

2022

MANAGEMENT AND STOCK STATUS SUSTAINABILITY OVERVIEW



14 LIFE
BELOW WATER



REDUCTION FISHERIES

PART 2

REDUCTION FISHERIES

2022 Management and stock status sustainability overview – PART 2

REPORT AUTHORS

Pedro Veiga (coordination) | Senior Scientist, Science Unit, M&E Division | pedro.veiga@sustainablefish.org

Marina Mendes | Senior Fisheries Analyst, Advisory Services Division | marina.mendes@sustainablefish.org

Matthew Cieri | FishSource Fisheries Analyst, Advisory Services Division | matthew.cieri@sustainablefish.org

Dave Martin | Program Director, Programs Division | dave.martin@sustainablefish.org

FISHERIES EVALUATIONS FISHSOURCE

Marina Mendes (coordination), Matthew Cieri, Christie Hendrich, José Ríos, Miguel Ruano

EDITOR

Amy Sweeting

KEYWORDS

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

SUPPORT

Sustainable Fisheries Partnership wishes to acknowledge the generous support of Cargill, Skretting, and the Aquaculture Stewardship Council in the production of the core analysis in this report. Additional sections of the FishSource profiles were developed out of current SFP programs and projects supported by the Walton Family Foundation.



DISCLAIMER

The current overview was mostly prepared with information available from [FishSource.org](https://fishsource.org)™, a program of Sustainable Fisheries Partnership (SFP). The findings summarized in the report are based on information that the authors accessed from FishSource in December 2022. SFP updates FishSource regularly, and the report may not capture the most recent data for all the stocks. Always check FishSource.org for the most updated information SFP has for any given stock and fishery. Given the large number of existing fisheries for a given sector, this report evaluates the strategically most important stocks worldwide at the time (based on criteria such as the volume of catch or interest for SFP partners, for example). Note that the **current scoring and ranking categories provided in the report do not consider the environmental impacts of the fisheries (i.e., they are based solely on the quality of management/degree of fishers' compliance and the status of the stock)**. However, the main environmental issues are considered at a high resolution, based on information already captured in the respective narrative "Environment and Biodiversity" sections of FishSource.org, and also in other sources of information.

SUMMARY

This report is the **13th edition (part 2)** of the SFP global sustainability overview for the main Pacific and Atlantic fish stocks used for reduction purposes. In the following sections, we present some key findings from the current (part 2) evaluations and the overall 2022 overview.

Main findings from the current (part 2) evaluations

- Of the eight evaluated fisheries, two have improved their management and stock status overall performance, and are now considered to be relatively well-managed ([Table 3](#)). An example is [Blue whiting - NE Atlantic](#), in which the official **TAC agreed between the coastal states is now in line with the advice by ICES**.
- **All of the stocks are in good condition**, and their respective fisheries are performing relatively well with regard to exploitation rates.
- However, **there is still one fishery with serious management issues**: European pilchard - NW Africa southern (Mauritania), where IUU activities still warrant concern.

Final remarks from the overall 2022 overview

For the 19 fisheries covered in the two parts of the 2022 overview, our analysis indicates that:

- **Anchoveta remains the species with the largest contribution to the reduction fisheries from the E Pacific and Atlantic oceans.** In 2020, total anchoveta catches (5.3 million t) represented half of the total catches.
- The recent improvements in the management of the NE Atlantic blue whiting fishery confirm that **adequate management in complex (multi-country) fisheries is possible if industry, science, and government work together**. This could be used as an example for transboundary stocks in other parts of the world that are facing similar challenges in terms of lack of or ineffective joint management.
- **Continued and increased industry engagement in improvements is thus critical.** This includes supporting adequate ecosystem-based long-term management objectives for these fisheries, to protect the respective stocks and associated trophic chains.
- Finally, the **impacts of reduction fisheries on non-target species, especially endangered, threatened, and protected (ETP) species, as well as on wider ecosystems, require further investigation**. Many reduction fisheries primarily target low-trophic-level species that are critical to the ecosystems they inhabit. Adequate information and management approaches are thus required to address this.

Important changes for 2022

- The list of fisheries evaluated remains broadly the same as in the 2021 edition, except for six fisheries that are not included in this year's overview (see [section 2](#)).
- Unlike in previous years, the 2022 evaluations will be conducted in two phases, to better align with the timings of the release of key management measures and stock assessment information of each fishery.
- The first phase focused on 11 fisheries, mostly from Europe and South America, and reflects information on status as of July 2022.
- Evaluations for the remaining eight fisheries are included in the current report (phase 2) of the 2022 overview ([Appendix I](#)).

TABLE OF CONTENTS

1	INTRODUCTION	1
2	ASSESSMENT CRITERIA AND FISHERIES INCLUDED	2
2.1	SOURCES OF INFORMATION AND ASSESSMENT CRITERIA	2
2.2	FISHERIES INCLUDED IN THE CURRENT OVERVIEW	4
3	MANAGEMENT QUALITY AND STOCK HEALTH	5
4	ENVIRONMENTAL IMPACTS OF REDUCTION FISHERIES	7
4.1	POTENTIAL DIRECT AND INDIRECT IMPACTS OF REDUCTION FISHERIES	7
4.2	FISHSOURCE ENVIRONMENTAL AND BIODIVERSITY SCORING METHOD	9
4.3	INTO THE UNKNOWN: THE RELATIONSHIP BETWEEN FISHERIES AND CLIMATE CHANGE	10
5	THE GLOBAL ROUNDTABLE ON MARINE INGREDIENTS ...	11
6	REFERENCES	12
	APPENDICES.	14



1 INTRODUCTION

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

Since 2008, analyses of FishSource² data (in the form of “sector reports”) have been performed for the most strategic seafood sectors. These overviews assess the management sustainability performance of individual stocks and aggregate data to reflect the status of the overall sector. This information can provide useful guidance to those parts of the fishing and seafood industries that need to incorporate sustainability criteria into procurement policies. The current report focuses on reduction fisheries, with emphasis on fisheries from the Atlantic and eastern Pacific oceans.

The 2022 edition of SFP's Reduction Fisheries Sustainability Overview analyzes fisheries from 19 different fisheries (most targeting forage species) and assesses the sustainability of the existing management regimes. As in previous editions, only a subset of the global catch applied for reduction is covered; fisheries that are used exclusively as fish trimmings are excluded from this sustainability analysis. Unlike previous editions, the 2022 evaluation was conducted in two phases: phase 1 (published in October 2022) covered 11 stocks, and the current phase covers eight stocks ([Appendix I](#)).

Southeast Asian fisheries in the Indian and western Pacific oceans – capturing a range of species and used for a variety of purposes – are also very relevant to the global catch supply for marine ingredients. But, as in previous years, the Asian fisheries are not extensively analyzed in this report.



FISHSOURCE | 15TH ANNIVERSARY

² FishSource is a publicly available online resource about the status of fisheries, fish stocks, and aquaculture. FishSource compiles and summarizes publicly available scientific and technical information and presents it in an easily interpretable form. For more information visit <https://www.fishsource.org/about>

2 ASSESSMENT CRITERIA AND FISHERIES INCLUDED

2.1 SOURCES OF INFORMATION AND ASSESSMENT CRITERIA

Our overview is based on information from [FishSource.org](https://www.fishsource.org), SFP's online information resource about the status of fish stocks and fisheries. FishSource scores (Cannon, 2006) consist

of a suite of criteria to assess key aspects of management and stock status of fisheries and fish stocks. **Table 1**, below, provides a brief explanation of the five FishSource scoring criteria (full details of the FishSource scoring methodology can be found at: <https://www.fishsource.org/how/scores>).

Table 1 | Current rationale for each of the five stock health and management quality FishSource scoring criteria

	Score/Criterion	Rationale	Rationale (description)
Management quality	Management strategy (1): Is management precautionary?	$F_{\text{at low biomass}} / F_{\text{target}}$ OR $F_{\text{current}} / F_{\text{target}}$	How does the adopted limit and/or target reference point for fishing mortality rate compare to the stock's fishing mortality rate at low biomass, as an index of whether the management strategy is precautionary? The higher the ratio, the lower the score.
	Managers' compliance (2): Do fishery managers follow scientific advice?	Set TAC / Advised TAC	How does the adopted total allowable catch (TAC) level compare to the scientific advice on measures needed to meet stock management objectives, as an index of whether fishery managers follow scientific advice? The higher the ratio, the lower the score.
	Fishers' compliance (3): Do fishers comply?	Catches / Set TAC	How did the catch level in the most current year for which data are available compare to the adopted TAC level, as an index of whether harvest control rules were met? The higher the ratio, the lower the score.
Stock health	Current health (4): Is the stock biomass healthy?	$B_{\text{current}} / B_{\text{target}}$	How does stock biomass in the most current year for which data are available compare to the biomass level that is predicted to support maximum sustainable yields, or similar biological reference point, as an index of whether the stock biomass is healthy? The higher the ratio, the higher the score.
	Future health (5): Will the stock be healthy in the future?	$F_{\text{current}} / F_{\text{target}}$	How does the fishing mortality rate in the most current year for which data are available compare to the rate that is predicted to support maximum sustainable yields, or similar biological reference point, as an index of whether the stock will be healthy in the future? The higher the ratio, the lower the score.

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 being the highest possible score. Preserving comparability with quantitative scores, qualitative scores are obtained by using the cut-off points as used in applications of the Marine Stewardship Council (MSC) fishery assessment method, where “< 6” indicates a high risk and a negative assessment finding, “≥ 6” indicates a medium risk and that improvements are required, and “≥ 8” indicates a low risk and that the fishery meets the criterion conditions. In addition, a data-deficient (DD) score also indicates a potentially high risk, given insufficient and/or out-of-date information on either the management, stock condition, or fishing pressure of the fishery in analysis.

The scores are based on the most recently available public data as of January 2023, and generally represent a snapshot of the position in 2021 or early 2022 concerning management quality and stock status indicators, and in 2020³ for catch statistics.

To create simple and accessible assessments of the stocks, FishSource scores are used to place fisheries into one of five ranked sustainability categories (A, B1, B2, DD, and C). The categorization is based on the quality of management (scores 1 to 3) and the status of the target stock (scores 4 and 5). Neither the scores nor the categories represent a complete evaluation of sustainability issues (e.g., ecosystem and biodiversity issues) or an endorsement of the overall sustainability of these fisheries.

Table 2 | Criteria for the five SFP management and stock status sustainability categories used in this 2022 fisheries overview

Categories	Criteria
Category A: Very well-managed fisheries	Score 8 and above across all FishSource scores
Category B1: Reasonably managed fisheries with stock in good condition	Score ≥ 6 across all FishSource scores, and score ≥ 8 in terms of biomass (i.e., current health of the stock)
Category B2: Reasonably managed fisheries	Score 6 or above across all FishSource scores
Category DD: Fisheries with high uncertainty in terms of their stock status or management	Score 6 or above across all FishSource scores, except that at least one FishSource score is data-deficient (DD) ⁴
Category C: Poorly managed fisheries	At least one FishSource score below 6

³ Although catch data for 2021 is already available for some fisheries, most is only available up to 2020; thus, we have used the 2020 catch across all fisheries.

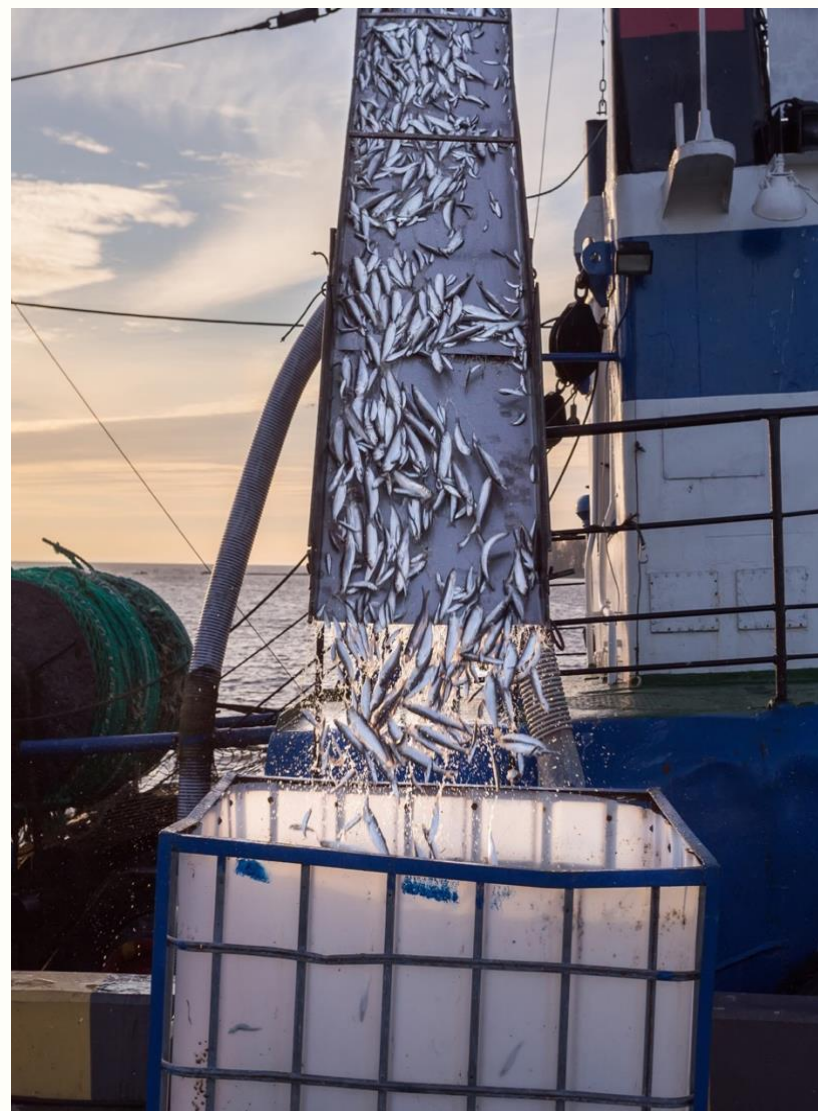
⁴ A data-deficient (DD) score is determined when there is high uncertainty or lack of information, which prevents a given score to be determined for that specific criterion. For more information, please consult <https://www.fishsource.org/faq>. The definition of the category DD was slightly amended in 2020 to better differentiate fisheries with high uncertainty in stock condition or management from those with moderate uncertainty.

2.2 FISHERIES INCLUDED IN THE CURRENT OVERVIEW

As in previous editions, this 2022 overview focuses solely on stocks that are used mainly for fishmeal and fish oil, regardless of the taxonomic group. The proportion of any given species/stock being utilized for fishmeal and fish oil will be a function of market demand and can change with time.

Compared to 2021, the 2022 overview does not include the following stocks: Antarctic krill - Atlantic Southern Ocean, Falkland sprat - Los Lagos Region, Falkland sprat - Aysén Region, Pacific chub mackerel - Ecuador, Frigate and bullet tunas - Ecuador, and Bali sardinella - Southern Java to Western Timor Sea. It also does not include smaller stocks of the NE Atlantic and SE Pacific (e.g., Sandeels nei - Northern and Central North Sea, Sandeels nei - Viking and Bergen Banks, Falkland sprat - Aysén Region), as available in the previous report. These are minor stocks and only represent a small fraction (< 2 percent in volume) of the global production that is used for reduction purposes.

Unlike previous editions, the 2022 sustainability overview was divided into two evaluation phases: (1) mid-2022 and (2) end of 2022. This approach allows evaluations to be more time-sensitive to the most recent status of each fishery. The first part focused on 11 fisheries, mostly from Europe and South America, and reflects information as of July 2022 ([Appendix I](#)). The respective report (available [here](#)) was published in October 2022. Part 2 evaluations, which cover the remaining eight fisheries, are considered in the current report.



3 MANAGEMENT QUALITY AND STOCK HEALTH

Table 3 | Current FishSource scores (Management Quality and Stock Health), SFP management and stock status sustainability category (A, B1, B2, DD, C), and latest catch ('000 t) data for the eight main stocks used for reduction purposes and assessed in this second phase of the 2022 overview

Stock /nested jurisdiction ^(1, 2)	Management Quality			Stock Health		Management and stock status sustainability category	Latest catch ⁽⁴⁾	Changes from last year
	Management strategy	Managers' compliance	Fishers' compliance	Current health	Future health			
Capelin - Barents Sea	≥ 8	10	10	≥ 8	≥ 8	B1	0.0	C to B1
Blue whiting - NE Atlantic	9.4	10	10	10	7.4	B1	1,495.3	C to B1
Norway pout - North Sea, Skagerrak and Kattegat	≥ 6	9.9	10	10	≥ 8	B1	129.5	-
Atlantic menhaden - NW Atlantic	≥ 8	≥ 6	9.7	9.1	8.6	B1	186.0	-
European sprat - Baltic Sea	≥ 6	10	9.0	10	7.9	B1	271.5	-
European pilchard - NW Africa central	≥ 6	≥ 6	≥ 8	≥ 8	≥ 6	B1	389.0	-
European pilchard - NW Africa southern (Morocco)	≥ 6	≥ 6	≥ 8	≥ 8	≥ 6	B1	588.7	-
European pilchard - NW Africa southern (Mauritania)	≥ 6	≥ 6	< 6	≥ 8	≥ 6	C	320.0	-

NOTES: (1) Shading in the stock name: light gray means no change from 2021; light green means a rise in the sustainability category; light orange means a drop in the sustainability category. (2) Stocks in the table are ordered according to the SFP stock status and management performance category, from A (the highest) to C (the lowest). The criteria for the five stock status and management performance categories used in this 2022 reduction fisheries overview are presented in [Table 1](#) above. The full list of stocks considered in parts 1 and 2 of the 2022 Reduction fisheries overview is available in [Appendix 1](#). (3) Catches refer to 2020 and are in thousand tonnes.

Table 4 | Changes in SFP management and stock status sustainability categories across the stocks evaluated in the second phase of the 2022 overview

Stock	Change in category	Notes
Blue whiting - NE Atlantic	C to B1	In 2022, the official TAC agreed between the coastal states was in line with the advice of ICES for the first time in recent years. Spawning stock biomass is at a record high, and was estimated at 2.2 times above the target reference point in 2022. A fishery improvement project is in place since 2021.
Capelin - Barents Sea	C to B1	The stock condition is considered to have improved considerably. The spawning biomass for early 2023 (after considering both natural and fishing mortality) is projected at more than two times above the biomass limit.

Table 5 | SFP management and stock status sustainability category C or DD stocks in the second phase of 2022 evaluations, and the reasons for FishSource scores below 6, data-deficient, or not scored

Stock	Management strategy	Managers' compliance	Fishers' compliance	Current health	Future health	Comments
European pilchard - NW Africa southern (Mauritania)⁽²⁾	≥ 6	≥ 6	< 6	≥ 8	≥ 6	There is still no national TAC for sardine or small pelagics in Mauritania. There has been some improvement in monitoring, control, and surveillance (MCS) capabilities to reduce illegal, unreported, and unregulated (IUU) fishing in Mauritania. However, a body of evidence suggests that IUU activity in Mauritania still warrants concern.

Notes: (1) "DD" means Data Deficient. For more information on data-deficient scores please see www.FishSource.org/faq. (2) A FIP in place for this fishery since 2017. Among other objectives, the FIP aims at supporting the implementation of an effective compliance system (FishChoice 2021).

4 ENVIRONMENTAL IMPACTS OF REDUCTION FISHERIES

4.1 POTENTIAL DIRECT AND INDIRECT IMPACTS OF REDUCTION FISHERIES

The sustainability of a fishery depends not only on the target stock, but also on the environment and ecosystem in which the fishery operates. Reduction fisheries are high-volume operations that catch small pelagic and other species using large and industrialized gear, such as purse seines or mid-water trawls.

Ecosystem impacts are often the biggest concern in reduction fisheries. Reduction fisheries target small pelagic species, which are key links in the food chain within many ecosystems. These forage species are vital for the ecosystem, as they are important energy pathways for energy flow from primary producers to apex predators. Dramatic reductions in the forage base can result in cascading effects on other trophic levels, reducing predator growth and fecundity in marine mammals and protected birds. Proper monitoring, management, and mitigation of ecosystem impacts are challenging and require resource-intensive monitoring and modeling.

While some reduction fisheries have taken precautionary measures to reduce their impact, such as keeping their removals below Maximum Sustainable Yield (MSY) levels, others have only indirectly addressed the problem through time/area closures or effort control measures, as in the case of Araucanian herring in Central-South Chile. Some reduction fisheries have shown positive progress, like NW Atlantic menhaden and Icelandic capelin, but their impact has not been fully studied in this report. Managers for Atlantic menhaden have recently utilized an ecosystem model to help set reference points that account

for menhaden's forage role along the US East Coast (Chagaris et al. 2020), and similar work is ongoing for menhaden in the Gulf of Mexico (Berenshtein et al. 2023). However, in many fisheries, the broader ecosystem impacts are poorly understood and are not being addressed adequately.

In general, and despite the high volume of the catch, bycatch ratios tend to be low in reduction fisheries. However, even small ratios of the target to non-target catch can be important to some depleted stocks, given the overall amount removed. The catch is often consolidated in the net at the water's surface and transferred to the hold, with minimal sorting.

Slipping of the catch, where the net is placed around a school of fish but then the contents are released, can also be an issue in some fisheries. Slipping of the catch can occur when the catch is unwanted due to quality issues, exceeds the limit for economic or regulatory reasons, because of the vessel's capacity, or for other operational reasons. This slippage of the net can cause unwanted mortality and is often difficult to quantify with onboard observers (Tenningen et al., 2021). In some jurisdictions such as the US, such slippage is not considered discarded as it is not brought on board the vessel. However precautionary management measures can be put in place to limit the uncertainty associated with such slippage (White, 2016).



Reduction fisheries tend to have minimal impact on ETP (endangered, threatened, or protected) species, due to their fishing methods, which often involve drying at the surface, reducing the chances of interaction with marine mammals, turtles, and sharks. Such interactions are few in reduction fisheries and often result in minimal impact on ETP species. However, interactions with pinnipeds and birds are possible, especially during daylight hours or closer to shore, and seabird interactions are often linked to the breeding season.

The tendency for low bycatch (as a ratio of fish caught) and few ETP interactions has, understandably, led to resources for in-person at-sea observation being directed toward other more problematic fisheries. One promising option is the use of electronic monitoring (EM) to capture important bycatch and other fisheries-dependent data while reducing costs and labor associated with such collections (NOAA, 2022).

Reduction fisheries tend to have a low impact on habitat due to the nature of their gear, but some may have impacts in shallower waters.

For example, purse seine fisheries in shallow water can stir up and impact bottom habitat.

It is challenging to evaluate the impact of the entire reduction sector, because each fishery in each region has its own unique characteristics. However, some general recommendations can be made, including:

- Increase observer monitoring to assess non-target removals and interactions with ETP species
- Enact measures to reduce slippage where possible
- Implement precautionary and directed management, such as seasonal or area closures in high bycatch/ETP impact areas
- Increase trophic monitoring and modeling to study ecosystem impacts
- Adopt precautionary quota setting to reduce potential impacts while ecosystem modeling studies are underway
- Explore measures to reduce potential interactions with ETP species, such as prohibiting fishing during daylight, using "scare" tactics, or modifying pumping procedures if ETP interactions occur.

These are general recommendations based on common issues in the reduction fisheries sector. However, it is crucial to evaluate potential impacts and risks on a fishery-by-fishery basis by developing FishSource Environment and Biodiversity scores, as more severe or less severe issues cannot be ruled out.

4.2 FISHSOURCE ENVIRONMENTAL AND BIODIVERSITY SCORING METHOD

A FishSource Environmental and Biodiversity scoring system has been developed to evaluate the full range of impacts a fishery can have on the environment and biodiversity, which are not captured by the FishSource management and stock status scores used for this report.

This new scoring system assesses the bycatch of other species; impacts on endangered, threatened, and protected species; impacts on seabed habitats; and impacts on the overall ecosystem ([Table 6](#), [Figure 1](#)). The scores can help to identify strengths and weaknesses in the fishery and prioritize improvements. The score scale ranges from 0-10, with a cut-off point of 6 for “acceptable performance but with improvements required” and 8 for “strong performance.”

The scoring system has been applied to more than 475 fisheries on FishSource. Although only a few reduction fisheries have been analyzed for Environmental and Biodiversity scores and potential risks, we hope to add more in the future. Fisheries thus far analyzed for Environmental and Biodiversity scores include high-profile fisheries such as Pacific tuna, NW American Lobster, and North Pacific groundfish (whitefish). None of the reduction fisheries so far analyzed for Environmental and Biodiversity scores are included in this current report. Nonetheless, some generalizations across the sector can be found in section 4.1 above.

Table 6 | Current rationale for each of the four environmental impacts scoring criteria.

Score/Criterion	Description
Bycatch	Is the fishery mitigating potential bycatch of other species?
ETP impacts	Is the fishery mitigating potential impacts on endangered, threatened, and protected (ETP) species?
Habitat	Is the fishery mitigating potential impacts on benthic habitats?
Ecosystem	Is the fishery mitigating potential impacts on the rest of the ecosystem?



Figure 1 | Example of the FishSource scores (environmental impacts component) of a fishery (Source: [FishSource](#))

4.3 INTO THE UNKNOWN: THE RELATIONSHIP BETWEEN FISHERIES AND CLIMATE CHANGE

Carbon sequestration by the oceans is critical to maintaining the equilibrium of global carbon dioxide levels, and ultimately in mitigating the effects of climate change. Fish in particular play a significant role in the ocean's carbon fluxes, as they are involved in both the uptake and release of carbon in marine ecosystems. As fish consume primary consumers such as zooplankton, they incorporate carbon into their tissues. This carbon is then released back into the ecosystem, by sinking into the deep ocean through respiration, feces, or when fish die (Saba et al., 2021).

Additionally, mesopelagic fish undergo large diel vertical migrations and likely play an important role in carbon sequestration by consuming carbon in the photic zone and transporting it below the thermocline, where it is effectively locked away until ocean currents allow for upwelling. As a consequence, the mid-to-long-term impacts of stressors such as climate change and increased fishing pressure on marine ecosystems, namely on the ocean's carbon fluxes, have been attracting increased attention (e.g., Martin et al., 2021).

Some of the anticipated effects of climate change and global warming include changes in the distribution and composition of fish communities (Walther et al., 2002; Cheung et al., 2009), which could further affect their role in carbon fluxes. Other expected impacts are continued and intensified ocean acidification, which will also lead to losses in marine biodiversity and reduced productivity of marine ecosystems (Kroeker et al. 2013; Yool et al. 2013). These potential impacts on species composition and abundance will also affect low-trophic-level species such as small pelagics, as well as mesopelagic fish, which are critical for food webs.

While it is widely recognized that climate change will have impacts on species distribution and shifts in abundance, which will ultimately lead to changes in the carbon fluxes, the extent of such impacts is not yet well understood. Further research on the resilience of fish stocks to harvest combined with response to climate change is thus needed. This is particularly important for species groups such as mesopelagic fish, which have been flagged as a potentially new important resource for commercial fisheries, but about which much is still unknown (Kourantidou and Jin, 2022; Saba et al., 2021).

5 THE GLOBAL ROUNDTABLE ON MARINE INGREDIENTS

In October 2021, SFP and IFFO (The Marine Ingredients Organisation) announced the launch of the **Global Roundtable on Marine Ingredients**. The roundtable is a sector-wide, multi-stakeholder initiative working to drive environmental and social improvements in key fisheries globally. The new roundtable has adopted a whole value chain approach, engaging a variety of users of marine ingredients, including producers of pet food, surimi, nutraceuticals, cosmetics, and other products, and involving key supply chain actors, including producers, processors, trade associations, and certification standards.



The roundtable currently has 13 members: Skretting, Biomar, Cargill, Olvea, Nestlé, Nissui, the Global Seafood Alliance, MarinTrust, the Aquaculture Stewardship Council, the Marine Stewardship Council, and the Federation of European Aquaculture Producers. Árni M. Mathiesen, former Assistant Director-General and Head of the Fisheries and Aquaculture Department at the United Nations Food and Agriculture Organization (FAO) in Rome, and now senior adviser at the Iceland Ocean Cluster in Reykjavík, Iceland, is the Independent Chair of the Global Roundtable. SFP and IFFO, together with Mr. Mathiesen, serve as the Secretariat.

Roundtable participants are currently engaged in a number of priority workstreams:

- In West Africa, the roundtable seeks to support improved regional fisheries management, as well as the Mauritania Small Pelagics FIP, and to ensure that the marine ingredients sector is not undermining local food security, including current work to better understand the situation on the ground.
- In South and Southeast Asia, Global Seafood Assurances is leading a working group focused on India, tracking related FIPs in Thailand and Vietnam, and hoping to be involved in a regional fisheries project in the Gulf of Thailand.
- IFFO is leading a workstream to improve information on life cycle assessments for marine ingredients, including getting more current data into the Global Feed LCA Institute database.

6 REFERENCES

- Berenshtein, I., Sagarese, S.R., Lauretta, M.V., Schueller, A.M. & Chagaris, D.D. .2023. Identifying trade-offs and reference points in support of ecosystem approaches to managing Gulf of Mexico menhaden. *Frontiers in Marine Science* 9. <https://doi.org/10.3389/fmars.2022.935324>
- Cannon, J. 2006. FishSource Scores, how they're calculated and what they represent, v.1. Sustainable Fisheries Partnership. 20 pp. https://s3.amazonaws.com/assets.fishsource.org/indices_overview.pdf
- Chagaris, D., Drew, K., Schueller, A., Cieri, M., Brito, J. & Buchheister, A. 2020. Ecological Reference Points for Atlantic Menhaden Established Using an Ecosystem Model of Intermediate Complexity. *Frontiers in Marine Science* 7: fmars.2020.606417
- Cheung, W.W.L., Lam, V.W.Y., Sarmiento, J.L., Kearney, K., Watson, R. and Pauly, D. 2009. Projecting global marine biodiversity impacts under climate change scenarios. *Fish and Fisheries* 10: 235-251. <https://doi.org/10.1111/j.1467-2979.2008.00315.x>
- FishChoice. 2021. "Mauritania small pelagics - purse seine" FIP: 2021 workplan. October 2021. FisheryProgress.org. Accessed online at: <https://fisheryprogress.org/node/9490/info>
- FishChoice. 2023. FisheryProgress.org. February 2023. Accessed online at: <http://www.fisheryprogress.org>
- Kroeker, K.J., Kordas, R.L., Crim, R., Hendriks, I.E., Ramajo, L., Singh, G.S., Duarte, C.M. and Gattuso, J.-P. 2013. Impacts of ocean acidification on marine organisms: quantifying sensitivities and interaction with warming. *Global Change Biology* 19: 1884-1896. <https://doi.org/10.1111/gcb.12179>
- MarinTrust. 2023a. "MarinTrust Approved whole fish and by-product raw material." MarinTrust website. February 2023 Accessed online at: <https://www.marin-trust.com/programme/main-standard/approved-whole-fish>
- MarinTrust. 2023b. "MarinTrust Improver Programme." MarinTrust website. February 2023. Accessed online at: <https://www.marin-trust.com/programme/improver-programme>
- Marine Stewardship Council (MSC). 2023. Fisheries in the MSC program. MSC website. February 2023. Accessed online at: <https://fisheries.msc.org/en/fisheries/>
- Martin, A.H., Pearson, H.C., Saba, G.K. & Olsen, E.M. 2021. Integral functions of marine vertebrates in the ocean carbon cycle and climate change mitigation. *One Earth* 4: 680-693. <https://doi.org/10.1016/j.oneear.2021.04.019>
- National Oceanic and Atmospheric Administration (NOAA). 2022. Fisheries observers: US Electronic Monitoring programs. NOAA website. February 2023. Accessed online at: <https://www.fisheries.noaa.gov/national/fisheries-observers/electronic-monitoring#:~:text=Electronic%20monitoring%20is%20a%20tool,use%20to%20track%20their%20catch>.
- Saba, G.K., Burd, A.B., Dunne, J.P., Hernández-León, S., Martin, A.H., Rose, K.A., Salisbury, J., Steinberg, D.K., Trueman, C.N., Wilson, R.W. and Wilson, S.E. 2021. Toward a better understanding of fish-based contribution to ocean carbon flux. *Limnology and Oceanography* 66: 1639-1664. <https://doi.org/10.1002/lno.11709>

- Sustainable Fisheries Partnership (SFP). 2017. Our Target 75 Initiative. June 2017. 7 pp.
https://s3.amazonaws.com/sfpcms.sustainablefish.org/historical-assets/publication_29/SFP_Target_75.pdf
- Sustainable Fisheries Partnership (SFP). 2023. FishSource. February 2023. Accessed online at: <http://www.fishsource.org>
- Tenningen, M., Zimmermann, F. & Enberg, K., 2021. Pre-catch and discard mortality in Northeast Atlantic herring and mackerel fisheries: consequences for stock estimates and advice, ICES Journal of Marine Science 78(7): 2603–2614.
<https://doi.org/10.1093/icesjms/fsab135>
- Walther G.R., Post, E., Convey, P., Menzel, A., Parmesan, C., Beebee, T.J.C., Fromentin, J.M., Hoegh-Guldberg, O., Bairlein, F. 2002 Ecological responses to recent climate change. Nature 416: 389–395. <https://doi.org/10.1038/416389a>
- White, C. 2016. New NOAA rules governing bycatch in Atlantic herring fishery start May 4. SeafoodSource. Published 6 April 2016. Accessed online at:
<https://www.seafoodsource.com/news/environment-sustainability/new-noaa-rules-governing-bycatch-in-atlantic-herring-fishery-start-may-4>
- Yool, A., Popova, E.E., Coward, A.C., Bernie, D. & Anderson, T.R. 2013. Climate change and ocean acidification impacts on lower trophic levels and the export of organic carbon to the deep ocean. Biogeosciences 10: 5831-5854.
<https://doi.org/10.5194/bg-10-5831-2013>



NW Africa sardine fishing fleet in Essaouira, Morocco.
©Donald Scott Lee, CC BY-SA 4.0, via Wikimedia Commons

APPENDIX I | Fisheries included in each of the parts of the 2022 overview, date FishSource profile last updated, FishSource scores, SFP management and stock status sustainability category (A, B1, B2, DD, C), and changes from last year

	Stock / nested jurisdiction ^(2,3)	Management strategy	Managers' compliance	Fishers' compliance	Current health	Future health	Management and stock status sustainability category	Changes from last year ⁽²⁾	Date FishSource profile last updated ¹
First evaluation phase ⁽¹⁾	Chilean jack mackerel - SE Pacific⁽⁴⁾	≥ 6	10	9.3	10	9.5	B1	-	23-Aug-2022
	Sandeels nei - Central Eastern North Sea	≥ 6	10	10	10	≥ 6	B1	-	6-Jul-2022
	Anchoveta - Chile Valparaíso (V) - Los Lagos (X)	≥ 6	10	10	9.8	8	B1	-	25-Aug-2022
	Araucanian herring - Central-South Chile	≥ 6	10	10	8.6	8	B1	B2 to B1	25-Aug-2022
	Anchoveta - Chile Atacama (III) - Coquimbo (IV)	≥ 6	10	≥ 8	8.8	6.8	B1	-	25-Aug-2022
	Gulf menhaden - Gulf of Mexico	≥ 6	≥ 8	≥ 6	8.7	9.7	B1	-	13-Jul-2022
	European sprat - North Sea, Skagerrak and Kattegat	≥ 6	≥ 6	10	6.4	≥ 6	B2	B1 to B2	24-Aug-2022
	Anchoveta - Peruvian Northern-Central	≥ 6	≥ 6	≥ 8	≥ 6	≥ 6	B2	-	24-Aug-2022
	Capelin - Icelandic	≥ 6	10	9.8	≥ 6	≥ 6	B2	-	16-Aug-2022
	Anchoveta - Southern Peru/Northern Chile	< 6	6.0	10	10	10	C	B1 to C	6-Sep-2022
	Sandeels nei - Dogger Bank area	< 6	10	0	7.0	≥ 6	C	-	12-Jul-2022
Second evaluation phase	Capelin - Barents Sea	≥ 8	10	10	≥ 8	≥ 8	B1	C to B1	24-Jan-2023
	Blue whiting - NE Atlantic	9.4	10	10	10	7.4	B1	C to B1	3-Feb-2023
	Norway pout - North Sea, Skagerrak and Kattegat	≥ 6	9.9	10	10	≥ 8	B1	-	3-Feb-2023
	Atlantic menhaden - NW Atlantic	≥ 8	≥ 6	9.7	9.1	8.6	B1	-	07-Dec-2022
	European sprat - Baltic Sea	≥ 6	10	9.0	10	7.9	B1	-	13-Dec-2022
	European pilchard - NW Africa central ⁽³⁾	≥ 6	≥ 6	≥ 8	≥ 8	≥ 6	B1	-	Mar-2022
	European pilchard - NW Africa southern (Morocco)	≥ 6	≥ 6	≥ 8	≥ 8	≥ 6	B1	-	Mar-2022
	European pilchard - NW Africa southern (Mauritania)	≥ 6	≥ 6	< 6	≥ 8	≥ 6	C	-	Mar-2022

Notes: (1) Evaluation phase 1 (light-blue shaded) reflects the fisheries updated in late 2022, with information as of July 2022. Evaluation phase 2 (light-gray shaded) relates to fisheries updated in early 2023 (current report), with information as of December 2022. **NOTES:** (2) Shading in stock name and changes from last year: light gray means no change from 2021; light green means rise in sustainability category; light orange means a drop in the sustainability category. (3) Stocks in the table are ordered according to the SFP stock status and management performance category, from A (the highest) to C (the lowest). The criteria for the five-stock status and management performance categories used in this 2022 reduction fisheries overview are presented in [Table 1](#) above. (4) Chilean jack mackerel is a transboundary stock, with five different jurisdictions and management performance per each of these jurisdictions. The scores presented reflect management performance at the stock level. The specific management quality scores for each of these units can be found on the Chilean jack mackerel - Southeast Pacific FishSource page.

APPENDIX II | Information about existing improvement (active FIPs) and certification programs, for the all the key fisheries assumed to be mainly used for reduction purposes

Status as of February 2023

Stock	Active FIPs ⁽³⁾				Certifications			
	FIP name	FIP start (year)	FIP type	FIP progress rating	MarinTrust ⁽⁴⁾	MSC ⁽⁵⁾	Date 1st MSC certification	# of MSC fisheries ⁽⁶⁾
Fisheries in first evaluation phase	Anchoveta - Chile Atacama (III) -Coquimbo (IV)	-	-	-	Yes	-	-	-
	Anchoveta - Chile Valparaíso (V) - Los Lagos (X)	-	-	-	Yes	-	-	-
	Anchoveta - Peruvian Northern-Central	Peruvian anchovy - industrial purse-seine ⁽⁷⁾	2017	Cp	A	Yes	-	-
	Anchoveta - Southern Peru/Northern Chile	-	-	-	Yes	-	-	-
	Araucanian herring - Central-South Chile	-	-	-	Yes	-	-	-
	Capelin - Icelandic	-	-	-	Yes	Cert	Apr 2017	2
	Chilean jack mackerel - SE Pacific	-	-	-	Yes	Cert	Apr 2019	2
	Gulf menhaden - Gulf of Mexico	-	-	-	- ⁽¹²⁾	Cert	Oct 2019	1
	Sandeels nei - Central Eastern North Sea	-	-	-	- ⁽¹²⁾	Cert, Wdrn	Mar 2017	2
	Sandeels nei - Dogger Bank area	-	-	-	-	Susp, Wdrn ⁽¹³⁾	Mar 2017	2

Status as of February 2023

	Stock	Active FIPs ⁽³⁾				Certifications			
		FIP name	FIP start (year)	FIP type	FIP progress rating	MarinTrust ⁽⁴⁾	MSC ⁽⁵⁾	Date 1st MSC certification	# of MSC fisheries ⁽⁶⁾
Fisheries in second evaluation phase	Atlantic menhaden - NW Atlantic	-	-	-	-	_(12)	Cert	Sep 2019	1
	Blue whiting - NE Atlantic	NE Atlantic Blue Whiting	2021	Bs	Unrated	IP	Sus, Wdrn ⁽⁹⁾	Jun 2016	4
	Capelin - Barents Sea	-	-		-	Yes	-	-	-
	European pilchard - NW Africa central	Morocco sardine - pelagic trawl and seine	2014	Cp	A	Yes ⁽⁸⁾	_(10)	-	-
	European pilchard - NW Africa southern (Morocco)	Morocco sardine - pelagic trawl and seine	2014	Cp	A	Yes ⁽⁸⁾	_(10)	-	-
	European pilchard - NW Africa southern (Mauritania)	Mauritania small pelagics - purse seine	2017	Cp	A	IP	-	-	-
	European sprat - Baltic Sea		-		-	Yes	Cert, FA, Wdrn	May 2017	6
	Norway pout - North Sea, Skagerrak and Kattegat	-	-		-	Yes	Cert, Wdrn	Mar 2017	2
Other fisheries	Antarctic krill - Atlantic Southern Ocean	-	-	-	-	-	Cert, Wdrn	Jun 2010	4
	Bonga shad - NW Africa	Mauritania small pelagics - purse seine	2017	Cp	A	IP	-	-	-
	European anchovy - South Africa/SE Atlantic	-	-	.	-	Yes	-	-	-
	European anchovy - NW Africa	Morocco anchovy - purse seine	2019	Cp	A	-	-	-	-
	Madeiran Sardinella - NW Africa	Mauritania small pelagics - purse seine	2017	Cp	A	IP	-	-	-
	Round sardinella - NW Africa	Mauritania small pelagics - purse seine	2017	Cp	A	IP	-	-	-
	South Africa redeye herring - South Africa/SE Atlantic	-	-		-	Yes	-	-	-
	Boarfish - NE Atlantic	-	-	-	-	Yes	-	-	-

Status as of February 2023

Stock		Active FIPs ⁽³⁾				Certifications			
		FIP name	FIP start (year)	FIP type	FIP progress rating	MarinTrust ⁽⁴⁾	MSC ⁽⁵⁾	Date 1st MSC certification	# of MSC fisheries ⁽⁶⁾
Other fisheries	Sandeels nei - Central and Southern North Sea	-	-		-	-	Wdrn	Mar 2017	1
	Falkland sprat - Los Lagos Region	-	-		-	Yes	-	-	-
	Falkland sprat - Aysén Region	-	-		-	-	-	-	-
	Frigate and bullet tunas Ecuador	Ecuador small pelagics	2018	Bs	B	IP	-	-	-
	Middling thread herring - Sinaloa and Nayarit	-	-		-	Yes	Cert	Oct 2016	1
	Pacific anchoveta - Ecuador	Ecuador small pelagics	2018	Bs	B	IP	-	-	-
	Pacific anchoveta - Pacific Panama	Panama small pelagics	2011	Cp	Completed	Yes	-	-	-
	Pacific chub mackerel - Ecuador	Ecuador small pelagics	2018	Bs	B	IP	-	-	-
	Pacific thread herring - Sonora	-	-		-	Yes	Cert, Wdrn	Jul 2011	3
	Thread herrings nei - Panama	Panama small pelagics	2011	Cp	Completed	IP	-	-	-
	Pacific anchoveta - Ecuador	Ecuador small pelagics	2018	Bs	B	IP	-	-	-
	Slender thread herring - Sinaloa and Nayarit	-	-		-	Yes	Cert	Oct 2016	1
	South American pilchard - Gulf of California	-				Yes	Cert	Jul 2011	1
	South American pilchard - Pacific Baja California	-	-		-	Yes	-	-	-
	Atlantic herring - Baltic Sea Central	-	-	-	-	Yes	Cert	Jun 2018	2
	Atlantic herring - Baltic Sea Gulf of Riga	-	-	-	-	Yes	Cert	Jan 2020	1

Status as of February 2023

Stock		Active FIPs ⁽³⁾				Certifications			
		FIP name	FIP start (year)	FIP type	FIP progress rating	MarinTrust ⁽⁴⁾	MSC ⁽⁵⁾	Date 1st MSC certification	# of MSC fisheries ⁽⁶⁾
Other fisheries	Australian pilchard - Great Australian Bight	-	-	-	-	Yes	Cert	Nov 2018	1
	Bali sardinella - Southern Java to Western of Timor Sea	-	-	-	-	-	-	-	-
	Indian oil sardine - Andhra Pradesh	-	-	-	-	-	-	-	-
	Indian oil sardine - Goa	Indian Oil Sardine	2018	Bs	E	IP	-	-	-
	Indian oil sardine - Karnataka	-	-	-	-	-	-	-	-
	Indian oil sardine - Kerala	-	-	-	-	-	-	-	-
	Indian oil sardine - Maharashtra	Indian Oil Sardine	2018	Bs	E	IP	-	-	-
	Indian oil sardine - Tamil Nadu	-	-	-	-	-	-	-	-
	South American pilchard - Japanese Pacific	-	-	-	-	-	-	-	-
	Japanese sardine - Japan Hokkaido	Japan Hokkaido Japanese sardine - purse seine	2022	Bs	Unrated	-	-	-	-
	Miscellaneous marine species – Gulf of Thailand ⁽¹¹⁾	Gulf of Thailand Mixed-Trawl Fishery	2020	Bs	Unrated	IP	-	-	-
	Miscellaneous marine species – Vietnam ⁽¹¹⁾	Vietnam mixed species - trawl	2021	Bs	C	-	-	-	-

Notes: (1) This list includes all key stocks and fisheries known to be used for reduction purposes (whole fish) that may be associated to one or more active fishery improvement projects (FIPs), or the certification programs considered, and not just the stocks considered in the current overview. (2) The first section of the table (blue shaded) includes the 11 fisheries included in part 1 of the overview, the second section (light gray) includes the eight fisheries in part 2 (current), and the third section (light yellow), includes other fisheries not covered in the current overview, but known to also be used for reduction purposes. (3) For more information on the currently active FIPs, please visit the Improvement Projects section in FishSource, or the respective FIP public reports in Fishery Progress (FishChoice 2023) or MarinTrust Improver Program (MarinTrust 2022b). FIP type: Bs = Basic and Cp = Comprehensive (4) Yes = Approved Whole Fish (main species) (MarinTrust 2023a); IP = covered under the MarinTrust Improver Programme (MarinTrust 2023b). (5) MSC Status: Cert = Certified; FA = Full Assessment; Sus = Suspended; Wdrn = Withdrawn (MSC 2021). (6) Refers to the number of fisheries that are in the MSC program and that overlap with the stock (source: SFP 2023; MSC 2023a). (7) In Peru, there is also a FIP covering the artisanal fishery for anchoveta. But since it must be used for human direct consumption only, it is outside of the scope of MarinTrust and the current overview. (8) Certified by MarinTrust as “by-product” fishery (for more information visit the MarinTrust website) (MarinTrust 2023a). (9) In late 2020, all the NE Atlantic blue whiting fisheries in the MSC program were suspended due to coastal states failing to set quotas in line with the advised levels. A FIP was launched in October 2021 (MarinTrust, 2023b). However, the FIP hasn’t yet been evaluated to determine its FIP type or progress rating. (10) The [Morocco sardine - pelagic trawl and seine](#) FIP is considered as Completed in Fishery Progress, but at the moment there is no public evidence that the fishery is undergoing MSC Full assessment already. (11) These are mixed species fisheries that cover multiple stocks of fish and invertebrates and are assessed and managed as a whole. (12) These fisheries are MSC-Certified and automatically considered MarinTrust compliant. For more information and verification reports, please see the [dedicated MarinTrust page](#). (13) This Units of Certification associated to this stock are no longer MSC-Certified due to the current poor stock condition, with spawning stock biomass in 2023 estimated to be below Blim.



Sustainable Fisheries
PARTNERSHIP

14 LIFE
BELOW WATER



FURTHER INFORMATION

<http://www.sustainablefish.org/>

For additional information, please contact us at:
info@sustainablefish.org