Reduction Fisheries:

SFP Fisheries Sustainability Overview 2019

Sustainable Fisheries
P A R T N E R S H I P

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Reduction Fisheries: SFP Fisheries Sustainability Overview 2019

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KEYWORDS

B_{MSY}; fisheries; FishSource; F_{MSY}; forage; improvement; low trophic level; ecosystem-based fisheries management; reduction; stock status; supply chain; sustainability; target

DISCLAIMER

This report was mainly prepared with information available from FishSource.org™, a program of Sustainable Fisheries Partnership (SFP). The findings summarized in the report are based on information that the authors accessed from FishSource in early July 2019. SFP updates FishSource regularly, but the report may not capture the most recent data for all the stocks. Always check FishSource.org for the most updated information SFP has for any given stock and fishery. Given the large number of existing fisheries for a given sector, this report evaluates the strategically most important stocks worldwide at the time (based on criteria such as the volume of catch or interest for SFP partners, for example). The current *scoring* and *ranking categories* provided in the report do not take into account the environmental impacts of the fisheries (i.e., are based solely on the quality of management/degree of fishers' compliance and the status of the stock). However, the main environmental issues are considered at a high resolution, based on information already captured in the respective narrative "Environment and Biodiversity" sections of FishSource.org, and also in other sources of information.

EXECUTIVE SUMMARY

The tenth edition of the SFP global sustainability overview covers the main Pacific and Atlantic fish stocks used for reduction purposes (to produce fishmeal and fish oil). The list of fisheries evaluated remains the same as in the 2018 edition. The fisheries are rated according to the sustainability assessment presented on FishSource ([http://www.fishsource.org),](http://www.fishsource.org) the SFP public database of fisheries information. The assessments are based on the most recently available public data as of June 2019 and generally represent a snapshot of the position in 2018 with regard to management quality and stock status indicators and in 2017[1] for catch statistics.

The overview is only concerned with fisheries that provide whole fish to the fishmeal and oil industry and does not cover fisheries that generate trimmings. The report does not generally cover an assessment of the status of Asian small pelagics and mixed-species trawl fisheries, because of the current difficulty in establishing management and catch data, although it does provide an evaluation for Indian oil sardine in India. This omission is significant, because the fisheries of Asia provide very large quantities of fishmeal; it is hoped that future editions of the report will be able to extend coverage to at least some of these fisheries. Nonetheless, we are confident that the report continues to cover approximately 50 percent of global fishmeal and oil production.

The report is marked by the addition of two new chapters, one dedicated to recent highlights, challenges, and opportunities of Asian reduction fisheries and another one to threats and recommendations on the interaction of seabirds and lower trophic level fisheries.

In summary, for the 26 stocks analyzed, the report concludes that:

1. The overall sustainability status of the fisheries covered in this report is slightly more pessimistic than in 2018. This is mostly related to a drop in the stock condition of a few European and South American fisheries (e.g., Chilean jack mackerel – SE Pacific). All of the fisheries already have relatively good management schemes in place; continued efforts in addressing the remaining management issues, and also in complying with the scientifically advised measures, would likely contribute to a faster recovery of the respective stocks to healthy levels.

2. **Three percent** of the total catch volume of the reduction fisheries in this analysis comes from stocks in very good condition (**Category A**) (**Figure 1**). As in the four previous editions, this corresponds to a single fishery: Antarctic krill - Atlantic Southern Ocean. This stock is managed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) and has had MSC-certified fisheries since 2010. Recently, a new Chilean fleet has joined the MSC program and was certified in September 2018 (**Appendix E).** It is important to note, however, that this does not mean that ecosystem monitoring should be ignored. Future ecosystem effects, such as the warming of the Antarctic by anthropogenic climate change and the relationship to fishery management, are not taken into account in this overview.

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[1] Although catch data for 2018 is already available for some fisheries, most is only available up to 2017; thus, we have used the 2017 catch across all fisheries.

3. **Eighty-eight percent** of the total catch volume in this analysis comes from stocks that are reasonably well-managed (or better) (i.e., that score 6 or above on all five FishSource criteria), **a three percent decrease compared to last year.** The stock with the largest contribution to this category continues to be the **Anchoveta - Peruvian northern-central stock**, which **represents approximately 32 percent** of the total catch, compared to 33 percent in the previous overview.

4. The catch volume from reasonably managed fisheries with the stocks in good condition (**Category B1) decreased by 5 percent** compared to 2018 (**Figure 2**). This was mostly due to slightly more pessimistic perceptions of the stock condition of the Chilean jack mackerel - SE Pacific (5 percent) and European pilchard - NW Africa southern stocks (**Table 4**).

5. **Twelve percent** (1.1 million tonnes) of the total catch for reduction purposes comes from poorly managed fisheries (**Category C**), **a rise of 2 percent compared to last year**. The volume coming from poorly managed fisheries is still considerably lower than that observed prior to 2017 (**Figure 2**).

6. Of the fisheries analyzed, **changes in sustainability categories from last year** were observed in **seven fisheries** (details on the specific changes for each of the fisheries can be found in **Table 4**).

    1. **Three fisheries improved** their status:
        1. European sprat - North Sea, Skagerrak and Kattegat (C to B1)
        2. European pilchard - NW Africa central (B2 to B1)
        3. Anchoveta - Chilean Central-Southern (regions V-X) (C to B2)
    2. **Four fisheries decreased** in their sustainability categories:
        1. Chilean jack mackerel - Southeast Pacific (B1 to B2)
        2. European pilchard - NW Africa southern (Morocco) (B1 to B2)
        3. Sandeels nei - Dogger Bank area (B1 to C)
        4. Capelin – Icelandic (B2 to C)

7. Progress toward improvements and certification continues, in particular for the Atlantic and Eastern Pacific reduction fisheries. Globally, and for the fisheries assumed to be used for reduction purposes, 17 fisheries have components that are already covered by the MSC program, 43 are at least partially covered by the IFFO Responsible Sourcing scheme (either as approved <u>whole raw material</u>, or <u>by-product</u>), and 10 are associated to currently active fishery improvement projects (FIPs) (**Table 5**). For more information on certification and FIPs, see **section 4**.

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LIST OF TERMS AND ABBREVIATIONS

|	
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
ICES	International Council for the Exploration of the Sea
IFFO	International Fishmeal and Fish Oil Organisation
IFFO RS	International Fishmeal and Fish Oil Organisation's Global Standard for Responsible Supply
INRH	Moroccan National Research Institute of Fisheries Resources
FAO	Food and Agriculture Organization of the United Nations
FIP	Fishery Improvement Project
FP	Fishery Progress
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
SFP	Sustainable Fisheries Partnership
TAC	Total Allowable Catch

1   INTRODUCTION

Sustainable Fisheries Partnership (SFP) applies a sectoral approach to its mission of making actionable information available to the supply chain in order to leverage market forces to achieve improvements in fisheries. Seafood sectors may be defined in terms of the shared biological characteristics of harvested species, as well as their role in defined markets (for instance, krill and anchovy share few biological characteristics, but they are both important in the same fishmeal and fish oil markets). In 2017, SFP announced a new sector-based initiative, called Target 75 (SFP 2017), that aims to get 75 percent of the world's seafood produced in a sustainable manner, or demonstrating improvement toward sustainability, by 2020. The reduction fisheries are one of the strategic seafood sectors covered by this initiative.

SFP created an online database in 2007, FishSource.org, to track individual stock and fishery performance within each sector against the FishSource sustainability criteria for management quality and stock status, environmental impacts, and improvement needs of individual fisheries. As of September 2019, FishSource covered 3,411 fisheries from more than 1,872 stocks or assessment units and 563 marine and freshwater wild-capture species (SFP 2019). Since 2008, analyses of FishSource data (in the form of "sector reports") have been performed for the most strategic seafood sectors. The sector reports assess the sustainability performance of individual stocks and aggregate data to reflect the status of the overall sector. This information can provide useful guidance to those parts of the fishing and seafood industries that need to incorporate sustainability criteria into procurement policies. This report focuses on the reduction fisheries sector, with emphasis on fisheries from the Atlantic and eastern Pacific oceans.

Reduction fisheries for the fishmeal and fish oil industry in the Atlantic and eastern Pacific oceans are largely dominated by low trophic level species. Due to their specific population biology and dynamics (e.g., high fecundity, early maturity, and short life span), these species are frequently resilient to fishing pressure if catches are well-managed, but overfishing is always a possibility without effective management controls. The proportion of any given catch that is used for reduction purposes (as opposed to human consumption) will vary over time depending on market conditions, with fish destined for consumers tending to attract higher prices. The forage species are also extremely important to the wider ocean ecology, because they are a critical food source for many species of fish, marine mammals, and seabirds and act as the foundation for many food webs. It is of the utmost importance that these stocks are well-managed, with adequate safety margins and a healthy respect for the wider ecological implications of commercial exploitation.

The current SFP Fisheries Sustainability Overview analyzes reduction fisheries from 26 different stocks (most targeting forage species) and assesses the sustainability of the existing management regimes. As in previous editions, only a subset of the global catch applied for reduction is covered; fisheries that are used exclusively as fish trimmings are excluded from this sustainability analysis. Southeast Asian fisheries that are used principally for reduction (mainly from "trash fish" fisheries, but also from fisheries targeting small pelagics) are also very relevant to the global catch supply for fishmeal, fish oil, and agriculture fertilizers, but are not included in this report.
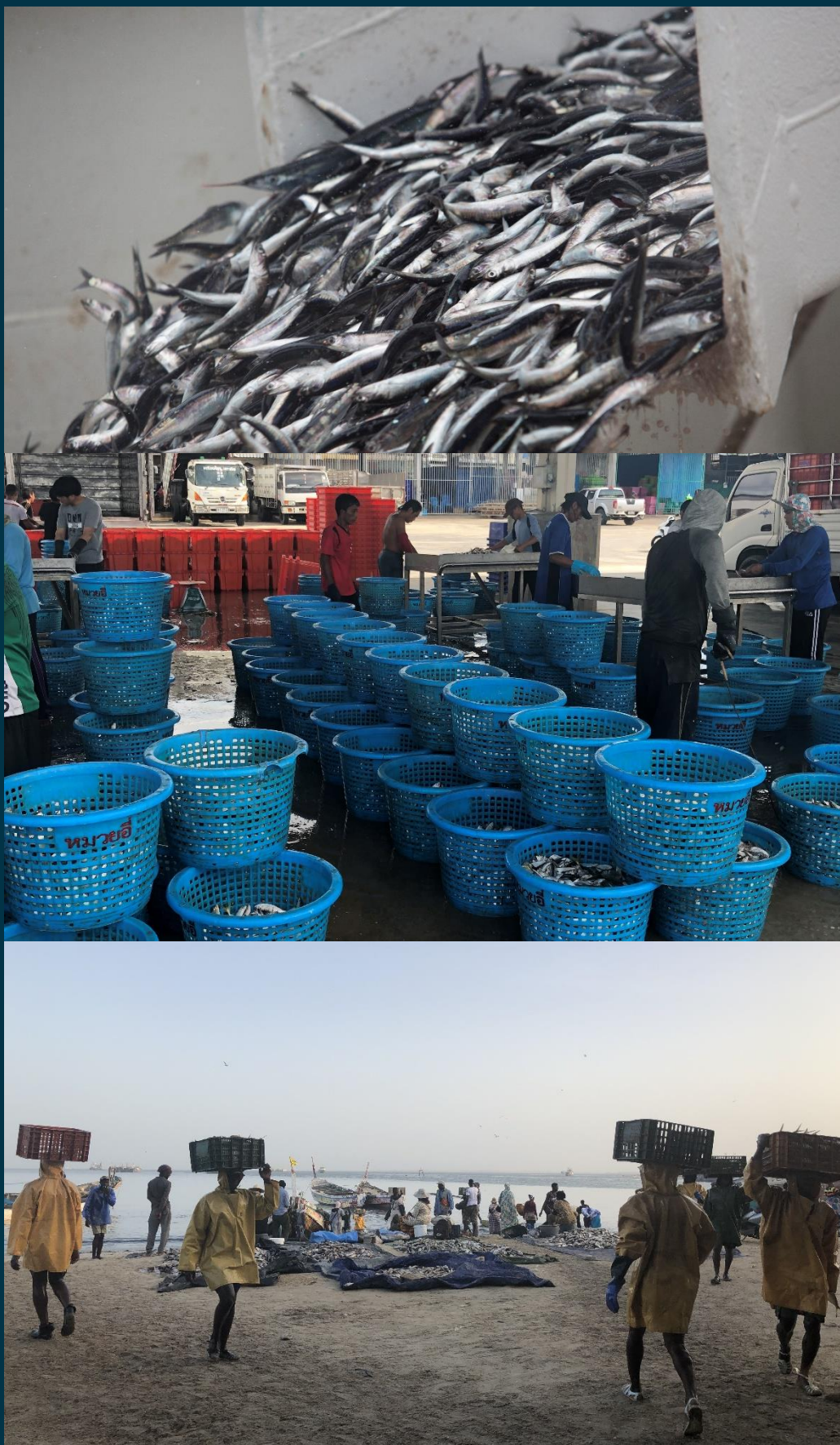
Top: Peruvian anchoveta fishery, Peru. © Renato Gozzer; **Middle**: Multispecies trawl fishery, Thailand. © Dave Martin. **Bottom**: Small pelagics artisanal fishery, Mauritania. © Carmen Gonzalez-Valles

2   SOURCES OF INFORMATION AND ASSESSMENT CRITERIA

Our overview is based on information from FishSource.org, SFP's online information resource about the status of fish stocks and fisheries. FishSource scores (Cannon 2006) consist of a suite of criteria to assess key aspects of management quality and stock status of fisheries and fish stocks. **Table 1**, below, provides a brief explanation of the five FishSource scoring criteria (full details of the FishSource scoring methodology can be found at: https://www.fishsource.org/how/scores).

Table 1. Current rationale for each of the five FishSource scoring criteria

	Score/Criterion	Rationale	Rationale (description)
Management quality	**Management strategy (1):** Is management precautionary?	$F_{\text{at low biomass}} / F_{\text{target}}$ OR $F_{\text{current}} / F_{\text{target}}$	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? The higher the ratio, the lower the score.
	Managers' compliance (2): Do fishery managers follow scientific advice?	Set TAC / Advised TAC	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? The higher the ratio, the lower the score.
	Fishers' compliance (3): Do fishers comply?	Catches / Set TAC	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? The higher the ratio, the lower the score.
Stock health	**Current health (4):** Is the stock biomass healthy?	$B_{\text{current}} / B_{\text{target}}$	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? The higher the ratio, the higher the score.
	Future health (5): Will the stock be healthy in the future?	$F_{\text{current}} / F_{\text{target}}$	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? The higher the ratio, the lower the score.

Source: Cannon 2006

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 quantitative scores, qualitative scores are obtained by using the cut-off points as used in applications of the Marine Stewardship Council (MSC) fishery assessment method, where "< 6" indicates a high risk and a negative assessment finding and that improvements are critical, "≥ 6" indicates a medium risk and that improvements are required, and "≥ 8" indicates a low risk and that the fishery meets the criterion conditions.

The scores are based on the most recently available public data as of July 2019 and generally represent a snapshot of the position in 2018 with regard to management quality and stock status indicators and in 2017[2] for catch statistics.

In order to create simple and accessible assessments of the stocks, FishSource scores are used to place fisheries into one of the five ranked sustainability categories (A, B1, B2, DD, and C). The categorization is based on the quality of management (scores 1 to 3) and the status of the target stock (scores 4 and 5). While there is information on environmental impacts of fishing activities in the FishSource fishery profiles (although not fully updated during 2019), this subject is not currently covered in the report. **Table 2**, below, shows the criteria considered for the five SFP sustainability categories used in the current overview.

Table 2. Criteria for the five SFP sustainability categories used in this 2019 fisheries overview

Categories	Criteria
Category A: Very-well-managed fisheries	Score 8 and above across all FishSource scores.
Category B1: Reasonably managed fisheries with stock in good condition	Score ≥ 6 across all FishSource scores, and score ≥ 8 in terms of biomass (i.e., current health of the stock).
Category B2: Reasonably managed fisheries	Score 6 or above across all FishSource scores.
Category DD: Fisheries with high uncertainty in terms of their stock status or management	Score 6 or above across all FishSource scores, except that at least one FishSource score is data-deficient (DD).[3]
Category C: Poorly managed fisheries	At least one FishSource score is below 6.

Given the important ecological role of most of the featured species within marine ecosystems (e.g., Peruvian anchoveta, Antarctic krill), particular emphasis is placed on biomass (hence the split into categories B1 and B2 to distinguish fisheries with high biomass). This reflects the crucial role of this criterion in determining the quality of management of a fishery and is closely aligned with recent developments in the MSC Fisheries Assessment Methodology with regard to low trophic level (LTL) fisheries.

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[2] Although catch data for 2018 is already available for some fisheries, most is only available up to 2017; 2017 catch has thus been used across all fisheries.

3 A data-deficient (DD) score is determined when there is high uncertainty or lack of information, which prevents a given score from being determined for that specific criterion. For more information, please consult https://www.fishsource.org/faq

2.1   Fisheries included in the 2019 Sustainability Overview

As in the four previous editions, this 2019 overview focuses solely on the stocks used for fishmeal and fish oil, regardless of the taxonomic group. For instance, since 2015 we have included the Antarctic krill stock, which is a crustacean but growing in importance as a commodity for fishmeal or krill oil purposes. Conversely, the herring stocks from the Northwest Atlantic (and more recently most of the Northeast Atlantic mackerel and horse mackerel), where catches have been mostly for human consumption in recent times, are excluded from this analysis. The proportion of any given species/stock being utilized for meal and fish oil will be a function of market demand and can change with time. As in the past three editions, this 2019 overview does not include smaller North Sea sandeel stocks (Sandeels nei - northern and central North Sea; Sandeels nei - northern North Sea Shetland; Sandeels nei - Skagerrak, Kattegat, and Belt Sea; and Sandeels nei - northern North Sea, Viking, and Bergen banks). These are small stocks and usually only represent a small fraction of the total sandeel catches in the North Sea. As in 2018, Sandeels nei - Central and Southern North Sea, although a larger stock than the aforementioned, is also not included in the current edition. In any case, despite being currently outside of the scope of this report, the evaluations for most of these specific fisheries are still available and can be consulted in FishSource.org.

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3   RESULTS

3.1   Overview of management quality and the status of the stocks

Overall, the main results from the assessment of the 26 reduction stocks included in the current overview, in terms of management quality and stock status, are as follows:

- **Almost half (48 percent)** of the catch supply for reduction purposes, and covered in the current overview, comes from South American fisheries (FAO area 87), followed by European (FAO area 27; 28 percent of total catch supply) and Northwest African fisheries (FAO area 34; 12 percent of total catch) (**Appendix A**).

- Compared to last year, there is a **12-percent increase in the total catch supplied by the reduction fisheries** included in this overview (**Appendix A**). This was related to an increase in catches of both South American and European reduction fisheries, in particular of anchoveta (*Engraulis ringens*; 14-percent increase) and blue whiting (32-percent increase).

- As in previous years, anchoveta remains by far the most important species used for reduction purposes, accounting for almost half (3.85 million tonnes; 45 percent) of the total catch covered in this overview. The two other most-captured species remain blue whiting from the NE Atlantic (1.56 million tonnes; 18 percent) and European pilchard from NW Africa (1.1 million tonnes; 14 percent) (Appendix B). **Together**, **these three species account for more than three quarters of the total reported catches** for the fisheries analyzed.

- **As in previous editions, almost all reduction fisheries covered in this overview continue to target low trophic level (LTL) species**. It is important that the management of these fisheries focus on an ecosystem-based (rather than single-species) approach, given the key role of some of these species as a source of food for upper levels of the food chain.

- Most of the catch continues to come from a few very important stocks: the **top five stocks** accounted for **more than two thirds (68 percent) of the total catch in this analysis.** These are a mix of large South American, European, and NW African reduction fisheries **(Table 3)**.

- As in 2018, the only Asian reduction fisheries evaluated as per stock status and management quality are from Indian oil sardine. This species is currently evaluated and managed as six distinct units. Although no other specific Asian fisheries are covered in the specific evaluations, we include a section in this report on recent highlights, challenges, and opportunities of Asian reduction fisheries **(Section 4)**.

- Antarctic reduction fisheries (krill) continue to have the highest stock status and management quality performance (relative proportion of production from A, B1, and B2 fisheries compared to DD and C fisheries), followed by North America, South America, and Europe **(Figure 3)**.

- **Three percent** of the total catch volume of the reduction fisheries in this analysis comes from stocks in very good condition (**Category A**) (**Figure 1**). As in the four previous editions,

this corresponds to a single fishery: Antarctic krill - Atlantic Southern Ocean. This stock is managed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) and has had MSC-certified fisheries since 2010. Recently, a new Chilean fleet has joined the MSC program and was certified in September 2018 (**Appendix E).** It is important to note, however, that this does not mean that ecosystem monitoring should be ignored. Future ecosystem effects, such as warming of the Antarctic by anthropogenic climate change and the relationship to fishery management, are not taken into account in this overview.

- Progress toward improvements and certification continues, in particular for the Atlantic and Eastern Pacific reduction fisheries. Globally, and for the fisheries assumed to be used for reduction purposes, 17 fisheries have components that are already covered by the MSC program, 43 are at least partially covered by the IFFO Responsible Sourcing scheme (either as approved <u>whole raw material</u>, or <u>by-product</u>), and 10 are associated with currently active fishery improvement projects (FIPs) (**Table 5**). For more information on certification and FIPs, see **section 4**.

- **Eighty-eight percent** of the total catch volume in this analysis comes from stocks that are reasonably well-managed (or better) (i.e., that score 6 or above on all five FishSource criteria), **a 3 percent decrease compared to last year.** The stock with the largest contribution to this category continues to be the **Anchoveta - Peruvian northern-central stock**, which **represents approximately 32 percent** of the total catch, compared to 33 percent in the previous overview.

- The catch volume from reasonably managed fisheries with the stocks in good condition (**Category B1) decreased by 5 percent** compared to 2018 (**Figure 2**). This was mostly due to slightly more pessimistic perceptions of the stock condition of the Chilean jack mackerel - SE Pacific (5 percent) and European pilchard - NW Africa southern stocks (**Table 4**).

- **Twelve percent** (1.1 million tonnes) of the total catch for reduction purposes comes from poorly managed fisheries (**Category C**), **a rise of 2 percent compared to last year**. The volume coming from poorly managed fisheries is still considerably lower than that observed prior to 2017 (**Figure 2**).

  o Currently, some of the **C-rated** fisheries are already relatively well-managed (i.e., score 6 or above on the FishSource criteria related to management quality), but either the stock is in a seriously depleted condition, or fishing pressure remains too high. Examples are the Sandeels nei - Dogger Bank area and Capelin - Icelandic stocks (**Table 3**). In these cases, efforts should be made to continue improving the management system in order to allow the stock and exploitation status to recover to target levels.

  o Even though positive results have been observed for the Anchoveta - Chilean Central-Southern (regions V-X) (where the stock has been steadily recovering, and is no longer considered depleted), for two Latin American fisheries (Frigate tuna – Ecuador and Pacific chub mackerel - Ecuador), both management and stock status

remain serious issues (no formal management strategy in place and limited restrictions to the fishery, with current biomass levels either unknown or very low). In India, all the Indian oil sardine fisheries included in the current overview also continue to face considerable management challenges and have high levels of uncertainty around the current stock condition and fishing pressure. In all these fisheries, improvements are needed in the management strategy to ensure management is precautionary, to allow for stock recovery and long-term sustainable yield.

- o A more detailed analysis of why each of these fisheries score badly (i.e., less than 6 across one or more criteria) in one or more of the specific FishSource sustainability criteria is provided in **Appendix C.**

- Of the fisheries analyzed, **changes in SFP sustainability categories from last year** were observed in **seven fisheries** (details on the specific changes for each of the fisheries can be found in **Table 4**).

  - o **Three fisheries improved** their status:
    - European sprat - North Sea, Skagerrak, and Kattegat (C to B1)
    - European pilchard - NW Africa central (B2 to B1)
    - Anchoveta - Chilean Central-Southern (regions V-X) (C to B2)
  - o **Four fisheries decreased** in their sustainability categories:
    - Chilean jack mackerel - Southeast Pacific (B1 to B2)
    - European pilchard - NW Africa southern (Morocco) (B1 to B2)
    - Sandeels nei - Dogger Bank area (B1 to C)
    - Capelin - Icelandic (B2 to C)
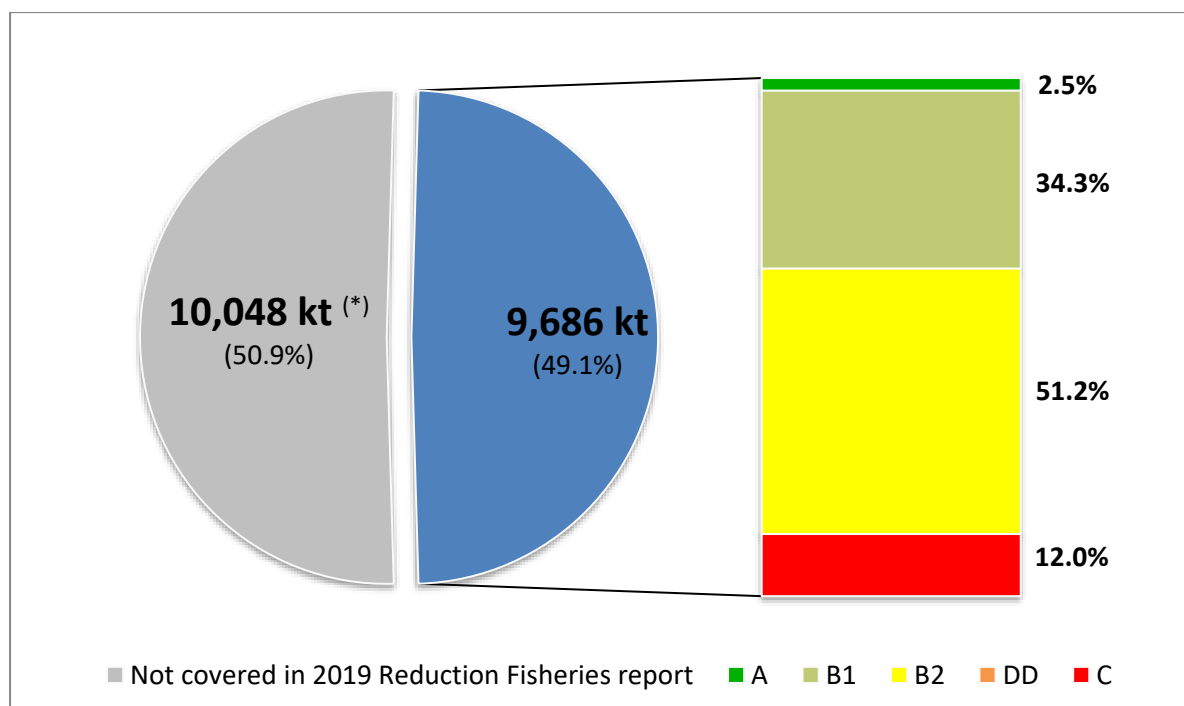
Figure 1. Catch volume ('000 t; in grey) and percentage of global reduction fisheries supply covered in this report (in blue), and percentage of catch by SFP sustainability category, compared to the combined reported catch of the 26 stocks covered in this report (column chart). **Notes**: (*) Includes estimated global supply from other Southeast Asian reduction fisheries (~8.5 million tonnes) (FAO 2012).
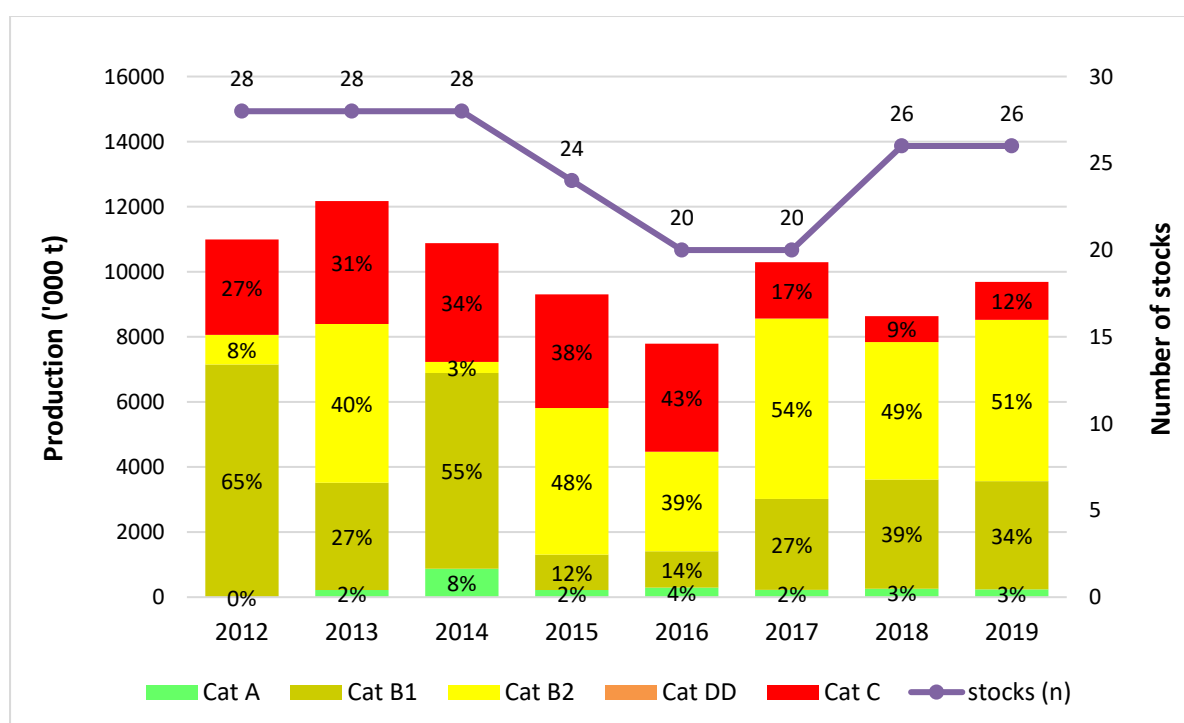
Figure 2. Number of stocks covered in the overview and percentage of the total volume per year for each SFP sustainability category (A, B1, B2, DD, C), for reporting periods 2012 through 2019. **Note**: The data-deficient (DD) category was only added in the current edition of the report.

Table 3. Current FishSource scores, SFP sustainability category, and latest catch ('000 t) data for the 26 main stocks used for reduction purposes and assessed in this overview (as of early July 2019). Catches refer to 2017 and are in thousand tonnes.

Stock / nested jurisdiction (when applicable) [1]	Management			Stock Status		Sustainability category [2]	Latest Catch	% of total	Changes from last year
	Score 1	Score 2	Score 3	Score 4	Score 5				
Antarctic krill - Atlantic Southern Ocean	≥ 8	10	10	≥ 8	≥ 8	A	237.3	2.5%	-
Blue whiting - NE Atlantic	9.4	10	6.3	10	6.4	B1	1,555.1	16.1%	-
Gulf menhaden - Gulf of Mexico	≥ 6	≥ 8	≥ 6	10	9.5	B1	462.5	4.8%	-
European sprat - Baltic Sea	≥ 8	9.9	9.8	10	7.1	B1	286.0	3.0%	-
European sprat - North Sea, Skagerrak and Kattegat	≥ 6	≥ 6	10.0	10.0	≥ 6	B1	129.7	1.3%	C to B1
Sandeels nei - Central Eastern North sea	≥ 6	≥ 8	10	10	7.3	B1	115.6	1.2%	-
Norway pout - North Sea	≥ 6	9.2	10	10	≥ 8	B1	33.9	0.4%	-
European pilchard - NW Africa central	≥ 6	≥ 6	≥ 6	≥ 8	≥ 6	B1	484.1	5.0%	B2 to B1
Araucanian herring - Central-South Chile	≥ 6	10.0	10	≥ 8	8.5	B1	259.3	2.7%	-
Chilean jack mackerel - Southeast Pacific [4]	≥ 6	≥ 8 - 10	≥ 8 - 10	7.5	9.2	B2	404.6	4.2%	B1 to B2
Atlantic menhaden - NW Atlantic	≥ 6	≥ 6	10	7.2	9.4	B2	169.4	1.7%	-
Anchoveta - Peruvian Northern-Central	≥ 6	≥ 8	10	≥ 6	≥ 6	B2	3,087.6	31.9%	-
Anchoveta - Southern Peru/Northern Chile (regions XV-I-II)	≥ 6	≥ 8	≥ 8	≥ 6	≥ 6	B2	708.7	7.3%	-
Anchoveta - Chilean Central-Southern (regions V-X)	≥ 6	10	≥ 6	≥ 6	7.4	B2	58.4	0.6%	C to B2
Capelin - Barents Sea	≥ 8	10	10	≥ 6	≥ 6	B2	0.0	0.0%	-
European pilchard - NW Africa southern (Morocco) [3]	≥ 6	≥ 6	≥ 6	≥ 6	≥ 6	B2	532.6	5.5%	B1 to B2
European pilchard - NW Africa southern (Mauritania) [3]	≥ 6	≥ 6	< 6	≥ 6	≥ 6	C	166.2	1.7%	-
Sandeels nei - Dogger Bank area	≥ 6	10	10	5.3	6.9	C	242.1	2.5%	B1 to C
Capelin - Icelandic	≥ 6	10	9.9	< 6	< 6	C	287.0	3.0%	B2 to C
Indian oil sardine - Kerala	< 6	≥ 6	DD	< 6	DD	C	127.0	1.3%	-
Indian oil sardine - Karnataka	< 6	≥ 6	DD	< 6	DD	C	98.1	1.0%	-
Indian oil sardine - Goa	< 6	≥ 6	DD	< 6	DD	C	48.1	0.5%	-
Pacific chub mackerel - Ecuador	< 6	≥ 6	DD	DD	DD	C	70.7	0.7%	-
Frigate tuna - Ecuador	< 6	≥ 6	DD	DD	DD	C	60.2	0.6%	-
Indian oil sardine - Tamil Nadu	< 6	≥ 6	DD	DD	DD	C	51.7	0.5%	-
Indian oil sardine - Maharashtra	< 6	≥ 6	DD	DD	DD	C	8.3	0.1%	-
Indian oil sardine - Andhra Pradesh	< 6	≥ 6	DD	DD	DD	C	2.2	0.0%	-

Notes: (1) Shading in the stock name: white means no change from 2018; light green means rise in sustainability category; light orange means a drop in the sustainability category. (2) Stocks are ordered according to the SFP sustainability category, from A (the highest) to C (the lowest). The criteria for the five SFP sustainability categories used in this 2019 reduction fisheries overview are presented in **Table 1** and **Table 2** above. (3) The European pilchard - NW Africa southern stock has different score outcomes for *Fishers' compliance* (Score 3) depending on the management unit; score outcomes for this stock are thus presented separately for each of the two main management units (Morocco and Mauritania). (4) Chilean jack mackerel is a transboundary stock, with five different jurisdictions and management performance per each of these jurisdictions. The specific management quality scores for each of these units can be found on the Chilean jack mackerel - Southeast Pacific FishSource page.

Table 4. Changes in SFP sustainability categories across the stocks evaluated in the 2019 overview

Stock	Change in category [1]	Notes
European sprat - North Sea, Skagerrak and Kattegat	C to B1	Even though fishing mortality remains too high, **the stock is in good condition (i.e., well above the target reference point), and showing an increasing trend**. Measures should be taken, however, to further reduce fishing mortality to sustainable levels and ensure the stock remains healthy in the long term.
European pilchard - NW Africa central	B2 to B1	**The stock is deemed in good condition and not fully exploited.** Dynamic production model assessments by the Moroccan National Research Institute of Fisheries Resources (INRH) and FAO produced similar and more positive results than last year, estimating spawning biomass roughly 50 percent above B_{MSY}.
Anchoveta - Chilean Central-Southern (regions V-X)	C to B2	**The stock has been steadily recovering, and is no longer considered depleted.** The stock biomass (SSB) has been increasing since 2011, and in 2018 was estimated at the highest value since 2009. Latest stock assessments suggest biomass to be somewhere between the limit and the target reference points.
Chilean jack mackerel - Southeast Pacific	B1 to B2	The stock health continues improving and rebuilding from the historically low levels in 2010. However, **the perception of the stock is slightly more pessimistic than last year, with both 2017 and 2018 biomass now estimated as slightly below the B_{MSY} reference point**. According to the latest assessment, the current model used reveals a tendency of overestimating the stock size.
European pilchard - NW Africa southern (Morocco)	B1 to B2	The perception of the stock is slightly more pessimistic than last year. **While the FAO working group's assessment suggested the stock to be non-fully exploited, the stock was estimated as fully exploited by the Moroccan National Research Institute of Fisheries Resources (INRH)**. Some INRH methods also suggest that fishing pressure may be too high.
Sandeels nei - Dogger Bank area	B1 to C	**The stock size has been in a declining trend since 2016, and the spawning biomass was estimated at below the biomass limit reference point at the beginning of 2019**. If the 2019 catches are in line with the TAC (and the level advised by ICES per the escapement strategy), the stock is projected to recover to target levels by 2020.
Capelin - Icelandic	B2 to C	**The stock is currently perceived to be in bad shape due to recent poor recruitment**. Recruitment has been well below average over recent years, and in late 2018 the portion of immature capelin was estimated at 10.8 billion fish, well below the trigger value of 50 billion fish. According to the latest projections, there was a 95-percent probability that capelin biomass left for spawning was below the biomass limit reference point.

Notes: [1] Light green means a rise in the sustainability category; light orange means a drop in the sustainability category.
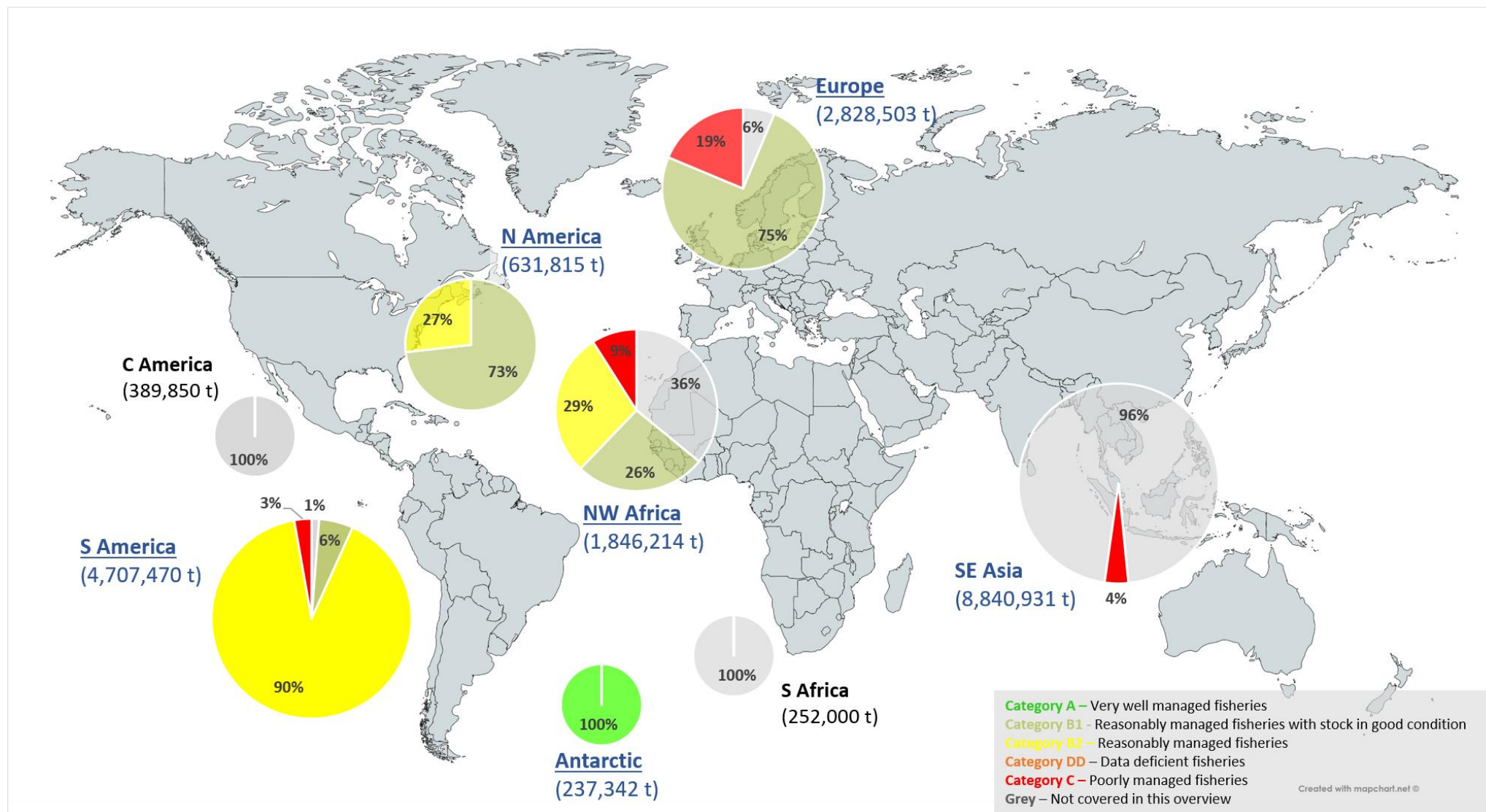
Figure 3. Percentage of reduction fisheries supply by SFP sustainability category for the eight major production regions

Notes: (1) Pie chart sizes are presented in a four-size scale depending on the catch class: < 500 kilo tonnes (kt) (Antarctic, Central America, South Africa); 500–1,500 kt (N America); 1,501–3,500 kt (Europe, NW Africa); > 3,500 kt (S America, SE Asia). (2) Regions with fisheries covered in this overview are in blue font. (3) Grey refers to capture production not covered by this overview. Sources for production volumes: FAO 2012, FAO 2019, ICES 2019, InstitutoPesca. 2019, SFP 2019, SUBPESCA 2019

Table 5. Information about improvement and certification programs for the fisheries assumed to be used for reduction purposes (as of September 2019)

Stock [1]	FIP information [3]			Certifications				MBAq Seafood watch (Year assessment) [7]
	FIP name	FIP start (Year)	FIP progress rating	IFFO RS	MSC [4]	Date 1st MSC Certification	# of MSC fisheries [5]	
Antarctic krill - Atlantic Southern Ocean	-	-	-	-	Cert, Sus [8]	Jun-10	3	Good alt. (2017)
Blue whiting - NE Atlantic	-	-	-	Yes	Cert	Jun-16	4	-
Gulf menhaden - Gulf of Mexico	-	-	-	Yes	FA	-	1	Good alt. (2015)
European sprat - Baltic Sea		-	-	Yes	Cert, FA, Wdrn	May-17	3	-
European sprat - North Sea, Skagerrak and Kattegat	-	-	-	Yes	Cert, Wrdn	Mar-17	3	-
Sandeels nei - Central Eastern North Sea	-	-	-	Yes	Cert	Mar-17	2	-
Norway pout - North Sea	-	-	-	Yes	Cert	Mar-17	2	-
European pilchard - NW Africa central	Morocco sardine - pelagic trawl and seine	2014	A	Yes [2]	-	-	-	-
Araucanian herring - Central-South Chile	-	-	-	Yes	-	-	-	-
Chilean jack mackerel - Southeast Pacific	-	-	-	Yes	Cert, FA	Apr-19	2	-
Atlantic menhaden - NW Atlantic	-	-	-	Yes	Cert	Sep-19	1	Good alt. (2015)
Anchoveta - Peruvian Northern-Central	Peruvian anchovy - industrial purse-seine	2017	A	Yes	-	-	-	-
Anchoveta - Peruvian Northern-Central	Peruvian anchovy - small scale purse-seine	2017	A	- [6]	-	-	-	-
Anchoveta - Southern Peru/Northern Chile (regions XV-I-II)	-	-	-	Yes	-	-	-	-
Anchoveta - Chilean Central-Southern (regions V-X)	-	-	-	Yes	-	-	-	-
Capelin - Barents Sea	-	-	-	Yes	-	-	-	-
European pilchard - NW Africa southern (Morocco)	Morocco sardine - pelagic trawl and seine	2014	A	Yes [2]	-	-	-	-
Sandeels nei - Dogger Bank area	-	-	-	Yes	Cert	Mar-17	2	-
Capelin - Icelandic	-	-	-	Yes	Cert	Apr-17	1	-
Indian oil sardine - Kerala	-	-	-	-	-	-	-	-
Indian oil sardine - Karnataka	-	-	-	-	-	-	-	-
Indian oil sardine - Goa	Indian Oil Sardine	2018	C	-	-	-	-	-
Pacific chub mackerel - Ecuador	Ecuador small pelagics	-	-	Yes [2,9]	-	-	-	-

Stock [1]	FIP information [3]			Certifications			# of MSC fisheries [5]	MBAq Seafood watch (Year assessment) [7]
	FIP name	FIP start (Year)	FIP progress rating	IFFO RS	MSC [4]	Date 1st MSC Certification		
Frigate tuna - Ecuador	Ecuador small pelagics	-	-	- [9]	-	-	-	-
Indian oil sardine - Tamil Nadu	-	-	-	-	-	-	-	-
Indian oil sardine - Maharashtra	Indian Oil Sardine	2018	not rated	-	-	-	-	-
Indian oil sardine - Andhra Pradesh	-	-	-	-	-	-	-	-
Boarfish - NE Atlantic	-	-	-	Yes	-	-	-	-
Pacific anchoveta - Pacific Panama	Panama small pelagics	2011	A	- [9]	-	-	-	-
South American pilchard - Gulf of California	-	-	-	Yes	Cert	Jul-11	1	-
Pacific thread herring - Panama	Panama small pelagics	2011	A	- [9]	-	-	-	-
Pacific thread herring - Gulf of California	-	-	-	Yes	Cert, Wdrn	Jul-11	3	-
Slender thread herring - Mexico	-	-	-	Yes	Cert	Oct-16	1	-
Slender thread herring - Gulf of California	-	-	-	Yes	Cert	Oct-16	1	-
Middling thread herring - Mexico Pacific	-	-	-	Yes	Cert	Oct-16	1	-
Sandeels nei - Central and Southern North Sea	-	-	-	Yes	Cert	Mar-17	1	-
South American pilchard - Pacific Baja California	-	-	-	Yes	-	-	-	-
Madeiran Sardinella - NW Africa	Mauritania small pelagics – purse seine	2017	C	- [9]	-	-	-	-
Bonga shad - NW Africa	Mauritania small pelagics – purse seine	2017	C	- [9]	-	-	-	-
Round sardinella - NW Africa	Mauritania small pelagics – purse seine	2017	C	- [9]	-	-	-	-
European anchovy - South Africa/SE Atlantic	-	-	-	Yes	-	-	-	-
Falkland sprat - Chilean regions X (de los lagos)	-	-	-	Yes	-	-	-	-
Anchoveta - Chilean Central-Southern (regions III and IV)	-	-	-	Yes	-	-	-	-
South Africa redeye herring - South Africa / SE Atlantic	-	-	-	Yes	-	-	-	-

Notes: (1) This list covers all the fisheries from the reduction fisheries sector (of SFP's Target 75 initiative) that are associated to one or more active fishery improvement projects (FIPs), or the certifications and rating programs considered. (2) Certified by IFFO as "by-product" fishery (for more information visit the IFFO Responsible Supply (RS) website) (IFFO 2019). (3) For more information on the currently active FIPs, please visit the Improvement Projects section in FishSource or the respective FIP public reports in Fishery Progress (FishChoice 2019). (4) MSC Status: Cert = Certified; FA = Full Assessment; Sus = Suspended; Wdrn = Withdrawn. (5) Refers to the number of fisheries that are in the MSC program and that overlap with the stock (source: SFP 2019; MSC 2019). (6) In Peru, the artisanal fishery for anchoveta must be used for human direct consumption only, thus it is outside of the scope of IFFO and the current overview. (7) Monterey Bay Aquarium Seafood Watch categories (MBAq 2019): Best Ch. = Best Choice; Good Alt. = Good alternative; Av = Avoid. Year assessment refers to the year the latest Seafood Watch assessment was conducted for the respective fishery. (8) The Rimfrost Antarctic krill MSC fishery has been suspended since June 2017. (9) There are improvement activities underway in this fishery, but it is still not evaluated as to meeting the requirements of a formal FIP. (9) The existing FIP was also recently accepted into the IFFO-RS improvement program.

3.2   Certification and fishery improvement projects

The growing demand for certified raw material for fish feed and fish oil seems to continue, which has likely influenced the positive trends that have been observed in terms of fisheries certification and fishery improvement projects (FIPs). The number of reduction fisheries joining the MSC program continues to increase steadily, particularly since 2016. In 2019, and for the stocks covered in the current overview, there were 18 fisheries either MSC-certified (13) or in MSC full assessment (5), an increase of 30 percent compared to 2018 (**Figure 4**). For the fisheries included in the current overview, the production coming from Europe, North America, and the Antarctic already represent from 75 to 100 percent of the total production for those regions (**Figure 5**). In South America, the first reduction fishery was MSC-certified in 2019 (Chilean Jack mackerel industrial purse seine fishery) (**Appendix E**), which is an important milestone.

A similar increasing trend is observed with the number of fisheries being IFFO RS approved, with most of the fisheries (and respective) production in South America, Europe, and North America already covered and approved by this program (**Figure 5**). Of the 26 fisheries covered in the current overview, 15 (*c.* 60 percent) are IFFO RS approved.
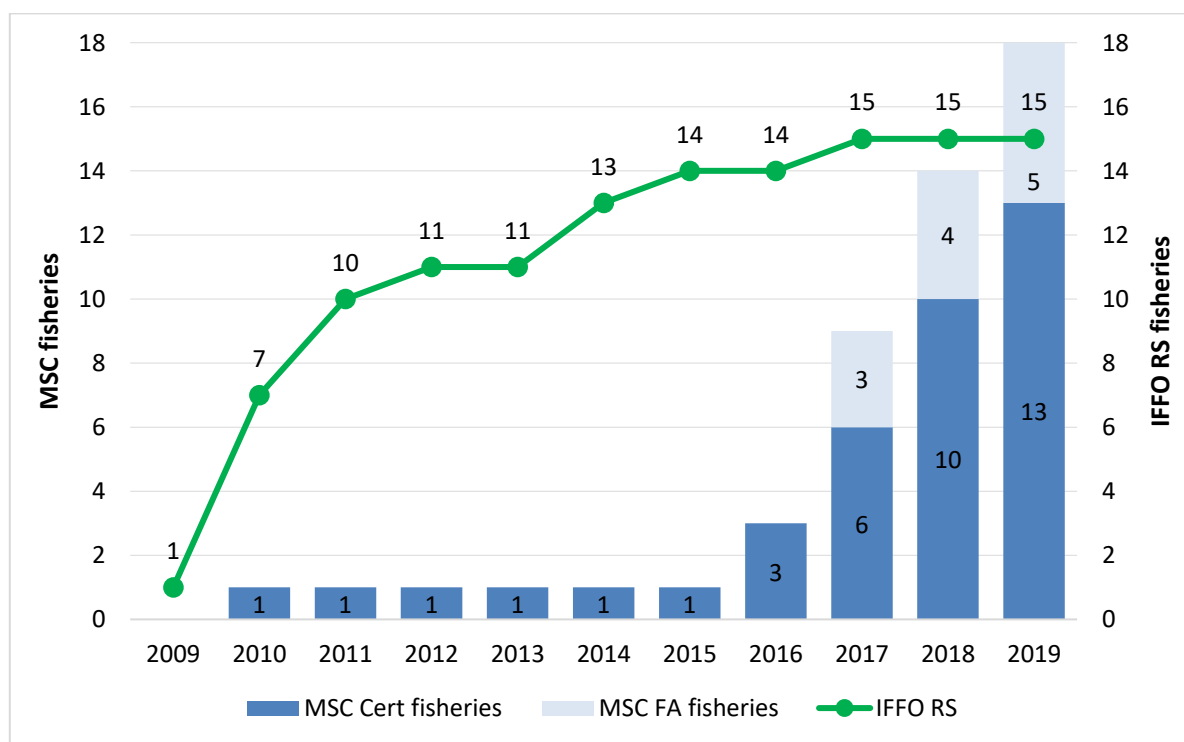
Figure 4. Number of fisheries in the MSC (MSC-certified and in assessment) and the IFFO RS programs (from 2009 to 2019), for the reduction fisheries included in the current overview. Source of data: MSC 2019.

There has also been continuing interest in FIPs, with six large currently active FIPs in various parts of the globe on key fisheries to the sector, particularly in NW Africa, where most of the production is from reduction fisheries already engaged in fisheries making good progress (**Table 5**). Several projects are now recognized under the IFFO RS Improver Programme, a formalized program for fisheries to achieve recognition when undertaking systematic improvements toward reaching the IFFO RS standard. The IFFO RS Improver Programme also launched a multispecies pilot to test new criteria developed specifically to assess multispecies fisheries, with a handful of projects expected to be recognized under this program in the coming year.

Despite the encouraging news for the sector in terms of achieving fisheries sustainability, there is still much room for improvement. This is particularly true for SE Asia, where still only a minor fraction of production is engaged in some type of formal improvement effort (i.e., either in a FIP making progress or in the IFFO RS or MSC programs).

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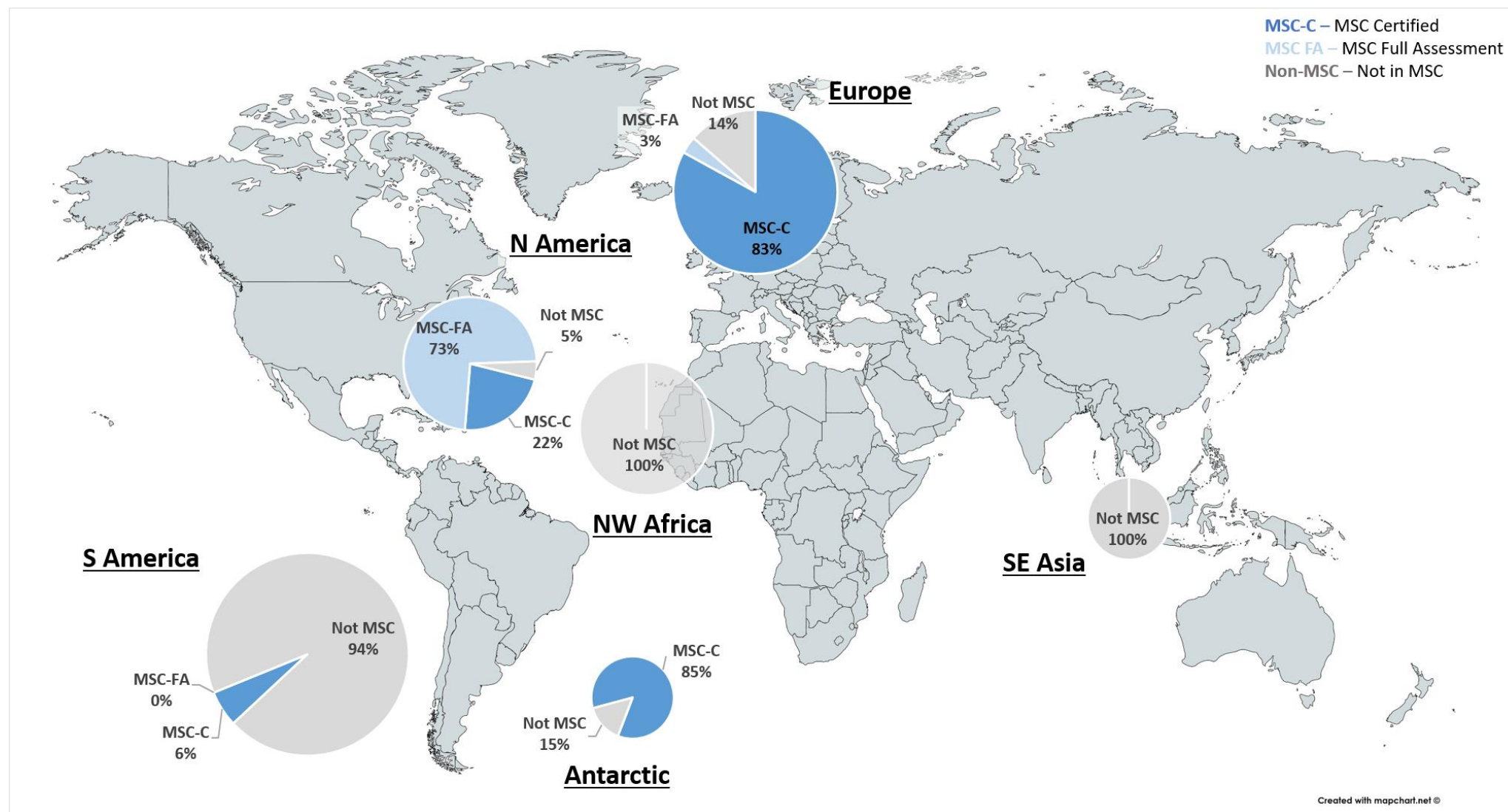
Figure 5. Percentage of supply coming from reduction fisheries that are MSC-Certified (MSC-C), in MSC Full Assessment (MSC-FA), and not in MSC, for the eight major production regions and for the 26 fisheries included in the current overview. **Notes:** (1) Pie chart sizes are presented in a four-size scale depending on the catch class: < 500 kt (Antarctic, SE Asia); 500–1,500 kt (N America, NW Africa); 1,501–3,500 kt (Europe); > 3,500 kt (S America).

Aquaculture certifications have been developing or enhancing feed requirements in recent years. Under the Global Aquaculture Alliance Best Aquaculture Practices feed mill standard, 50 percent of fishmeal and fish oil must come from fisheries that are certified to the MSC standard, in a credible FIP, or approved for use under the IFFO RS standard. A review of the fisheries featured in this report clearly shows that the vast majority are suitable for this purpose.

The Aquaculture Stewardship Council (ASC) is in a state of transition with its feed requirements. The current operational requirement is that fisheries used for fishmeal and fish oil should achieve a minimum of six across all five FishSource scores (so, effectively, A-, B1-, and B2-rated fisheries are all acceptable) (ASC 2017a; ASC 2017b). ASC has published a [new draft feed standard](#) that is expected to be launched towards the end of 2019. The draft standard accepts fisheries that are in FIPs, including IFFO RS Improver Programme, MSC-certified, or approved by IFFO RS, and includes an obligation on aquaculture feed manufacturers to improve the overall sustainability of their marine ingredients over time.

4   ASIAN REDUCTION FISHERIES

Southeast Asian reduction fisheries represent almost half of the global catch for the reduction sector and fall into two categories: the "trash fish" fisheries and the directed fisheries for small pelagics; neither is covered in this report. *Trash fish* are usually generated as a component of the catch from multi-species trawling, where species suitable for direct consumption are separated from unpalatable, juvenile, and poorly preserved fish (used for fishmeal) after the catch has been brought aboard the fishing vessel or landed. Recent reports indicate trash fish may compose a significant portion (e.g., >20 percent) of all landings in many SE Asian countries, including >50 percent of landings in Thailand and China.[4]

The directed fisheries that target small pelagic species are potentially more discerning in catch composition, although the actual levels of bycatch remain uncharacterized. Both types of reduction fisheries mostly still take place in regions with low levels of governance, where fishing pressure can be very high and ecological impacts may be extreme.

SE Asian countries comprised six of the top 15 countries for fishmeal production in 2016 (SEAFISH 2018), accounting for 46 percent of production among the top 15. The volumes of fishmeal generated by local fisheries (as opposed to other sources, such as trimmings from aquaculture and tuna processing) in SE Asia can be substantial; exact figures are hard to calculate, but SFP estimates that the annual catch of fish used for reduction may represent close to half of the global catch for this sector. The fishmeal generated in Southeast Asia is crucial to the aquaculture industries of the

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[4] Sources: China ([https://secured-static.greenpeace.org/eastasia/Global/eastasia/publications/reports/oceans/2017/Investigation%20into%20China's%20marine%20trash%20fish%20fisheries_GPEA%20Media%20Briefing.pdf](#)); Thailand ([http://www.rebyc-cti.org/countries-profiles/doc_download/52-thailand-national-report-on-bycatch-management-and-reduction-of-discard](#)); Other Asian countries (http://www.rebyc-cti.org/countries-profiles)

region and particularly for farmed shrimp, but the data in terms of production is scarce and outdated for most countries.

The persistent challenges that reduction fisheries in Asia face include data deficiency, low governance, and severe environmental impacts. For most of these fisheries, the information on the amount of catches, species captured, size composition, main fishing grounds, and effort are scarce and not systematically collected. For most of the species known to be captured, there is no information on the stock condition or the exploitation status. There are also well-established negative social impacts from these fisheries, such as labor abuses (particularly associated with Thailand).

These and other challenges were highlighted in a report published in May 2019 by the Global Aquaculture Alliance (GAA) and IFFO, the Marine Ingredients Organisation (IFFO and GAA 2019). Focused on Thailand and Vietnam, the report tracks the decline in fisheries health starting in the 1960s and highlights some of the critical challenges facing these fisheries today. The report also includes a number of recommendations to support and encourage expansion of improvement efforts.

With increasing aquaculture production, the demand for fish feed is also likely to continue rising in the future. If nothing is done, this will result in increased fishing pressure on already overexploited fish stocks in the region (FAO 2005). While the challenge is great, over the last year there have been some positive steps towards improvements. As noted above, ASC is launching a new feed standard and IFFO RS has launched a [multispecies trial](#) under its Improver Programme. In the fall of 2018, a FIP was launched for Indian Oil Sardine, and SFP and Fish Matter are working on a project with the FAO to develop a toolkit for assessing and managing multispecies fisheries common throughout Asia.

5   SEABIRDS AND LOWER TROPHIC LEVEL FISHERIES – A VIEW FROM BIRDLIFE INTERNATIONAL

The issue

Seabirds are very sensitive to changes in prey abundance – when lower trophic level (LTL) "forage" fish populations fall below certain thresholds, breeding success decreases strongly (Cury et al., 2011). While long-lived seabirds are equipped to deal with periodic reductions in prey levels, consistently low prey abundance can result in long-term population declines (Kitayasky et al., 2010). Stock depletion by LTL fisheries has therefore been identified as a critical factor influencing seabird declines, including in Norway (Dragesund et al., 1980), the North Sea (Cook et al., 2011), the Humboldt Current (Muck and Pauly, 1987; Tovar et al., 1987), and South Africa (Crawford et al., 2011).

Ecosystem-based management of forage fisheries is thus vital for a number of threatened seabird species, including Atlantic puffin, African and Humboldt penguins, Brunnich's guillemot, and Black-legged kittiwake (CAFF, 2013).

While there are good examples of precautionary management of forage fisheries (e.g., Antarctic krill (CCAMLR, 2016)), there are numerous examples of stock collapse as a result (at least in part) of overexploitation (van der Lingen et al., 2006; Pinsky et al., 2011; Essington et al., 2015). Such collapses are thought to be the result of the high catchability of forage fish even when stocks are low (because of their shoaling behavior), and because of the false perception that their "fast" life histories make them less vulnerable to collapse (Pinsky et al., 2011).

Fishery-driven collapses can have far-reaching consequences. On the Humboldt Current, the overfishing of anchoveta in Peru commencing in the 1950s, coupled with El Niño events and expanding urban sprawl, precipitated a huge decline in the anchoveta-dependent Guanay cormorant population from 20-30 million birds in the mid-1950s to 2-3 million in 1982 (Muck and Pauly, 1987; Tovar et al., 1987).

Seabird-friendly forage fisheries management

In recent years, proposals for managing forage fisheries to take account of the needs of seabirds (and other marine predators) have emerged. These include relatively coarse proposals to keep forage fish biomass above one third of unfished biomass - an approach dubbed "one third for the birds" (Cury et al. 2011), and a risk-based approach suggested by Pikitch et al. (2012) in which the degree of precaution (and therefore the setting of B_{lim}, F_{max}, and other measures) is scaled according to the degree of uncertainty (low, intermediate, or high) about the effects of fisheries on forage fish stocks and dependent predators. Where knowledge is low, the suggested approach combines ensuring LTL stocks are left at a minimum of 80 percent of unfished biomass, with spatio-temporal fisheries closures for predators to prevent local depletion. Measures along these lines have been implemented in the krill fishery around South Georgia and the South Sandwich Islands, which include a precautionary catch limit that extends across the whole of CCAMLR Subarea 48.3 and a seasonal closure within the EEZ (GSGSSI, 2016). Pikitch et al. (2012) further suggest that no *new* forage fisheries should be started when information is limited.

Where knowledge is intermediate, the authors propose that B_{lim} should not exceed 40 percent of unfished biomass and F should not exceed 0.5.

The specific approach will depend on the fishery, but the following principles are critical to ensure that there is enough prey left for dependent predators:

1. A precautionary approach to management – scaled according to data availability – that takes account of the highly dynamic nature of LTL fish stocks and the impact of oceanography and trophic disruption, notably caused by climate change

2. Ecosystem-based catch limits set at a spatial scale appropriate to the extent to which the target species aggregate locally; no new fisheries where knowledge is low

3. Catch limits enhanced with temporal and other spatial controls on fishing - informed as far as possible by the ecological needs of dependent seabird species, and real-time data collection on both the resource and the fishing effort.

6   CONCLUSIONS

The overall sustainability status of the fisheries covered in this report is slightly more pessimistic than in 2018. This is mostly related to a drop in the stock condition of a small number of fisheries. Therefore, this result should not be discouraging or mask the considerable improvements in management systems that have been observed for some regions over the last decade.

As in recent years, it is possible to observe the positive trend in fisheries certification, fisheries improvement projects, and other management improvement initiatives, in particular among the reduction fisheries from the North Atlantic and Eastern Pacific waters. These results, combined with the continued improvement of management performance in many fisheries in this sector, clearly represent a good news story for the fishmeal and fish oil industry and show that it is becoming ever more responsible with regard to fisheries management. Congratulations should also be extended to the aquaculture feed industry, which has played a leading role in promoting sustainability and supporting FIPs.

However, the industry is still confronted by the realities of Asian reduction fisheries. This report features some Asian fisheries – the Indian oil sardine – and also notes new information and new improvement models geared toward such fisheries. More broadly, SFP has seen a growing interest in improvements in many Asian countries, and it is to be hoped that formal fishery improvement projects will be developed in the near future. Only by creating and supporting fishery improvement projects at a larger scale in this region can we expect to see the kind of progress currently experienced in the Atlantic and Eastern Pacific, and eventually build a fishmeal/oil industry that is 100-percent sustainable.

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ACKNOWLEDGMENTS

GLOSSARY

Assessment unit	Ideally, a biological stock is examined to determine the sustainability of a resource. Species may be assessed by units that are not aligned with the biological stock structure, either because the stock structure is unknown, or for practical or political purposes. Although not an ideal situation, the results can still provide valuable information on the species' status.
Biological stock	A biological stock is a group of individual marine animals of a single species that is relatively self-contained, both spatially and temporally. Biological stock is the preferred assessment unit. Ideally, assessment and management are both conducted at this level, even if a stock spans national and international waters.
Fishery	The term "fishery" can have many different meanings. Within FishSource profiles, we use it to indicate the combination of a flag country with a fishing gear operating within a management unit, upon a resource. It is the finest scale of resolution captured in FishSource profiles, as it is generally the scale at which sustainability can most fairly and practically be evaluated.
Fishery Improvement Project (FIP)	A joint effort by seafood stakeholders to leverage action toward greater sustainability in a fishery via better policies, management, and purchasing and fishing practices. More about FIPs at https://www.fishsource.org/improvement-project, and about the FIP Toolkit & Resources at https://www.sustainablefish.org/Programs/Professional-Guidance/FIP-Toolkit-Resources
FishSource	Created in 2007 by SFP, FishSource is a publicly available online resource about the status of fisheries, fish stocks, and aquaculture. FishSource compiles and summarizes publicly available scientific and technical information and presents it in an easily interpretable form. More at https://www.fishsource.org/
FishSource sustainability criteria	Simplified indicators of how fisheries are performing according to globally accepted measures of sustainability. The scores are each calculated on a scale from zero to ten, with information obtained from stock assessment reports and from management measures adopted in the fishery. By identifying strengths and challenges in the fishery, they can help to prioritize and implement improvements needed in the fishery.
Ecosystem impact scores	Principle-criteria structure based on the framework of ecological risk assessment (ERA) for fisheries. The three principles – bycatch, habitat, and ecosystem – assess the magnitude of the impact (outcome), the measures taken to mitigate the impacts (management), and uncertainty due to absence or low quality of available information (information) for each principle.
Low trophic level species	Also known as forage species, these are small, short-lived species that occupy a low trophic level (LTL) in the ecosystem (e.g., krill, anchovy, herring, pilchard, sprat, sardine, sandeel, and menhaden) and can be found in large shoals in specific regions (e.g., southeast Pacific).
Management unit	A management system may operate at an international, national, regional, or even smaller scale. One management system may manage the same species differently in different fishing areas. A management unit can thus take a diversity of forms but can be defined as the most basic unit wherein one or more management organizations, within a defined fishing area, distinctly manage a particular resource.
Reduction fisheries	Fisheries in which the catch is processed (or "reduced," as the name suggests) into fishmeal and fish oil. Traditionally, in the Atlantic and Eastern Pacific oceans, these

fisheries mostly target small pelagic, or low trophic level, species such as anchovies, krill, sardine, or menhaden. In southeast Asia, a growing fraction of the catch used for reduction is small and low-value/trash fish from multispecies trawl fisheries.

Seafood sectors	Groups of species with shared biological characteristics of harvested species and/or a role in defined markets. More about sectors and Supply Chain Roundtables at https://www.sustainablefish.org/Programs/Improving-Wild-Fisheries/Seafood-Sectors-Supply-Chain-Roundtables
SFP sustainability categories	Closely aligned with the MSC Fisheries Assessment Methodology with regard to low trophic level (LTL) fisheries, the categories are created to simplify the assessment of stocks, combining FishSource scores (management quality and stock health scores) to place fisheries into one of five ranked sustainability categories (A, B1, B2, DD, and C).
Target 75	SFP's campaign focused on ensuring that 75 percent of world production in key sectors is – at a minimum – either sustainable (i.e., certified by the MSC program, or green-listed in SFP's Metrics tool) or making regular, verifiable improvements. More at https://www.sustainablefish.org/Programs/Target-75
Trash fish	The term commonly used for fish that have generally very low or no direct commercial value; these are usually fish that are small in size or species with very low consumer preference. Trash fisheries are of great importance in the Asia region, representing more than one quarter of the total marine capture production in several Southeast Asian countries (FAO 2005). Trash fish are mostly used as fishmeal in aquaculture, but also for human consumption (as a cheap source of animal protein in coastal areas).

APPENDICES

Appendix A. Total reported catch ('000 t) by FAO area, and relative contribution to the total catch for the three top FAO areas, for the reduction fisheries included in the 2016, 2017, 2018, and 2019 overviews
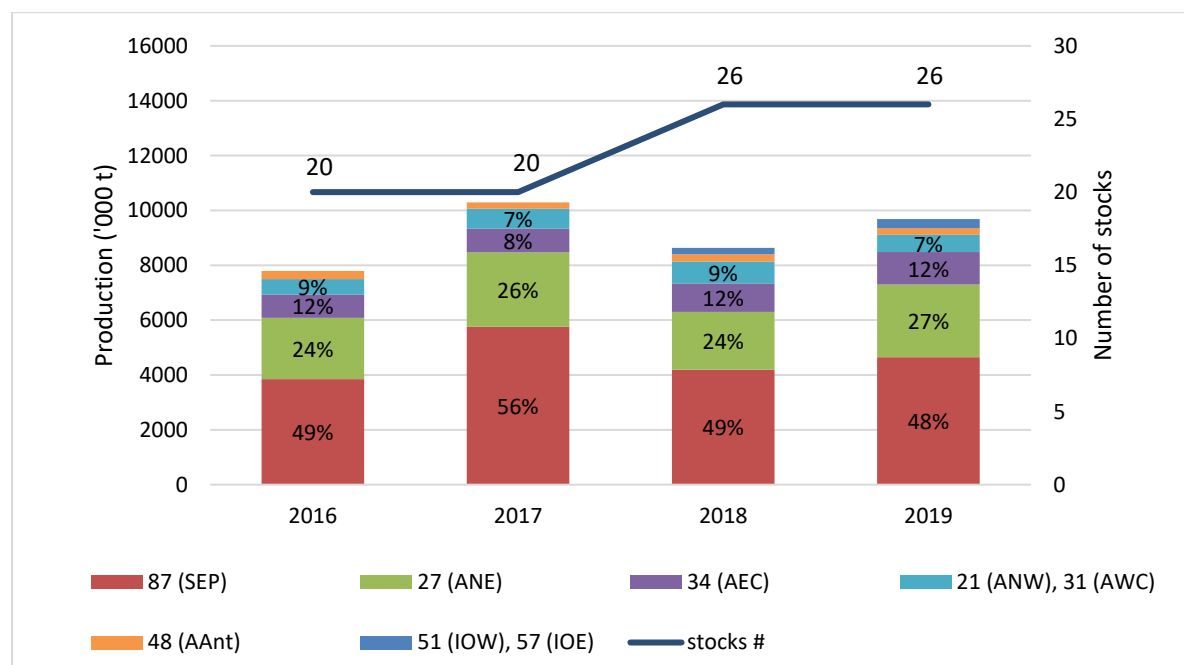
Notes: SEP = Southeast Pacific, AAnt = Antarctic Atlantic, ANE = Northeast Atlantic, IOW = Western Indian Ocean, IOE = Eastern Indian Ocean, AEC = Eastern Central Atlantic, ANW = Northwest Atlantic, AWC = Western Central Atlantic. Stocks #, number of stocks.

Appendix B. Total production ('000 t) by species of the stocks included in the 2019 reduction fisheries overview
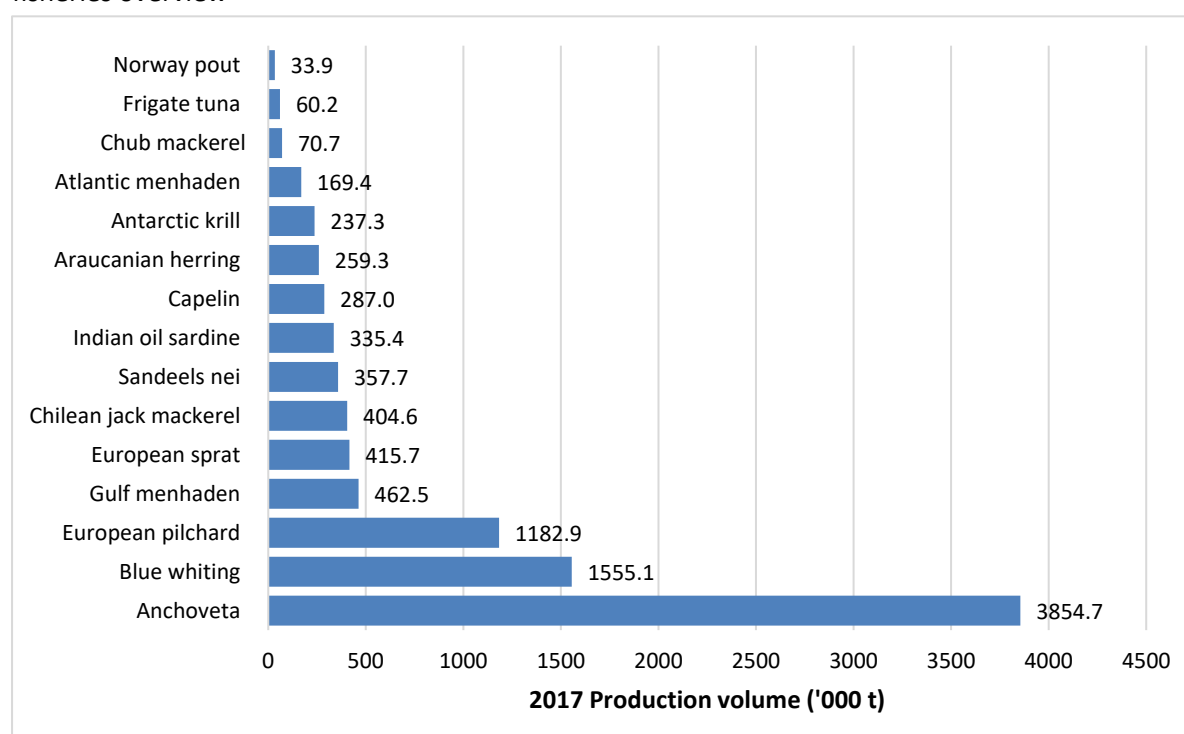
Appendix C. SFP sustainability category C stocks in the 2019 evaluation and the reasons for having FishSource scores below 6

Stock	Score 1	Score 2	Score 3	Score 4	Score 5	Comments
European pilchard - NW Africa southern (Mauritania)	≥ 6	≥ 6	< 6	≥ 6	≥ 6	There is no national TAC for sardine or small pelagics in Mauritania, and no fishery management plan. There has been some improvement in monitoring, control, and surveillance (MCS) capabilities to reduce illegal, unreported, and unregulated (IUU) fishing in Mauritania. **However, a variety of IUU fishing activities are still persistent and unquantified in the region; complex foreign fishing arrangements may exacerbate the problem.**
Sandeels nei - Dogger Bank area	≥ 6	10	10	5.3	6.9	The stock size has been in a declining trend since 2016, and the **spawning biomass was estimated at below the biomass limit reference point at the beginning of 2019.** If the 2019 catches are in line with the TAC (and the level advised by ICES per the escapement strategy), the stock is projected to recover to target levels by 2020.
Capelin - Icelandic	≥ 6	10	9.9	< 6	< 6	**The stock is currently deemed to be in bad shape due to recent poor recruitment**. Recruitment has been well below average over recent years, and in late 2018 the portion of immature capelin was estimated at 10.8 billion fish, well below the trigger value of 50 billion fish. According to the latest projections, there was a 95-percent probability that capelin biomass left for spawning was below the biomass limit reference point.
Indian oil sardine - Kerala	< 6	≥ 6	DD	< 6	DD	Even though there are already some management measures in place for the fishery (e.g., closed seasons and areas, gear and mesh size restrictions), **specific management objectives are not defined, and output controls such as TACs (or fish quotas) and minimum landing sizes are also not used**. The magnitude of IUU fishing and compliance with current fishing regulations are also currently unknown. **The last "rapid" stock assessment concluded that the populations off Kerala are in a "declining state" (CMFRI, 2018)**. The future health of the stock cannot be projected, as there is no information on fishing mortality levels or reference points. However, **there are concerns that if fishing effort remains unassessed, the fleet may grow to exceed sustainable levels.**

Stock	Score 1	Score 2	Score 3	Score 4	Score 5	Comments
Indian oil sardine - Karnataka	< 6	≥ 6	DD	< 6	DD	Even though there are already some management measures in place for the fishery (e.g., closed seasons and areas, gear and mesh size restrictions), **specific management objectives are not defined, and output controls such as TACs (or fish quotas) and minimum landing sizes are also not used. The magnitude of IUU fishing and compliance with current fishing regulations are also currently unknown**. This stock has been recognized as "less abundant" in 2016 and in 2017 (CMFRI 2018), based on a "rapid" stock assessment. However, it is unclear what "less abundant" means in terms of stock condition, as the assessment is qualitative and no previous or current biomass estimates (against known reference points) are available. In addition, the quality and robustness of this type of assessment cannot be evaluated based on the information provided by the CMFRI. Fishing mortality levels are unknown, and there are concerns that, if this situation of lack of data on fishing pressure persists, the fleet may grow to exceed sustainable levels.
Indian oil sardine - Goa	< 6	≥ 6	DD	≥ 6	DD	Even though there are already some management measures in place for the fishery (e.g., closed seasons and areas, gear and mesh size restrictions), **specific management objectives are not defined, and output controls such as TACs (or fish quotas) and minimum landing sizes are also not used. The magnitude of IUU fishing and compliance with current fishing regulations are also currently unknown**. Although the latest information (2016) indicates that the resource is underexploited (CMFRI 2016-2017 Annual Report), **the quality of that stock assessment cannot be evaluated**. In addition, the levels of fishing effort and fishing mortality are presently unknown.
Pacific chub mackerel - Ecuador	< 6	≥ 6	DD	DD	DD	**There is no management plan or harvest control rule in place for this stock.** Output controls such as TACs (or fish quotas) and minimum landing sizes are also not used. **The magnitude of IUU fishing and compliance with current fishing regulations are unknown. Stock status and fishing mortality levels are also presently unknown.** The last stock assessment is almost 20 years old, and biological reference points have not been defined.

Stock	Score 1	Score 2	Score 3	Score 4	Score 5	Comments
Frigate tuna - Ecuador	< 6	≥ 6	DD	DD	DD	**Specific management objectives are not defined,** and output controls such as TACs (or fish quotas) and minimum landing sizes are also not used. **Stock status and fishing mortality levels for frigate tuna caught off Ecuador are presently unknown. A recent acoustic survey produced an estimate of biomass, but this information alone is not enough to ascertain the current or future health of the stock.**
Indian oil sardine - Tamil Nadu	< 6	≥ 6	DD	DD	DD	Even though there are already some management measures in place for the fishery (e.g., closed seasons and areas, gear and mesh size restrictions), **specific management objectives are not defined, and output controls such as TACs (or fish quotas) and minimum landing sizes are also not used**. The magnitude of IUU fishing and compliance with current fishing regulations are also currently unknown. **The status of the stock and the fishing pressure are unknown.** The latest information, based on data from 2016, is older than one generation, and no update on stock status was provided in the last CMFRI report in 2018. **There are concerns that if fishing effort remains unassessed, the fleet may grow to exceed sustainable levels.**
Indian oil sardine - Maharashtra	< 6	≥ 6	DD	≥ 6	DD	Even though there are already some management measures in place for the fishery (e.g., closed seasons and areas, gear and mesh size restrictions), **specific management objectives are not defined, and output controls such as TACs (or fish quotas) and minimum landing sizes are also not used**. The magnitude of IUU fishing and compliance with current fishing regulations are also currently unknown. The latest information on this stock is from 2014 (i.e., four years old) and based on "rapid" stock assessment, for which the quality and robustness could not be evaluated based on the information provided by the CMFRI. **The status of the stock and current exploitation levels are thus uncertain.** There are concerns that if fishing effort remains unassessed, the fleet may grow to exceed sustainable levels.

Stock	Score 1	Score 2	Score 3	Score 4	Score 5	Comments
Indian oil sardine - Andhra Pradesh	< 6	≥ 6	DD	DD	DD	Even though there are already some management measures in place for the fishery (e.g., closed seasons and areas, gear and mesh size restrictions), **specific management objectives are not defined, and output controls such as TACs (or fish quotas) and minimum landing sizes are also not used**. The magnitude of IUU fishing and compliance with current fishing regulations are also currently unknown. **The status of the stock and the fishing pressure are unknown.** The latest information, based on data from 2016, is older than one generation, and no update on stock status was provided in the last CMFRI report in 2018. **There are concerns that if fishing effort remains unassessed, the fleet may grow to exceed sustainable levels.**

Notes: "DD" means Data Deficient. For more information on data-deficient scores, please consult FishSource.org/faq

Appendix D. Current SFP sustainability category and suggested improvement actions for the 26 stocks used for reduction purposes assessed in the 2019 overview

Notes: (1) Improvement actions for specific components of a stock (identified with the country and respective fishing gear) are also included, when applicable; (2) Sources of information: Fishery Progress (Fishchoice) 2019, SFP 2019.

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
Antarctic krill - Atlantic Southern Ocean	A	1. Monitor fishery and management system for any changes that could jeopardize MSC re-certification. 2. Support efforts to manage this fishery at a finer spatial scale, as enabled by current catch reporting, to further reduce risks of local area depletion of krill. 3. Support efforts to enable an updated multinational krill biomass survey.
Blue whiting - NE Atlantic	B1	1. Ensure that the contracting parties to the Coastal State Agreement (including the EU, Faroe Islands, Iceland, and Norway) comply with TACs in order to reduce fishing mortality to no more than the reference point. 2. Conduct research to fully define the stock structure and develop stock-specific assessments, reference points, and harvest strategies appropriate to each stock. 3. Encourage the adoption of ecosystem-based fisheries management, namely, consider the importance of blue whiting as a forage species when setting reference points and catch limits. 4. Collect comprehensive information on bycatch (species, quantities, areas, seasonality).
Gulf menhaden - Gulf of Mexico	B1	1. Ensure the data inputs to the stock assessment (e.g., abundance survey, catch sampling, age data, bait fishery landings) are of sufficient quality (quantity, accuracy, precision, lack of bias, and timeliness) to support a high-quality stock assessment. 2. Companies owning vessels in the Gulf menhaden fleet obtain and release the bycatch data from the government observer program (not releasable by the government because of the low number of vessels/companies observed). Engage with scientists and catchers to analyze and publish the scale and trends of ETP bycatch. 3. Conduct outreach to the Gulf States Marine Fisheries Commission to encourage them to develop a harvest strategy and control rule, including biomass and fishing mortality targets, that account for the ecosystem services provided by menhaden as prey for many species.
European sprat - Baltic Sea	B1	1. Work with managers to develop a stock-wide, spatially explicit management plan for the fisheries that catch Baltic sprat (including Russia), ensuring there are adequate amounts of sprat in all areas to serve as prey for cod stocks and other ecosystem needs. 2. Ensure catch and discard data collection and reporting are adequate to support the stock assessment, including addressing species misidentification.

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
		3. Bycatch data collection and reporting should include interactions with birds and mammals, especially for the gillnet fleet.
		4. A new benchmark stock assessment is needed, which should address uncertainties due to retrospective overestimation of spawning stock biomass and underestimation of fishing mortality.
		5. Ensure future TACs are set in accordance with scientific advice.
		6. Ensure these recommendations are represented to the EU Pelagic Advisory Council (https://www.pelagic-ac.org/) directly or through one of the General Assembly members.
European sprat - North Sea, Skagerrak and Kattegat	**B1**	1. Press ICES to conduct further scientific research to fully define the stock structure to improve management.
		2. Press regional advisory bodies, national fisheries administrations, and the European Commission to develop a multi-species, ecosystem-based management plan, with specific management objectives for the pelagic fisheries in the North Sea and associated areas.
		3. Ensure that managers set the TAC in line with scientific advice.
		4. Engage with the EU Pelagic Advisory Council (https://www.pelagic-ac.org/) directly or through one of the General Assembly members, to ensure sustainable exploitation.
		5. Engage as a stakeholder in all MSC certifications for this stock and support the MSC client groups to ensure all conditions attached to the certifications are fully addressed.
Sandeels nei - Central Eastern North Sea	**B1**	1. Press regional advisory bodies, national fisheries administrations, and the European Commission to develop a multi-species, ecosystem-based management plan for North Sea pelagic fisheries, including a harvest control rule(s).
		2. Ensure these recommendations are represented to the EU Pelagic Advisory Council (https://www.pelagic-ac.org/) directly or through one of the General Assembly members.
		3. For stocks with high and increasing fishing mortality, poor recruitment, and/or low stock status, support managers to be responsive to the status of the stock and make precautionary management decisions.
		4. Engage as a stakeholder in all MSC certifications for this stock and support the MSC client groups to ensure all conditions attached to the certifications are fully addressed.
Norway pout - North Sea	**B1**	1. Engage with ICES and fishery management authorities in the EU and Norway to develop a long-term management plan and harvest control rule that considers the impacts of this fishery on the overall ecosystem structure and function.

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
		2. Work with scientists to conduct research to better understand the influence of natural factors, such as temperature and predation, on recruitment and population size.
		3. Implement monitoring, analyses, and assessments to determine the direct and indirect impacts of this fishery on sensitive habitats, and endangered, threatened, and protected (ETP) species, particularly marine mammals and seabirds.
		4. Work with scientists and managers to define fishing mortality reference points.
European pilchard - NW Africa central Morocco sardine - pelagic trawl and seine| 2014 | A | Jo Gascoigne; Ministère de l'Agriculture et de la Pêche Maritime| https://fisheryprogress.org/fip-profile/morocco-sardine-pelagic-trawl-and-seine-maroc-sardine-chalut-p%C3%A9lagique-et-senne	B1	1. Push the Moroccan National Fisheries Research Institute (INRH) and the FAO to publish annual scientific advice in a timely manner. 2. Push fishery managers to further develop and fully implement the management plan, including catch limits and appropriate harvest control rules for all species (stocks). 3. Work with managers to improve catch and discard information and better define the scale of any IUU fishing for all fleets. 4. Work with scientists to understand the uncertainties in the stock assessment and improve the different assessment models and input data (catches, discards, biological data) to reduce the level of uncertainty in the assessment and to work toward resolving the differences between the models. 5. Work with scientists to conduct studies to clarify the stock structure of northwest African pilchard/sardine. 6. Press managers to implement a recovery strategy for other target species in this multi-species fishery, to ensure that all such species are at least above their biologically based limit reference points (or proxies for the point of recruitment impairment), especially Cunene horse mackerel and Atlantic horse mackerel. 7. Work with scientists and managers to expand the at-sea observer program to provide representational coverage of all components of the fishery, to better understand catches and discards, as well as interactions with habitats and all types of bycatch
Araucanian herring - Central-South Chile	B1	1. Engage with managers and IFOP to ensure that catch recommendations and scientific reports are publicly available in a timely manner. 2. Support the work of scientists and managers to improve reporting of catches, discards, bycatch, and ETP incidental captures, including the expansion of the observer program, as well as define the scale of interactions with benthic habitats. 3. Monitor implementation of the discard reduction plan (July 2017).

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
		4. Work with scientists to conduct research on and develop new stock assessment models that take into account key environmental variables
		5. Support the implementation of the Anchoveta-Araucanian herring management plan (2016), and ensure timely revisions of the plan include a specific recovery plan with explicit harvest control rules, considering the mixed nature of this fishery and its role in the ecosystem.
Chilean jack mackerel - Southeast Pacific	B2	1. Work with scientists to support the continuous improvements underway in stock assessment and research on stock structure, especially the effects of environmental variability on the population.
		2. Encourage the South Pacific Regional Fisheries Management Organization (SPRFMO) to set biological reference points and harvest control rules that consider the species role in the ecosystem and shifts in environmental conditions.
		3. Encourage SPRFMO members and cooperating non-members to fully implement and comply with SPRFMO's Conservation and Management Measures.
		4. Encourage the government of Peru to continue setting its domestic TAC so as not to exceed the total stock catch limit advised by the SPRFMO Scientific Committee.
		5. Encourage the government of Ecuador to publish its scientific advice.
		6. Support the fishery to implement measures to address conditions in the MSC certification, especially to minimize fishing-related mortality of associated fish species and ETP species.
Atlantic menhaden - NW Atlantic	B2	1. Support research to improve understanding of the role of menhaden in the ecosystem.
		2. Encourage the Atlantic States Marine Fisheries Commission to continue considering the ecological role of menhaden as an important prey species in the ecosystem when updating reference points and management measures.
		3. Advocate for improvement in the reporting of catches by area for the bait sector, to reduce uncertainty in understanding removals.
Anchoveta - Peruvian Northern-Central Peruvian anchovy - industrial purse-seine | 2017 | A | CeDePesca | https://fisheryprogress.org/fip-profile/peruvian-anchovy-industrial-purse-seine Peruvian anchovy – small scale purse-seine | 2017 | A | CeDePesca |	B2	1. Request the government of Peru to develop a long-term management plan for the fishery, with an explicit harvest strategy and reference points that take into account the key role of anchoveta in the ecosystem.
		2. Consider further improvements to the stock evaluation process, such as the development of annual stock assessment models that incorporate improved catch data (landings and discards) and the effects of environmental variability. All stock evaluation results should be peer reviewed and publicly reported.

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
https://fisheryprogress.org/fip-profile/peruvian-anchovy-small-scale-purse-seine		3. Encourage the Peruvian authorities to assign stock-specific artisanal and small-scale quotas based on scientific advice. 4. Encourage the Peruvian research authorities to assess the status of minor species (e.g., longnose anchovy - *Anchoa nasus*) and encourage the Ministry of Production to develop management/rebuilding plans as appropriate. 5. Work with scientists and managers to improve reporting of catches, discards, and all bycatch; analyze the data and publish the results on bycatch quantities and trends. 6. Develop and implement bycatch reduction measures for the industrial and artisanal fleets based on increased knowledge from the IMARPE observer program and support industry programs (e.g., Cuidamar and Salvamar) created to quantify and reduce interactions with ETP species. 7. Work with scientists to define the scale of interactions with and impacts on benthic habitats.
Anchoveta - Southern Peru/Northern Chile (regions XV-I-II)	B2	1. Support the work of the governments of Peru and Chile to establish coordinated fishery research and management plans in line with the objectives of the agreed Strategic Action Program between both countries. 2. Support the implementation of the 2018 management plan for the Chilean portion of the fishery. 3. Encourage the Peruvian authorities to assign stock-specific artisanal and small-scale quotas based on scientific advice. 4. Work with scientists to increase the robustness of stock assessment models, ensuring they take into account key environmental variables and the needs of dependent predators. 5. Support the work of scientists and managers in both countries to improve reporting of catches and discards, as well as interactions with habitats and all types of bycatch. 6. Encourage the Peruvian and Chilean research authorities to assess the status of minor species (e.g., South American pilchard - *Sardinops sagax*) and develop management/rebuilding plans as appropriate.
Anchoveta - Chilean Central-Southern (regions V-X)	B2	1. Engage with managers and IFOP to ensure that catch recommendations and scientific reports are publicly available in a timely manner. 2. Support the work of scientists and managers to improve reporting of catches, discards, bycatch, and ETP incidental captures, including the expansion of the observer program, as well as define the scale of interactions with benthic habitats. 3. Monitor implementation of the discard reduction plan (July 2017).

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
		4. Work with scientists to conduct research on and develop new stock assessment models that take into account key environmental variables
		5. Support the implementation of the Anchoveta-Araucanian herring management plan (2016) and ensure timely revisions of the plan include a specific recovery plan with explicit harvest control rules, considering the mixed nature of this fishery and its role in the ecosystem.
Capelin - Barents Sea	**B2**	1. Ensure all catching countries fully comply with catch limits (including any limits on bycatch in other fisheries), in order to support the rebuilding of the stock (the fishery is closed for 2019).
		2. Work with scientists and managers to develop a stock assessment and a target reference point that fully take into account predation of juvenile capelin.
		3. Contact the Joint Russian-Norwegian Fisheries Commission (JRNFC) and request that the fishery is not re-opened until an ecosystem-based fisheries management system is in place.
European pilchard - NW Africa southern (Morocco) Morocco sardine - pelagic trawl and seine | 2014 | A | Jo Gascoigne; Ministère de l'Agriculture et de la Pêche Maritime | https://fisheryprogress.org/fip-profile/morocco-sardine-pelagic-trawl-and-seine-maroc-sardine-chalut-p%C3%A9lagique-et-senne	**B2**	1. Support the Sub-Regional Fisheries Commission and Morocco in their efforts to develop a strategic plan for management of the small pelagics fisheries in the region. The management plan should include species-specific TACs, joint setting of TACs, and consideration of how environmental variability may affect stocks.
		2. Work with scientists to understand the uncertainties in the stock assessment and improve the different assessment models and input data (catches, discards, biological data) to reduce the level of uncertainty in the assessment and to work toward resolving the differences between the models.
		3. Encourage management authorities to release stock assessment results sooner and improve transparency of subsequent management actions, including the setting of catch or effort limits.
		4. Ask the government/regional authorities to continue to improve catch and discard reporting and to publish fishery compliance information, especially for Mauritania.
		5. Work with scientists to conduct studies to clarify the stock structure of northwest African pilchard/sardine.
		6. Press managers to implement a recovery strategy for other target species in this multi-species fishery, to ensure that all such species are at least above biologically based limit reference points (or proxies for the point of recruitment impairment), especially for Cunene and Atlantic horse mackerels, and round and Madeiran sardinellas.
		7. Work with scientists and managers to expand the at-sea observer program to provide representational coverage of all components of the fishery, to better understand catches and discards, as well as interactions with habitats and all types of bycatch.

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
European pilchard - NW Africa southern (Mauritania)	**C**	Same as for the Moroccan jurisdiction (above).
Sandeels nei - Dogger Bank area	**C**	1. Press regional advisory bodies, national fisheries administrations, and the European Commission to develop a multi-species, ecosystem-based management plan for North Sea pelagic fisheries, including a harvest control rule(s). 2. Ensure these recommendations are represented to the EU Pelagic Advisory Council (https://www.pelagic-ac.org/) directly or through one of the General Assembly members. 3. For stocks with high and increasing fish mortality, poor recruitment, and/or low stock status, support managers to be responsive to the status of the stock and make precautionary management decisions. 4. Engage as a stakeholder in all MSC certifications for this stock and support the MSC client groups to ensure all conditions attached to the certifications are fully addressed.
Capelin - Icelandic	**C**	1. Ensure all catching countries fully comply with catch limits (including any limits on bycatch in other fisheries), in order to support the stock to rebuild. 2. Work with scientists and managers to review the harvest strategy, harvest control rule, and the TAC setting procedures, including ensuring that these are appropriately precautionary, given the importance of capelin as a forage species. 3. Encourage the Icelandic Marine Research Institute to commission a peer review of the stock assessment, including evaluation of the current acoustic monitoring survey, to ensure optimal coverage and minimization of uncertainty.
Indian oil sardine - Kerala	**C**	1. Support current improvement efforts and encourage the development of a formal, national, Indian oil sardine fishery improvement project (FIP) covering all stocks, including the following activities: 2. Encourage regulators to commission research to better define the biological stock structure. 3. Ask regulators to conduct and fully publish standardized stock assessments at the appropriate spatial scale. 4. Ask managers to publish historic annual catch data, including percentages of juvenile catch, by gear type for each state. 5. Work with managers to develop and agree on long-term objectives for the fishery, and develop a management plan, including biological reference points, a harvest strategy, and a harvest control rule for each stock.

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
		6. Push managers to prevent further growth in effort in these fisheries until adequate stock assessments are available and stock status relative to reference points is known.
		7. Encourage managers to immediately implement management measures for each state to monitor and prevent or reduce the capture of juvenile fish, as advised by relevant scientific bodies, as done in Kerala.
		8. Work with scientists to research the environmental impacts of the fishery, especially with regard to effective monitoring of the incidental capture of endangered, threatened, and protected species.
		9. Support and encourage enhanced surveillance and enforcement to reduce illegal, unreported, and unregulated (IUU) fishing.
Indian oil sardine - Karnataka	C	1. Support current improvement efforts and encourage the development of a formal, national, Indian oil sardine fishery improvement project (FIP) covering all stocks, including the following activities:
		2. Encourage regulators to commission research to better define the biological stock structure.
		3. Ask regulators to conduct and fully publish standardized stock assessments at the appropriate spatial scale.
		4. Ask managers to publish historic annual catch data, including percentages of juvenile catch, by gear type for each state.
		5. Work with managers to develop and agree on long-term objectives for the fishery, and develop a management plan, including biological reference points, a harvest strategy, and a harvest control rule for each stock.
		6. Push managers to prevent further growth in effort in these fisheries until adequate stock assessments are available and stock status relative to reference points is known.
		7. Encourage managers to immediately implement management measures for each state to monitor and prevent or reduce the capture of juvenile fish, as advised by relevant scientific bodies, as done in Kerala.
		8. Work with scientists to research the environmental impacts of the fishery, especially with regard to effective monitoring of the incidental capture of endangered, threatened, and protected species.
		9. Support and encourage enhanced surveillance and enforcement to reduce illegal, unreported, and unregulated (IUU) fishing.
Indian oil sardine - Goa Indian Oil Sardine | 2018 | C | CPFoods; Omega Fishmeal & Oil pvt | http://www.indiasardinefip.co.in/index.php	C	1. Support current improvement efforts and encourage the development of a formal, national, Indian oil sardine fishery improvement project (FIP) covering all stocks, including the following activities: 2. Encourage regulators to commission research to better define the biological stock structure.

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
		3. Ask regulators to conduct and fully publish standardized stock assessments at the appropriate spatial scale.
		4. Ask managers to publish historic annual catch data, including percentages of juvenile catch, by gear type for each state.
		5. Work with managers to develop and agree on long-term objectives for the fishery, and develop a management plan, including biological reference points, a harvest strategy, and a harvest control rule for each stock.
		6. Push managers to prevent further growth in effort in these fisheries until adequate stock assessments are available and stock status relative to reference points is known.
		7. Encourage managers to immediately implement management measures for each state to monitor and prevent or reduce the capture of juvenile fish, as advised by relevant scientific bodies, as done in Kerala.
		8. Work with scientists to research the environmental impacts of the fishery, especially with regard to effective monitoring of the incidental capture of endangered, threatened, and protected species.
		9. Support and encourage enhanced surveillance and enforcement to reduce illegal, unreported, and unregulated (IUU) fishing.
Pacific chub mackerel – Ecuador Ecuador small pelagics | 2018 | C | Camara Nacional de Pesqueria (CNP) | http://smallpelagics.org/	**C**	1. Support current improvement efforts and encourage the development of a formal, national, Ecuador small pelagic fishery improvement project (FIP), including the following activities:
		2. Work with scientists to review the stock structure, develop an appropriate stock assessment model, and conduct and publish regular stock assessments.
		3. Encourage regulators to develop a management plan, including biological reference points, a harvest strategy, and harvest control rule.
		4. Ask managers to implement fishery conservation measures based on the best scientific advice, to reduce catches of immature fish and establish appropriate limits for catch and/or effort.
		5. Work with regulators to implement a consistent system for the regular collection and publication of fisheries and observer data from all fleet segments and gear types, especially for the artisanal fleet.
		6. Ask managers to review both the process and scientific basis used to implement temporal closures and evaluate the results of this management approach.
		7. Encourage regulators to improve monitoring, control, and surveillance to ensure compliance with regulations.
		8. Develop formal decision-making frameworks, which should establish: a) sources of information and scientific research to support decision making, b) consultation and inclusion of relevant stakeholders,

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
		institutions, and organizations in decision making, c) transparent reporting of research outcomes and consultation processes, and d) a public strategy to implement decisions. 9. Work with scientists to define the scale of interactions with and impacts on ETP species and benthic habitats.
Frigate tuna - Ecuador Ecuador small pelagics | 2018 | C | Camara Nacional de Pesqueria (CNP) | http://smallpelagics.org/	**C**	1. Support current improvement efforts and encourage the development of a formal, national, Ecuador small pelagic fishery improvement project (FIP) that includes the following activities: 2. Work with scientists to develop a research program to determine the stock structure and spatial distribution, and then develop appropriate stock assessment models that take into consideration key environmental variables. 3. Work with regulators to develop a management strategy based on the best scientific advice, including appropriate coordination or harmonization for transboundary stocks (e.g., through the Inter-American Tropical Tuna Commission). 4. Develop formal decision-making frameworks, which should establish: a) sources of information and scientific research to support decision making, b) consultation and inclusion of relevant stakeholders, institutions, and organizations in decision making, c) transparent reporting of research outcomes and consultation processes, and d) a public strategy to implement decisions. 5. Work with regulators to implement a consistent system for regular collection and publication of fisheries and observer data from all fleet segments and gear types, especially for the artisanal fleet. 6. Encourage regulators to improve monitoring, control, and surveillance to ensure compliance with regulations. 7. Ask managers to review both the process and scientific basis used to implement temporal closures and evaluate the results of this management approach. 8. Work with regulators and scientists to define appropriate technical fishery conservation measures, including, for example, establishment of a minimum landing size to reduce catches of immature fish, as advised by the National Institute of Fisheries of Ecuador (INP). 9. Work with scientists to define the scale of interactions with and impacts on ETP species and benthic habitats.
Indian oil sardine - Tamil Nadu	**C**	1. Support current improvement efforts and encourage the development of a formal, national, Indian oil sardine fishery improvement project (FIP) covering all stocks, including the following activities: 2. Encourage regulators to commission research to better define the biological stock structure.

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
		3. Ask regulators to conduct and fully publish standardized stock assessments at the appropriate spatial scale.
		4. Ask managers to publish historic annual catch data, including percentages of juvenile catch, by gear type for each state.
		5. Work with managers to develop and agree on long-term objectives for the fishery, and develop a management plan, including biological reference points, a harvest strategy, and a harvest control rule for each stock.
		6. Push managers to prevent further growth in effort in these fisheries until adequate stock assessments are available and stock status relative to reference points is known.
		7. Encourage managers to immediately implement management measures for each state to monitor and prevent or reduce the capture of juvenile fish, as advised by relevant scientific bodies, as done in Kerala.
		8. Work with scientists to research the environmental impacts of the fishery, especially with regard to effective monitoring of the incidental capture of endangered, threatened, and protected species.
		9. Support and encourage enhanced surveillance and enforcement to reduce illegal, unreported, and unregulated (IUU) fishing.
Indian oil sardine - Maharashtra Indian Oil Sardine | 2018 | C | CPFoods; Omega Fishmeal & Oil pvt | http://www.indiasardinefip.co.in/index.php	**C**	1. Support current improvement efforts and encourage the development of a formal, national, Indian oil sardine fishery improvement project (FIP) covering all stocks, including the following activities:
		2. Encourage regulators to commission research to better define the biological stock structure.
		3. Ask regulators to conduct and fully publish standardized stock assessments at the appropriate spatial scale.
		4. Ask managers to publish historic annual catch data, including percentages of juvenile catch, by gear type for each state.
		5. Work with managers to develop and agree on long-term objectives for the fishery, and develop a management plan, including biological reference points, a harvest strategy, and a harvest control rule for each stock.
		6. Push managers to prevent further growth in effort in these fisheries until adequate stock assessments are available and stock status relative to reference points is known.
		7. Encourage managers to immediately implement management measures for each state to monitor and prevent or reduce the capture of juvenile fish, as advised by relevant scientific bodies, as done in Kerala.
		8. Work with scientists to research the environmental impacts of the fishery, especially with regard to effective monitoring of the incidental capture of endangered, threatened, and protected species.

Stock Year FIP started | (FIP progress rating) | FIP leadership | link to FIP public report	SFP sustainability Category	Current SFP Suggested Improvement Actions
		9. Support and encourage enhanced surveillance and enforcement to reduce illegal, unreported, and unregulated (IUU) fishing.
Indian oil sardine - Andhra Pradesh	C	1. Support current improvement efforts and encourage the development of a formal, national, Indian oil sardine fishery improvement project (FIP) covering all stocks, including the following activities: 2. Encourage regulators to commission research to better define the biological stock structure. 3. Ask regulators to conduct and fully publish standardized stock assessments at the appropriate spatial scale. 4. Ask managers to publish historic annual catch data, including percentages of juvenile catch, by gear type for each state. 5. Work with managers to develop and agree on long-term objectives for the fishery, and develop a management plan, including biological reference points, a harvest strategy, and a harvest control rule for each stock. 6. Push managers to prevent further growth in effort in these fisheries until adequate stock assessments are available and stock status relative to reference points is known. 7. Encourage managers to immediately implement management measures for each state to monitor and prevent or reduce the capture of juvenile fish, as advised by relevant scientific bodies, as done in Kerala. 8. Work with scientists to research the environmental impacts of the fishery, especially with regard to effective monitoring of the incidental capture of endangered, threatened, and protected species. 9. Support and encourage enhanced surveillance and enforcement to reduce illegal, unreported, and unregulated (IUU) fishing.

Notes: (1) sources of information: 1, Fishchoice 2019; 2, SFP 2019.

Appendix E. Fisheries in the MSC program that are relevant to the current 26 stocks included in this overview, as of September 2019 (Source: MSC 2019)

FAO area	MSC fishery name	Species covered (1)	Stocks covered	MSC status	Certification date	Tonnage ('000 t) (¹)	Tonnage Year
48 **(Atlantic, Antarctic)**	Aker Biomarine Antarctic krill	Antarctic krill (*Euphausia superba*)	Antarctic krill - Atlantic Southern Ocean	Certified	15-Jun-10	156.7	2017
	Deris S.A. - Pesca Chile - Antarctic krill fishery	Antarctic krill (*Euphausia superba*)	Antarctic krill - Atlantic Southern Ocean	Certified	6-Sep-18	45.0 (2)	2018
	Rimfrost Antarctic krill	Antarctic krill (*Euphausia superba*)	Antarctic krill - Atlantic Southern Ocean	Suspended	20-Aug-15	11.0	2015
21 **(Northwest Atlantic)**	Omega Protein Corporation U.S. Gulf of Mexico menhaden purse seine	Gulf menhaden (*Brevoortia patronus*)	Gulf menhaden - Gulf of Mexico	In Assessment	na	- (3)	2017
	Omega Protein Corporation U.S. Atlantic menhaden purse seine	Atlantic menhaden (*Brevoortia tyrannus*)	Atlantic menhaden - NW Atlantic	Certified	3-Sep-19	141.3	2018
27 **(Northeast Atlantic)**	Faroese Pelagic Organization North East Atlantic blue whiting	Blue whiting (*Micromesistius poutassou*)	Blue whiting - NE Atlantic	Certified	15-Jun-16	338.8	2017
	PFA, DPPO, KFO, SPSG & Compagnie des Pêches St Malo Northeast Atlantic blue whiting Pelagic Trawl	Blue whiting (*Micromesistius poutassou*)	Blue whiting - NE Atlantic	Certified	3-Feb-16	341.1	2017
	ISF Iceland North East Atlantic blue whiting	Blue whiting (*Micromesistius poutassou*)	Blue whiting - NE Atlantic	Certified	11-Jan-18	228.9	2017
	Norway spring spawning herring	Blue whiting (*Micromesistius poutassou*)	Blue whiting - NE Atlantic	Certified with component(s) in assessment	02-Jan-18	309.3	2016
	Norway North East Atlantic blue whiting	Blue whiting (*Micromesistius poutassou*)	Blue whiting - NE Atlantic	In Assessment	na	399.4	2017
	DFPO and DPPO North Sea, Skagerrak and Kattegat sandeel, sprat and Norway pout	Lesser sand-eel (*Ammodytes marinus*), Sandeels nei (*Ammodytes* spp)	Sandeels nei - Dogger Bank area, Sandeels nei - Central Eastern North sea, Sandeels nei - SE North Sea	Certified with component(s) in assessment	23-Mar-17	458.5	2017
		European Sprat (*Sprattus sprattus*)	European sprat - North Sea			127.0	2017
		Norway pout (*Trisopterus esmarkii*)	Norway pout - North Sea,			25.9	2016
	Norway sandeel, pout and north sea sprat	Sandeels nei (*Ammodytes* spp.)	Sandeels nei - Central Eastern North Sea, Sandeels nei - Dogger Bank area	Certified	23-Feb-18	120.2	2017
		European sprat (*Sprattus sprattus*)	European sprat - North Sea			9.744	

FAO area	MSC fishery name	Species covered (1)	Stocks covered	MSC status	Certification date	Tonnage ('000 t) ()	Tonnage Year
		Norway pout (*Trisopterus esmarkii*)	Norway pout - North Sea			21.433	
	ISF Iceland capelin	Capelin (*Mallotus villosus*)	Capelin - Icelandic	Certified	18-Apr-17	186.0	2017
	LFPO pelagic trawl sprat (*Sprattus sprattus*)	European sprat (*Sprattus sprattus*)	European sprat - Baltic sea	Certified	22-May-17	21.8	2017
	Finland Baltic herring & sprat	European sprat (*Sprattus sprattus*)	European sprat - Baltic sea	Certified	25-Jun-18	10.5	2016
	Denmark, Estonia, Germany, Sweden Baltic herring and sprat	European sprat (*Sprattus sprattus*)	European sprat - Baltic sea	In Assessment	na	- (3)	na
	NZRO Gulf of Riga herring and sprat trawl fishery	European sprat (*Sprattus sprattus*)	European sprat - Baltic sea	In Assessment	na	- (3)	na
87 (Southeast Pacific)	Chile Purse Seine jack mackerel jurel	Chilean jack mackerel (*Trachurus murphyi*)	Chilean jack mackerel - SE Pacific	Certified	26-Apr-19	268.3	2017
	EU South Pacific midwater otter trawl Jack mackerel fishery	Chilean jack mackerel (*Trachurus murphyi*)	Chilean jack mackerel - SE Pacific	In Assessment	na	0.03	2017

Notes: (1) Only species/stocks covered in this overview are included here. (2) This is a new fishery; the volume included is an estimate based on the expected level of catch for the 2017/18 fishing season (MSC 2018). (3) No specific volume is still available for these fisheries in assessment; we assumed the entire catch for this species and country in the respective stock as covered by the MSC fishery. (4) MSC tonnage refers to 2016, with the exceptions of LFPO pelagic trawl sprat (*Sprattus sprattus*) (2015), Rimfrost Antarctic krill (2015), and Deris S.A. - Pesca Chile - Antarctic krill fishery (2018). (5) Volumes as reported by the respective MSC fisheries

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FURTHER INFORMATION

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