



Sustainability of Main Commercial Tuna Stocks



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This report was prepared using information from FishSource.com, a program of the Sustainable Fisheries Partnership (SFP). SFP periodically updates FishSource resources as new information becomes available. The findings summarized in this report are based on information that the authors accessed from FishSource in December 2013. The scoring and ranking categories provided do not take into account the environmental impacts of the fisheries (i.e., are based solely on the quality of management/fisher compliance and the status of the stock). FishSource.com captures the main environmental issues in the narrative “Environment and Biodiversity” sections of fishery profiles.



EXECUTIVE SUMMARY

Tuna products are the fourth most valuable globally traded seafood commodity. Multi-gear, multispecies fisheries that supply globally traded tuna products have direct and indirect ecological effects. Increasing demand, overcapacity, poor compliance with existing management measures, and rudimentary governance systems call into question the long-term sustainability of some tuna fisheries.

Stock status and quality of management systems were evaluated for 22 stocks of major commercial tuna species using a fishery assessment method developed by the Sustainable Fisheries Partnership (SFP) for their [FishSource.com](https://www.fishsource.com) program. The assessment method employs a suite of five criteria. Two criteria assess the adequacy of stock-specific harvest control rules and biological reference points. One criterion assesses compliance with harvest control rules. And two criteria assess whether biomass and fishing mortality rates are within stock-specific target biological reference points. Scores resulting from an assessment against the five FishSource criteria are on a scale of 0 to 10, representing lowest to highest possible scores, respectively.

Findings reflect only the status and management of main commercial stocks, and not the ecological sustainability of effects on associated and dependent species and broader, community- and ecosystem-level collateral effects. While these other ecological effects are not accounted for in FishSource scores, some FishSource fishery profiles include this information in narrative sections, and improvement recommendations, included in one section of FishSource online profiles, account for these effects.

Based on an assessment of time series of biomass and fishing mortality, eastern Atlantic Ocean skipjack, western Atlantic Ocean skipjack, western and central Pacific Ocean skipjack, and western and central Pacific Ocean yellowfin tuna stocks have been moderately exploited. Because they are caught in mixed-species fisheries, it is not possible to increase catches of these moderately exploited stocks without increasing fishing mortality of other stocks, including of bigeye tuna. Eastern Pacific Ocean skipjack and yellowfin tuna stocks have been fully exploited; fishing mortality for these stocks should be kept near target reference points in order to continue to supply maximum sustainable yields.

Five tuna stocks (Atlantic Ocean bigeye, east Atlantic Ocean and Mediterranean bluefin, north Atlantic Ocean albacore, south Atlantic albacore, Indian Ocean yellowfin) have had long-term declining temporal trends in biomass but with signs of recent improvements. Four stocks (Indian Ocean bigeye and albacore, west Atlantic Ocean Bluefin, Atlantic Ocean yellowfin) have had long-term declining temporal trends in biomass. Future changes in the status of these stocks of “climbers” and “fallers” should be monitored closely to determine if the current management system successfully maintains the stocks at levels consistent with precautionary management targets.

The majority of the stocks of principal market tuna species has a poor conservation status and/or has deficits in fundamental management elements. Of the 22 assessed stocks, none had a score of ≥ 8 for all five FishSource criteria. Eleven stocks had all five scores ≥ 6 but at least one score of < 8 , representing 83% of reported landings of tuna from the 22 stocks. The other half of the stocks had at least one < 6 score, representing 17% of combined reported landings for the 22 stocks.

SFP recognizes the International Seafood Sustainability Foundation (ISSF) as leading a global fishery improvement project (FIP) as defined by the [Conservation Alliance for Seafood Solutions](https://www.conservationaliaison.org/) (CASS), working to improve regional-level management frameworks for purse seine, longline, and pole-and-line fisheries for skipjack, yellowfin, bigeye, and albacore tuna stocks. At the time SFP accessed data

from FishSource to prepare this report (December 2013), fishery profiles had not yet been developed that SFP will associate with the ISSF FIP.

Ninety-five individual fisheries or groups of fisheries that supply tuna products to North American, European, Australian, and other markets, where retailers, food service providers, and major seafood buyers have adopted policies on their procurement of sustainable seafood, were evaluated based on their being certified or under full assessment against the Marine Stewardship Council (MSC) standard, and whether they are in a FIP as defined by CASS. Of the 95 fishery units, 67 are not MSC certified, are not undergoing an MSC full assessment, and are not in a FIP. These fishery units supply tuna from stocks for which none had a score of ≥ 8 for all five FishSource criteria, suggesting that they currently would not unconditionally pass an assessment against the MSC standard. Companies in the supply chains for the fisheries covered in these profiles and other stakeholders are encouraged to establish and implement FIPs for these fisheries to incentivize positive changes toward sustainability to a point where the fishery would unconditionally pass an assessment against the MSC standard.

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1. INTRODUCTION

Purse seine, longline, and pole-and-line fisheries are the main gear types supplying global tuna markets (Miyake et al., 2010). Purse seine fisheries supply primarily skipjack and yellowfin tuna to produce canned light meat tuna. Pelagic longline fisheries supply albacore tuna for canned white meat tuna, and bigeye and yellowfin tuna for fresh and frozen products. Pole-and-line fisheries produce a small proportion of total supply of skipjack tuna for canning. Tuna products have the fourth highest value of globally traded seafood commodities, accounting for about 8% of the total value of globally traded seafood products in 2010 (FAO, 2012). Demand for both canned and fresh/frozen tuna products has been steadily increasing, as have recent trends in landings: The reported landings of the principal market species of tunas and tuna-like species¹ increased from less than 0.2 million tonnes in the early 1950s to a peak of 6.6 million tonnes in 2010, largely due to increased catch of tropical skipjack tuna by purse seiners (Gilman, 2011; FAO, 2012). Increasing demand, overcapacity, poor compliance with existing obligations, and rudimentary domestic and regional governance systems call into question the long-term sustainability of the multi-gear, multi-species fisheries that supply globally traded tuna products (Gilman, 2011; FAO, 2012; Gilman and Kingma, 2013; Gilman et al., 2013b).

This report summarizes findings on the current status and management of stocks of the principal tuna market species through an assessment using five criteria employed by the Sustainable Fisheries Partnership's (SFP's) FishSource program. The report also identifies the proportion of selected fisheries or groups of fisheries that supply tuna and tuna-like species to markets in North America, Europe, and Australia that have profiles in FishSource that are in fishery improvement projects (FIPs) as defined by the Conservation Alliance for Sustainable Seafood (CASS, 2011), are certified against the Marine Stewardship Council (MSC) standard (MSC, 2010), and are undergoing full assessment against the MSC standard.

This study, however, does not report findings from an assessment of fisheries for tuna and tuna-like species for other critically important elements, including several fundamental aspects of governance systems (Small, 2005; Gilman, 2011; Gilman et al., 2013b), effects on associated and dependent species, and broader community- and ecosystem-level effects, common issues raised with tuna fisheries (Miyake et al., 2010; Gilman, 2011; Dagorn et al., 2012; Gilman et al., 2013b; ISSF, 2013b; MBAq, 2013). In addition to reducing the abundance of principal market species, marine capture fisheries, including pelagic fisheries targeting relatively fecund tuna and tuna-like species, can have large impacts on incidentally caught associated and dependent species that are vulnerable to overexploitation due to their life history characteristics, including endangered and threatened populations and species of seabirds, sea turtles, marine mammals, elasmobranchs (sharks and their relatives), and some bony fishes (Gilman, 2011; Dagorn et al., 2012).² Pole-and-line fisheries have nominal bycatch. The fisheries that supply pole-and-line fisheries with live bait, however, can have problematic ecological effects, including from bycatch and overexploitation of target baitfish species (Gillett et al., 2010). Ghost fishing by abandoned, lost, or discarded fishing gear poses substantial ecological and socioeconomic problems, including from ghost fishing mortality, thought to be most problematic in passive fishing gear after setting (e.g., gillnets, longlines, pots, and other trap gear) (Matsuoka et al., 2005; Macfayden et al., 2009). Tuna fisheries likely have nominal habitat effects. Contact between gear and the seabed can occur in tuna fisheries that fish at shallow submerged features (Passfield and Gilman, 2010; Gilman et al., 2012), and currents might bring lost, abandoned, and discarded longline and purse seine gear into contact with sensitive habitats (UNEP and FAO, 2009). Collateral, indirect effects of pelagic longline, purse seine, and other tuna fisheries are not well understood, have not been within the scope of past risk assessments, and are largely not accounted for by management authorities (ICES, 2005; Dagorn et al., 2012; Garcia et al., 2012; Gilman et al., 2012, 2013a,b).

¹ "Tuna and tuna-like species" typically refers to species of the suborder Scombroidei, including the tropical and temperate tunas, billfishes and bonitos.

² For more information on differences in bycatch by the different sources of canned light meat tuna, see SFP (2012a).



2. METHODS

Summaries are provided of the outcomes of FishSource assessments of 22 tuna “stock-level profiles,” a FishSource unit of evaluation that covers an entire stock, including all fisheries and gear types that contribute to fishing mortality of that stock. Data used in the preparation of this report were obtained from SFP’s FishSource.com program in December 2013. The FishSource assessment method comprises five criteria (SFP, 2006):³

- Criterion 1: “Is management precautionary?” How does the adopted limit and/or target reference point for fishing mortality rate compare to the stock’s fishing mortality rate at low biomass, as an index of whether the management strategy is precautionary? Defined in Annex II of the United Nations Fish Stocks Agreement, “Limit reference points set boundaries which are intended to constrain harvesting within safe biological limits within which the stocks can produce maximum sustainable yield. Target reference points are intended to meet management objectives” (UNFSA, 1995).
- Criterion 2: “Do fishery managers follow scientific advice?” How does the adopted total allowable catch (TAC) level compare to the scientific advice on measures needed to meet stock management objectives, as an index of whether fishery managers follow scientific advice?
- Criterion 3: “Do fishers comply?” How did the catch level in the most current year for which data are available compare to the adopted TAC level, as an index of whether harvest control rules were met?
- Criterion 4: “Is the stock biomass healthy?” How does stock biomass in the most current year for which data are available compare to the biomass level that is predicted to support maximum sustainable yields, or similar biological reference point, as an index of whether the stock biomass is healthy?
- Criterion 5: “Will the stock be healthy in the future?” How does the fishing mortality rate in the most current year for which data are available compare to the rate that is predicted to support maximum sustainable yields or similar biological reference point, as an index of whether the stock will be healthy in the future?

In the results, we report the year of the data used for each criterion of each scored profile. Different profiles might employ data from different years based on the date of the most current stock assessment and other information used to assess fisheries against the FishSource criteria.

In cases where there was a lack of requisite publicly available information, which was the case for many of the stock-level profiles included in this assessment, SFP employed a qualitative method to assess some or all of the five FishSource criteria. A qualitative method was also used for criterion 2 when the management system employs harvest control rules other than a TAC, or there was evidence supporting overriding the quantitative evaluation finding. SFP invites public comments on FishSource profiles to help improve the accuracy of the information used for the assessment as well as to improve the FishSource assessment method.

Time series of biomass and fishing mortality rates for stock-level profiles were evaluated and compared to target biological reference points. Time series of SSB and F are positively correlated with FishSource Scores 4 and 5, respectively. Data were available to assess 18 of the stocks included in this study. Estimates are relative to the upper target reference point (MSY or equivalent and F_{MSY} or equivalent) except for North Pacific albacore, where no reference points exist and absolute (in k t) estimates of SSB are provided. For east Pacific bluefin and Indian Ocean skipjack, only one and two

³ Find more about the FishSource assessment methodology in the FishSource [FAQ section](#).



data points, respectively, were available, and therefore these stocks were not included in this study component. Data were included beginning as early as 1970, where available.

For profiles assessed using the FishSource quantitative criteria, FishSource scores each criterion on a scale of 0 to 10, with 0 being the lowest and 10 the highest possible score. Preserving comparability with scores resulting from a quantitative assessment, SFP scores resulting from a qualitative assessment were obtained by using the cut-off points as used in applications of the MSC fishery assessment method, where “< 6” indicates a high risk and a negative assessment finding; “≥ 6” indicates a medium risk and that improvements are required; and “≥ 8” indicates a low risk and that the fishery meets the criterion conditions.

FishSource scores are used to place profiles into one of three ranking categories, defined as follows:

- Category A: Very well managed: All 5 scores are ≥8
- Category B: Adequately managed: All 5 scores are ≥6
- Category C: Poorly managed: One or more score is <6.

The ranking categories are solely based on the quality of management (scores resulting from criteria 1 to 3) and the status of the stock (scores resulting from criteria 4 and 5). However, SFP provides information on fishery ecosystem effects in the narrative sections of FishSource profiles, and improvement recommendations are developed taking these broader effects into account.

The term “fishery-level profile” is used in the FishSource program to refer to a unit of evaluation that covers one or a group of fisheries and fishing gear types that supplies a fraction of total landings of a stock of a market species. In some cases, multiple FishSource tuna profiles exist for a single fishery. For a fishery that catches multiple species and/or multiple stocks of an individual species, a separate FishSource profile might exist for each stock of each species. Furthermore, some fishery-level profiles are for incidental species that are a small component of the total retained and/or discarded catch. For example, there is a “fishery-level” profile for western and central Pacific Ocean skipjack tuna for combined Hawaii longline deep-set tuna and shallow-set swordfish longline fisheries (for which skipjack is about 6% of the total combined catch (NMFS, 2013)) and a separate “fishery-level” profile for western and central Pacific Ocean bigeye taken by the Hawaii longline deep-set bigeye tuna fishery (for which bigeye is about 30% of the total catch (NMFS, 2013)).

In 2011, the Conservation Alliance for Seafood Solutions adopted, *Guidelines for Supporting Improvement Projects* (CASS, 2011). The guidelines identify five characteristics that a project must have in order to be recognized as a FIP, and further define additional elements that a project must have in order to be recognized as a FIP that is “moving toward sustainability” (CASS, 2011).

We determined the proportion of 95 fishery-level profiles that catch one or more of the 22 tuna stocks covered in this study that are in a FIP as defined by CASS (2011), are MSC certified, or are currently undergoing MSC full assessment. These 95 fishery profiles were largely selected by SFP for inclusion in FishSource because the fisheries included in the profiles supply one or more of SFP’s corporate partners, which are retailers and major seafood buyers primarily in North America, Europe, and Australia. SFP considers a project to be a FIP when SFP’s criteria for FIP Stage 1 or higher are met, where SFP defines a Stage 1 FIP as: “The fishery has been evaluated, improvement options are identified, and supply chain engaged, with this information publicly available” (SFP, no date).

We also identified the number of FIPs that catch from each stock and for which there is a FishSource fishery-level profile.



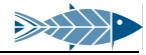
SFP recognizes the International Seafood Sustainability Foundation (ISSF, <http://iss-foundation.org/>) as leading a global FIP for purse seine, longline, and pole-and-line tuna fisheries covering all skipjack, yellowfin, bigeye, and albacore tuna stocks.⁴ At the time SFP accessed data from FishSource to prepare this report (December 2013), profiles had not yet been developed that SFP will associate with the ISSF FIP. SFP plans to establish 19 new FishSource profiles covering the stocks of the four tuna species and three gear types covered by ISSF.

At least two fisheries supply tuna products that are in FIPs that were not covered in this study. WWF is leading a project for two Philippines handline fisheries (WWF, 2011); as of December 2013, FishSource did not contain profiles for the fisheries included in this project.

For the subset of fishery-level profiles that had scores that differed from the relevant stock-level profile scores, we explained the reason for the different scores.

The proportion of total reported landings of tuna contributed by each stock-level profile is reported. Information on landing levels was not available for fishery-level profiles.

⁴ SFP has determined that ISSF meets the CASS definition of a FIP (ISSF draws on market forces, its Participating Companies, to motivate fishery improvements; has a workplan; participants have made explicit commitments to make improvements by adopting ISSF Conservation Measures; participants fund ISSF to implement the workplan activities; and ISSF reports on its progress in implementing its workplan), but SFP has determined that ISSF does not meet the CASS definition of a FIP that is “moving toward sustainability (CASS. 2011).



3. RESULTS AND DISCUSSION

Appendix 1, Tables 1 and 2, present results of an assessment of 22 stocks of principal market tuna species against SFP's five FishSource criteria. For each stock-level profile and for fishery-level profiles with scores that differed from the relevant stock-level profile, Table 3 identifies the year of the data used for the assessment against each of the five FishSource criteria. Figure 1 summarizes the status of 21 of the 22 stocks covered in this report based on scores from assessment against FishSource criteria 4 and 5. Figure 1 excludes the status of longtail tuna, for which a stock assessment report had not been published at the time of preparing this report. Time series of spawning stock biomass (SSB) and fishing mortality rates (F) relative to target biological reference points for the 18 assessed tuna stocks are presented in Figure 2. Main results related to the assessment of tuna stocks are:

- None of the 22 tuna stocks had scores of ≥ 8 for all five FishSource criteria (i.e., none were in category A). Half (11) of the 22 stocks were in category B, and the other half in category C.
- Of the 11 stocks in category C, 7 had < 6 scores for criterion 1.
- Some albacore, all yellowfin, and all skipjack tuna stocks were in relatively good condition, based on receiving scores of ≥ 6 against criteria 4 and 5 (except for north Atlantic Ocean albacore tuna, which is overfished and for which there is a lack of evidence of stable or sustained increase in biomass).
- The majority (83%) of the total reported landings from these 22 tuna stocks come from 11 stocks that scored ≥ 6 for all 5 criteria (category B).
- The western and central Pacific Ocean skipjack tuna stock made up 36% of the total reported landings of tunas and 44% of landings from category B stocks (Figure 3).
- About 17% of total tuna landings from the 22 assessed stocks comes from the 11 stocks in category C.
- Six stocks have at least one fishery that is MSC certified that includes that stock in its unit of certification. An additional 4 stocks have at least one fishery that is undergoing MSC full assessment and includes that stock in its unit of certification, but do not have a fishery that is MSC certified.
- Of the 22 stocks, 7 had at least one FishSource fishery-level profile that is in an SFP-recognized FIP: eastern Pacific Ocean yellowfin; Indian Ocean albacore, bigeye, and yellowfin; western and central Pacific Ocean bigeye, skipjack, and yellowfin.
- Four tuna stocks have been **moderately exploited** and did not exceed biomass or F target biological reference points during the entire analyzed time series: eastern Atlantic Ocean skipjack, western Atlantic Ocean skipjack, western and central Pacific Ocean skipjack, and western and central Pacific Ocean yellowfin (i.e., these four stocks have not been overfished and have not experienced overfishing during the full assessed time series). Because they are caught in mixed-species fisheries, it is not possible to increase catches of these moderately exploited stocks without also increasing fishing mortality of other stocks, including of bigeye tuna.
- Two tuna stocks have been fluctuating around their biomass and F target reference points, indicating that they have largely been **consistently fully exploited** and supplying maximum sustainable yields, meeting target stock management objectives, and fishing mortality should not be allowed to increase: eastern Pacific Ocean skipjack and yellowfin.
- Five tuna stocks have had long-term declining temporal trends in biomass but with signs of recent reductions in F and improvements in biomass ("**climbers**"): Atlantic Ocean bigeye, east Atlantic Ocean and Mediterranean bluefin, north Atlantic Ocean albacore, south Atlantic Ocean albacore, and Indian Ocean yellowfin. Future changes in the status of these stocks should be monitored closely to determine if the current management system maintains the stocks at levels



consistent with precautionary management targets. Notably, the recent decline in fishing mortality of the east Atlantic and Mediterranean bluefin tuna stock suggested that there had been a dramatic improvement since the previous stock assessment (ICCAT, 2012). The stock was subject to a high degree of misreporting since the mid-1990s and concomitant high uncertainty in available catch data. The next stock assessment, planned for publication in late 2014, will hopefully clarify whether overfishing is no longer occurring and whether the stock is headed towards recovery.

- Four tuna stocks have had long-term declining temporal trends in biomass (“fallers”): Indian Ocean bigeye, Indian Ocean albacore, west Atlantic Ocean bluefin, and Atlantic Ocean yellowfin. Future changes in the status of these stocks should be monitored closely to determine if the current management system maintains the stocks at levels consistent with precautionary management targets.
- The following tuna stocks did not fit in one of the above categories, for reasons including that they did not exhibit clear temporal trends in biomass or F or data quality is too poor: north and south Pacific Ocean albacore and western and central Pacific Ocean bigeye.



Score for FishSource criterion 5 – Relative fishing mortality rate	< 6			
	≥ 6 and < 8	BFT SO BFT WAO	ALB SAO	ALB IO ALB SPO BET WCPO
	≥ 8	ALB NAO	BFT EAM YFT AO YFT EPO	ALB NPO BET AO BET EPO BET IO SKJ EAO SKJ EPO SKJ IO SKJ WAO SKJ WCPO YFT IO YFT WCPO
		< 6	≥ 6 and < 8	≥ 8
Score for FishSource criterion 4 – Relative biomass				

KEY	
ALB = albacore tuna	AO = Atlantic Ocean
BET = bigeye tuna	EAO = East Atlantic Ocean
BFT = bluefin tuna	EAM = Eastern Atlantic and Mediterranean
SKJ = skipjack tuna	EPO = Eastern Pacific Ocean
YFT = yellowfin tuna	IO = Indian Ocean
	NAO = North Atlantic Ocean
	NPO = North Pacific Ocean
	SAO = South Atlantic Ocean
	SO = Southern Ocean
	SPO = South Pacific Ocean
	WAO = West Atlantic Ocean
	WCPO = Western & Central Pacific Ocean

Figure 1. Graphical representation of the status of 21 stocks of principal market tuna species based on scores from assessment against FishSource criteria 4 and 5, on relative stock size and fishing mortality rate, respectively.

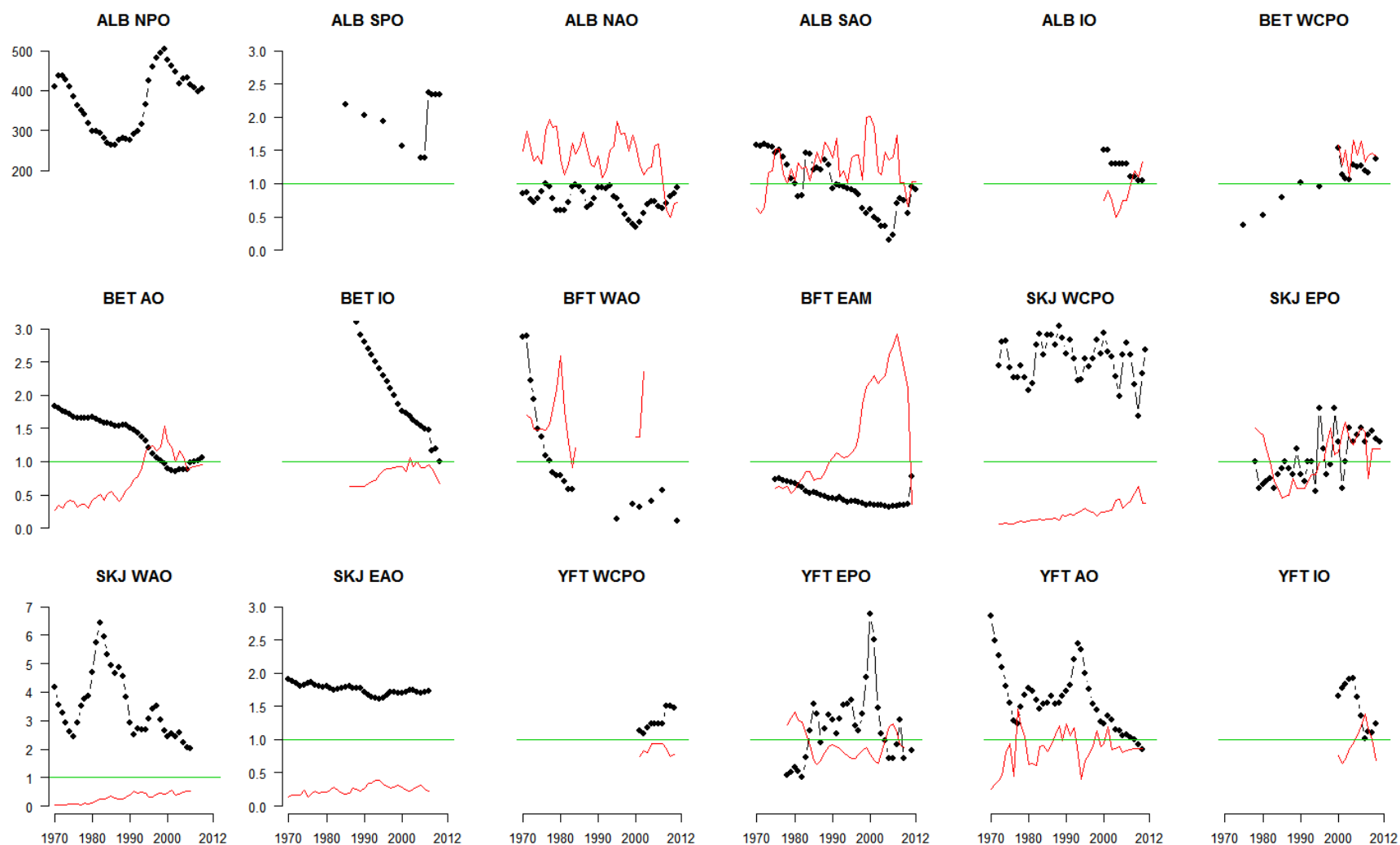


Figure 2. Temporal trends in spawning stock biomass (SSB, black lines with dots) and fishing mortality (F or equivalent, red lines). Estimates are relative to the upper target reference point (MSY or equivalent and F_{msy} or equivalent, green lines) except for North Pacific albacore where no reference points exist and absolute (in k t) estimates of SSB are provided. Acronyms for stocks are defined in Figure 1.



Table 1 also presents information on 95 SFP FishSource fishery-level profiles for tuna species, identifying those that are MSC certified, are undergoing MSC full assessment, and are in an SFP-recognized FIP. Main results related to the fishery-level profiles are:

- Sixteen of the fishery-level profiles were in the MSC program: 10 are MSC certified, 6 are undergoing full assessment. None of the profiles in the MSC program are also in an SFP-recognized FIP.
- Twelve fishery-level profiles were in SFP-recognized FIPs. As explained in the Methods section, multiple FishSource profiles can exist for a single fishery. The 12 fishery profiles that are in FIPs belong to a total of seven tuna fishery SFP-recognized FIPs: (i) Panama longline yellowfin tuna FIP (led by Centro Desarrollo y Pesca Sustentable, CeDePesca (SFP, 2012b)); (ii) Marshall Islands longline bigeye and yellowfin tuna FIP (led by Norpac Fisheries Export (Norpac Fisheries Export, 2013)); (iii) Indonesia Indian Ocean longline yellowfin and bigeye tuna FIP (led by SFP (SFP, 2013a)); (iv) Sri Lanka longline yellowfin and bigeye tuna FIP (led by SFP (SFP, 2013b)); (v) Thailand purse seine tonggol tuna FIP (led by Procordia Food AB and SFP (SFP, 2013c)); (vi) Indonesia seine net, longline, handline, and pole-and-line tuna FIP (led by World Wildlife Fund, WWF (WWF, 2012)); and (vii) Indonesia handline and pole-and-line tuna FIP (led by Anova Food (Anova, no date)).
- 71% (67 of 95) fishery-level profiles were not MSC certified, not undergoing an MSC full assessment, and not in a FIP as defined by CASS (Figure 4).
- Of the 95 fishery-level profiles, 68 were in category B, and 27 in category C (Figures 4 and 5).

The FishSource fishery-level profile for the Senegal Atlantic Ocean yellowfin tuna longline fishery was the one fishery-level profile with scores that differed from the scores of the relevant stock-level profile (Table 1). The score for FishSource criterion 3 was 10 for the stock-level profile because the stock-wide actual catch was less than a set TAC level based on data for the most current year for which data were available (SFP, 2013d). The score for criterion 3 was ≥ 6 for the Senegal profile; the reason stated for the different score was, “Although TAC levels have not been exceeded, compliance within some sectors of the Senegalese fishery is poor” (SFP, 2013e).

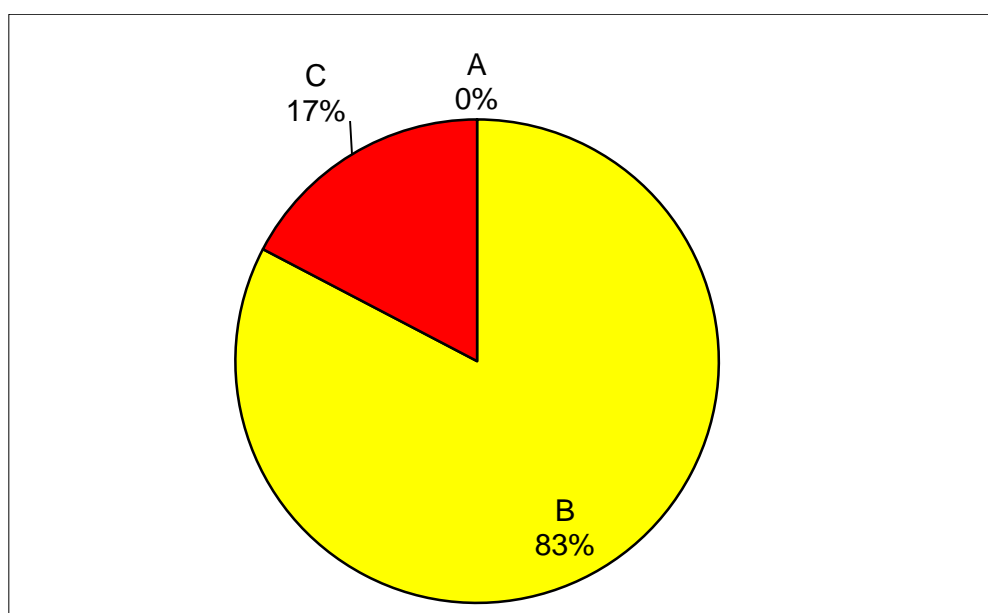


Figure 3. Proportion of total reported landings by SFP FishSource sustainability category for 22 tuna stock-level FishSource profiles. Catch levels are based on the most currently available data for each stock (Table 1). Categories are defined in the Methods section.

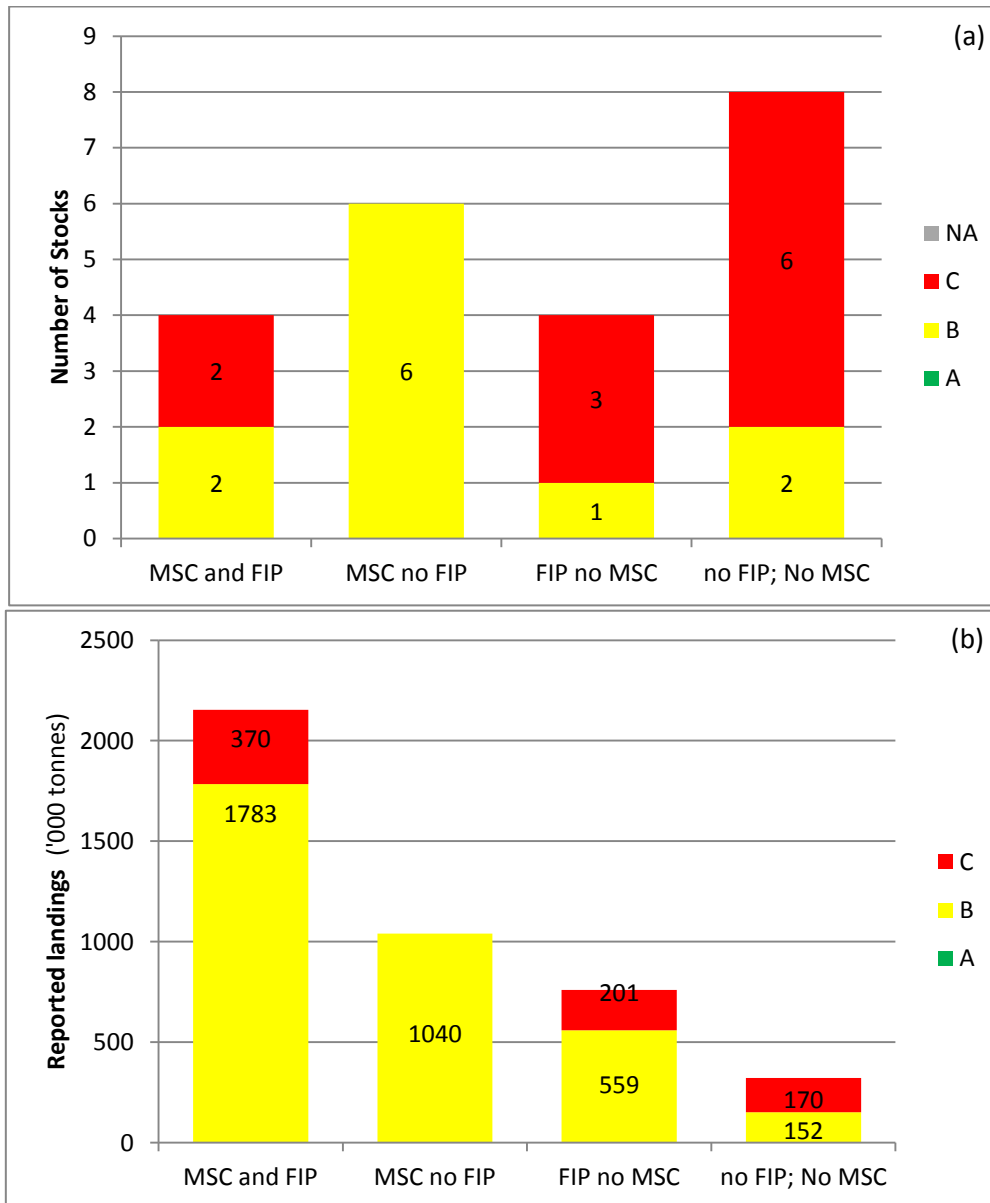


Figure 4. FishSource stock-level tuna profiles by sustainability category (defined in the Methods section) and split by whether the FishSource stock-level profile includes fishery-level profiles that are in the MSC program (certified or in full assessment) and/or are in an SFP-recognized FIP displayed as (a) number of stock-level profiles, and (b) reported landings.

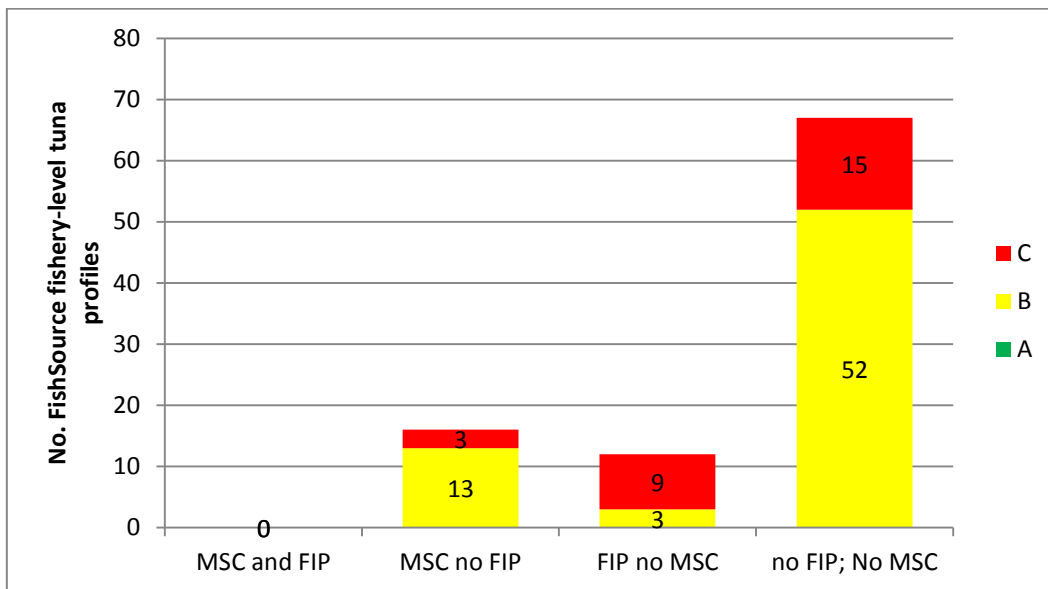


Figure 5. Number of FishSource fishery-level tuna profiles by category (defined in the Methods section), and subdivided to show whether the FishSource stock-level profile includes fishery-level profiles that are in the MSC program (certified or in full assessment) and/or are in an SFP-recognized FIP.



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Appendix 1. Results Tables

Table 1. Results from an assessment of 22 tuna stock-level FishSource profiles (bold profile name) against five criteria used in SFP's FishSource program, reported landings from each stock, and 95 FishSource "fishery-level" tuna profiles (indented profile name) identifying one fishery-level profile with a score that differed from the relevant stock-level profile, and identifying profiles that were certified against the Marine Stewardship Council (MSC) standard, are currently undergoing full assessment against the MSC standard, and were in an SFP-determined fishery improvement project.

Profile Name ¹	Scientific advice	Managers compliance	Catch sector compliance	Relative biomass	Fishing mortality	Category (A-C) ²	Reported landings (thousands of tonnes) ³	MSC certified or undergoing full assessment ⁴	FIP Lead ⁵
Atlantic bluefin tuna - Eastern Atlantic and Mediterranean	≥ 6	10	< 6 ⁶	7.1	10	C	9.8		
Atlantic bluefin tuna - Western Atlantic	4.9	10	10	5.5	6.9	C	1.6		
Bigeye tuna - Atlantic	≥ 6	10	10	8.2	8.2	B	89.9	1 FA	
Bigeye tuna - Atlantic (Country: CA; Gear: LL;)							-		
Bigeye tuna - Atlantic (Country: US, ES; Gear: LL; MSC-Client: DBS; MSC-Status: MSC Full Assessment;)							-	FA	
Bigeye tuna - Atlantic (Country: SH; Gear: LX; MSC-Client: SHDA; MSC-Status: Not certified;)							-		
Bigeye tuna - Eastern Pacific	< 6	N/A	N/A	≥ 8	≥ 8	C	88.2		
Bigeye tuna - Eastern Pacific (Country: EC; Gear: LLD;)							-		
Bigeye tuna - Indian Ocean	< 6	≥ 6	≥ 6	8	9.3	C	71.0	2 FA	2
Bigeye tuna - Indian Ocean (Country: ES; Gear: PS; MSC-Client: PE; MSC-Status: MSC Full Assessment;)							-	FA	
Bigeye tuna - Indian Ocean (Country: ID; Gear: LL; FIP: Indonesian Tuna, SFP)							-		SFP
Bigeye tuna - Indian Ocean (Country: LK; Gear: GN;)							-		
Bigeye tuna - Indian Ocean (Country: LK; Gear: LLD; FIP: Sri Lanka tuna, SFP)							-		SFP
Bigeye tuna - Western and Central Pacific	< 6	< 6	≥ 6	≥ 8	6.4	C	161.6		1
Bigeye tuna - Western and Central Pacific (Country: FM; Gear: LLD;)							-		
Bigeye tuna - Western and Central Pacific (Country: ID; Gear: LL;)							-		



Profile Name ¹	Scientific advice	Managers compliance	Catch sector compliance	Relative biomass	Fishing mortality	Category (A-C) ²	Reported landings (thousands of tonnes) ³	MSC certified or undergoing full assessment ⁴	FIP Lead ⁵
Bigeye tuna - Western and Central Pacific (Country: KR; Gear: LL;)							-		
Bigeye tuna - Western and Central Pacific (Country: MH; Gear: LLD; FIP: Marshall Islands bigeye tuna, Norpac)							-		Norpac
Bigeye tuna - Western and central Pacific (Country: US; Management area: Hawaii and high seas; Gear: drifting longline - deep-set to target bigeye tuna)							-		
Bigeye tuna - Western and Central Pacific (Country: VN; Gear: LLD;)							-		
Longtail tuna - Indo-West Pacific	< 6	N/A	N/A	N/A	N/A	C	-		2
Longtail tuna - Indian Ocean (Country: TH; Gear: PS; FIP: Thai tonggol, Procordia / SFP)							-		Procordia and SFP
Longtail tuna - W Pacific (Country: TH; Gear: PS; FIP: Thai tonggol, Procordia / SFP)							-		Procordia and SFP
Skipjack tuna - Eastern Atlantic	≥ 6	≥ 6	≥ 6	≥ 8	≥ 8	B	126.9		
Skipjack tuna - Eastern Atlantic (Country: ES; Mgmt Area: Canary Islands; Gear: LHM, LHP)							-		
Skipjack tuna - Eastern Atlantic (Country: GH; Gear: PS;)							-		
Skipjack tuna - Eastern Atlantic (Country: SN; Gear: LHP_pII;)							-		
Skipjack tuna - Eastern Atlantic (Country: CI; Gear: LHP;)							-		
Skipjack tuna - Eastern Atlantic (Country: SH; Gear: LX; MSC-Client: SHDA; MSC-Status: Not certified;)							-		
Skipjack tuna - Eastern Pacific	≥ 6	≥ 6	≥ 6	9,2	≥ 8	B	284.7	1 Cert	
Skipjack tuna - Eastern Pacific (Country: EC; Gear: PS;)							-		
Skipjack tuna - Eastern Pacific (Country: MX; Gear: LHM; MSC-Client: PPM; MSC-Status: MSC Certified;)							-	Cert	



Profile Name ¹	Scientific advice	Managers compliance	Catch sector compliance	Relative biomass	Fishing mortality	Category (A-C) ²	Reported landings (thousands of tonnes) ³	MSC certified or undergoing full assessment ⁴	FIP Lead ⁵
Skipjack tuna - Indian Ocean	≥ 6	≥ 6	≥ 6	10	9.6	B	428.7	1 FA 1 Cert	
Skipjack tuna - Indian Ocean (Country: ES; Gear: PS; MSC-Client: PE; MSC-Status: MSC Full Assessment;)							-	FA	
Skipjack tuna - Indian Ocean (Country: FR, ES; Gear: PS;)							-		
Skipjack tuna - Indian Ocean (Country: MV; Gear: LHM; MSC-Client: MSPEA; MSC-Status: MSC Certified;)							-	Cert	
Skipjack tuna - Western and Central Pacific	6	≥ 6	≥ 6	≥ 8	≥ 8	B	1540.0	1 Cert	1
Skipjack tuna - Western and Central Pacific (Country: ID; Gear: LHP; FIP: Indonesia Tuna, WWF)							-		WWF
Skipjack tuna - Western and Central Pacific (Country: JP; Gear: LHM; MSC-Client: TS; MSC-Status: Withdrawn;)							-		
Skipjack tuna - Western and Central Pacific (Country: MH, PW, FM, SB, TV, PG, KI, NR; Gear: PS; MSC-Client: PNA; MSC-Status: MSC Certified;)							-	Cert	
Skipjack tuna - Western and Central Pacific (Country: NZ; Gear: PS;)							-		
Skipjack tuna - Western and Central Pacific (Country: PH; Gear: PS;)							-		
Skipjack tuna - Western and Central Pacific (Country: PH; Gear: TM;)							-		
Skipjack tuna - Western and Central Pacific (Country: TH; Gear: PS;)							-		
Skipjack tuna - Western and Central Pacific (Country: TW; Gear: PS;)							-		
Skipjack tuna - Western and Central Pacific (Country: US; Mgmt Area: Hawaii & high seas; Gear: LL;)							-		
Skipjack tuna - Western and Central Pacific (Country: VN; Gear: PS;)							-		
Skipjack tuna - Western Atlantic	< 6	≥ 6	≥ 6	10	9.9	C	39.3		
Skipjack tuna - Western Atlantic (Country: BR; Gear:)							-		



Profile Name ¹	Scientific advice	Managers compliance	Catch sector compliance	Relative biomass	Fishing mortality	Category (A-C) ²	Reported landings (thousands of tonnes) ³	MSC certified or undergoing full assessment ⁴	FIP Lead ⁵
LHP_pll;									
Southern bluefin tuna	6	7,8	10	1.3	≥ 6	C	11.4		
Yellowfin tuna - Atlantic	≥ 6	10	10	7.4	8.5	B	101.9	1 FA	
Yellowfin tuna - Atlantic (Country: BR; Gear: LLD;)							-		
Yellowfin tuna - Atlantic (Country: ES; Gear: LL;)							-		
Yellowfin tuna - Atlantic (Country: GD; Gear: LLD;)							-		
Yellowfin tuna - Atlantic (Country: PA; Gear: LL;)							-		
Yellowfin tuna - Atlantic (Country: SN; Gear: LL;)			≥ 6			B	-		
Yellowfin tuna - Atlantic (Country: SR; Gear: LLD;)							-		
Yellowfin tuna - Atlantic (Country: TT; Gear: LLD;)							-		
Yellowfin tuna - Atlantic (Country: TT; Gear: NK;)							-		
Yellowfin tuna - Atlantic (Country: US; Gear: LL; MSC-Client: DBS; MSC-Status: MSC Full Assessment;)							-	FA	
Yellowfin tuna - Atlantic (Country: SH; Gear: LHP, LHM; MSC-Client: SHDA; MSC-Status: Not certified;)							-		
Yellowfin tuna - Eastern Pacific	6	≥ 6	≥ 6	7.2	8.0	B	243.3	1 Cert	1
Yellowfin tuna - Eastern Pacific (Country: CR; Gear: LLD;)							-		
Yellowfin tuna - Eastern Pacific (Country: EC; Gear: LLD;)							-		
Yellowfin tuna - Eastern Pacific (Country: MX; Gear: LHM; MSC-Client: PPM; MSC-Status: MSC Certified;)							-	Cert	
Yellowfin tuna - Eastern Pacific (Country: NI; Gear: LLD;)							-		
Yellowfin tuna - Eastern Pacific (Country: PA; Gear: LLD; FIP: Panama yellowfin tuna, Panalang/CeDePesca)							-		CeDePesca
Yellowfin tuna - Indian Ocean	< 6	≥ 6	≥ 6	10	8.6	C	299.1	2 FA	3
Yellowfin tuna - Indian Ocean (Country: ES; Gear: LL;)							-		



Profile Name ¹	Scientific advice	Managers compliance	Catch sector compliance	Relative biomass	Fishing mortality	Category (A-C) ²	Reported landings (thousands of tonnes) ³	MSC certified or undergoing full assessment ⁴	FIP Lead ⁵
Yellowfin tuna - Indian Ocean (Country: ES; Gear: PS; MSC-Client: PE; MSC-Status: MSC Full Assessment;)							-	FA	
Yellowfin tuna - Indian Ocean (Country: ID; Gear: LHP;)							-		
Yellowfin tuna - Indian Ocean (Country: ID; Gear: LL; FIP: Indonesian Tuna, SFP)							-		SFP
Yellowfin tuna - Indian Ocean (Country: ID; Gear: PS;)							-		
Yellowfin tuna - Indian Ocean (Country: ID; Gear: SX, LL, LHM; FIP: Indonesia Tuna, WWF)							-		WWF
Yellowfin tuna - Indian Ocean (Country: IN; Gear: LHP;)							-		
Yellowfin tuna - Indian Ocean (Country: KR; Gear: LL;)							-		
Yellowfin tuna - Indian Ocean (Country: LK; Gear: LLD; FIP: Sri Lanka tuna, SFP)							-		SFP
Yellowfin tuna - Indian Ocean (Country: MV; Gear: LHP; MSC-Client: MSPEA; MSC-Status: MSC Full Assessment;)							-	FA	
Yellowfin tuna - Indian Ocean (Country: TH; Gear: LL;)							-		
Yellowfin tuna - Western and Central Pacific	≥ 6	≥ 6	≥ 6	9.9	8.9	B	558.8		1
Yellowfin tuna - Western and Central Pacific (Country: ID; Gear: SX, LL, LHM;)							-		
Yellowfin tuna - Western and Central Pacific (Country: ID; Gear: LHP; FIP: Indonesian headline tuna, Anova)							-		Anova
Yellowfin tuna - Western and Central Pacific (Country: ID; Gear: SX, LL;)							-		
Yellowfin tuna - Western and Central Pacific (Country: ID; Gear: LLD;)							-		
Yellowfin tuna - Western and Central Pacific (Country: ID; Gear: LL, LX, PS;)							-		
Yellowfin tuna - Western and Central Pacific (Country: ID; Gear: LX;)							-		



Profile Name ¹	Scientific advice	Managers compliance	Catch sector compliance	Relative biomass	Fishing mortality	Category (A-C) ²	Reported landings (thousands of tonnes) ³	MSC certified or undergoing full assessment ⁴	FIP Lead ⁵
Yellowfin tuna - Western and Central Pacific (Country: ID; Gear: PS;)							-		
Yellowfin tuna - Western and Central Pacific (Country: KR; Gear: LL;)							-		
Yellowfin tuna - Western and Central Pacific (Country: MH; Gear: LLD, LHP, PS;)							-		
Yellowfin tuna - Western and Central Pacific (Country: MH; Gear:LLD)							-		
Yellowfin tuna - Western and Central Pacific (Country: MY; Gear: LX;)							-		
Yellowfin tuna - Western and Central Pacific (Country: PH; Gear: LHP, LHM;)							-		
Yellowfin tuna - Western and Central Pacific (Country: PH; Gear: LHP _hdl;)							-		
Yellowfin tuna - Western and Central Pacific (Country: PH; Gear: LLD;)							-		
Yellowfin tuna - Western and Central Pacific (Country: PH; Gear: LX;)							-		
Yellowfin tuna - Western and Central Pacific (Country: SG; Gear: LLD;)							-		
Yellowfin tuna - Western and Central Pacific (Country: US; Gear: LL;)							-		
Yellowfin tuna - Western and Central Pacific (Country: VN; Gear: LLD;)							-		
Albacore - Indian Ocean	≥ 6	< 6	N/A	8.2	6.7	C	38.9		1
Albacore - Indian Ocean (Country: ID; Gear: LL; FIP: Indonesian Tuna, SFP)							-		SFP
Albacore - North Atlantic	≥ 6	≥ 6	≥ 6	< 6	≥ 8	C	20.0		
Albacore - North Atlantic (Country: US; Gear: LL;)							-		
Albacore - North Pacific	≥ 6	≥ 6	≥ 6	≥ 8	≥ 8	B	69.4	3 Cert	
Albacore - North Pacific (Country: CA; Gear: LLS, LHP; MSC-Client: CHMSF; MSC-Status: MSC Certified;)							-	Cert	
Albacore - North Pacific (Country: CA; Gear: LTL;)							-		



Profile Name ¹	Scientific advice	Managers compliance	Catch sector compliance	Relative biomass	Fishing mortality	Category (A-C) ²	Reported landings (thousands of tonnes) ³	MSC certified or undergoing full assessment ⁴	FIP Lead ⁵
Albacore - North Pacific (Country: KR; Gear: LL;)							-		
Albacore - North Pacific (Country: US; Gear: LL, LTL, LHP, LHM;)							-		
Albacore - North Pacific (Country: US; Gear: LTL, LHM; MSC-Client: AAFA; MSC-Status: MSC Recertified;)							-	Cert	
Albacore - North Pacific (Country: US; Gear: LTL, LHM; MSC-Client: WFOA; MSC-Status: MSC Certified;)							-	Cert	
Albacore - North Pacific (Country: US; Gear: LTL, LHM;)							-		
Albacore - South Atlantic	≥ 6	10	9.5	7.6	7.9	B	24.7		
Albacore - South Atlantic (Country: PA; Gear: LL;)							-		
Albacore - South Atlantic (Country: SH; Gear: LHP, LHM; MSC-Client: SHDA; MSC-Status: Not certified;)							-		
Albacore - South Pacific	≥ 6	≥ 6	≥ 6	10	10	B	65.7	3 Cert	
Albacore - South Pacific (Country: FJ; Gear: LL; MSC-Client: FTBOA; MSC-Status: MSC Certified;)							-	Cert	
Albacore - South Pacific (Country: NZ; Gear: LTL; MSC-Client: TMA; MSC-Status: MSC Certified;)							-	Cert	
Albacore - South Pacific (Country: US; Gear: LTL, LHM; MSC-Client: AAFA; MSC-Status: MSC Recertified;)							-	Cert	

¹ Key to acronyms and abbreviations is in Appendix 2.

² Category A = all 5 scores ≥ 8 ; B = all 5 scores ≥ 6 but at least one score of < 8 ; C = one or more of 5 scores < 6 . Fishery-level profiles had the same category as the stock-level profile in which they are nested unless noted otherwise.

³ Reported landing values are for the latest year for which public data were available.

⁴ Cert = Certified, FA = in full assessment. For stock-level profiles (bold), value identifies the number of fishery-level profiles that are certified or in full assessment.

⁵ FIP = fishery improvement project; Anova = Anova Food; CeDePesca = Centro Desarrollo y Pesca Sustentable; Norpac = Norpac Fisheries Export; Procordia = Procordia Food AB; SFP = Sustainable Fisheries Partnership. For stock-level profiles (bold), value identifies the number of fishery-level profiles that are in an SFP-recognized FIP. SFP considers a project to be a FIP when the SFP criteria for FIP Stage 1 or higher are met, which includes that information on the FIP status and progress is publicly available (SFP, no date). For stock-level profiles (bold), value identifies the number of fishery-level profiles that are in an SFP-recognized FIP.

⁶ There is some evidence that IUU fishing mortality of Mediterranean bluefin tuna has declined in recent years, including due to augmented monitoring of purse seine catches going to growout cages, which was likely the main source of past IUU catches, e.g., see Gagern et al. (2013); SFP will review current information on IUU fishing when this profile is next updated.



Table 2. Year of data used for the assessment of profiles against each FishSource criteria for 22 FishSource stock-level tuna profiles, and one fishery-level tuna profile (indented profile name).

Profile name ¹	Year of data ²				
	Criterion 1: Scientific advice	Criterion 2: Managers compliance	Criterion 3: Catch sector compliance	Criterion 4: Biomass	Criterion 5: Fishing mortality rate
Atlantic bluefin tuna - Eastern Atlantic and Mediterranean	2012	2012	2012	2011	2011
Atlantic bluefin tuna - Western Atlantic	2001	2007	2008	2007	2007
Bigeye tuna - Atlantic	2012	2012	2012	2009	2009
Bigeye tuna - Eastern Pacific	2010	2010	2010	2013	2012
Bigeye tuna - Indian Ocean	2011	2011	2010	2010	2010
Bigeye tuna - Western and Central Pacific	2013	2013	2013	2013	2011
Longtail tuna - Indo-West Pacific	2010	NA	NA	NA	NA
Skipjack tuna - Eastern Atlantic	2012	2012	2012	2008	2008
Skipjack tuna - Eastern Pacific	2012	2012	2012	2011	2011
Skipjack tuna - Indian Ocean	2010	2010	2010	2010	2010
Skipjack tuna - Western and Central Pacific	2011	2011	2011	2011	2011
Skipjack tuna - Western Atlantic	2012	2012	2012	2006	2006
Southern bluefin tuna	2011	2009	2008	2009	2011
Yellowfin tuna - Atlantic	2013	2011	2012	2010	2010
Yellowfin tuna - Atlantic (Country: SN; Gear: LL;)	2012	2011	2012	2010	2010
Yellowfin tuna - Eastern Pacific	2009	2013	2009	2009	2009
Yellowfin tuna - Indian Ocean	2011	2012	2009	2010	2010
Yellowfin tuna - Western and Central Pacific	2012	2012	2012	2010	2010
Albacore - Indian Ocean	2013	2012	NA	2010	2010
Albacore - North Atlantic	2011	2011	2011	2008	2008
Albacore - North Pacific	2011	2012	2012	2009	2009
Albacore - South Atlantic	2012	2012	2012	2012	2012
Albacore - South Pacific	2012	2012	2012	2010	2011

¹ Key to acronyms and abbreviations is in Appendix 2.

² NA indicates that this criterion was not assessed for the profile.


Appendix 2. Key to Acronyms used in Appendix 1, Tables 1 and 2

AU	Australia
BR	Brazil
CA	Canada
CI	Ivory Coast
CR	Costa Rica
EC	Ecuador
ES	Spain
EU	European Union
FM	Federated States of Micronesia
GD	Grenada
GEN	Gillnets and entangling nets (not specified)
GN	Gillnets (not specified)
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
ID	Indonesia
IN	India
IOTC	Indian Ocean Tuna Commission
JP	Japan
KR	South Korea
LHM	Handlines and pole-lines (mechanized)
LHM_pll	Pole-lines mechanized
LHP	Handlines and pole-lines (hand operated)
LHP_hdl	Handlines hand operated
LHP_pll	Pole-lines hand operated
LK	Sri Lanka
LL	Longlines (not specified)
LLD	Drifting longlines
LLS	Set longlines
LTL	Trolling lines
LX	Hooks and lines (not specified)
MH	Republic of the Marshall Islands
MU	Mauritius
MV	Maldives
MX	Mexico
NI	Nicaragua
NK	To be defined
NZ	New Zealand
PA	Panama
PH	Philippines
PS	Purse seines
RG	Recreational fishing gear
SH	Saint Helena
SN	Senegal
SPC	Secretariat of the Pacific Community
SR	Suriname
SX	Seine nets (not specified)
TH	Thailand
TM	Midwater trawls (not specified)
TT	Trinidad and Tobago
US	United States of America
VN	Vietnam
WCPCF	Western and Central Pacific Fisheries Commission