

APPENDIX I. BYCATCH

Impacts by gear type

All fishing gears have some level of environmental impact, and bycatch is one of the most noticeable ones. This summary presents the overall ratings given by default to various gear types. Deviations from these color ratings may occur for individual stocks, due to advice from the ISSF Scientific Advisory Committee; these are noted for each particular stock in which deviations may occur.

This summary is presented only for non-target (non-tuna) species. Note that in some ocean regions, fishing modes such as FAD-based purse seining and pole-and-line fishing can result in high catches of small individuals of bigeye and yellowfin, which are undesirable. In this stock status report, these impacts are measured directly under the status section for these stocks.

Sources of information used for these ratings include the following: Amandè et al. (2010), Clarke and Harley (2010), FAO (2009), Gillett (2011), Gilman (2011), Harley, et al. (2011), IATTC (2012), IOTC (2005), Matsumoto and Bayliff (2008), Morizura et al. (1999), Olson (2010), Pianet et al. (2010a), Pianet et al. (2010b), SPC/OFP (2008), and SPC/OFP (2010).

Gillnet fishing.

ORANGE

Gillnet fisheries take substantial amounts of tunas in various ocean regions, especially in the Indian Ocean. For the most part, these are poorly monitored but it is known that they tend to catch many different species at the same time. Bycatch rates of many non-target species tends to be high. Large-scale driftnets are generally prohibited on the high seas but appear to continue to be used.

Sharks. Silky, oceanic whitetip and scalloped hammerhead sharks are common in gillnet fisheries. All of these species are of concern because of their low productivity and vulnerability to overfishing.

Sea Turtles. Sea turtle bycatch is thought to be highest in gillnet fisheries compared to other gears. Sea birds. The incidental catch of sea birds in gillnet fisheries is largely unknown.

Other finfish. Gillnet operations catch a number of other finfishes. Some of these include very productive species such as dolphinfish ("mahi-mahi") that are not of immediate concern.

to be resilient to fishing (blue shark), and others which are likely to be more vulnerable because of their low reproductive rates (e.g., porbeagle and thresher sharks).

Sea Turtles. Some turtles are also caught in longline operations as bycatch, many of which are discarded (including live releases). All RFMOs have some type of mitigation measure in place. Roughly one half, or more, of the turtles caught are alive, so the main mitigation measures aim to dehook them and release them alive.

Sea birds. Some sea birds are also caught in longline operations as bycatch, especially in higher latitudes. Most (~90%) sea birds caught are dead when brought onboard, so the best practice for mitigation is to avoid their being hooked, which is the main type of mitigation measure used by the RFMOs. Of particular concern are albatrosses and petrels.

Other finfish. After tunas and sharks, longline operations catch a number of other finfishes. Some of these include very productive species such as dolphinfish ("mahi-mahi") that are not of immediate concern. Longlining also catches marlins, some of which are estimated to be overfished.

Handlines.

GREEN

This mode of fishing typically results in small bycatch rates.

Longlining.

ORANGE

Sharks. Longline fisheries tend to have very high catch rates of sharks (in some areas, 30% of the longline catches are sharks). In some cases the sharks can be a target of the fishing operations, at least for parts of a trip. Sharks caught include a wide range of species, some of which are thought

Mid-water trawling.

ORANGE

This mode of fishing has a small bycatch rate of cetaceans.

Pole-and-line fishing.

YELLOW

There are no major concerns with the catch of vulnerable non-target species by this gear. However, the method requires the use of live baitfish (small pelagics) that are used to keep the schools of tunas attracted to the fishing vessels while they are fished. The effects of fishing on these populations is largely unknown; however, they should be managed in order to support pole and line fisheries. Gillett (2011)

notes that the amount of baitfish available in the WCPO is a limiting factor to the amount of pole and line fishing that can occur. In addition, the bait species captured are generally more fragile than temperate baitfish species.

Purse seining on free schools.

GREEN

This mode of fishing typically results in small bycatch rates of non-target species.

Purse seining on FADs.

YELLOW

Purse seining on FADs (anchored FADs, drifting FADs and natural logs) generally has bycatch rates of non-target species that are higher than those of free school sets.

Sea Turtles. The number of turtles that die in purse seine fishing operations is very small. Nevertheless, it is relatively easy to release turtles when caught alive and this is the main mitigation measures used by RFMOs.

Sharks. 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 white tip and silky sharks. Entanglement can be a significant problem, especially if FAD designs use underwater netting materials with large mesh sizes. ISSF is advocating for RFMOs to require non-entangling designs.

Sea birds. Mortality of other sensitive species like seabirds in FAD operations is almost nonexistent.

Other finfish. FAD fishing does result in large catches of other finfish such as dolphinfish ("mahimahi"). 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 bycatches is one of utilization (waste), since the majority of these are discarded at sea so that the fish holding tanks can be reserved for the more valuable tunas.

Purse seining on tuna-dolphin associations.

GREEN

Marine mammals. In the EPO, purse-seine fishermen have learned to take advantage of the association between yellowfin schools and herds of dolphins that is prevalent in the region. Fishermen 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 it has since the late 1980s declined by 98% after fishermen and scientists developed techniques for releasing the dolphins alive after a set, and retaining the tunas. Some scientists believe that there is an un-quantified level of mortality after the sets, caused by stress, and this remains a controversial issue. However, based on fishery-independent surveys, the abundance of most dolphin populations in the region is estimated to be either stable or increasing, while a few may be declining. The Agreement on the International Dolphin Conservation Program (AIDCP) establishes allowable dolphin mortality limits; current (2011) levels are one-fourth of that level. There is a 100%-coverage observer program in place for these operations. Catches of non-target species in these operations are very small.

Trolling.

GREEN

This mode of fishing typically results in very small bycatch rates of non-target species.

Tuna traps.

GREEN

Migrating schools of bluefin tuna have been caught by traps that are fixed near the shoreline, especially in the eastern Atlantic and Mediterranean. Most of the catch in these traps consists of scombrids, including bluefin, and up to 99% of it is utilized. There are no major bycatch issues known with this passive gear, although it occasionally catches sharks.

RFMO bycatch mitigation and monitoring

The following is a summary of the major mitigation and monitoring measures adopted by the various tuna RFMOs.

CCSBT

Sea birds, sharks and turtles: With only one exception, all CCSBT Members and Cooperating Non-Members are also Parties or Cooperating Parties to IOTC, WCPFC and/or ICCAT. As a consequence, any binding bycatch mitigation measure of these RFMOs is in practice binding on the CCSBT Member/Cooperating Non-Member when fishing within that Convention Area. Additionally, the non-binding Recommendation to Mitigate the Impact on Ecologically

Related Species - ERS - of Fishing for Southern Bluefin Tuna (updated 2011) strongly encourages CCSBT members to comply with mitigation measures on sea birds, sharks and sea turtles adopted by ICCAT, IOTC and WCPFC.

Sea birds. Mandatory use of Tori poles is required by all members in all southern bluefin longline fisheries South of 30°S.

Monitoring and mitigation research. CCSBT members are required to exchange information concerning new or refined

techniques to reduce incidental catch of seabirds and cooperate in developing and assessing the effectiveness of such techniques. Most CCSBT Members and Cooperating Non-Members have achieved 10% scientific observer coverage (in catch and effort) for their fisheries; the 10% level is a non-binding target.

IATTC

General: Resolution 04-05 requires the release of non-target species caught in purse seine fisheries.

Sea Turtles. Resolution C-07-03 requires fishermen to release sea turtles entangled in FADs or caught in longlines and to avoid encircling them with purse seine nets. The resolution also calls for research to mitigate sea turtle bycatch, especially with gear modifications. Resolution C-13-04 calls for a transition to non-entangling FADs in purse seine fisheries.

Sharks. Resolution C-05-03 discourages shark retention and establishes a limit in the amount of shark fins that can be landed, relative to the total weight of shark bodies that must be retained. This ratio of fin-to-body-weight acts as a disincentive to target sharks because the shark carcasses occupy hold space on the vessel and have little market value. The Resolution also mandates reporting of shark catches to IATTC. Resolution C-11-10 prohibits the retention of oceanic whitetip sharks and requires the release of specimens that are alive when caught. Resolution C-13-04 calls for a transition to non-entangling FADs in purse seine fisheries.

Sea birds. The IATTC Resolution C-11-02 requires longline vessels operating in high latitudes (North of 23°N, South of 30°S and around the Galapagos Islands) to employ at least two sea bird mitigation techniques such as night setting or weighted branch lines.

Dolphins. The AIDCP establishes total per-stock and per-year limits on incidental dolphin mortality (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.

Monitoring and mitigation research. Through the Agreement on the International Dolphin Conservation Program (AIDCP), there is 100% observer coverage on all large purse seiners (> 363 tons in carrying capacity) and lower coverage on smaller vessels. This level of observer coverage, coupled with the information from fishing logbooks, allows the IATTC to maintain a very complete accounting of the bycatch taken in purse seine fisheries in the EPO. Several IATTC Recommendations and Resolutions encourage research that could make FAD-based purse seining and longlining more species-selective. These are non-binding, however, and depend on the IATTC member nations making the necessary resources available. ISSF has a research program for bycatch mitigation in purse seine fisheries, and IATTC scientists are taking part in this program (IATTC, 2010b). Resolution C-11-08 now requires 5% scientific observer coverage for large longliners.

NOTE: Major fleets such as Japan that use longlining in the EPO reported catches of non-target species to IATTC (particularly sharks and billfishes; Matsumoto and Bayliff, 2008), and in this sense they were relatively better than longline fleets elsewhere. However, it is apparent that this level of monitoring and reporting has not been maintained.

ICCAT

Sharks: Recommendations 04-10, 05-05 and 06-10 established a 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. Recommendation 07-06 limits mortality on porbeagle and North Atlantic shortfin mako. Recommendations 09-07, 10-07, 10-08 and 11-08 prohibit the retention on board of bigeye thresher, oceanic white tip, several species of hammerhead sharks, and silky sharks. All of these measures have a reporting requirement associated with them (Recommendation 12-05 requires all parties in 2013 to report on their compliance with Recs. 04-10, 07-06, 09-07, 10-08, 10-07, 11-08, and 11-15). Recommendation 10-06 prohibits the retention of shortfin mako onboard vessels flagged to countries that do not report catches for this species.

Sea Turtles. Recommendations 10-09 and 13-11 set up reporting requirements for sea turtle interactions and mandates its scientific committee to assess, by 2014, the impact of tuna fisheries on sea turtle populations. The measure has specific requirements for longline operators to be trained on appropriate handling and release of live turtles so as to maximize their survival.

Sea birds. Recommendation 07-07 required longliners operating south of 20°S to use at least two of several mitigation measures such as weighted branch lines or tori (bird-scaring) lines. The measure also required ICCAT members to collect and report data on interactions between fisheries and sea birds. Recommendation 11-09 strengthened the mitigation measures in 07-07, especially for longliners fishing south of 25°S, and in the Mediterranean.

Other finfish. Longliners and other fisheries also take Atlantic blue and white marlin as bycatch, both of which are thought to be overfished. ICCAT adopted Recommendation 06-09, later superseded by 12-04, a rebuilding plan with catch limits by country.

Monitoring and mitigation research. ICCAT has specific requirements for reporting data on sharks, sea turtles and sea birds. For the most part these are not complied with fully, but the situation is improving over time. Recommendation 10-10 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. Recommendation 11-10 requires CPCs to collect and report data on bycatch and discards either through observer programs and logbooks (for vessels to which Rec. 10-10 applies) 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 zero catches) by prohibiting them from retaining such species in the following year.

IOTC

Sharks: The IOTC has adopted measures that address shark conservation concerns. Resolution 05/05 established a 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. Resolution 12/09 prohibits the retention on board of all species of thresher sharks, a group that is thought to be particularly vulnerable due to its low productivity. In addi-

tion, Resolution 12/09 requires data reporting to IOTC, especially for fisheries targeting sharks. Resolution 13/05 prohibits intentional purse seine setting on tunas associated with whale sharks. Resolution 13/06 prohibits the retention of oceanic whitetip sharks. Resolution 13/08 calls for a transition to non-entangling FADs in purse seine fisheries starting in 2014.

Sea Turtles. Resolution 12/04 (which supersedes various prior measures) requires IOTC members to mitigate sea turtle mortality and to provide data on turtle bycatch to the SC. The measure has specific requirements for longline and purse seine operators to facilitate the appropriate handling and release of live turtles. Resolution 13/08 calls for a transition to non-entangling FADs in purse seine fisheries starting in 2014.

Sea birds. Resolution 12/06 (which supersedes various prior measures) requires longliners operating south of 25°S to use at least two of several mitigation measures such as weighted branch lines or tori (bird-scaring) lines. The measure also requires IOTC members to provide data on interactions between fisheries and sea birds to the SC.

Monitoring and mitigation research. Resolution 10/04 established a regional observer program that requires at least 5% coverage for vessels over 24 m, and for smaller vessels operating in the high seas. Resolution 08/04 requires longliners greater than 24 m overall, as well as smaller longliners operating in the high seas, to have electronic logbooks and record and report data on target and non-target species to the SC. Monitoring of bycatches in the gillnet fisheries is extremely poor.

WCPFC

Sea Turtles. CMM 2008-03 instructs WCPFC members to implement the FAO (2009) guidelines for reducing sea turtle mortality, and requires longline operators to use line cutters and de-hookers to handle and promptly release sea turtles caught or entangled. The measure also requires purse seine operators to avoid setting on turtles if possible and to disentangle/release them when caught alive.

Sharks. CMM-2010-07 requires reporting of shark catches and discards by gear type and species. The measure also established a limit on the ratio of shark fins to total shark weight that can be retained onboard fishing vessels, and encourages the release of live sharks. CMM-2011-04 prohibits the retention on board of oceanic white tip sharks and CMM-13-08 does the same for silky sharks. CMM-2012-04 prohibits deliberate purse seine sets around whale sharks and requires reporting of interactions. WCPFC has initiated a research plan aimed at improving statistics and observer coverage on sharks and conducting assessments for key shark species (Clarke and Harley, 2010).

Sea birds. CMM 2012-07 requires longliners operating north of 23°N and south of 23°S to use at least two of several mitigation measures such as weighted branch lines or tori (bird-scaring) lines. The measure also encourages mitigation research to be conducted by WCPFC members.

Cetaceans. CMM-2011-03 prohibits deliberate purse seine sets around cetaceans and requires reporting of interactions.

Other finfish. Striped marlin are also caught as bycatch in longline fisheries; this species is of more concern because it has been declining in abundance. The WCPFC adopted CMM 2010-01 which sets a cap on the catch of striped marlin for each member relative to historical levels.

Monitoring and mitigation research. With the exception of sharks under CMM 2009-04, reporting of bycatch species is not mandatory at WCPFC, so much of the information available comes from observer programs. The WCPFC has a Regional Observer Program that, since 2010, is intended to have 100% coverage on purse seine vessels that fish on the high seas or between two or more EEZs. As these data become available and are analyzed by the Scientific Committee, monitoring should improve. National observer programs are also run by WCPFC members, but it is not clear that all of the bycatch information collected in those programs is made available to the SC for integrated analyses. For longline fisheries, observer coverage is poor overall. Much of the information available is from bilateral EEZ access agreements in Pacific Island countries. Observer coverage for distant-water fleets is extremely low.

