



Reduction Fisheries:

SFP Fisheries Sustainability Overview 2016



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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; aquaculture

DISCLAIMER

This report was mainly prepared with information available from FishSource.com[™], a program of Sustainable Fisheries Partnership (SFP). The findings summarized in the report are based on information that the authors accessed from FishSource in April 2016. SFP updates FishSource regularly but the report may not capture the most recent data for all the stocks. Always check FishSource.com 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 (based on criteria such as volume of catch or interest for SFP partners, for example). The *scoring and ranking categories* provided currently 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.com, and also in other sources of information.



EXECUTIVE SUMMARY

This briefing represents the seventh edition of the SFP global sustainability overview of the main Pacific and Atlantic fish stocks used for reduction purposes (to produce fishmeal and fish oil). The 2016 analysis covers 20 stocks (compared to 24 last year) from 13 species and two main groups (fish and crustaceans), rated according to the sustainability assessment presented on FishSource (www.fishsource.com). The document covers the most recent assessment period for which comparable data is publicly available as of May 2016.

Similarly to last year, this 2016 overview focuses solely on the stocks used for fishmeal and fish oil — regardless of the taxonomical group. For instance, in this edition we include Antarctic krill, which is a crustacean but growing in importance as a commodity for fishmeal and oil purposes. Conversely, the herring stocks from European waters in the northwest Atlantic (and more recently most of the northeast Atlantic mackerel, European pilchard, and horse mackerel), are now almost exclusively used for direct human consumption (not counting trimmings) and are excluded from this year's analysis. It has always been a reality for the authors of this report that the proportion of any given species/stock being utilized for fishmeal and fish oil is a function of market demand and can change with time.

The fisheries are ranked into four sustainability categories (A, B1, B2, and C) according to scores on FishSource, the SFP public database of fisheries information. The categorization is based on the quality of management (scores 1 to 3) and status of the target stock (scores 4 and 5). While information on the environmental impacts of fishing activities is also captured in the narrative sections of the FishSource fishery profiles, it is not currently captured by the scoring system. The categories, defined within the context of FishSource's 10-point scoring scale, are:

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
Category B2: Reasonably managed fisheries	Score 6 or above across all FishSource scores
Category C: Poorly managed fisheries	At least one FishSource score is below 6



In summary, the briefing concludes that for the 20 stocks analyzed in 2016:

- **Most (49%)** of the catch used for reduction purposes for comes from South American fisheries (FAO area 87), followed by European (FAO area 27; **29% of total catch supply**) and northwest African (FAO area 34; **11% of total catch**) fisheries (**Appendix A; Appendix B**).
- Compared to 2015, there was a **16% decrease in the total catch supplied by the reduction fisheries** included in this overview. This was related to a considerable drop in catches of **the South American reduction fisheries**, in particular of Peruvian anchoveta (to less than half of the previous year) — the species that produces the largest volumes of fishmeal in the world (FAO 2014). Nonetheless, there was an increase in catches observed in the NE Atlantic reduction fisheries, mainly due to a significant rise in catches of NE Atlantic blue whiting (*Micromesistius poutassou*) (**Appendix C**).
- Despite the significant decrease in catches compared to the previous year, **anchoveta** remains by far the **most important species for reduction purposes**, accounting for **more than one third (37%)** of the total catch in this overview. **The two other most important species remain blue whiting (15%)** from NE Atlantic, and **European pilchard (11%)**. Together, **these three species account for more than 60% of the total reported catches** of the fisheries analyzed in this report.
- **Catches from fisheries for reduction** purposes continue to have a **considerable contribution** to the total finfish catches. This is particularly true in some areas such as the SE Pacific and the Antarctic, where reduction fisheries contributed to more than two thirds of the total marine finfish catch. The **contribution of reduction fisheries** to the **total finfish catch** for each of the FAO areas covered in this overview ranged from **21% (NW Africa; FAO 34)** to **99%¹ (Atlantic, Antarctic; FAO 48)** (**Appendix B**).
- **With the exception of some fisheries in Europe, all reduction fisheries in the Atlantic and Eastern Pacific continue to target low trophic level (LTL) species**. Future management of such fisheries should be based on an ecosystem-wide approach (rather than single-species), given the key role of some of these species as a source of food to upper levels of the food chain.
- As in previous editions, most of the catch supply came from a few very important stocks: the **top ten stocks** in terms of reported catches accounted for **90% of the total catch in this analysis (Table 5)**. In this list are: the Peruvian and Chilean anchoveta fisheries, NE Atlantic blue whiting, the northwest African sardine fisheries, Chilean Araucanian herring, Icelandic capelin, Chilean jack mackerel, the US Gulf menhaden fishery (Gulf of Mexico), as well as the Antarctic krill fishery.
- Only **3.8 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 last year's overview, this corresponds to a single fishery: Antarctic krill - Atlantic Southern Ocean. This fishery is

¹ For the Antarctic Atlantic, krill catches are compared to total catches in that FAO fishing area (i.e., finfish, crustaceans, etc.).



managed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), and is MSC certified as sustainable since 2010. It is important to note, however, that this does not mean that ecosystem monitoring should be ignored. The current evaluation does not consider future ecosystem effects (such as warming of the Antarctic by anthropogenic climate change) and the relationship to fishery management.

- Cumulatively, **most (57.4%)** 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). The stock with the largest contribution to this category clearly continues to be the **anchoveta - Peruvian northern-central stock**, which **represented around 22%** of the total catch in this analysis.
- Although there was a slight increase in volume in this category from last year, only **14%** of the catch comes from stocks that score 6 or above in all criteria AND the score for biomass is 8 or more, meaning biomass is at or above target levels (**Category B1**). These stocks are in very good shape in terms of biomass, but still need some improvements in management strategy and/or on current fishing mortality levels. This level of performance is in line with the current Aquaculture Stewardship Council requirements for fisheries providing fishmeal and fish oil for feed to certified farms (ASC 2012).
- **More than one third** (42.6%; 3.3 million tonnes) of the total catch for reduction purposes comes from the seven poorly managed fisheries (Category C) in this overview (**Figure 1**).
 - In many cases, these **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 fishing pressure remains too high, or the stock is in a serious depleted condition; examples are the Chilean jack mackerel or the Barents Sea capelin.
 - In other **C-rated** fisheries (e.g., NE Atlantic blue whiting), although the current stock status is good, some serious management issue (e.g., TAC well above advised levels) is causing these fisheries to score badly. In such cases, if the specific management issue(s) is/are resolved (with status quo elsewhere), the ratings of the fisheries would improve.
 - One fishery, **anchoveta - Chilean regions V-X**, remains in very bad shape both in terms of management (in this particular case the issue is fishers' compliance with set quotas) and stock status (current biomass well below the limit reference point). In this fishery, improvements are needed in the management strategy to ensure landings are in line with the set quotas, to allow the stock recovery.
 - A more detailed analysis of why each of these fisheries scores badly (i.e., less than 6) in one or more of the specific FishSource sustainability criteria is provided in **Appendix E**.
- For the 20 stocks covered in both the 2015 and 2016 evaluations, there was a **slight increase** in catch supply of **A and B1 category fisheries (+4.1%)** compared to 2015. This was caused by



the upgrade in category of three fisheries (Norway pout - North Sea, lesser sand-eel - Dogger Bank area, European pilchard - Northwest Africa southern stock), in which there were improvements in the management system (**Table 4**). It was also related to some extent to an increase in catches of the Antarctic krill fishery. However, there was also an increase in the catch supply from poorly managed (i.e., C-rated) fisheries (**+5.1%**), mostly related to the increased catches in the NE Atlantic blue whiting fishery.

- Of the 20 fisheries analyzed, **changes in sustainability categories from 2015** were observed in **six fisheries** (details on the specific changes for each of the fisheries can be found in **Table 4**):
 - **Four fisheries improved** their status: Norway pout - North Sea (C to B1), lesser sand-eel - Dogger Bank area (C to B1), European pilchard - Northwest Africa southern stock (C to B1), European pilchard - Northwest Africa central stock (C to B2).
 - **Two fishery stocks decreased** in their sustainability category: Atlantic menhaden - NW Atlantic (B1 to B2), Araucanian herring - Chilean (B1 to C)



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1 INTRODUCTION

Sustainable Fisheries Partnership (SFP) applies a sectoral approach to its mission of making actionable information available to retailers and 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 (so, for instance, krill and anchovy share few biological characteristics, but they are both important in the same fishmeal and fish oil markets).

SFP has created an online database, FishSource.com, in which individual stock and fishery performance within each sector is tracked against the [FishSource sustainability criteria](#) for management quality and stock status, environmental impacts, and improvement needs of individual fisheries. As of June 2016, FishSource covered 1,928 individual fisheries from more than 500 stocks and 400 marine and freshwater wild-captured species (SFP 2016). 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 in order 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 particular report focuses on the reduction fisheries sector.

Reduction fisheries for the fishmeal and fish oil industry in the Atlantic and east Pacific oceans are largely dominated by 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, sand-eel, and menhaden) and can be found in large shoals in specific regions (e.g., southeast Pacific). 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 controls. These stocks are also extremely important to 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.

This 2016 SFP Fisheries Sustainability Overview analyzes reduction fisheries from 20 different stocks (most targeting forage species) and assesses the sustainability of the current management regimes. It is important to note that only a subset of the global catch that is used for reduction is covered: fisheries that are used exclusively as fish trimmings are excluded from this sustainability analysis. Southeast Asian fisheries that are used mainly for reduction (mainly from “trash”² fish fisheries, but also from small pelagics directed fisheries) are also very relevant to the global catch supply for fishmeal and fish oil and agriculture fertilizers but are not included in this report. However, a brief analysis on the growing importance and main challenges of these Southeast Asian fisheries is provided.

² “Trash fish” is the term commonly used for fish that have generally very low or no direct commercial value; these are generally fish that are small in size or species with very low consumer preference. Trash fisheries are of great importance in the Asian region, representing more the one fourth 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).



2 SOURCES OF INFORMATION AND ASSESSMENT CRITERIA

Our overview is based on information from [FishSource.com](http://www.fishsource.com), 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 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: <http://www.fishsource.com/faqs>).

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

	Score/Criterion	Rationale	Rationale (description)
Management quality	Score 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.
	Score 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.
	Score 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 Status	Score 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.
	Score 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 MSC fishery assessment method, where “< 6” indicates a high risk and a negative assessment finding, “≥ 6” indicates a medium risk and that improvements are required, and “≥ 8” indicates a low risk and that the fishery meets the criterion conditions.

The scores are based on the most recently available public data as of May 2016 and generally represent a snapshot of the position in 2015 with regard to management quality and stock status



indicators and in 2014³ for catch statistics. More recent data may be obtained from [FishSource.com](https://www.fishsource.com) for some specific stocks, but not for all of the stocks analyzed.

FishSource scores are then used to place fisheries into one of four ranked sustainability categories (A, B1, B2, and C). The categorization is based on the quality of management (scores 1 to 3) and status of the target stock (scores 4 and 5). While information on environmental impacts of fishing activities is also captured in the narrative sections of the FishSource fishery profiles, it is not currently captured by the scoring system. **Table 2**, below, shows the criteria of the four sustainability categories used in the overview.

Table 2. Criteria for the four sustainability categories used in this 2015 Fisheries sustainability 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
Category B2: Reasonably managed fisheries	Score 6 or above across all FishSource scores
Category C: Poorly managed fisheries	At least one FishSource score is below 6

Given the important role of most of the species used for reduction as forage species (e.g., Peruvian anchoveta, Antarctic krill), particular emphasis is placed on biomass for the categorization above (i.e., the split into categories B1 and B2). 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 Marine Stewardship Council Fisheries Assessment Methodology with regard to low trophic level (LTL) fisheries.

As in the 2015 edition, this 2016 overview focuses solely on the stocks used for fishmeal and fish oil, regardless of taxonomic group, due to a redefinition of this seafood sector recently conducted by SFP to best align with its strategic mission. For instance, in this edition (as last year) we include 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, were excluded from this year's 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. The only difference between this 2016 overview and last year's edition was the exclusion of four smaller stocks of the North Sea sand-eel (lesser sand-eel - Central Western North Sea, lesser

³ Although catch data for 2015 is already available for some fisheries, most is only available up to 2014, thus we have used the 2014 catch across all fisheries.



sand-eel - Shetland, lesser sand-eel - Kattegat, and lesser sand-eel - Viking and Bergen Banks). These are minor stocks and only represent a small fraction (<2% in volume) of the total sand-eel catches in the North Sea. Although currently outside of the scope of this report, the evaluations for these specific fisheries are still available and can be consulted in [FishSource.com](https://www.fishsource.com).



3 RESULTS

Sustainable Fisheries Partnership has been releasing annual overviews of stock status and management quality for reduction fisheries since 2008. As in 2015, the current report relies on a SFP's redefinition of the seafood sector to best align with its strategic mission; the current "reduction fisheries" sector only includes stocks where whole fish are used for reduction purposes (excluding trimmings, or "by-products"). This redefined sector also includes species from Southeast Asian fisheries that are used mostly for reduction (mainly from the commonly known "trash" fish fisheries, but also from small pelagics directed fisheries). However, the sustainability evaluations for this latter group of fisheries are outside the scope of this report, which only focuses on the most important reduction fisheries for American, Australian, and European markets. Four European sand-eel fisheries are not included in this report due to their minor importance in terms of total sand-eel catches in the North Sea. A comparison among the criteria adopted and the fisheries included in this and the previous two reports is given in **Table 3**.

Table 3. Comparison of the stocks included in the current and last year's sustainability overview

	2016 report	2015 report	2014 report
Criteria for inclusion of stocks	Same criteria and fisheries as for 2015, but excluding four minor European sand-eel stocks, which combined represent a minor fraction (<2% in volume) of the total sand-eel catches in the North Sea: lesser sand-eel - Central Western North Sea, lesser sand-eel - Kattegat, lesser sand-eel - Shetland, lesser sand-eel - Viking and Bergen Banks	Exclusive use for reduction, whole raw material, and globally largest and/or important to key markets (i.e., by-products related fisheries, SE Asian reduction fisheries, or fisheries exclusively used for human consumption, are excluded)	Use for reduction OR for human consumption, preferably small pelagics, globally largest and/or important to key markets
Number of stocks analyzed	20	24	28
Total catch volume analyzed ('000 tonnes)	7,791	9,304	10,878
Top five stocks in catch volume	1. Anchoveta - Peruvian northern-central stock (2) 2. Blue whiting - Northeast Atlantic 3. Anchoveta - Chilean regions xv-i-ii /Southern Peruvian stock 4. European pilchard - Northwest Africa central stock 5. Araucanian herring - Chilean	1. Anchoveta - Peruvian northern-central stock 2. Anchoveta - Chilean regions XV-I-II/Southern Peruvian stock 3. Blue whiting - Northeast Atlantic 4. Gulf menhaden - Gulf of Mexico 5. European pilchard - Northwest Africa central stock	1. Anchoveta - Peruvian northern-central stock 2. Anchoveta - Chilean regions XV-I-II/Southern Peruvian stock 3. Araucanian herring - Chilean 4. Atlantic herring - Northeast Atlantic spring spawners 5. Gulf menhaden - Gulf of Mexico
Cumulative % for the top five, in catch volume	65%	76%	61%
Taxonomic variability (in number)	Small pelagics (14), other (4), shrimp (1), whitefish (1)	Small pelagics (14), other (8), shrimp (1), whitefish (1)	Small pelagics (25), other (3)
Stocks in common with previous year's report	20	17	-



3.1 Overview of management quality and the current status of the stocks

Overall, the main results from the current assessment of the 20 reduction fisheries, in terms of management quality and stock status, are as follows:

- **Most (49%)** of the catch supply for reduction purposes for EU and American markets continues to come from South American fisheries (FAO area 87), followed by European (FAO area 27; **29% of total catch supply**) and northwest African (FAO area 34; **11% of total catch**) fisheries (**Appendix A; Appendix B**).
- Compared to 2015, there was a **16% decrease in the total catch supply by the reduction fisheries** included in this overview. This was related to a considerable drop in catches of **the South American reduction fisheries**, in particular of Peruvian anchoveta (to less than half of the previous year)—the species with the highest catches in the world (FAO 2014). Nonetheless, there was an increase in catches observed in the NE Atlantic reduction fisheries, mainly due to a significant rise in catches of NE Atlantic blue whiting (*Micromesistius poutassou*) (**Appendix C**).
- Despite the significant decrease in catches compared to the previous year, **anchoveta** remains by far the **most important species for reduction purposes**, accounting for **more than one third (37%) of the total catch** in this overview. **The two other most captured species remain blue whiting (15%)** from NE Atlantic, and **European pilchard (11%)**. Together, **these three species account for more than 60% of the total reported catches** of the fisheries analyzed in this report.
- **Catches from fisheries for reduction** purposes continue to have a **considerable contribution** to the total finfish catches. This is particularly true in some areas such as the SE Pacific and the Antarctic, where reduction fisheries contributed to more than two thirds of the total marine finfish catch⁴. The **contribution of reduction fisheries to the total finfish catch** for each of the FAO areas covered in this overview ranged from **21% (NW Africa; FAO 34)** to **99% (Atlantic, Antarctic; FAO 48)** (**Appendix D**).
- **With the exception of some fisheries in Europe, all reduction fisheries in the Atlantic and Eastern Pacific continue to target low trophic level (LTL) species**. It is important that the management of these fisheries focuses 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.
- As in previous editions, most of the catch comes from a few very important stocks: the **top ten stocks** in terms of reported catches accounted for **90% of the total catch in this analysis (Table 5)**. In this list are: the Peruvian and Chilean anchoveta fisheries, NE Atlantic blue whiting, the northwest African sardine fisheries, Chilean Araucanian herring, Icelandic capelin,

⁴ For the Antarctic Atlantic, krill catches are compared to total catches in that FAO fishing area (i.e., finfish, crustaceans, etc.).



Chilean jack mackerel, the US Gulf menhaden fishery (Gulf of Mexico), as well as the Antarctic krill fishery.

- Only **3.8 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 last year's overview, this corresponds to a single fishery: Antarctic krill - Atlantic Southern Ocean. This fishery is managed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), and is MSC certified as sustainable since 2010. It is important to note, however, that this does not mean that ecosystem monitoring should be ignored. The current evaluation does not consider future ecosystem effects (such as warming of the Antarctic by anthropogenic climate change) and the relationship to fishery management.
- Cumulatively, **most (57.4%)** 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). The stock with the largest contribution to this category continues to be clearly the **anchoveta - Peruvian northern-central stock**, which **represented around 22%** of the total catch in this analysis.
- Although there was a slight increase in volume in this category from last year, only **14%** of the catch comes from stocks that score 6 or above in all criteria AND the score for biomass is 8 or more, meaning biomass is at or above target levels (**Category B1**). These stocks are in very good shape in terms of biomass, but still need some improvements in management strategy and/or on current fishing mortality levels. This level of performance is in line with the current Aquaculture Stewardship Council requirements for fisheries providing fishmeal and fish oil for feed to certified farms (ASC 2012).
- **More than one third** (42.6%; 3.3 million tonnes) of the total catch for reduction purposes comes from the seven poorly managed fisheries (Category C) in this overview (**Figure 1**).
 - In many cases, these **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 fishing pressure remains too high, or the stock is in a serious depleted condition; examples are the Chilean jack mackerel or the Barents Sea capelin.
 - In other **C-rated** fisheries (e.g., NE Atlantic blue whiting), although the current stock status is good, there is some serious management issue (e.g., TAC well above advised levels) that is causing these fisheries to score badly. In such cases, if the specific management issue(s) is/are resolved (with status quo elsewhere), the condition of the fisheries would improve.
 - One fishery, **anchoveta - Chilean regions V-X**, remains in very bad shape both in terms of management (in this particular case the issue is fishers' compliance with set quotas) and stock status (current biomass well below the limit reference point). In this fishery, improvements are needed in the management strategy to ensure landings are in line with the set quotas, to allow the stock recovery.



- A more detailed analysis of why each of these fisheries is scoring badly (i.e., less than 6) in one or more of the specific FishSource sustainability criteria is provided in **Appendix E**.
- For the 20 stocks covered in both the 2015 and 2016 evaluations, there was a **slight increase** in catch supply of **A and B1 category fisheries (+4.1%)**, compared to 2015. This was caused by the upgrade in category of three fisheries (Norway pout - North Sea, lesser sand-eel - Dogger Bank area, European pilchard - Northwest Africa southern stock), in which there were improvements in the management system (**Table 4**). It was also related to some extent to an increase in catches of the Antarctic krill fishery. However, there was also an increase in the catch supply from poorly managed (i.e., C-rated) fisheries (**+5.1%**), mostly related to the increased catches in the NE Atlantic blue whiting fishery.
- Of the 20 fisheries analyzed, **changes in sustainability categories from 2015** were observed in **six fisheries** (details on the specific changes for each of the fisheries can be found in **Table 4**):
 - **Four fisheries improved** their status: Norway pout - North Sea (C to B1), lesser sand-eel - Dogger Bank area (C to B1), European pilchard - Northwest Africa southern stock (C to B1), European pilchard - Northwest Africa central stock (C to B2).
 - **Two fishery stocks decreased** in their sustainability category: Atlantic menhaden - NW Atlantic (B1 to B2), Araucanian herring – Chilean (B1 to C).

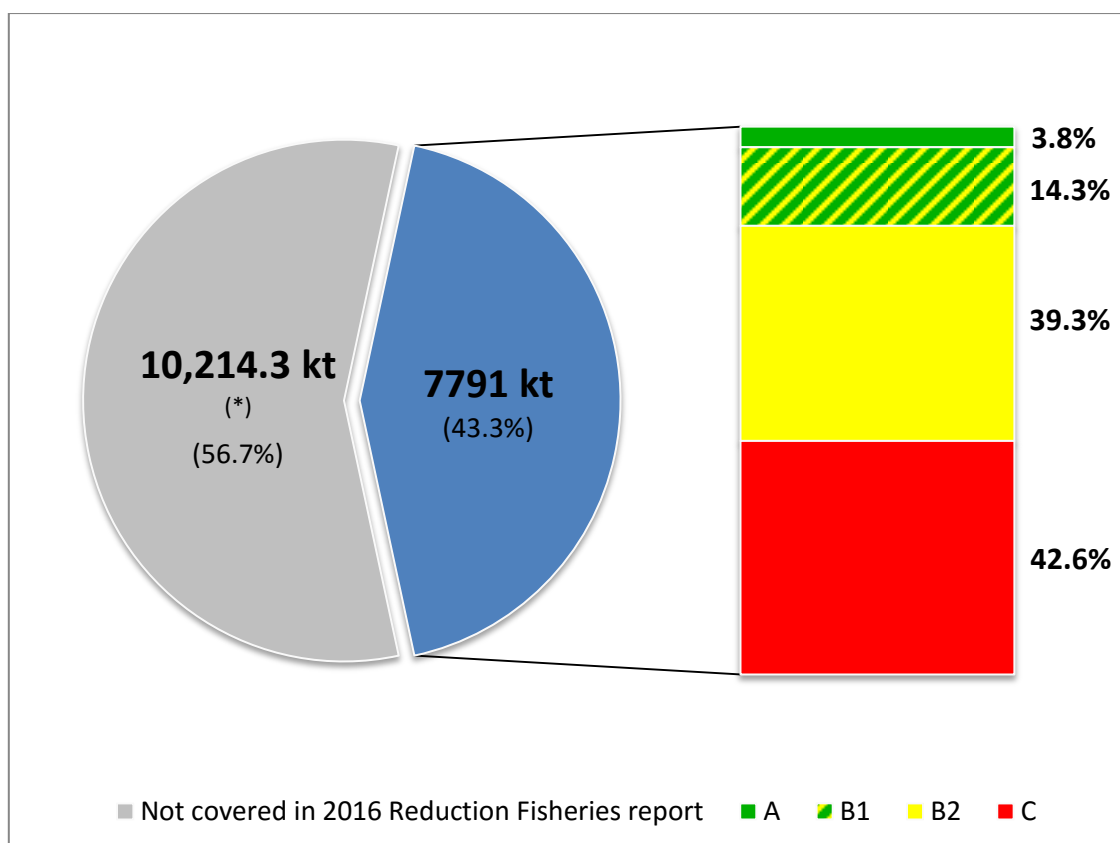


Figure 1. Catch volume ('000 t) and percentage of global reduction fisheries supply covered in this report, and percentage of catch by SFP FishSource sustainability category compared to the combined reported catch of the 20 stocks covered in this report (column chart). Note: (*) Includes estimated global supply from the Southeast Asian reduction fisheries (~8.5 million tonnes) (FAO 2012).

Table 4. Changes in catch volumes of fish from the four categories (A, B1, B2, C) for the 20 common stocks between the 2015 and 2016 reporting periods.

Evaluation category	Evaluation category criteria	2016 report			2015 report			Change 2015 – 2016
		Stocks (n)	Catch ('000 t)	% of catch	Stocks (n)	Catch ('000 t)	% of catch	
A	All scores ≥ 8	1	293.0	3.8%	1	217.4	2.3%	1.4%
B1	All scores ≥ 6 , and biomass score ≥ 8	6	1117.9	14.3%	5	1087.8	11.7%	2.7%
B2	All scores ≥ 6 , biomass score < 8	6	3058.4	39.3%	4	4502.1	48.4%	-9.2%
C	One or more scores < 6	7	3321.7	42.6%	10	3491.6	37.5%	5.1%



Table 5. Current FishSource scores, sustainability category, and latest catch data for the 20 main stocks used for reduction purposes and assessed in this overview (as of May 2016) (catches refer to 2014 and are in thousand tonnes).

Stock	Management			Stock Status		Evaluation category	Latest Catch (¹ 000 t)	% of total	Changes from 2015	FIP Y/N (year)	Certification	
	Score 1	Score 2	Score 3	Score 4	Score 5						IFFO	MSC
Antarctic krill - Atlantic Southern Ocean	≥ 8	10	10	≥ 8	≥ 8	A	293	3.8%	-	-	-	Cert
European sprat - North Sea	≥ 6	≥ 6	10	10	8.3	B1	157	2.0%	-	-	✓	FA
Lesser sand-eel - Central Eastern North sea	≥ 6	10	10	10	≥ 6	B1	142.6	1.8%	-	-	✓	FA
Norway pout - North Sea	≥ 6	10	10	10	10	B1	44.2	0.6%	C to B1	-	✓	FA
Gulf menhaden - Gulf of Mexico	≥ 6	≥ 8	≥ 6	8.8	10	B1	391.8	5.0%	-	-	✓	-
Lesser sand-eel - Dogger Bank area	≥ 6	10	6.3	8.4	≥ 6	B1	99.2	1.3%	C to B1	-	✓	FA
European pilchard - Northwest Africa southern stock	≥ 6	≥ 6	≥ 6	≥ 8	≥ 8	B1	283.1	3.6%	C to B1	2014	✓ ⁽⁴⁾	-
Atlantic menhaden - NW Atlantic	≥ 6	≥ 6	10	7.6	10	B2	168.4	2.2%	B1 to B2	-	✓	-
Anchoveta - Chilean regions III and IV	≥ 6	8.2	10	6.6	6.4	B2	33.9	0.4%	-	-	✓	-
Anchoveta - Peruvian northern-central stock ⁽²⁾	≥ 6	9.7	≥ 6	≥ 6	≥ 6	B2	1720 ⁽²⁾	22.1%	-	-	✓	-
European pilchard - Northwest Africa central stock	≥ 6	≥ 6	≥ 6	≥ 6	≥ 8	B2	573.9	7.4%	C to B2	2014	✓ ⁽⁴⁾	-
Capelin - Icelandic	≥ 6	10	10	≥ 6	≥ 6	B2	517	6.6%	-	-	✓	FA
Boarfish - NE Atlantic	≥ 6	10	10	≥ 6	≥ 6	B2	45.2	0.6%	-	-	✓	-
Blue whiting - Northeast Atlantic	< 6	< 6	10	9.8	6.3	C	1155.3	14.8%	-	-	✓	Cert ⁽⁵⁾
Araucanian herring - Chilean	≥ 6	8.2	2.7	8.6	8.3	C	543	7.0%	B1 to C	- ⁽³⁾	✓	-
Lesser sand-eel - SE North Sea	≥ 6	10	10	6.4	< 6	C	8.9	0.1%	-	-	✓	FA
Anchoveta - Chilean regions XV-I-II/Southern Peruvian stock	≥ 6	≥ 6	≥ 6	6.1	3.2	C	1082	13.9%	-	-	✓	-
Capelin - Barents Sea	≥ 8	10	10.0	< 6	≥ 6	C	65.7	0.8%	-	-	✓	-
Chilean jack mackerel	≥ 6	10	9.1	5.3	8.6	C	410.3	5.3%	-	- ⁽³⁾	✓ ⁽⁴⁾	-
Anchoveta - Chilean regions V-X	≥ 6	8.2	0.0	2.6	7.5	C	56.4	0.7%	-	- ⁽³⁾	✓	-

Notes: (1) Shading in stock name: white means no change from 2015; light green means rise in sustainability category; light orange means drop in sustainability category. (2) In 2014, only the first fishing season was opened (23 April - 31 July / 10 August) due to the low biomass estimates in winter surveys. (3) The improvement programs undergoing in these fisheries until recently no longer meet the criteria for a fishery improvement project (FIP). (4) Certified by IFFO as “by-product” fishery (for more information visit the [IFFO Responsible Supply \(RS\) website](https://www.iffosupply.com/)). (5) Two blue whiting fisheries were MSC certified in 2016 (MSC 2016a, 2016b).

**Table 6.** Changes in sustainability categories across the stocks evaluated.

Stock	Change in category ⁽¹⁾	Notes
Norway pout - North Sea	C to B1	After a final combined EU+Norway TAC in 2014 well above (132%) ICES' updated advice, 2015 and 2016 combined quotas again in line with advice. There is a bilateral agreement between Norway and the EU on joint stock management to harmonize some management measures, but an explicit long-term management plan is still missing for this fishery. Several long-term management strategies have been proposed in last years, but none has been adopted yet.
Lesser sand-eel - Dogger Bank area	C to B1	The perception of the stock is more optimistic compared to last year. According to the latest assessment, the spawning biomass increased 24% in comparison to 2015 and is currently above the target reference point. Fishers' compliance with set quotas has also improved, though still not optimal. Latest reported catch (2015) is still above the set limits, but the gap between catch and TACs has decreased considerably compared to last year (from 74% to 23% of TAC overshoot).
European pilchard - Northwest Africa southern stock	C to B1	Improvement in both stock condition and fishers' compliance. There were signs of non-compliance in the past. The recent magnitude of illegal, unreported, and unregulated (IUU) fishing is unknown, but the enforcement system in place is thought to have improved (e.g., monitoring system in place through traceability of landings, VMS, and observers onboard foreign vessels). Total reported catches have been well below catch limits defined. Discarding data are not yet available but work in collecting these data is in progress. As for the stock condition, two assessment models conducted in 2015 gave slightly different results, but both suggest the stock biomass to be around target levels, and above the limit reference point (B_{MSY}). Based on these results, Gascoigne (2016) concluded that the southern stock is "fully exploited" (less than the central stock), meaning "the fishery operates within the limits of sustainability" (FAO 2015).
European pilchard - Northwest Africa central stock	C to B2	There is still no harvest control rule should the stock biomass drop below limit levels, but a management plan based on effort limits was put in place in this area in 2015. Other technical measures like fishing licenses, gear and vessel restrictions, seasonal closures, and closed areas are established. Although catch limits are not in use, the effort control strategy seems to have been able to keep catches around advised levels in recent years.
Atlantic menhaden - NW Atlantic	B1 to B2	A benchmark assessment was conducted in 2015, which resulted in new reference points being recommended by the technical committee and peer review panel. In light of the newly adopted reference points, stock fecundity is now perceived as slightly (10%) below the target reference point. Fishing mortality is well below threshold levels, however.
Araucanian herring - Chilean	B1 to C	Fishers' compliance dropped significantly, with 2014 total landings almost 1.5 times the set quota of 373 thousand tonnes. However, artisanal landings in particular have not exceeded their assigned quotas since 2010.

Notes: (1) Light green means rise in sustainability category; light orange means drop in sustainability category.



3.2 Assessing sustainability under uncertainty: the current main challenges on data quality

The lack of quantitative information from fisheries and stocks renders a precise assessment of status more difficult and uncertain. In addition to the results from the latest fisheries evaluations (**Table 7**), it is also important that readers are aware of the quality of the information available. This is the second year we present a table on the quality of information. As in 2015, the high number of qualitative scores in Table 5 (e.g., “≥ 6”) shows that a substantial proportion of the stocks suffer from data limitation issues. The limitations have to do with the absence of target reference points for management, missing estimates of fishing mortality and biomass, outdated estimates, or a combination of all of these. In fact, when looking at the list of stocks, the uncertainty generated by missing data is high, with only half of the fisheries achieving a good level of information quality (i.e., of 4 or above), measured as public availability of target fishing mortality and biomass reference points, lower limit biomass reference point, and up-to-date estimates of fishing mortality and biomass (**Table 7**).

Table 7. Quality of available data for assessing status of stocks in the current report.

Stock	F _{trp} (y/n)	F (up to date)	B _{trp} (y/n)	B _{lim} (y/n)	SSB (up to date)	Data quality	Latest catch (kt)
Anchoveta - Chilean regions III and IV	Yes	Yes	Yes	Yes	Yes	5	33.9
Anchoveta - Chilean regions V-X	Yes	Yes	Yes	Yes	Yes	5	56.4
Anchoveta - Chilean regions XV-I-II/ Southern Peruvian stock	Yes	Yes	Yes	Yes	Yes	5	1082.0
Araucanian herring - Chilean	Yes	Yes	Yes	Yes	Yes	5	543.0
Atlantic menhaden - NW Atlantic	Yes	Yes	Yes	Yes	Yes	5	168.4
Blue whiting - Northeast Atlantic	Yes	Yes	Yes	Yes	Yes	5	1155.3
European sprat - North Sea	Yes	Yes	Yes	Yes	Yes	5	157.0
Norway pout - North Sea	Yes	Yes	Yes	Yes	Yes	5	44.2
Chilean jack mackerel	Yes	Yes	Yes	No	Yes	4	410.3
Lesser sand-eel - Central Eastern North sea	No	Yes	Yes	Yes	Yes	4	142.6
Lesser sand-eel - Dogger Bank area	No	Yes	Yes	Yes	Yes	4	99.2
Lesser sand-eel - SE North Sea	No	Yes	Yes	Yes	Yes	4	8.9
Gulf menhaden - Gulf of Mexico	Yes	No	Yes	Yes	No	3	391.8
Anchoveta - Peruvian northern-central stock	No	No	Yes	No	Yes ⁽¹⁾	2	1720.0
Boarfish - NE Atlantic	No	Yes	No	No	Yes	2	45.2
Capelin - Barents Sea	No	No	No	Yes	Yes	2	65.7
Capelin - Icelandic	No	No	No	Yes	Yes	2	517.0
European pilchard - Northwest Africa central stock	Yes	No	Yes	No	No	2	573.9
European pilchard - Northwest Africa southern stock	Yes	No	Yes	No	No	2	283.1
Antarctic krill - Atlantic Southern Ocean	No	No	No	No	No	0	293.0

Notes: (1) According to the available information, estimates on spawning biomass are direct estimates from regular biomass surveys (not from analytical stock assessments). For more details please go to FishSource.com. (2) Latest catches are from 2014 and in thousand tonnes. (3) F_{trp}, fishing mortality target reference point; F, fishing mortality (latest estimate); B_{trp}, biomass target reference point; B_{lim}, biomass limit reference point SSB, spawning stock biomass (latest estimate). (4) Data quality: 0 (low) – 5 (high).



3.3 Certification and fisheries improvements information

Table 5 (page 10, above) includes information on the reduction fisheries involved in a fishery improvement project or certification program. In terms of certification, all fisheries in this overview are involved in some kind of certification program (i.e., either IFFO- or MSC-certified fisheries). Note, however, that three fisheries are certified by IFFO as “by-product” fisheries (IFFO 2016a).

In terms of the MSC program specifically, 31% of the total catch in this 2016 overview comes from stocks in which at least a component of the fishery is engaged in the MSC program (i.e., either certified or undergoing full assessment). This is a considerable increase compared to previous years (e.g., only 3% in 2014, and 14% in 2015), and mainly due to the recent entry of new European fisheries in the MSC program (e.g., Icelandic capelin) (MSC 2016), and the considerable increase in catches in some of these fisheries (e.g., NE Atlantic blue whiting). Examples of fisheries recently entering the MSC program are blue whiting (two fisheries entered MSC full assessment in 2014 and were certified in 2016) and North Sea fisheries for sand-eel, sprat, and Norway pout (MSC 2016). Note that, despite the certification in 2016, the NE Atlantic blue whiting fishery is currently undergoing serious issues at the management level, with a lack of agreement between all parties on the share of the blue whiting stock. This has resulted in combined TACs well above those scientifically recommended since 2014 (for more details see Appendix E or consult the [full fishery evaluation](#) in FishSource).

Two of the reduction fisheries featured in this report are involved in fishery improvement projects (FIPs) and are both rated as “A” grade for FIP progress. This represents a relatively small number of FIPs given the apparent need for improvement. It is to be hoped that the fishmeal and fish oil industry recognizes the value of FIPs in future and supports such projects. For the ongoing FIPs, information on progress for each FIP can be found in **Appendix F**.

3.4 Southeast Asian reduction fisheries: Importance and current main challenges

Although this report covers the principal reduction fisheries of the eastern Pacific and the Atlantic, it does not offer any analysis regarding the reduction fisheries of SE Asia. These Asian fisheries fall into two categories: the “trash fish” fisheries and the directed fisheries for small pelagics. 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 fish (used for fishmeal) after the catch has been brought aboard the fishing vessel. The directed fisheries that target small pelagic species are potentially more discerning in catch composition although the actual levels of bycatch remain uncharacterized. Both of these types of reduction fishery take place in fisheries with low levels of governance where fishing pressure can be very high and ecological impacts may be extreme.

The volumes of fishmeal generated by local fisheries 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 be several million tonnes. The fishmeal generated in SE Asia is crucial to the aquaculture industries of the region and particularly for farmed shrimp. Reduction fisheries in Asia face several challenges including data-deficiency, low governance, and severe environmental impacts. There are also well-



established negative social impacts from these fisheries such as labor abuses (particularly associated with Thailand).

Reduction fisheries in SE Asia urgently need to adopt improvement programs to meet accepted global norms for fishery management and environmental/social impacts, but there has been relatively little progress so far. SFP is aware of four fishery improvement projects that have been launched (or are about to be launched) in the region, but there is a need for a great many more. SFP plans to issue a further communication in 2016 concerning existing FIPs in Asia and the potential for initiating new projects.



3.5 Aquaculture and reduction fisheries



Salmon farm in Scotland. Photo credits: Jenna Stoner

The aquaculture sector is the primary consumer of both fishmeal and fish oil. In 2010, it was estimated that 73% of fishmeal and 71% of fish oil went to aquaculture feeds (Shepherd and Jackson 2013). Significant gains have been made in feed and aquaculture industries to improve feed conversion ratios and find alternative ingredients to fishmeal and oil. Despite these efficiency gains, fishmeal and fish oil continue to be important and strategic ingredients in many aquafeeds especially for salmon and trout, crustaceans, and other marine fishes. The rapid growth of the aquaculture sector will continue to drive demand for fishmeal and fish oil. It is increasingly important for aquaculture industries, as they strive to demonstrate the sector's sustainability, to be able to prove that marine ingredients are being sourced from well-managed, healthy stocks.

The supply of marine ingredients is anticipated to remain static at current production levels: approximately five million tonnes of fishmeal and one million tonnes of fish oil (Shepherd and Jackson 2013). To account for fluctuations or decreases in the landings from wild-capture fisheries, an increasing proportion of fishmeal and oil are being sourced from fishery by-products. In 2012, fish by-products accounted for 35% of world fishmeal production (FAO 2014).

Just over 18% of the total catch from the stocks analyzed in this report achieves the level of performance required under the Aquaculture Stewardship Council salmon standard.⁵ Noting that this report does not cover fisheries used for by-product or “trash” fisheries from Southeast Asia, the availability of marine ingredients meeting the leading aquaculture certification standard is alarmingly low. Furthermore, there is a significant lag in the adoption of chain of custody traceability in marine feed ingredient supply chains. For example, there are currently 110 sites certified to the International Fishmeal and Fish Oil Organisation (IFFO) RS standard which account for about 42% of combined global marine ingredients; however, only 25 of the sites (~23%) also meet the IFFO RS Chain of Custody standard (IFFO 2016b). The chain of custody component is critical for the end users (such as aquaculture industries) to be able to effectively demonstrate responsible sourcing practices.

The aquaculture (and aquaculture feed) industries face an urgent task; retailers and food service companies require certified seafood products to maintain consumer confidence, but these certifications are challenged by a shortage of suitable marine ingredients. There is a clear common interest across the whole supply chain to work together to achieve improvements in fishery management and deliver the responsibly produced fishmeal and fish oil needed to meet the requirements of aquaculture standards. The current situation cannot meet the long-term ambitions of the seafood industry and there needs to be a mobilization across the supply chain to remedy the situation.

⁵ The Aquaculture Stewardship Council salmon standard requires fishery(ies) from which all marine raw material in feed is derived to have all FishSource scores ≥ 6 and the biomass score ≥ 8 (ASC 2012).



4 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions may be drawn from this report:

- More than a third of the catch (42.6%) from the fisheries studied in this report are in Category C—this means that at least one score is below 6 and that significant improvements are required. The figure for 2010 was 26.7%. This is poor performance from a sector that seeks to present an image of responsible management and needs to be remedied.
- Only 18% of the catch from fisheries studied in this sector would meet the requirements of feed for Aquaculture Stewardship Council certified farms (all FishSource scores ≥ 6 and the biomass score ≥ 8). This is highly regrettable and places great pressure on aquaculture producers and retailers that wish to see certified product in the marketplace.
- Across the twenty fisheries studied, only two are in fishery improvement projects (both in the east-central Atlantic near Morocco). Given the relative ease with which FIPs could be implemented in most of the fisheries featured in this review, it is unfortunate how little effort has been made toward progress in fisheries management.
- With the exception of some fisheries in Europe, all reduction fisheries in the Atlantic and Eastern Pacific continue to target low trophic level (LTL) species. Future management of such fisheries should be based on an ecosystem-wide approach (rather than single-species), given the key role of some of these species as a source of food to upper levels of the food chain.
- Access to information remains a significant problem, with only half of the fisheries in this review achieving a good level of information quality. Many fisheries have insufficient information in the public domain for independent researchers to provide science-based guidance to the seafood industry.

Sustainable Fisheries Partnership recommends the following:

- Aquaculture feed manufacturers, aquaculture producers, and retailers should all communicate with the producers of fishmeal and fish oil concerning the urgent need for fishery improvement projects in key regions. Such improvements should include fisheries management, wider ecosystem concerns, and the public availability of data.
- Aquaculture feed manufacturers, aquaculture producers, and retailers should consider adopting procurement specifications that require aquaculture feeds only contain fishmeal and fish oil from fisheries that are either certified to the Marine Stewardship Council standard or in a FIP (“basic” or “comprehensive” as defined by the Conservation Alliance for Seafood Solutions).



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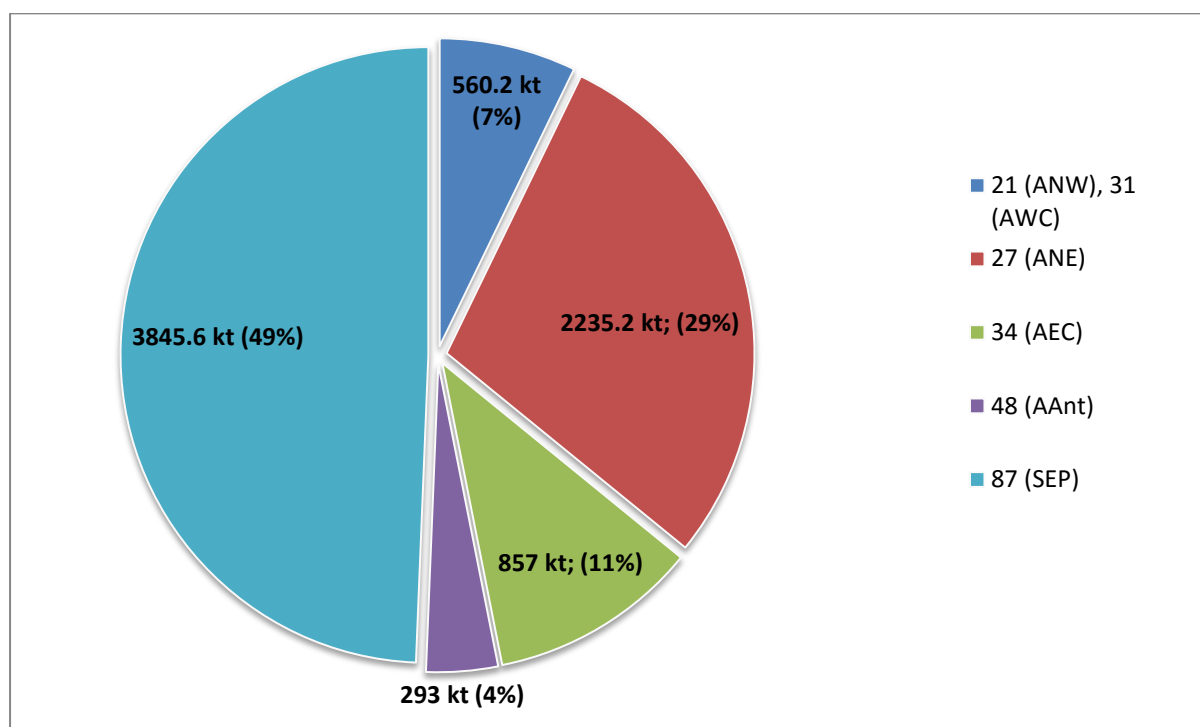
DISCLAIMER

The views expressed in this report are solely those of Sustainable Fisheries Partnership and in no way reflect the views of any other party.



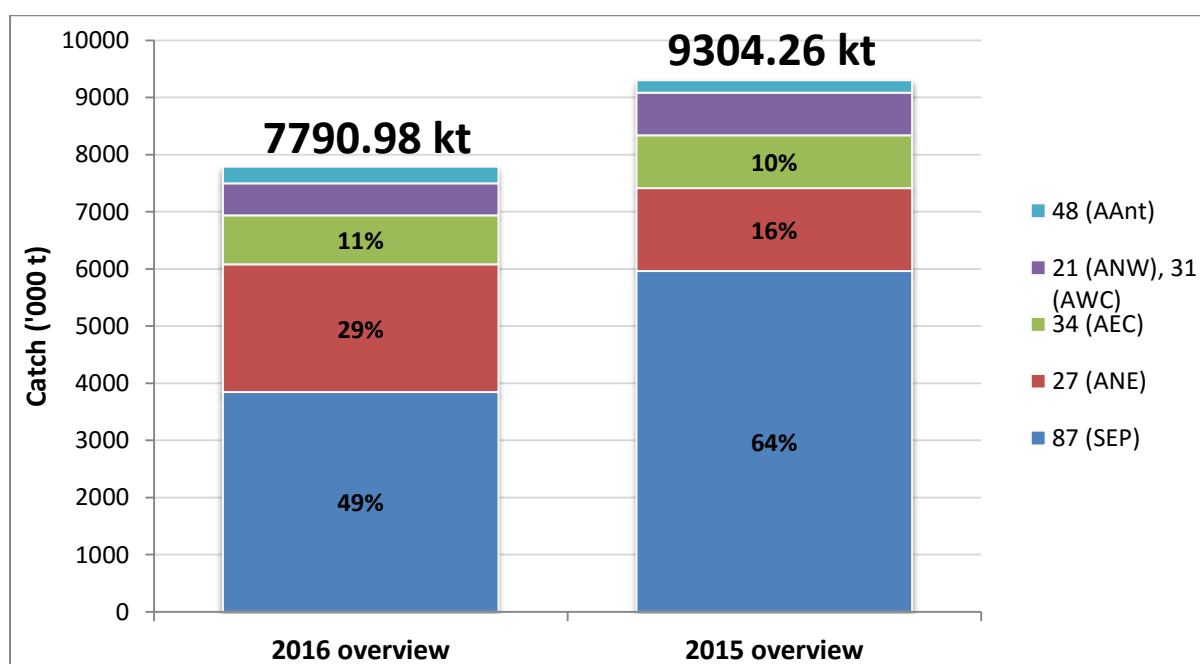
APPENDICES

Appendix A. Catch from reduction fisheries included in this overview, per main FAO fishing area.



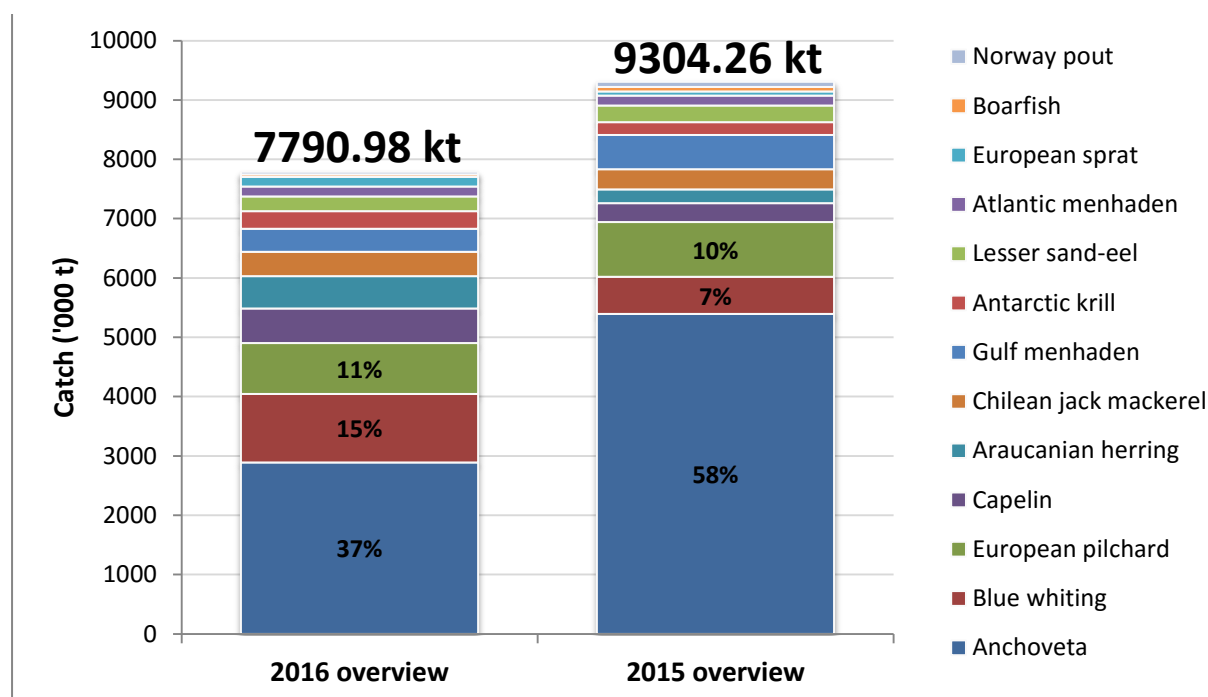
Note: Codes for FAO areas are as follows: 27 (ANE) – Northeast Atlantic, 87 (SEP) – Southeast Pacific, 21 (ANW) – Northwest Atlantic, 31 (AWC) – West-Central Atlantic, 34 (AEC) – East-Central Atlantic, 48 (AAnt) – Antarctic Atlantic. For the Antarctic Atlantic, krill catches are compared to total catches in that FAO fishing area (i.e., finfish, crustaceans, etc.).

Appendix B. Total reported catch, catch by FAO area, and relative contribution to the total catch for the three top FAO areas, for the reduction fisheries included in the 2015 and 2016 overviews.

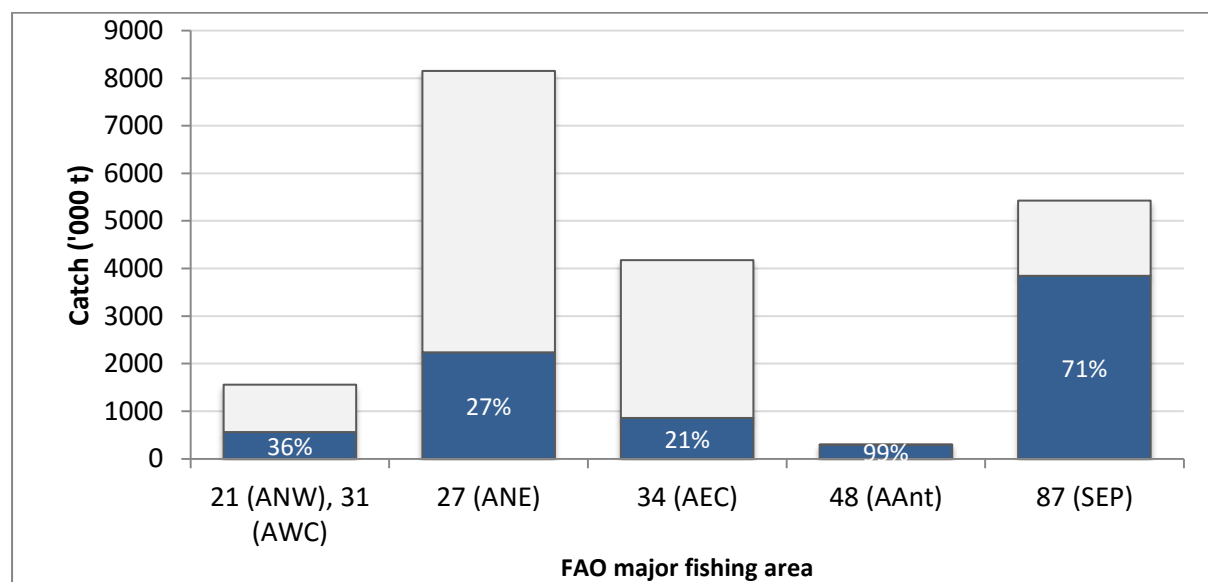




Appendix C. Total reported catch, catch by species, and relative contribution to the total catch for the three top species, for the fisheries included in the 2015 and 2016 overviews.



Appendix D. Catch from reduction fisheries per main FAO fishing area, compared to total marine finfish catch.⁶



Source: FAO FishStatJ (FAO 2011–2015)

⁶ For the Antarctic Atlantic, krill catches are compared to total catches in that FAO fishing area (i.e., finfish, crustaceans, etc.).


Appendix E. Category C stocks in the 2015 evaluation and the reasons for scores below 6.

Stock	Score 1	Score 2	Score 3	Score 4	Score 5	Comments
Blue whiting - Northeast Atlantic	< 6	< 6	10.0	9.8	6.3	<p>The previous long-term management plan, which was in place since 2008, is no longer in force due to the recent lack of agreement between all parties on the share of the blue whiting stock. This has resulted in combined TACs well above those scientifically recommended since 2014. For 2015, there was no agreement on the catch shares by individual parties and these have set unilateral quotas. ICES has estimated the resulting 2015 total catch (i.e., the sum of the individual quotas) would be around 1.3 million tonnes, i.e., 1.5 times above the advised by ICES (0.84 million tonnes).</p> <p>In the meantime, Norway and EU have reached an ad hoc bilateral agreement on blue whiting quotas for 2016 (EU Council 2015), but no agreement is known to have been made with the remaining coastal states. According to unofficial information, the Icelandic Government has unilaterally set Iceland's 2016 blue whiting quota at around 164,000 tonnes, a 30% increase from Iceland's quota in 2015 despite the combined TAC already well above the advised.</p>
Araucanian herring - Chilean	≥ 6	8.2	2.7	8.6	8.3	<p>Fishers' compliance dropped significantly, with 2014 total landings almost 1.5 times the set quota of 373 thousand tonnes. However, artisanal landings in particular have not exceeded their assigned quotas since 2010.</p>
Lesser sand-eel - SE North Sea	≥ 6	10.0	10.0	6.4	< 6	<p>Current spawning biomass is estimated at between the limit and target reference points; however, recent recruitment has been below average and in 2015 was estimated to be among the lowest values in the historical series. A reduction of the stock size to below MSY B_{escapement} is expected in 2017, for all catch options projected by ICES.</p>
Anchoveta - Chilean regions XV-I-II/Southern Peruvian stock	≥ 6	≥ 6	≥ 6	6.1	3.2	<p>Fishing mortality (F) levels have dropped but remain too high: F in 2015 was estimated at around 1.5 times the target reference point. TACs are still set unilaterally by Chile and Peru, which has resulted in the inability to address overfishing at the stock level.</p>



Stock	Score 1	Score 2	Score 3	Score 4	Score 5	Comments
Capelin - Barents Sea	≥ 8	10.0	10.0	< 6	≥ 6	Recruitment in 2015 was estimated at 27,000 tonnes, among the lowest in the historical series. The maturing component of the stock, assessed in autumn 2015, was estimated at 446,000 tonnes, the lowest in the last 10 years. Spawning biomass is projected to be below B_{lim} (with >95% probability) by the end of the fishing season, in 2016.
Chilean jack mackerel	≥ 6	10.0	9.1	5.3	8.6	Spawning biomass continues recovering from the historical low in 2010, but the stock is still considered overfished (i.e., remains well below the provisional estimate of B_{MSY}). Improvements have been made in terms of management strategy, and fishing mortality has been within sustainable levels in recent years.
Anchoveta - Chilean regions V-X	≥ 6	8.2	0.0	2.6	7.5	Spawning biomass has been slowly recovering from the historical low in 2011, probably related to the recent improvements at the management level (e.g., the significant reductions in the set TACs and, consequently, in fishing pressure; the creation of a working group to develop a management plan; and the adoption of more precautionary reference points). However, the stock remains in a seriously depleted condition, well below the limit reference point. Recent catches remain well above both the scientifically recommended and the set TAC, mostly due to the continued TAC overshoot by the artisanal sector. The level of misreporting in the artisanal sector might also be considerable, but no estimates are available. The excessive fishing mortalities in the past and poor recruitments are related to stock's depleted condition.



Appendix F. Current SFP sustainability category, fishery improvement projects (FIPs) involvement, and SFP public improvement recommendations for the 24 stocks used for reduction purposes, assessed in this overview.

Note: FIP progress rating categories: (A) exceptional progress; (B) good progress; (C) recent progress; (D) past progress; (E) negligible progress.

Stock		Sust. Category	Current SFP Public Improvement recommendations	
FIP name Year FIP started (FIP progress rating) FIP leadership link to FIP public report			to catchers and regulators	to retailers and supply chain
Antarctic krill - Atlantic Southern Ocean		A	<ol style="list-style-type: none"> 1. Monitor fishery and management system for any changes that could jeopardize MSC recertification. 2. Improve the quantity and quality of the fish bycatch sampling including observer training in fish identification. 3. Evaluate competition between the fishery and protected species in all areas and, as needed, implement special measures of protection for protected species in localized areas. 4. Monitor changes in the extent of sea ice coverage and evaluate its impact on krill fishing mortality. 	<ol style="list-style-type: none"> 1. Support the sustainability achievements of this fishery by sourcing this product and ensure that the producers are aware that sustainability certification played a role in your decision to source this product. 2. Encourage catchers and regulators to promptly address weaknesses in the fish bycatch sampling program and fully evaluate competition between the fishery and protected species. 3. Encourage catchers and regulators to monitor changes in the extent of sea ice coverage and evaluate its impact on krill fishing mortality. 4. Determine if fishmeal or oil produced from this fishery is an ingredient in any of the products in your supply chain. If so, ensure that the suppliers (e.g., of aquaculture feed, pet food, nutraceuticals) join the European Sustainable Fishmeal Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/european-fishmeal-roundtable).
European sprat - North Sea		B1	<ol style="list-style-type: none"> 1. Support the development of a long-term management plan that takes into account the ecological role of sprat as a forage species. 	<ol style="list-style-type: none"> 1. Ask the European Sustainable Fishmeal Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/european-fishmeal-roundtable) to press their national fisheries administrations and the European Commission to develop an ecosystem-based,



Stock FIP name Year FIP started (FIP progress rating) FIP leadership link to FIP public report	Sust. Category	Current SFP Public Improvement recommendations	
		to catchers and regulators	to retailers and supply chain
			multi-annual management plan for North Sea pelagic fisheries. 2. Retailers and their farmed fish suppliers should ask their vendors and/or primary producers to support the MSC assessment and certification process of the North Sea sprat fishery.
Lesser sand-eel - Central Eastern North Sea	B1	1. Ensure accurate reporting of catches and effort by management area. 2. Support the development of an ecosystem-based, multi-annual management plan for pelagic fisheries. 3. Engage and support the MSC process by addressing fisheries improvement needs identified through pre-assessment and assessments.	1. Request the catchers in your supply chain to ensure accurate reporting of catches and effort by management area. 2. Ask the European Sustainable Fishmeal Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/european-fishmeal-roundtable) to press their national fisheries administrations and the European Commission to develop an ecosystem-based, multi-annual management plan for North Sea pelagic fisheries. 3. Retailers and their farmed fish suppliers should ask their vendors and/or primary producers to support the MSC assessment and certification process of the North Sea sand-eel fishery.



Stock FIP name Year FIP started (FIP progress rating) FIP leadership link to FIP public report	Sust. Category	Current SFP Public Improvement recommendations	
		to catchers and regulators	to retailers and supply chain
Norway pout - North Sea	B1	<ol style="list-style-type: none"> 1. Catchers should proactively engage with ICES and fishery management authorities to ensure a long-term management plan is developed and adopted. 2. Conduct scientific research to better understand the influence of natural factors, such as temperature and predation, on pout recruitment and population size. 3. Implement monitoring to determine the impact of this fishery on protected, endangered, and threatened (PET) species such as marine mammals, seabirds, and turtles. 	<ol style="list-style-type: none"> 1. Retailers and their farmed fish suppliers should ask the European Sustainable Fishmeal Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/european-fishmeal-roundtable) to encourage their vendors and/or primary producers to support the MSC assessment and certification process of the fishery.
Gulf menhaden - Gulf of Mexico	B1	<ol style="list-style-type: none"> 1. Companies owning vessels in the Gulf menhaden fleet should 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). 2. Implement a precautionary Gulf-wide annual quota based on scientific advice to ensure continued health of this stock. 3. Implement biomass and fishing mortality targets that account for the ecosystem services provided by menhaden as prey for many species. 	<ol style="list-style-type: none"> 1. Encourage harvesting companies to release summaries of all observer-derived bycatch data collected from their vessels. 2. Contact the Gulf States Marine Fisheries Commission and encourage them to implement a precautionary annual quota based on scientific advice and biomass and fishing mortality targets that account for the ecosystem services provided by menhaden as prey for many species.



Stock FIP name Year FIP started (FIP progress rating) FIP leadership link to FIP public report	Sust. Category	Current SFP Public Improvement recommendations	
		to catchers and regulators	to retailers and supply chain
Lesser sand-eel - Dogger Bank area	B1	<ol style="list-style-type: none"> 1. Ensure accurate reporting of catches and effort by management area. 2. Support the development of an ecosystem-based, multi-annual management plan for pelagic fisheries. 	<ol style="list-style-type: none"> 1. Request the catchers in your supply chain to ensure accurate reporting of catches and effort by management area. 2. Ask the European Sustainable Fishmeal Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/european-fishmeal-roundtable) to press their national fisheries administrations and the European Commission to develop an ecosystem-based, multi-annual management plan for North Sea pelagic fisheries.
European pilchard - Northwest Africa southern stock Moroccan sardine 2014 A Industry Steering Group http://fisheryimprovementprojects.org/fip/moroccan-sardine-2/	B1	<ol style="list-style-type: none"> 1. Publish current fishery compliance information. 2. Conduct scientific studies to clarify the stock structure of northwest African pilchard/sardine. 3. Implement a recovery strategy for other target species in this fishery, including Cunene horse mackerel and round sardinella. 4. Expand the coverage of the at-sea observer program to better understand interactions with the seabed (benthic) ecosystem and with protected, endangered, and threatened protected species. 	<ol style="list-style-type: none"> 1. Contact the CCCAN and Mauritanian national fisheries administrations and ask them to publish current fishery compliance information and conduct scientific studies to clarify the stock structure of northwest African pilchard/sardine. 2. Ask your supplier to advocate for improvements in catch and effort reporting and increased coverage of the current at-sea observer program for trawl and purse seine vessels. 3. Request your suppliers to support the Morocco Sardine FIP and refer them to the FIP website.



Stock FIP name Year FIP started (FIP progress rating) FIP leadership link to FIP public report	Sust. Category	Current SFP Public Improvement recommendations	
		to catchers and regulators	to retailers and supply chain
Atlantic menhaden - NW Atlantic	B2	<ol style="list-style-type: none"> 1. Continue research to improve understanding of the role of menhaden in the food web. 2. Managers should develop ecosystem reference points and management measures according to the ecological role of menhaden as a prey species in the ecosystem. 3. Improve harvest reporting (catch by area) in the bait sector to reduce uncertainty regarding removals. 	<ol style="list-style-type: none"> 1. Encourage your supply chain to start a fishery improvement project (FIP). For advice on starting a FIP see SFP's Seafood Industry Guide to FIPs at http://www.sustainablefish.org/publications/2014/04/30/the-seafood-industry-guide-to-fips. 2. Contact the Atlantic States Marine Fisheries Commission and request that they consider the ecological role of menhaden as an important prey species in the food web when updating reference points and management measures.
Anchoveta - Chilean regions III and IV	B2	<ol style="list-style-type: none"> 1. Support the work of the recently appointed management committee and encourage their prompt action in the development and implementation of a management plan. 2. Catch recommendations and scientific reports should be publicly available in a timely manner (before managers set catch limits) and should include a clearly defined methodology used to issue the total allowable catch (TAC). 3. Implement a monitoring program to better document fishery interactions with non-target species, particularly jack mackerel and protected, endangered, and threatened species of sea birds and marine mammals. 4. Conduct research on fishery interactions with bottom habitat in shallow regions where purse seines are more likely to make contact with the seafloor. 	<ol style="list-style-type: none"> 1. Request the prompt action by the management committee in designing and implementing an appropriate management plan. 2. Request that scientific reports are made publicly available before managers set catch limits. 3. Determine if product from this fishery is an ingredient used in aquaculture feed in any of the products in your supply chain. If so, ensure that the aquaculture feed suppliers join the South America Reduction Fishery Supply Chain Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/south-american-small-pelagics-roundtable).



Stock FIP name Year FIP started (FIP progress rating) FIP leadership link to FIP public report	Sust. Category	Current SFP Public Improvement recommendations	
		to catchers and regulators	to retailers and supply chain
Anchoveta - Peruvian northern-central stock	B2	<ol style="list-style-type: none"> 1. Request a program of annual stock assessments for this stock that incorporates improved catch data and a peer review. 2. Develop a long-term management plan for the fishery with a specific harvest control rule that accounts of the role of anchoveta in the ecosystem as a forage species. 3. Improve data-gathering systems to ensure appropriate reporting of catches and discards. Explore potential opportunities to develop techniques to identify juvenile and adult anchoveta from acoustic fisheries data in order to reduce discarding. 	<ol style="list-style-type: none"> 1. Request the Peruvian Government to follow recommendations by external peer reviewers of the currently applied real-time stock monitoring methodology used as base for fishery management. 2. Request the Peruvian Government to establish an official harvest control rule that account's for the anchoveta's role in the ecosystem as a forage species. 3. Determine if product from this fishery is an ingredient used in aquaculture feed in any of your supply chain. If so, encourage your suppliers to participate in the South America Reduction Fisheries Supply Chain Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/south-american-small-pelagics-roundtable).
European pilchard - Northwest Africa central stock Moroccan sardine 2014 A Industry Steering Group http://fisheryimprovementprojects.org/fip/moroccan-sardine-2/	B2	<ol style="list-style-type: none"> 1. Ensure that the Moroccan National Fisheries Research Institute (INRH) provides yearly scientific advice for the implementation of a harvest strategy and total allowable catch as part of the management plan. 2. Conduct scientific studies to clarify the stock structure of northwest African pilchard/sardine. 3. Implement a recovery strategy for other target species in this fishery, including Cunene horse mackerel, round sardinella, and European anchovy. 4. Expand the coverage of the at-sea observer program to better understand interactions with the seabed (benthic) ecosystem and with 	<ol style="list-style-type: none"> 1. Contact the Moroccan and Mauritanian national fisheries administrations and advocate for the implementation of a harvest strategy and total allowable catch, as well as scientific studies to clarify the stock structure of northwest African pilchard/sardine. 2. Ask your supplier to advocate for improvements in catch and effort reporting and increased coverage of the current at-sea observer program for trawl and purse seine vessels. 3. Request your suppliers to support the Morocco Sardine FIP and refer them to the FIP website.



Stock FIP name Year FIP started (FIP progress rating) FIP leadership link to FIP public report	Sust. Category	Current SFP Public Improvement recommendations	
		to catchers and regulators	to retailers and supply chain
		protected, endangered, and threatened protected species.	
Capelin - Icelandic	B2	<ol style="list-style-type: none"> 1. Advocate for and support scientific institutions and managers in establishing biologically-based reference points and assessing the environmental impact of the fishery. 2. Adopt ecosystem-based fisheries management, namely consider the importance of capelin as forage species when setting catch limits. 	<ol style="list-style-type: none"> 1. Contact the Marine Research Institute (MRI) requesting that biologically-based reference points for the stock are developed and that the environmental impact of the fishery is evaluated to support ecosystem-based fisheries management.
Boarfish - NE Atlantic	B2	<ol style="list-style-type: none"> 1. Formally implement the proposed management plan. 2. Collect further biological data to allow for a robust age-based assessment. 3. Implement a program to collect baseline data on protected species interactions in this fishery. 	<ol style="list-style-type: none"> 1. Contact your national fisheries administration and request the adoption of the management plan, while the TAC should continue to be set according to the interim plan. 2. Contact your national fisheries research institute and request that they collect biological data on this stock to allow for a robust age-based assessment and data on protected species interactions in this fishery.
Blue whiting - Northeast Atlantic	C	<ol style="list-style-type: none"> 1. Ensure that the total allowable catch (TAC) for the entire northeast Atlantic blue whiting stock is set in accordance with scientific advice. 2. Ensure that all countries harvesting from this stock reach an agreement on how the overall TAC will be allocated. 3. Adopt ecosystem-based fisheries management, namely consider the importance of blue whiting as forage species when setting catch limits. 	<ol style="list-style-type: none"> 1. Contact the relevant national fisheries administration for the fishery from which you are sourcing, and request that scientific advice is followed when setting the total allowable catch (TAC), emphasize that an agreement on the TAC share must be reached with other countries harvesting from this stock, and ask that ecosystem-based fishery management be adopted to account for blue whiting's role as a forage species. 2. Retailers should ask their vendors to support the blue whiting fisheries that are undergoing



Stock FIP name Year FIP started (FIP progress rating) FIP leadership link to FIP public report	Sust. Category	Current SFP Public Improvement recommendations	
		to catchers and regulators	to retailers and supply chain
			MSC assessment.
Araucanian herring - Chilean	C	<ol style="list-style-type: none"> 1. Support work on the development and prompt implementation of the management plan for the fishery. The management plan should have a multi-species approach and include clear objectives for stock recovery and for research. 2. Promote specific research programs aimed at identifying and quantifying catch of non-target species (including protected, endangered, and threatened species) and discards. 3. Improve the reporting of catch (landings) and effort for better control of TACs, especially in the artisanal fishery. 	<ol style="list-style-type: none"> 1. Request the prompt action by the management committee in finalizing and implementing the multi-species management plan. 2. Engage in and encourage producers to be part of initiatives aimed at providing accurate data to relevant fisheries management authorities. 3. Determine if fishmeal or oil produced from this fishery is an ingredient in any of the products in your supply chain. If so, ensure that the suppliers (e.g., of aquaculture feed, pet food, nutraceuticals) join the South America Reduction Fishery Supply Chain Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/south-american-small-pelagics-roundtable).
Lesser sand-eel - SE North Sea	C	<ol style="list-style-type: none"> 1. Ensure accurate reporting of catches and effort by management area. 2. Support the development of an ecosystem-based, multi-annual management plan for pelagic fisheries. 	<ol style="list-style-type: none"> 1. Request the catchers in your supply chain to ensure accurate reporting of catches and effort by management area. 2. Ask the European Sustainable Fishmeal Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/european-fishmeal-roundtable) to press their national fisheries administrations and the European Commission to develop an ecosystem-based, multi-annual management plan for North Sea pelagic fisheries.
Anchoveta - Chilean regions XV-I-II / Southern Peruvian stock	C	<ol style="list-style-type: none"> 1. Develop and implement a coordinated management and research plan between Peru and Chile. Support work by the Chilean 	<ol style="list-style-type: none"> 1. Encourage the Peru and Chile governments to establish coordinated fishery research and management plans.



Stock FIP name Year FIP started (FIP progress rating) FIP leadership link to FIP public report	Sust. Category	Current SFP Public Improvement recommendations	
		to catchers and regulators	to retailers and supply chain
		<p>authorities for the establishment of the management committee and prompt development and implementation of a management plan ensuring it is the result of adequate transboundary coordination.</p> <p>2. Make stock assessment and scientific advice publicly available in a timely manner. Ensure robustness of stock assessment methodologies and support more and better research into stock structure and fishery-ecosystem interactions.</p> <p>3. Establish a total allowable catch (including allocations by country and sector) in accordance with scientific advice and considering the species role in the ecosystem as a forage species.</p> <p>4. Support IMARPE (Instituto del Mar del Peru) to improve control and surveillance of landings including of juveniles, discarding, and bycatch, especially from the medium- and small-scale fleets.</p>	<p>2. Encourage the Peru and Chile governments to make public all scientific advice and set catch limits in accordance with scientific advice and considering the species role in the ecosystem as a forage species.</p> <p>3. Determine if fishmeal or oil produced from this fishery is an ingredient in any of the products in your supply chain. If so, ensure that the suppliers (e.g., of aquaculture feed, pet food, nutraceuticals) join the South America Reduction Fisheries Suppliers Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/south-american-small-pelagics-roundtable).</p>
Capelin - Barents Sea	C	<p>1. Maintain the fishery closure until biomass rebuilds above the biomass limit reference point and recruitment improves.</p> <p>2. Adopt ecosystem-based fisheries management, namely consider the importance of capelin as forage species when setting catch limits.</p>	<p>1. Contact the Joint Russian-Norwegian Fisheries Commission (JRNFC) and state your support for the current fishery closure, but request that they adopt ecosystem-based fisheries management, namely consider the importance of capelin as forage species when setting catch limits.</p>
Chilean jack mackerel	C	<p>1. Design and implement a research program to improve the stock assessment inputs, especially those related to the stock structure.</p> <p>2. Establish biomass and fishing mortality</p>	<p>1. Encourage the South Pacific Regional Fishery Management Organisation to set biomass and fishing mortality reference points that consider the species ecological role as a forage species.</p>



Stock FIP name Year FIP started (FIP progress rating) FIP leadership link to FIP public report	Sust. Category	Current SFP Public Improvement recommendations	
		to catchers and regulators	to retailers and supply chain
		reference points considering the species ecological role as a forage species. 3. Publish bycatch information collected by the observers program and results from the ecological risk assessments.	2. Encourage your supply chain to work with the governments to collect and publish information on bycatch. 3. Determine if fishmeal or oil produced from this fishery is an ingredient in any of the products in your supply chain. If so, ensure that the suppliers (e.g., of aquaculture feed, pet food, nutraceuticals) join the South American Reduction Fisheries Supply Chain Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/south-american-small-pelagics-roundtable).
Anchoveta - Chilean regions V-X	c	1. Support work on the development and prompt implementation of the management plan for the fishery. The management plan should have a multi-species approach and include clear objectives for stock recovery and for research. 2. Promote specific research programs aimed at identifying and quantifying catch of non-target species (including protected, endangered, and threatened species) and discards. 3. Improve the reporting of catch (landings) and effort for better control of TACs, especially in the artisanal fishery.	1. Request the prompt action by the management committee in finalizing and implementing the multi-species management plan. 2. Engage in and encourage producers to be part of initiatives aimed at providing accurate data to relevant fisheries management authorities. 3. Determine if fishmeal or oil produced from this fishery is an ingredient in any of the products in your supply chain. If so, ensure that the suppliers (e.g., of aquaculture feed, pet food, nutraceuticals) join the South America Reduction Fishery Supply Chain Roundtable (http://www.sustainablefish.org/fisheries-improvement/small-pelagics/south-american-small-pelagics-roundtable).