can be found at: www.wcpfc.int/home

Commission members. The Ocean Fisheries Programme of the Secretariat of the Pacific Community (SPC-OFP) provides contracted scientific support to the Commission, through the Commission's Scientific Committee (SC), on southern stocks. On the other hand, the International Scientific Committee (ISC) provides non-contracted research to the Commission's Northern Committee (NC) on stocks occurring north of 20° N. SC and NC provide the scientific outcomes for consideration in the Commission's annual meeting.

Cooperation with other organizations includes many RFMOs such as IATTC, CCSBT and IOTC.

INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT)

Established in 1969, ICCAT has a relatively large membership, the majority of which are coastal states in the Atlantic region. The ICCAT secretariat plans budgets and facilitates the work carried out by the Commission, while national scientists from the contracting and co-operating parties conduct the data collection, scientific research and stock assessment of the key stocks managed by the Commission. Meetings of the various working groups occur annually, ensuring constant management discussion and revision where necessary. The Commission adheres to the precautionary approach to fisheries management and actively collaborates with other RFMOs to reduce IUU fishing.

The Commission specifically addresses issues such as discards and bycatch, protected and endangered species, IUU and capacity. Recommendations adopted by ICCAT apply throughout the ICCAT area of competence, although they are implemented domestically by CPCs for operations both inside and outside their EEZs.

Detailed information on the organization and full text resolutions and measures can be found at: www.iccat.int/en

INDIAN OCEAN TUNA COMMISSION (IOTC)

IOTC was formally established in 1993. The objective of the Commission is to promote cooperation among its members with a view to ensuring, through appropriate management, the conservation and optimum utilization of stocks covered by this Agreement and encouraging sustainable development of fisheries based on such stocks. IOTC manages the transboundary stock of southern bluefin tuna in coordination with the Commission for the Conservation of Southern Bluefin Tuna (CCSBT).

Detailed information on the organization and full text resolutions and measures can be found at: https://iotc.org

The Scientific Committee advises the Commission and sub-commissions on research and data collection, on the status of stocks and on management issues. As with other tuna RFMOs, separate subgroups composed of CPC country scientists conduct research on specific areas of interest to the Commission. Both Commission and Scientific Committee meetings take place on an annual basis. Binding Conservation and management measures for CPCs are usually adopted by consensus of all Members in a Commission meeting.

Members of the Commission must provide available and accessible statistical information on catch, effort, and sizes as well as information on bycatch and other affected non-target species.

COMMISSION FOR THE CONSERVATION OF SOUTHERN BLUEFIN TUNA (CCSBT)

The Convention for the Conservation of Southern Bluefin Tuna was founded in 1994. The Convention has no specific area of jurisdiction. Instead, the Convention applies to southern bluefin tuna (Thunnus maccoyii - SBT) throughout its global distribution. CCSBT is recognized as having the

principal SBT management role and therefore conducts the assessments and sets the conservation measures for SBT.

Science planning, execution and analysis is primarily conducted by the Scientific Committee and Member States. CCSBT shares interest with several other RFMOs, namely WCPFC, IOTC and ICCAT.

CCSBT collects a variety of data types from its members and cooperating non-members, including total catch, catch and effort data, and catch at size data. Catch and trade information is also collected. CCSBT does not have a management area and has no mandate for managing species other than SBT, although the Commission has established a Working Group on Ecologically Related Species (ERSWG) and has taken measures to reduce the impact of SBT fishing on ecologically related species and bycatch.

Detailed information on the organization and full text resolutions and measures can be found at: www.ccsbt.org

FURTHER NOTES ON DATA REPORTING AND COMPLIANCE

Observer Coverage Requirements

For longline vessels, although the details of the programs vary, most tuna RFMOs require an observer coverage level of at least 5 percent for longline vessels over 24 meters, which in ICCAT increased to 10 percent. This coverage level might also apply, in some cases, for smaller vessels operating in the high seas or in EEZs other than their flag state EEZ.

Tag Recovery and Reporting

Tuna (and other fish) tagging programs have a number of uses, but almost all tagging programs share a common goal: gathering data about fish. Most tagging programs seek information on fish movements, growth, behavior, and mortality. This data is critical to our understanding of fish biology and for the creation of accurate models for stock

assessments. You might also encounter tagged seabirds, with small bands on their legs.

Simple tags have printed information and instructions on how to return the tag. These tags remain attached to the fish until it is caught or landed. Some high-tech tags monitor and record position and environmental data continuously. Some fish tags even pop off the fish at an appointed time, float to the surface, and transmit information via satellite.

If the vessel's crew catches/lands a tagged animal, please take the time to remove the tag, note the time and location of the catch/landing and ensure that the tag is returned to its owner. Often there are rewards for the return of tags — another reason to help contribute to the good management of your fishery. **Fishers must not remove the tags from live birds.**

CONCLUSION

By completing this online module, you are ensuring that the vessels you skipper are compliant with the skipper training measure. The ISSF Skipper Training Conservation Measure requires that ISSF Participating Companies transact business only with vessels whose skippers have completed this online module or attended one of the in-person ISSF Skipper Workshops.

This guidebook to best practices in sustainable tuna fishing is a living document that will continue to be updated to reflect the state of the art. ISSF welcomes suggestions to improve the guidebook or ideas for further fisheries research.

FEEDBACK FORM

You have now completed review of the Skippers' Guidebook to Sustainable Longline Fishing Practices.

For ISSF to record this activity and ensure that the vessel(s) you skipper are credited as meeting the related ISSF Conservation Measure, **you MUST follow the link at right to complete**. If you do not currently have Internet (wi-fi) access, please return to this page to complete this step when wi-fi is available.

Fill out the feedback form here

Credits and Citations

Acknowledgements

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