



## Small Pelagics:

### SFP Fisheries Sustainability Overview 2014





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### KEYWORDS

assessment;  $B_{MSY}$ ; fisheries; FishSource;  $F_{MSY}$ ; forage; improvement; low trophic level; management; small pelagics; reduction; stock status; supply chain; sustainability; target

### DISCLAIMER

This report was mainly prepared with information available from [FishSource.com](http://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 March 2014. SFP updates FishSource regularly, however, this report may not capture the most recent data for all the stocks. Given the large number of existing stocks for a given sector, this report evaluates the most strategically important stocks producing raw material for fishmeal and fish oil worldwide (based on criteria such as volume of catch, for example). The *scoring* and *ranking categories* provided do not take into account the environmental impacts of the fisheries (i.e., are based solely on the quality of management/fisher compliance and the status of the stock). However, the main environmental issues are already captured in the narrative “Environment and Biodiversity” sections of FishSource.com and in other sources of information.



## EXECUTIVE SUMMARY

This briefing represents the fifth edition of the SFP global sustainability overview of a subset of Pacific and Atlantic small pelagic fish stocks used for fishmeal, fish oil, and human consumption; the document covers the most recent assessment period for which comparable data is available as of March 2014. The analysis covers 28 fish stocks from 16 species around the Atlantic and central/south Pacific oceans (which account for 39% of the global wild harvest of small pelagics<sup>1</sup>), rated according to the sustainability assessment presented on FishSource ([www.fishsource.com](http://www.fishsource.com)).

Most of the stocks analyzed are currently used for fishmeal and fish oil, but this is not true for all. For instance, some herring stocks from the northwest Atlantic have not been processed for meal or oil in recent times, and more recently most of the NE Atlantic sardine and horse mackerel catches have been for human consumption. The proportion of any given species/stock being utilized for meal and fish oil will be a function of market demand and can change from year to year.

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 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:

**Category A** – Very well managed fisheries that score 8 and above across all FishSource scores

**Category B1** – Reasonably managed fisheries that score  $\geq 6$  across all FishSource scores, and score  $\geq 8$  in terms of biomass

**Category B2** – Reasonably managed fisheries that score 6 or above across all FishSource scores

**Category C** – Poorly managed fisheries where at least one FishSource score is below 6

In summary, the briefing concludes that for the 28 small pelagic fish stocks analyzed:

- Just 8% of the total catch comes from stocks in very good condition (Category A). This corresponds to two herring stocks and one blue whiting stock from the Northeast Atlantic.
- Cumulatively, 66.5% of the catch supply comes from stocks that are reasonably well managed (or better) (i.e., that score 6 or above on all five FishSource criteria).
- More than half (55.3%) 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. 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.

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<sup>1</sup> Using data for 2012 catch and comparing to FAO global reported landings for ISSCAAP groups 35 (Herrings, sardines, anchovies) and 37 (Miscellaneous pelagic fishes) (FAO, 2011–2014)



- 33.5% of the catch comes from stocks that score below 6 on at least one of the criteria (Category C). These stocks have not been effectively managed or are currently in poor condition and significant improvements are required.
- In terms of stock status and exploitation rates, specifically:
  - **73.1%** of the catch supply (c. 7.95 million tonnes) comes from stocks considered to be healthy (i.e., in which the stock biomass is at or above its biological reference points), **8.5%** from stocks at intermediate levels of biomass, and **17.8%** from stocks currently depleted (i.e., below limit biological reference points or at historical low levels of biomass).
  - Around 70% of the catch supply comes from stocks managed within agreed targets (i.e., either with fishing mortality below  $F_{MSY}$  or proxy levels or low fishing mortalities), 17% from moderate fishing mortality (i.e., with fishing mortality slightly above the historical average or  $F_{MSY}$  or proxy levels), and 13% from stocks where overfishing is occurring.
  - For 3 stocks, cumulatively representing 0.5% of the total catch supply, the stock and exploitation status are unknown.
- Fifteen of the 28 stocks contain fishery improvement projects (FIPs). The majority of catch coming from stocks where FIPs exist is from fisheries that are making exceptional progress according to the SFP FIP Progress Rating scheme (34% of catch; 5 stocks); while 16% of catch comes from fisheries that made some recent progress (3 stocks). Six FIPs, which correspond to 12% of total catch, made only negligible progress.
- In terms of MSC certification, four of the stocks contain fisheries that are certified according to the Marine Stewardship Council or in full assessment. Twelve of the stocks are used as sources of fishmeal that are certified for use under the International Fishmeal and Fish Oil Organisation Responsible Supply (IFFO RS) program. Only 3% of the total volume of fish from the 28 stocks is MSC certified.
- There is an emerging scientific consensus that certain small pelagic stocks can be considered “key” to ecosystems because of their role in energy flows from primary producers to higher trophic levels. Stocks that are identified as key in the future will need to be managed with greater precaution than under current regimes in order to ensure responsible stewardship of this resource. It is a matter of urgency that those stocks subject to greatest exploitation be assessed for key status as soon as possible.





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## 1 INTRODUCTION

Sustainable Fisheries Partnership (SFP) applies a sectorial approach to its mission of putting actionable information in the hands of retailers and the supply chain in order to leverage market forces to achieve improvements in the sustainability of fisheries. Seafood sectors are defined in terms of the shared biological characteristics of harvested species and are designed to facilitate standardized approaches to data gathering and analysis. They are also intended to group fisheries that are of interest to members of the supply chain, and this current report focuses on one such group – small pelagics.

Small pelagic fisheries typically feed the fishmeal and fish oil industry, but in some regions are also important for direct human consumption (e.g., Asia, Africa, and Europe). Also known as forage species, these are small, short-lived species that occupy a low trophic level (LTL) in the ecosystem (e.g., anchovy, herring, pilchard, sprat, sardine, 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. Consequently, 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.

In 2012,<sup>2</sup> global small pelagics landings represented roughly 40% of the marine finfish landed,<sup>3</sup> and 30% of the world capture production (FAO 2011–2014). The SFP Fisheries Sustainability Overview is a ranking exercise which analyzes 28 stocks of forage species and assesses the sustainability of the current management regimes. This information can provide useful guidance to those parts of the fishing and seafood industries that need to incorporate sustainability criteria into procurement policies. It is important to note that this sector report only covers a subset of the small pelagic species/stocks grouped as “herrings, sardines, anchovies” and “miscellaneous pelagic fishes” by the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) of the Food and Agriculture Organization (FAO). The criteria for the inclusion of a given stock on the report was based on a combination of its importance in terms of catch volume and the strategic interest for Sustainable Fisheries Partnership (SFP) partners.

### 1.1 The need for greater precaution in managing some “key” small pelagic stocks

Theory on food chains and global ocean production has evolved significantly over the past few decades (Pimm 1982, Cury et al. 2001) but it was only recently that special attention started to be devoted to species which, under particular conditions, play a central role in funneling energy up and down the food webs (Rice 1995, Smith et al. 2011). These “key” species (Rice 1995) often belong to the small pelagics group (FAO ISSCAAP group 35 – herrings, sardines, anchovies) and occupy low trophic levels (LTL) in marine ecosystems.

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<sup>2</sup> 2012 is the latest year for which reported landings data is available.

<sup>3</sup> This includes reported landings excluding captures from inland waters.



The departure from the single-species approach in the late 1980s toward embracing the ecosystem concept in fisheries management created the need to better understand ecosystem functioning and energy flows across marine food chains. In many highly productive marine systems, a single key LTL species (or only a few of them) connects groups lower on the trophic chains with top predators. As the importance of these forage fish to other levels of the food chain was reported (Cury et al. 2001) it became clear that the fishing of such species would have to be regulated in such a way that enough biomass is left in the water to maintain regular functioning of energy flows across the food chain. This is especially critical in “wasp-waist” systems (Rice 1995, Cury et al. 2000, Shannon et al. 2000) where a few highly abundant, key LTL species directly drive the abundance dynamics of both upper and lower trophic levels.

In fact, recent studies have shown that in several highly productive systems in the world, including areas where upwelling phenomena play a central role in ocean productivity (Humboldt current, California, Benguela and Canary coast lines), fishing LTL species at  $F_{MSY}$  ( $B_{MSY}$ ) is not precautionary enough and could negatively impact on the wider ecosystem. (Johnson et al. 2010, Brown and Mackinson 2011, Marzlof and Tam 2011, Shannon and Shin 2011, Smith et al. 2011, Kaplan et al. 2012).

Whereas in many real stock assessment situations a good proxy to  $B_{MSY}$  is taken from 40% of the unfished biomass ( $B_{40}$ ), studies have shown that by managing key LTL stocks at a more precautionary  $B_{75}$  (75% of unfished biomass as target) the impact to other groups in the food chain can be mitigated, while not losing too much production in the long term (Smith et al. 2011, Pikitch et al. 2012).

Ecological considerations around key LTL species lie behind recent revisions of the Marine Stewardship Council standard regarding small pelagics. Any small pelagic species that is identified as key by the MSC methodology is subject to further criteria regarding biomass and exploitation that go beyond those required for non-key species. Consequently, in establishing the possibilities for any given fishery achieving MSC certification, it is essential that the stock first be defined as either key or non-key before further assessment can be performed.



## 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. Below is 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>):

- Score 1 - Is management precautionary? *How does the adopted limit and/or target reference point for fishing mortality rate compare to the stock's fishing mortality rate at low biomass, as an index of whether the management strategy is precautionary?*
- Score 2 - Do fishery managers follow scientific advice? *How does the adopted total allowable catch (TAC) level compare to the scientific advice on measures needed to meet stock management objectives, as an index of whether fishery managers follow scientific advice?*
- Score 3 - Do fishers comply? *How did the catch level in the most current year for which data are available compare to the adopted TAC level, as an index of whether harvest control rules were met?*
- Score 4 - Is the stock biomass healthy? *How does stock biomass in the most current year for which data are available compare to the biomass level that is predicted to support maximum sustainable yields, or similar biological reference point, as an index of whether the stock biomass is healthy?*
- Score 5 - Will the stock be healthy in the future? *How does the fishing mortality rate in the most current year for which data are available compare to the rate that is predicted to support maximum sustainable yields, or similar biological reference point, as an index of whether the stock will be healthy in the future?*

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 March 2014 and generally represent a snapshot of the position in 2013 with regard to management quality and stock status indicators and in 2012<sup>4</sup> for catch statistics. More recent data may be obtained from FishSource.com for 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

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<sup>4</sup> Catch data for 2011 has been used for Gulf menhaden - Gulf of Mexico, Pacific anchoveta - Gulf of Panama, Pacific thread herring - stock units undefined (Country: PA; Gear: FCN, PS; FIP: Panama small pelagics, CeDePesca), Pacific bumper - stock units undefined (Country: PA; Gear: FCN, PS; FIP: Panama small pelagics, CeDePesca); catch data for 2010 has been used for European pilchard - Northwest Africa central stock and European pilchard - Northwest Africa southern stock.



activities is also captured in the narrative sections of the FishSource fishery profiles, it is not currently captured by the scoring system. The definitions of the categories are:

**Category A** – Very well managed fisheries that score 8 and above across all FishSource scores

**Category B1** – Reasonably managed fisheries that score  $\geq 6$  across all FishSource scores, and score  $\geq 8$  in terms of biomass

**Category B2** – Reasonably managed fisheries that score 6 or above across all FishSource scores

**Category C** – Poorly managed fisheries where at least one FishSource score is below 6

Given the important role of small pelagics as forage species, particular emphasis is placed on biomass for the categorization (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.

Finally, the analysis described in this paper also includes data regarding recent catches, MSC certification information (certified fisheries, outstanding MSC conditions—where the fishery is certified), and whether fishery improvement projects (FIPs) are in place.



### 3 RESULTS

#### 3.1 Overview of Management Quality and the Current Status of the Stocks

Overall, the main results from the current assessment of the 28 small pelagic stocks, in terms of management quality and stock status, are as follows:

- Just 8% of the total catch comes from stocks in very good condition (Category A). This corresponds to two herring stocks and one blue whiting stock from the Northeast Atlantic.
- Cumulatively, 66.5% of the catch supply comes from reasonably managed stocks (or better), i.e., that score 6 or above on all five FishSource criteria.
- More than half (55.3%) 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. This level of performance is in line with the current Aquaculture Stewardship Council requirements for fisheries providing fishmeal and oil for feed to certified farms.
- 33.5% of the catch comes from stocks that score below 6 on at least one of the criteria (Category C). These stocks have not been effectively managed or are currently in poor condition and significant improvements are required. The appendix describes the reasons for each of the scores rated at below 6.
- In terms of stock status and exploitation rates, specifically:
  - 73.1% of the catch supply (c. 7.95 million tonnes) comes from stocks considered to be healthy (i.e., in which the stock biomass is at or above its biological reference points), 8.5% from stocks at intermediate levels of biomass, and 17.8% from stocks currently depleted (i.e., below limit biological reference points or at historical low levels of biomass).
  - Around 70% of the catch supply comes from stocks managed within agreed targets (i.e., either with fishing mortality below  $F_{MSY}$  or proxy levels or low fishing mortalities), 17% from moderate fishing mortality (i.e., with fishing mortality slightly above the historical average or  $F_{MSY}$  or proxy levels), and 13% from stocks where overfishing is occurring.
  - For three stocks, cumulatively representing 0.5% of the total catch supply, the stock and exploitation status are unknown.
- Fifteen of the 28 stocks contain FIPs.
- In terms of MSC certification, four of the stocks contain fisheries that are certified according to the Marine Stewardship Council or in full assessment. Twelve of the stocks are used as sources of fishmeal that is certified under the International Fishmeal and Oil Organisation Responsible Supply (IFFO RS) program.

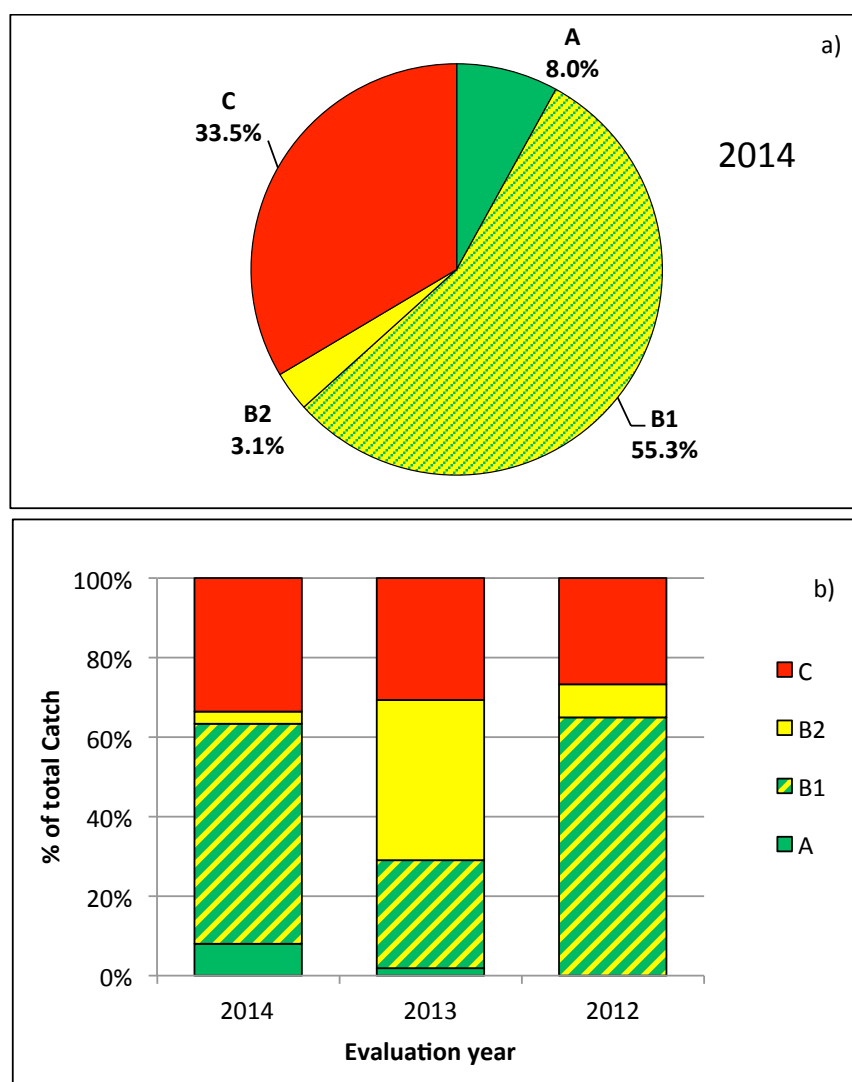




- 74% of the total catch comes from stocks that either include at least one MSC-certified fishery or are in a FIP. However, based on MSC data, the volume of fish generated by MSC-certified fisheries from within the 28 stocks is 350,428 tonnes—this is just over 3% of the total volume of fish from the 28 stocks.
- Five stocks improved in status from 2013 to 2014—see Figure 2: northern blue whiting, Icelandic herring - summer spawning, European sprat - North Sea, Peruvian anchovy - northern-central stock, lesser sand-eel - Dogger Bank area.
- Three stocks had reduced scores from 2013 to 2014—see Figure 2: capelin - Icelandic, European pilchard - Iberian, European pilchard - Northwest Africa southern stock.
- There have been changes in the volumes of fish in each of the categories from 2013 to 2014 (see Table 1, below). However, the total percentage of catch in B1 and B2 has stayed the same—the change has occurred through high-volume fisheries moving from B2 to B1, and this is almost entirely due to Peruvian anchovy scoring higher than the previous year.

**Table 1.** Changes in percentage volumes of fish from the four categories (A, B1, B2, C) between 2013 and 2014 reporting periods

Evaluation category	Evaluation category scores	Percentage of catch in 2014 report	Percentage of catch in 2013 report	Change, 2013 - 2014
<b>A</b>	All scores $\geq 8$	8%	1.8%	+6.2%
<b>B1</b>	All scores $\geq 6$ , and biomass score $\geq 8$	55.3%	27.2%	+28.1
<b>B2</b>	All scores $\geq 6$ , biomass score $< 8$	3.1%	40.3%	-37.2
<b>C</b>	One or more scores $< 6$	33.5%	30.6%	+2.9



**Figure 1.** Proportion of total reported landings by SFP FishSource sustainability category; a) shows the results from the present evaluation and b) compares them to previous evaluations.

Table 2 shows the FishSource scores achieved by each of the stocks across the five criteria along with the categories for the 2014 analysis.



**Table 2.** Current FishSource scores, sustainability category, latest catch data, Marine Stewardship Certification (MSC) Status, fishery improvement project information, and IFFO RS status for the 28 small pelagics stocks assessed in this overview.



Stock	Management			Stock Status		Category	Catch ('000 t)	Year of catch	No. MSC fisheries <sup>1</sup>	FIP Y/N (year FIP)	IFFO
	Score 1	Score 2	Score 3	Score 4	Score 5						
Blue whiting - Northeast Atlantic	8.9	10	10	10	9.7	A	375.7	2012	0	2011	Y
Atlantic herring - Icelandic summer-spawning	≥ 8	10	9.2	10	8.0	A	72	2012	0	-	Y
Atlantic herring - North Sea Autumn spawners	8.4	10	10	9.3	10	A	424	2012	6 C; 1 Wn	-	Y
Anchoveta - Peruvian northern-central stock	≥ 6	10	10	10	≥ 8	B <sub>1</sub>	3283.3	2012	0	2008	Y
Araucanian herring - Chilean	≥ 6	10	10	10	9.5	B <sub>1</sub>	850.2	2012	0	2008	Y
Baltic sprat - Baltic Sea	≥ 6	10	9.6	10	8	B <sub>1</sub>	231	2012	1 FA	2011	N
Atlantic herring - Baltic Sea Bothnian Sea stock	≥ 6	10	10	10	9.3	B <sub>1</sub>	100.6	2012	0	-	N
European sprat - North Sea	≥ 6	8.1	10	10	10	B <sub>1</sub>	85.6	2012	0	2011	N
Norway pout - North Sea	≥ 6	10	10	8.9	≥ 6	B <sub>1</sub>	27	2012	0	-	Y
Gulf menhaden - Gulf of Mexico	≥ 6	≥ 6	≥ 6	8.8	10	B <sub>1</sub>	613.8	2011	0	-	Y
Atlantic herring - NE Atlantic Spring spawners	≥ 6	≥ 6	10	8	7.4	B <sub>1</sub>	826	2012	4 C; 1 FA; 1 Su	-	Y
Lesser sand-eel - Dogger Bank area	≥ 6	10	10	7.9	≥ 8	B <sub>2</sub>	44.6	2012	0	2011	Y
Capelin - Barents Sea	≥ 8	10	10	≥ 6	≥ 6	B <sub>2</sub>	296	2012	0	-	Y
Anchoveta - Chilean regions XV-I-II/southern Peruvian stock	≥ 6	0	10	8.4	10	C	1067.8	2012	0	2008	Y
Lesser sand-eel - SE North Sea	≥ 6	10	5.6	6.3	≥ 6	C	8.1	2012	0	2011	Y
Capelin - Icelandic	≥ 6	10	10	≥ 6	< 6	C	551	2012	0	-	Y
Atlantic horse mackerel - NE Atlantic southern stock	< 6	10	10	≥ 6	≥ 6	C	25	2012	0	-	N
European pilchard - Northwest Africa central stock	≥ 6	< 6	< 6	< 6	< 6	C	504.6	2010	0	-	N
Chilean jack mackerel	≥ 6	10	10	< 6	≥ 6	C	436.3	2012	0	2010	N
Atlantic horse mackerel - NE Atlantic western stock	< 6	6.4	10	< 6	6.1	C	173.1	2012	0	-	N
European pilchard - Iberian	≥ 8	≥ 8	< 6	< 6	7.0	C	54.86	2012	1 C	-	N
European pilchard - Northwest Africa southern stock	≥ 6	≥ 8	≥ 6	5.6	9.7	C	419.5	2010	0	-	N
Lesser sand-eel - Central Eastern North sea	≥ 6	10	10	4.0	≥ 6	C	45.1	2012	0	2011	Y
Atlantic menhaden - NW Atlantic	≥ 6	≥ 6	≥ 8	2.6	< 6	C	228.8	2012	0	2009	N
Anchoveta - Chilean regions V-X	< 6	0	10	2.5	3.9	C	74.5	2012	0	2008	Y
Pacific anchoveta - Gulf of Panama	< 6	N/A	N/A	N/A	N/A	C	31.1	2011	0	2011	N
Pacific thread herring - stock units undefined	< 6	N/A	N/A	N/A	N/A	C	27.3	2011	0	2011	N
Pacific bumper - stock units undefined	< 6	N/A	N/A	N/A	N/A	C	0.98	2011	0	2011	N

<sup>1</sup> MSC Fisheries information: C, Certified; FA, Full Assessment; Su, Suspended; Wn, Withdrawn.



Table 3 shows the most relevant changes in sustainability categories, across the stocks evaluated.

**Table 3.** Changes in sustainability categories across the stocks evaluated.

Stock	Change in category	Notes
Blue whiting - Northeast Atlantic	B <sub>1</sub> to A	Fishers compliance improved, with catches in 2012 below the set TAC.
Atlantic herring - Icelandic summer-spawning	B <sub>1</sub> to A	The management strategy in place has been proven precautionary in maintaining the stock at healthy levels.
 Anchoveta - Peruvian northern-central stock	B <sub>2</sub> to B <sub>1</sub>	Recent surveys have been optimistic and spawning stock biomass currently estimated at twice the size of the 2012 estimate, and well above the precautionary limit. Compliance is deemed good overall. Managers seem to be following scientific advice, but disclosure of information is still a problem.
European sprat - North Sea	C to B <sub>1</sub>	Overall improvements in management and stock condition. In 2013, set TACs more in line with scientific advice; spawning stock biomass above its precautionary reference point and on a decreasing trend, and below provisional F <sub>MSY</sub> proxy since 2005.
Lesser sand-eel - Dogger Bank area	C to B <sub>2</sub>	Since 2011, specific catch limits are set per management area. After the TAC overshoot in 2012, catches in 2013 (preliminary) were within set limits.
Capelin - Icelandic	B <sub>2</sub> to C	Recruitment has been below average. Projections for 2014 in terms of spawning biomass are divergent, with two methods indicating SSB above below the 400,000 t threshold.
 European pilchard - Iberian	B <sub>2</sub> to C	Currently no international annual TAC is set, and this has led the most recent total catches to significantly exceed scientifically advised limits. Spawning stock biomass is well below the historical average.
European pilchard - Northwest Africa southern stock	B <sub>1</sub> to C	Spawning stock biomass on a decreasing trend, probably due to environmental factors, and currently below its limit reference point (estimates from 2011).

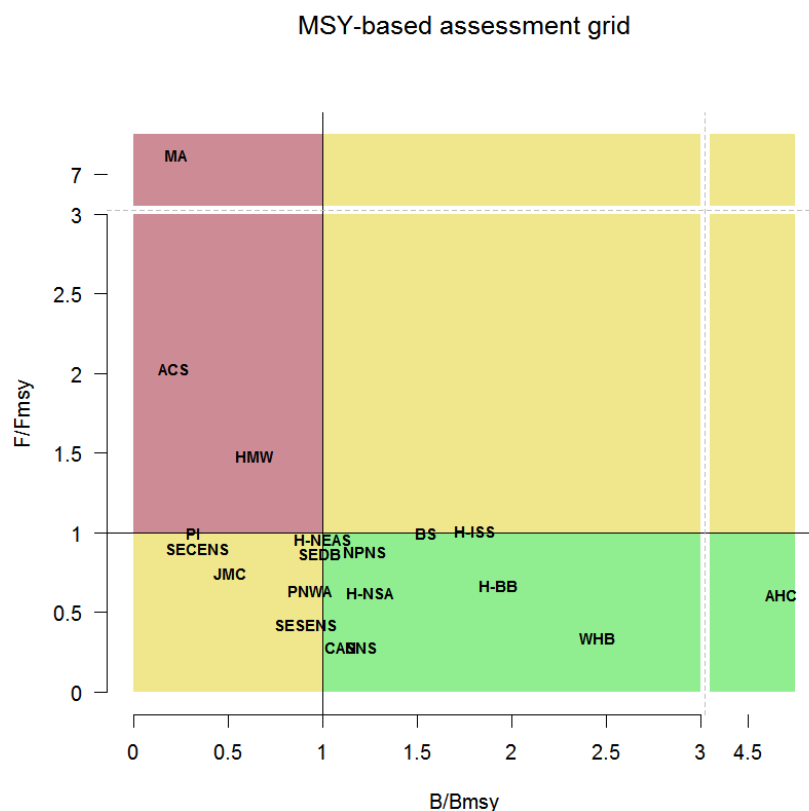
### 3.2 Managing small pelagics under different scenarios – MSY-based management vs precautionary management as “key” LTL species

The publicly available information on each of the stocks considered here varies substantially, as do the management systems in place for those stocks and their managerial and validation tools (see FishSource.com). Using the most up-to-date information on biomass indices, fishing mortality, and respective reference points, we have assessed the current status of biomass against a) mainstream best practices in fisheries management (MSY-based) and b) a more precautionary suite of management targets which are more appropriate for key’ LTL species (from Smith et al. 2011), with B<sub>75</sub> and F<sub>0.5</sub>\*F<sub>MSY</sub> set as targets (or 0.5 the natural mortality M coefficient as F proxy, if F unavailable). This analysis is described in figures 2 and 3. We have assumed equivalency between B<sub>40</sub> and B<sub>MSY</sub> for plotting purposes.

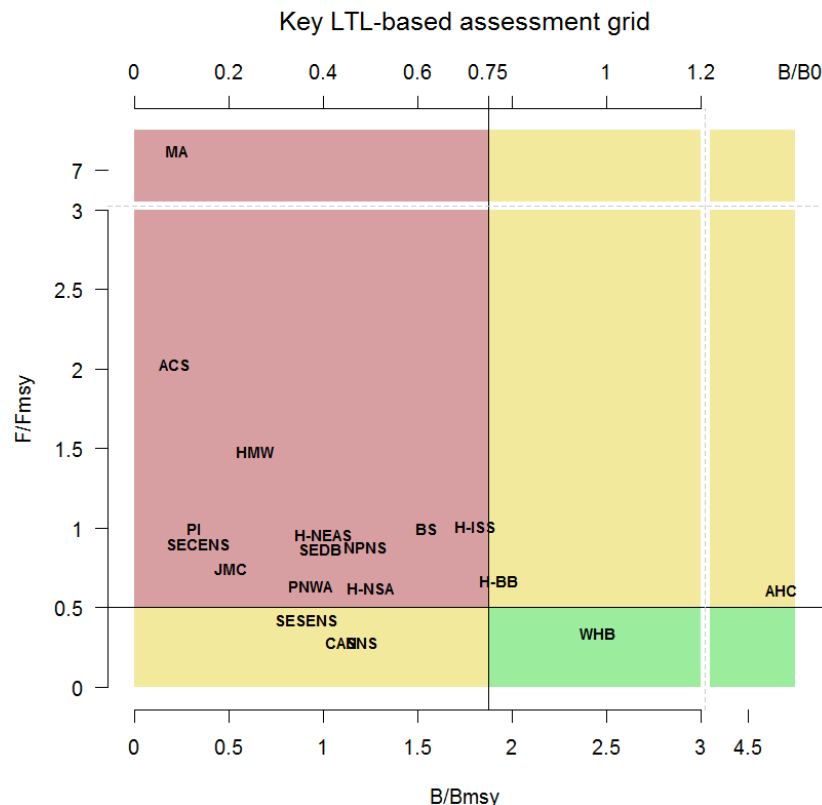
There is not yet a comprehensive assessment of all small pelagic stocks to establish whether they are key, and so no conclusions can currently be drawn about how many fisheries should be managed in line with the more precautionary approach. However, there is clearly an urgent need to establish the



key status for LTL fish stocks, and this will require further research in describing and quantifying their importance to food chains, understanding feeding profiles, and building dietary matrices.



**Figure 2.** Kobe plot - MSY-based assessment grid: biomass and fishing mortality relative to MSY for stocks for which information is publicly available. Acronyms denote stocks as follows: ACS: Anchoveta - Chilean regions V-X | AHC: Araucanian herring - Chilean | BS: Baltic sprat - Baltic Sea | CAN: Anchoveta - Chilean regions XV-I-II /southern Peruvian stock | H-BB: Atlantic herring - Baltic Sea Bothnian Sea stock | H-ISS: Atlantic herring - Icelandic summer-spawning | HMW: Atlantic horse mackerel - NE Atlantic western stock | H-NEAS: Atlantic herring - NE Atlantic Spring spawners | H-NSA: Atlantic herring - North Sea autumn spawners | JMC: Chilean jack mackerel | MA: Atlantic menhaden - NW Atlantic | NPNS: Norway pout - North Sea | PI: European pilchard - Iberian | PNWA: European pilchard - Northwest Africa southern stock | SECENS: Lesser sand-eel - Central Eastern North Sea | SEDB: Lesser sand-eel - Dogger Bank area | SESENS: Lesser sand-eel - SE North Sea | SNS: European sprat - North Sea | WHB: Blue whiting - Northeast Atlantic. Nine stocks are not plottable due to missing biomass estimates (Atlantic horse mackerel - NE Atlantic southern stock | Gulf menhaden - Gulf of Mexico), missing fishing mortality estimates (Anchoveta - Peruvian northern-central stock | Capelin - Barents Sea | Capelin - Icelandic) or both (Pacific anchoveta - Gulf of Panama | European pilchard - Northwest Africa central stock | Pacific thread herring - stock units undefined | Pacific bumper - stock units undefined).



**Figure 3.** Kobe plot – key LTL-based assessment grid: biomass and fishing mortality relative to  $B_{75}$  and  $0.5 F_{MSY}$  for stocks for which information is publicly available. Acronyms and notes as in caption of Figure 2.

An assessment using the MSY-based grid shows that most stocks perform relatively well and lie either within or close to the bottom right hand quadrant where fishing pressure is below  $F_{MSY}$  and biomass is above  $B_{MSY}$ . However, adopting a more conservative management approach that would be appropriate for key LTL species significantly reduces the number of fisheries that could be considered to be performing well. Consequently, it is of great importance to establish which species are key and which are not.

There is as yet no comprehensive assessment of which LTL species are key but Baltic sprat (BS) and Baltic herring (H-BB) may be eligible for such status in the Baltic ecosystem (more research is required). Sand-eel stocks (SECENS, SEDB, SESENS), which have been described in the literature as key LTL species (Brown and Mackinson 2011), perform poorly against the more precautionary LTL-based grid, especially the Central-Eastern North Sea stock (SECENS). Anchoveta stocks from the Humboldt Current areas (Chile and Peru) have also been described as key (Marzloff and Tam 2011) and perform equally poorly against the key LTL assessment grid, especially the Chilean anchovy V-X stock (ACS) but also the Chilean XV-Southern Peruvian stock (CAN). The Northern Peruvian anchovy stock lacks fishing mortality reference points and cannot be plotted on these Kobe diagrams, but biomass is currently at about 52% of pristine levels ( $B_0$ ), significantly below the more precautionary biomass reference point of 75% of  $B_0$  which may be more appropriate for this stock according to recent literature (Marzloff and Tam 2011).





### 3.3 Fisheries Improvement Projects (FIPs) information

Fishery improvement projects (FIPs) are present in 15 of the 28 stocks – five (5) of these FIPs are making exceptional progress, while three (3) made some recent progress but seven (7) made only negligible progress in the opinion of SFP. The majority of the stocks with FIPs making exceptional progress are from South America, while the majority of those making only negligible progress are from Europe.

The SFP FIP progress rating is given in brackets after the title of each FIP in Table 4. The ratings are defined as follows (further information on rating methodology available from SFP):

A = Exceptional progress

B = Good progress

C = Recent progress

D = Past progress

E = Negligible progress

All of the reduction fish stocks featured in this overview would benefit from improvements in management. Table 4 indicates the current priority improvements required for the 15 stocks of small pelagics in which a fishery improvement project (FIP) is present.

**Table 4.** Current SFP public improvement recommendations for the 15 stocks where a fishery improvement project is underway.

Fishery (Progress Rating)	SFP public recommendations	
	to catchers & regulators	to retailers and supply chain
Blue whiting - Northeast Atlantic (A)	<ol style="list-style-type: none"> <li>1. Support an assessment of the environmental impact of this fishery.</li> <li>2. Support the implementation of ecosystem-based fisheries management (EBFM)</li> </ol>	<ol style="list-style-type: none"> <li>1. Engage with the Pelagic RAC by participating in meetings.</li> <li>2. Write to the European Commission and NEAFC requesting that the blue whiting management plan is amended to include a fixed % TAC variation clause.</li> <li>3. Retailers to consider incorporating the requirement for identification of fisheries in aquaculture feeds into procurement specifications.</li> </ol>
Anchoveta - Peruvian northern-central stock (A)	<ol style="list-style-type: none"> <li>1. Transparency must be increased by making scientific reports publicly available.</li> <li>2. Establish target reference point and clear limit reference points, particularly in regard to the impacts on trophic chains.</li> <li>3. Support the assessment of direct and indirect impacts of the fishery on the ecosystem.</li> <li>4. Establish limits for anchovy harvest by the small-scale fleet and strict controls to avoid diversion from direct human consumption to fishmeal factories.</li> </ol>	<ol style="list-style-type: none"> <li>1. Contact (or ask your supply chain) the Peruvian government and animal feed producers using this resource requesting public access to stock assessments and implementation of ecosystem-based management with reference points according to the impacts in the trophic chain.</li> </ol>



Fishery (Progress Rating)	SFP public recommendations	
	to catchers & regulators	to retailers and supply chain
Araucanian herring – Chilean (E)	1. Request to SUBPESCA that: <ul style="list-style-type: none"> <li>• The artisanal fishery has observers on board,</li> <li>• The fishery has an adaptive system of closures and openings in order to avoid recruitment overfishing,</li> <li>• The fishery has a clear recovery plan.</li> </ul>	Ask aquaculture feed providers to URGENTLY request from their Chilean providers evidences that: <ul style="list-style-type: none"> <li>• The fishery has a clear recovery plan in place</li> <li>• Fishmeal producers do not accept more than 10% of juveniles at processing plants</li> </ul>
Baltic sprat - Baltic Sea (E)	1. Support the development of a management plan taking into account spatial and mixed species issues. 2. Catchers to report on bycatch levels.	1. Request (or ask your suppliers) that catchers report on bycatch levels, namely of herring. 2. Contact (or ask you suppliers) your national fisheries administration, refer them to the FishSource evaluation, and request that they pressure the European Commission to develop an ecosystem-based management plan. 3. Retailers to ask the European Fishmeal and Oil Users Roundtable to explore transiting ownership of FIP to the fishmeal sector and/or primary producers.
European sprat - North Sea (E)	1. Support the development of a long-term management plan that takes into account the role of sprat as a forage species in the ecosystem.	1. Contact (or ask your suppliers) your national fisheries administration, refer them to the FishSource profile, and request that they pressure the European Commission to develop an ecosystem-based management plan. 2. Retailers to ask the European Fishmeal and Oil Users Roundtable to explore transiting ownership of FIP to the fishmeal sector and/or primary producers.
Lesser sand-eel - Dogger Bank area (E)	1. Catchers to report on catch and effort by the seven management areas. 2. Support the development of an ecosystem-based long-term management plan.	1. Request (or ask you suppliers) that catchers continue to report catches and effort by management area. 2. Contact (or ask you suppliers) your national fisheries administration, refer them to the FishSource assessment, and request that they pressure the European Commission to develop an ecosystem-based management plan. 3. Retailers to ask the European Fishmeal and Oil Users Roundtable to explore transiting ownership of FIP to the fishmeal sector and/or primary producers.



Fishery (Progress Rating)	SFP public recommendations	
	to catchers & regulators	to retailers and supply chain
Anchoveta - Chilean regions XV-I-II/Southern Peruvian stock (C)	<ol style="list-style-type: none"> <li>1. Implement coordinated management and research plan between Peru and Chile.</li> <li>2. Keep working in the development and/or improvement of the fisheries science common approach.</li> <li>3. Establish limits for anchovy harvest by the Peruvian artisanal fleet and strict controls to avoid deviation from direct human consumption to fishmeal factories.</li> <li>4. Enforce the 5-mile exclusion zone for the industrial fleet in both countries as a precautionary approach, while scientific and consensual research demonstrates possibilities for another less precautionary approach.</li> </ol>	<ol style="list-style-type: none"> <li>1. Contact (or ask your supply chain) the Peru foreign office, Chile foreign office, Chilean and Peruvian exporters of fishmeal and fish oil, and companies making animal feed with this product requesting a coordinated approach to research and management between Chile and Peru.</li> </ol>
Lesser sand-eel - SE North Sea (E)	<ol style="list-style-type: none"> <li>1. Catchers to report on catch and effort by the seven management areas.</li> <li>2. Support the development of an ecosystem-based long-term management plan.</li> </ol>	<ol style="list-style-type: none"> <li>1. Request (or ask your suppliers) that catchers continue to report catches and effort by management area.</li> <li>2. Contact (or ask your suppliers) your national fisheries administration, refer them to the FishSource assessment, and request that they pressure the European Commission to develop an ecosystem-based management plan.</li> <li>3. Retailers to ask the European Fishmeal and Oil Users Roundtable to explore transiting ownership of FIP to the fishmeal sector and/or primary producers.</li> </ol>
Chilean jack mackerel (C)	<ol style="list-style-type: none"> <li>1. Conduct research to improve the stock assessment inputs, especially regarding the stock structure.</li> <li>2. Set biomass and fishing mortality reference points that account for the extreme ecological importance of this species in the southern Pacific food web.</li> <li>3. Publicly release any available information on bycatch, including that collected by the observer programme and ecological risk assessments.</li> </ol>	<ol style="list-style-type: none"> <li>1. Contact the South Pacific Regional Fishery Management Organisation. Thank them for the recent improvements in the stock assessment and management regulations. Encourage them to set biomass and fishing mortality reference points that account for the extreme ecological importance of this species in the southern Pacific food web (current reference points are provisional, and do not account for food web impacts).</li> <li>2. Encourage your supply chain to work with the governments to collect and make public information on bycatch.</li> </ol>
Lesser sand-eel - Central Eastern North Sea (E)	<ol style="list-style-type: none"> <li>1. Catchers to report on catch and effort by the seven management areas.</li> <li>2. Support the development of an ecosystem-based long-term management plan.</li> </ol>	<ol style="list-style-type: none"> <li>1. Request (or ask your suppliers) that catchers continue to report catches and effort by management area.</li> <li>2. Contact (or ask your suppliers) your national fisheries administration, refer them to the FishSource assessment, and request that they</li> </ol>



Fishery (Progress Rating)	SFP public recommendations	
	to catchers & regulators	to retailers and supply chain
		pressure the European Commission to develop an ecosystem-based management plan. 3. Retailers to ask the European Fishmeal and Oil Users Roundtable to explore transiting ownership of FIP to the fishmeal sector and/or primary producers.
Atlantic menhaden - NW Atlantic (C)	<ol style="list-style-type: none"> <li>1. Efforts to reduce fishing mortality (F) to the target F should continue, in order to allow stock recovery.</li> <li>2. Overall data collection should be increased.</li> <li>3. A coastwide fishery independence index of adult abundance should be developed (ASMFC 2012b).</li> <li>4. A multispecies catch-at-age model should also be developed more thoroughly, particularly to aid setting reference points.</li> <li>5. Allocate between reduction and bait harvest.</li> <li>6. Predators needs should be addressed by leaving a scientifically-based proportion of menhaden in the water.</li> </ol>	Contact your supplier, refer them to the FishSource assessment and encourage them to lead a FIP to address the issues, or request that they resume any current FIP activities and report progress publicly.
Anchoveta - Chilean regions V-X (E)	<ol style="list-style-type: none"> <li>1. Request to SUBPESCA that: <ul style="list-style-type: none"> <li>• The artisanal fishery has observers on board</li> <li>• The fishery has an adaptive system of closures and openings in order to avoid recruitment overfishing</li> <li>• The fishery has a clear recovery plan.</li> </ul> </li> </ol>	<p>Ask aquaculture feed providers to URGENTLY request from their Chilean providers evidences that:</p> <ul style="list-style-type: none"> <li>• The fishery has a clear recovery plan in place</li> <li>• Fishmeal producers do not accept more than 10% of juveniles at processing plants</li> </ul>
Pacific anchoveta - Gulf of Panama (A)	<ol style="list-style-type: none"> <li>1. Perform a stock assessment as soon as enough data are available from historic catch and effort data and the new fishery monitoring program.</li> <li>2. Establish a management plan, including reference points and a harvest strategy that account for the extreme ecological importance of these fish in the food web.</li> <li>3. Conduct research to better describe this fishery's impact on the ecosystem with respect to bycatch and gear impacts on the seafloor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Contact (and/or ask your supply chain to contact) the Panama Aquatic Resources Authority (ARAP) to thank them for implementing the new fishery monitoring program. Encourage them to continue to expand their research and monitoring capabilities to allow them to establish a management plan that includes reference points and a harvest strategy that account for the extreme ecological importance of these fish in the food web.</li> <li>2. Engage and support the existing fishery improvement project.</li> </ol>
Pacific thread herring - stock units undefined (A)	<ol style="list-style-type: none"> <li>1. Perform a stock assessment as soon as enough data are available from historic catch and effort data and the new fishery monitoring program.</li> <li>2. Establish a management plan, including reference points and a harvest strategy</li> </ol>	<ol style="list-style-type: none"> <li>1. Contact (and/or ask your supply chain to contact) the Panama Aquatic Resources Authority (ARAP) to thank them for implementing the new fishery monitoring program. Encourage them to continue to</li> </ol>



Fishery (Progress Rating)	SFP public recommendations	
	to catchers & regulators	to retailers and supply chain
	<p>that account for the extreme ecological importance of these fish in the food web.</p> <p>3. Conduct research to better describe this fishery's impact on the ecosystem with respect to bycatch and gear impacts on the seafloor.</p>	<p>expand their research and monitoring capabilities to allow them to establish a management plan that includes reference points and a harvest strategy that account for the extreme ecological importance of these fish in the food web.</p> <p>2. Engage and support the existing fishery improvement project.</p>
Pacific bumper - stock units undefined (A)	<p>1. Perform a stock assessment as soon as enough data are available from historic catch and effort data and the new fishery monitoring program.</p> <p>2. Establish a management plan, including reference points and a harvest strategy that account for the extreme ecological importance of these fish in the food web.</p> <p>3. Conduct research to better describe this fishery's impact on the ecosystem with respect to bycatch and gear impacts on the seafloor.</p>	<p>1. Contact (and/or ask your supply chain to contact) the Panama Aquatic Resources Authority (ARAP) to thank them for implementing the new fishery monitoring program. Encourage them to continue to expand their research and monitoring capabilities to allow them to establish a management plan that includes reference points and a harvest strategy that account for the extreme ecological importance of these fish in the food web.</p> <p>2. Engage and support the existing fishery improvement project.</p>

### 3.4 MSC Information

The 28 stocks were also examined for participation in certification programs. More information can be found at [www.fishsource.com](http://www.fishsource.com).

For the 28 stocks included in this report, only four contain fisheries certified by MSC (C) or in Full Assessment (FA) (Table 2):

- Atlantic herring - North Sea autumn spawners (6 certified fisheries)
- Atlantic herring - NE Atlantic spring spawners (4 certified fisheries; 1 in full assessment; 1 suspended)
- Baltic sprat - Baltic Sea (1 fishery in in full assessment)
- European pilchard – Iberian (4 certified fisheries).

According to MSC data, the volume of fish generated by MSC-certified fisheries from within the 28 stocks is 350,428 tonnes—this is just over 3% of the total volume of fish from the 28 stocks.



## 4 CONCLUSIONS AND RECOMMENDATIONS

This report should give reassurance to those interested in small pelagic fisheries while also giving pause for thought. The good news from this report is that many of the stocks featured are in reasonable shape and more than half of the volume of fish would be compliant with the current requirements of the Aquaculture Stewardship Council for feed.

However, there are still many fisheries that are performing badly and these account for a third of the volume of fish generated by the 28 stocks. Fishery improvement projects in place will help to improve performance and it is hoped that this will be reflected in rising scores over coming years. The report describes the improvement actions required and how the supply chain can act to support progress.

However, despite a generally positive conclusion, it would be misguided to be complacent about the management of small pelagics and the potential for changing market demands in the future.

This report describes a broad scientific consensus that LTL species that can be defined as “key” – i.e., essential to the integrity of the ecosystem because of their role in energy transfer between trophic levels – need to be managed according to more precautionary criteria than previously adopted. There is as yet no comprehensive assessment of which small pelagic species are key, but such an analysis is essential to the future responsible management of such an ecologically critical resource. And even without such an analysis, there are clear indications regarding certain species such as sand-eel stocks in the North Sea and anchoveta stocks from the Humboldt Current areas (Chile and Peru).

It may be that those commercial groups dependent on small pelagics will need to accept a paradigm shift in responsible management for some species in the future and respond accordingly. The more conservative approach required for the management of key LTL species is reflected in the most recent MSC methodology for certification, and it may be no coincidence that only 3% of the volume of fish from the 28 stocks is currently certified.

It is to be hoped that responsible actors within the supply chain will press for the identification of key LTL species as a matter of urgency along with the necessary management measures required for such an ecologically important resource. Such measures could take place within the context of MSC certification or, alternatively, in a different approach that delivered the same levels of ecological precaution.

On the basis of the findings in this report, SFP recommends the following:

Members of the supply chain for small pelagics (and products derived from small pelagics) should actively:

- Support current fishery improvement projects and promote the recommendations identified by SFP.
- Work to create fishery improvement projects in those fisheries that require improvement but have no projects in place.





- Press for the identification of key stocks of small pelagics with regard to ecological importance based on the current scientific consensus.
- Support efforts to manage key stocks of small pelagics with greater levels of precaution to ensure responsible management of this resource.



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## Appendix – Category C stocks and the reasons for scores below 6

Stock	FishSource scores					Comments
	S1	S2	S3	S4	S5	
Anchoveta - Chilean regions XV-I-II/ southern Peruvian stock	≥ 6	0	10	8.4	10	An integrated management plan is lacking for this fishery: TACs set unilaterally and well above advised levels; global TAC in 2014 set at 103% above the scientifically advised.
Lesser sand-eel - SE North Sea	≥ 6	10	5.6	6.3	≥ 6	There are no fishing reference points defined and management plan still needs to be developed. Harvest has exceeded set quotas in 2012 and 2013.
Capelin - Icelandic	≥ 6	10	10	≥ 6	< 6	Recruitment has been below average. Projections for 2014 in terms of spawning biomass are divergent, with two methods indicating SSB above below the 400,000 t threshold used for management purposes.
Atlantic horse mackerel - NE Atlantic southern stock	< 6	10	10	≥ 6	≥ 6	No management goals set and reference points still to be defined.
European pilchard - Northwest Africa central stock	≥ 6	< 6	< 6	< 6	< 6	Scientific advice has been ignored, public information is outdated, and illegal fishing is considered severe. Stock is at very low levels and overfishing considered to be occurring.
Chilean jack mackerel	≥ 6	10	10	< 6	≥ 6	Improvements have been made in terms of management strategy. However, the stock is still considered overfished, although SSB has been increasing recently.
Atlantic horse mackerel - NE Atlantic western stock	< 6	6.4	10	< 6	6.1	No biomass reference points defined since 2010, and the current management plan is not considered precautionary. Stock biomass is at historical low levels. TAC in 2014 was 22.5% above the scientifically advised level.
European pilchard - Iberian	≥ 8	≥ 6	< 6	< 6	7	Currently no international annual TAC is set, and this has led the most recent total catches to significantly exceed scientifically advised limits. Spawning stock biomass remains well below the historical average.
European pilchard - Northwest Africa southern stock	≥ 6	≥ 8	≥ 6	5.6	9.7	Spawning stock biomass on a decreasing trend, probably due to environmental factors, and currently below its limit reference point. Last estimates are from 2011.
Lesser sand-eel - Central Eastern North Sea	≥ 6	10	10	4	≥ 6	After the steady decrease from 2010 to 2013, Spawning Biomass remains well below its limit reference point.
Atlantic menhaden - NW Atlantic	≥ 6	≥ 6	≥ 8	2.6	< 6	Overfishing is considered highly likely to be occurring. Stock fecundity is estimated at well below the adopted limit reference point, but it is unclear if stock is overfished given uncertainty in the estimates.



Stock	FishSource scores					Comments
	S1	S2	S3	S4	S5	
Anchoveta - Chilean regions V-X	< 6	0	10	2.5	3.9	Reference points have been recently adopted, but no recovery plan is yet in place. Excessive fishing mortalities and poor recruitments are related to stock's depleted condition.
Pacific anchoveta - Gulf of Panama	< 6	NA	NA	NA	NA	No management plan is in place and no target or limit reference points have been defined. No information on stock and exploitation status is available. The fishery is still not managed by TACs or quotas.
Pacific thread herring - stock units undefined	< 6	NA	NA	NA	NA	No management plan is in place and no target or limit reference points have been defined. No information on stock and exploitation status is available. The fishery is still not managed by TACs or quotas.
Pacific bumper - stock units undefined	< 6	NA	NA	NA	NA	No management plan is in place and no target or limit reference points have been defined. No information on stock and exploitation status is available. The fishery is still not managed by TACs or quotas.