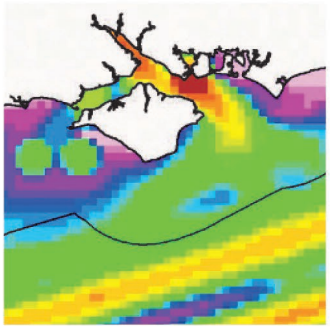
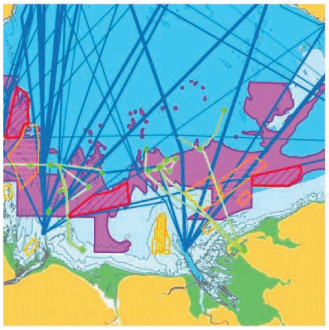
Marine Stewardship Council

Northeast Atlantic Pelagic Fisheries – Management Challenges for Straddling Fish Stocks

Final Report

June 2023

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	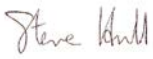

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Executive Summary

The North East Atlantic (NEA) pelagics are among the largest populations of commercially exploited fish stocks in the world. Atlantic mackerel (*Scomber scombrus*), blue whiting (*Micromesistius poutassou*) and Atlanto-Scandian herring (*Clupea harengus*) support large-scale fisheries in all major fishing nations in the region and contribute to food security both in the region and around the world, providing a low-cost source of protein as well as an important source of fish meal used in aquaculture production.

This report sets out the current situation in relation to the management and governance of these stocks and explores options and approaches for establishing quota shares and limiting exploitation to sustainable levels.

All three pelagic stocks are straddling stocks, which occur in the Exclusive Economic Zones (EEZ) of coastal states as well as on the high seas. Management of these stocks requires coastal states and fishing states to jointly agree on a total allowable catch (TAC) in line with scientific advice, and define how it will be shared between states by agreeing on how they will allocate quota shares among them. Currently, coastal states agree on the TAC aligned with scientific advice, but then set unilateral quotas that exceed it. This has the same effect as not being able to agree on the TAC, nor follow the scientific advice. The outcome is that the overall catch from the combined national quotas is substantially higher than the scientific advice, putting these stocks at risk of overexploitation and stock decline.

The latest scientific advice (for 2023) for the three pelagic stocks indicates that stock biomasses are currently healthy, but biomass can fluctuate with both environmental variability and levels of fishing pressure. Fishing pressure on the stocks currently exceeds the Maximum Sustainable Yield (MSY) reference points, and for herring and blue whiting it is also higher than the precautionary reference point.

The lack of agreement on quota shares for these stocks has resulted in quotas, and catches, being above sustainable levels advised by ICES for many years. As a result, fishing mortality is not currently constrained by the management arrangements, threatening their sustainability. Fisheries for these stocks have had their MSC certification suspended and many have subsequently withdrawn from the Program.

All three stocks in the past have had agreements for quota shares involving some or all of the coastal and fishing states. When agreements are in place, the total combined quotas are generally in line with the scientific advice, offering protection and good management for these stocks. However, agreements have broken down in recent years, in part due to the shifting stock distributions changing the relative abundance and availability in each coastal state's waters. Climate-related impacts on fish stock distribution are likely to result in these pressures continuing and increasing in the future, therefore stock-wide management through science-based TACs and agreed quota allocations is necessary to support effective future management of these stocks.

The report explores different approaches to defining and implementing quota shares, overarching agreement structures, and options in the absence of agreement. Quota shares can be based on historical landings records, zonal attachment and other criteria. Once agreed, quota allocations can remain fixed indefinitely, or may have an agreed mechanism for their adjustment and review. This can enable quota allocations to be updated as stock distributions shift, without needing to renegotiate the whole agreement. However, this creates an added level of complexity to the initial agreement. Building

additional flexibility into agreements, such as the potential for parties to swap, trade or lease quota, as well as provide access within EEZ, can also help to match fishing opportunities with industry needs.

Agreements for quota shares can be reached for individual stocks with the relevant parties, or a single agreement may cover multiple stocks. Multi-stock agreements may be more difficult to reach initially, as several stocks are under consideration, and it may increase the number of parties involved. However, they may allow compromises that trade-off benefits between different stocks and other associated issues such as access to waters, which can increase resilience of the agreement in the longer-term.

The process for reaching agreement is principally a political one, influenced by many factors with key considerations around criteria such as historic rights, economic dependency on fishing, where the stocks reside and their biology. While data can be used to inform decisions, it can also be used in support of differing negotiating positions. Even science-driven approaches have a level of subjectivity in selecting the criteria and approach to analysing the data to determine quota shares. However, fisheries management has always had to deal with imperfect data in an ever-changing environment, and this is a key challenge for securing a long-term management framework that can give fish stocks the best level of protection.

Within agreements, consideration should be given to the merits of majority voting rather than the need for consensus decision-making, with the aim of avoiding the breakdown of agreements. Incorporation of an objection procedure to enable decisions to be reviewed by a panel, as well as a dispute resolution procedure should be considered. This would provide a framework that can handle new and changing information over time, with the objective that agreements are resilient and management remains in place, with effective adoption and implementation by the coastal and fishing states.

Sustainable management of internationally shared fish stocks is a challenge that is common to all ocean areas. The North East Atlantic pelagic stocks benefit from a strong science base, relatively few coastal and fishing states involved in their exploitation and management, and currently healthy stock biomasses. However, they currently lack a comprehensive governance framework, including quota shares, that is able to ensure that total catches are constrained to the level of scientific advice.

Management needs to be adaptive and resilient, incorporating the best available evidence and involving all relevant stakeholders, to be able to effectively manage exploitation levels and respond to changes in biomass of these dynamic and economically important stocks. It needs to include arbitration and dispute resolution procedures, as well as majority-voting, to ensure the integrity of agreements are upheld through the challenges that come with decision-making in a variable environment.

The key factor for driving an agreement is political will – a willingness to compromise, together with a commitment to ensuring sustainable exploitation of the stocks. However, good governance also entails the collective effort by all stakeholders with an interest in the future health and sustainability of fisheries to influence and require that the principles of good fisheries management as set out by UNCLOS, UNFSA and FAO, are upheld for the benefit of the marine environment and wider society. This includes civil society actors, industry, supply chain interests, academia and others to help influence momentum towards lasting agreements.

By finding a path forward to achieve a comprehensive agreement on management and quota shares for these stocks, the coastal states and fishing states can demonstrate that they are globally at the forefront of fisheries sustainability, helping to ensure the future productivity of the stocks, while maintaining the food security and economic benefits that the fisheries provide.

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Disclaimer

The North East Atlantic pelagic fisheries had their MSC certificates suspended or withdrawn between 2019 and 2021, due to the lack of effective and comprehensive management frameworks that can effectively limit fishing pressure on the stocks. The MSC has commissioned this independent report to set out the historical and current situation in relation to these stocks and the challenges for their sustainable management, with the aim of promoting discussion and supporting the fisheries as well as managers and other civil society actors, in the consideration of options for addressing the issues and political impasse.

The MSC is a non-profit organisation with a mission to use its ecolabel and fishery certification program to contribute to the health of the world's oceans by recognising and rewarding sustainable fishing practices, transforming the seafood market to a sustainable basis and influencing the choices people make when buying seafood.

The views and opinions expressed in this report are those of the authors and do not reflect the official policy or position of the MSC.

1 Introduction

The North East Atlantic (NEA) pelagics are among the largest populations of commercially exploited fish stocks in the world. Atlantic mackerel (*Scomber scombrus*), blue whiting (*Micromesistius poutassou*) and Atlantic herring (*Clupea harengus*), together with European sprat (*Sprattus sprattus*) account for more than 65% of the total catches and 95% of pelagic catches in the North East Atlantic (Fernandes *et al*., 2020). They have resulted in the development of large-scale fisheries in all major fishing nations in the region and contribute to food security both in the region and around the world, providing a low-cost source of protein as well as an important source of fish meal used in aquaculture production.

This report focuses on three key NEA pelagic stocks: North East Atlantic blue whiting; Atlanto-Scandian (AS) herring; and Atlantic mackerel. These stocks are widely distributed, spanning several different coastal states' waters as well as high seas areas (Figure 1). They are widely distributed, and migrate between different areas at different times of year for spawning, feeding and over-wintering. As a result, there are a number of coastal states (states in whose waters a stock is present), and fishing states (states who fish for the stocks, either on the high seas or in other coastal states' waters through access agreements) involved in their exploitation and management (Table 1).

Source: MSC

Figure 1. Estimated distribution of blue whiting, Atlanto-Scandian herring, and mackerel in the North East Atlantic

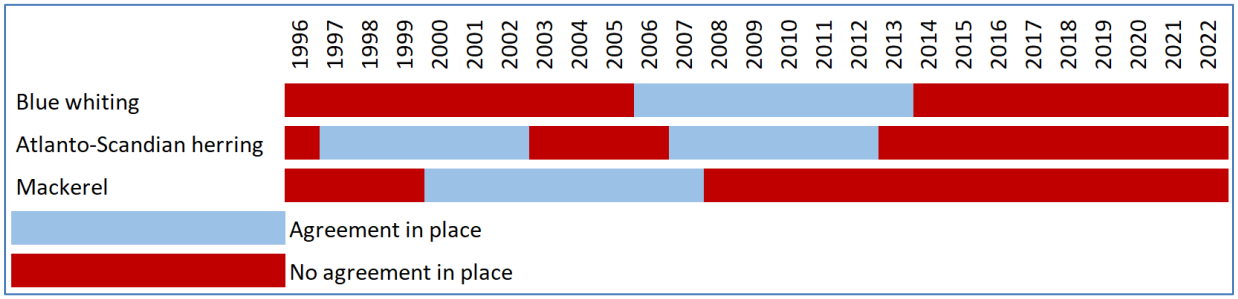
Table 1. Coastal states and fishing states for each stock

	EU	Faroe Islands	Green-land	Iceland	Norway	Russia	UK
Blue whiting	CS	CS	FS	CS	CS	FS	CS
Atlanto-Scandian herring	FS	CS	FS	CS	CS	CS	CS
Mackerel	CS	CS	CS	CS	CS	FS	CS
Key: Coastal state (CS); Fishing state (FS)							

Sustainable management needs to take into account and control fishing pressure from all sources (coastal states and fishing states), and management, data collection and research need to be coordinated among all relevant parties. As a result, the NEA pelagic stocks present a particular challenge for coordination of fisheries management across various jurisdictions, with the parties involved needing to agree on sustainable catch limits, as well as the distribution of quotas among them.

Currently, for the NEA pelagics, states agree on management of the stocks and set the overall TAC in line with scientific advice, but there are no agreed quota shares for determining what proportion of the TAC can be fished by each state. As a result, each country sets itself a national (unilateral) quota, however the sum of these unilateral quotas exceeds the agreed overarching TAC. Over the period 1996-2022, there has been only one year in which all coastal and fishing states agreed on management and quota shares for these pelagic stocks (Figure 2).

The agreements have generally broken down, primarily due to shifting stock distributions, which change the relative abundance and availability in each coastal state's waters, leading to challenges related to how to share the quotas. Climate-related impacts on fish stock distribution are likely to result in these pressures continuing and increasing in the future, with a recent study finding that 23% of transboundary stocks will have shifted and 78% of the world's Exclusive Economic Zones (EEZs) will have experienced at least one shifting stock by 2030 (Palacio-Abrantes *et al.*, 2022).



Source: ICES, 2022a, b, c; and sources in Section 3.

Figure 2. Status of agreements involving all coastal and fishing states, 1996–2022

Over time, fishing these stocks in excess of the scientifically advised limits can lead to overfishing[1], a reduction in stock biomass such that the stock is considered overfished[2], and in the most extreme case, stock collapse[3]. The stock status and advice for the NEA pelagic stocks, and the contrast between TACs, quotas and catches, is explored in Section 3.

The Atlanto-Scandian herring fishery provides an important example of stock collapse, driven by overfishing, recruitment failure and climate change. In the 1960s, the stock collapsed from 10 million tonnes to 10 thousand tonnes and took several decades of restricted catches to recover. In Iceland, this caused a decline in gross domestic product, exports, currency exchange rate, household expenditure, as well as social effects such as unemployment, emigration and the decline of settlements dependent on herring (Sigurdsson, 2006).

The lack of coastal state agreement on quota shares for these stocks has resulted in the suspension of sustainability certification from the Marine Stewardship Council (MSC) for fisheries targeting the stocks and subsequent withdrawal from the MSC Program when their certification period ended. This reflects the lack of an over-arching governance framework that is able to ensure that total catches comply with the level of scientific advice. It also has a number of implications for the supply chain, particularly for those businesses that have committed to sourcing from sustainable, certified fisheries. Sustainability and supply

[1] A stock that is subject to overfishing has a fishing mortality (harvest) rate that is higher than the rate that produces maximum sustainable yield (MSY).

[2] A stock is considered overfished when exploited beyond an explicit limit beyond which its abundance is considered "too low" to ensure safe reproduction. Often the term is used when biomass has been estimated to be below a limit biological reference point that is used as the signpost defining an "overfished condition". This is often taken as being FMSY but the usage of the term may not always be consistent (FAO, 2023).

[3] Stock collapse is an abrupt decline in stock biomass, followed by an ensuing period of prolonged depletion, indicative of impaired production (Yletyinen *et al.*, 2018).

chain implications are discussed in Section 4, and the management and governance framework for these stocks is described in Appendix B.

There are a number of options for developing quota shares for international and shared fish stocks, in terms of the criteria and methods for determining shares, and the frameworks for implementing those agreements. All have their pros and cons, and these are set out and explored in Section 5, followed by conclusions in Section 6.

The converging impacts of climate change and political changes in the region create an additional layer of management complexity that must be addressed and mitigated through effective stock management plans and agreements that are adaptive and resilient to environmental and political changes. Addressing these issues through effective and comprehensive long-term management arrangements could offer a blueprint for other highly dynamic, straddling stocks that cover multiple jurisdictions.

The agreement of quota shares is difficult, but not impossible. The responsibility for sustainable management of fish stocks lies firmly with the coastal states in whose waters those stocks reside, as well as the fishing states that exploit the stocks. For these stocks, which are some of the most productive, fished by some of the wealthiest nations in the world, with world-class fisheries science and research, it is not beyond political capability to come to an agreement on their sustainable management and exploitation. Industry, coastal states governments, the supply chain, and other stakeholders all have a role to play in in supporting quota share agreements for these fisheries.

2 International Fisheries Governance Framework

All three pelagic stocks are straddling stocks, which occur in the EEZs of coastal states as well as on the high seas. The United Nations Convention on the Law of the Sea (UNCLOS) sets the overarching legal framework for the conservation and management of these fish stocks, and has been ratified by all relevant states in the region (UNTC, 2022). States must cooperate on management, either **directly**, or through appropriate **subregional or regional organisations**, such as Regional Fisheries Management Organisations (RFMOs). Among the matters they must agree on are participatory rights (e.g. allocation of allowable catch) and decision-making rules (as detailed in the United Nations Fish Stocks Agreement (UNFSA), UN, 2013). Appendix B provides more detail on the management framework in the North East Atlantic, regional and coastal states arrangements.

Sustainable fisheries management requires that stock status is assessed, and a level of catch is defined and implemented that enables the stock to maintain its biomass, subject to natural fluctuations, into the future. Ensuring that the advised level of catch is adhered to by fishing fleets, and enforcing the agreed limits is an important part of achieving sustainable fisheries management.

For stocks like the NEA pelagics that are distributed throughout the waters of several coastal states, as well as international waters, this requires coastal states and fishing states to jointly:

- Agree on a **total allowable catch (TAC)** in line with scientific advice; AND
- Define **how the TAC will be shared** between states by agreeing on quota shares.

Robust Harvest Control Rules (HCRs) support the process of setting the TAC in line with scientific advice, so that the level of fishing pressure is adjusted as the stock size changes. This can help to ensure exploitation at maximum sustainable yield (MSY), and fishing pressure is reduced if stock biomass falls, allowing the stock to rebuild. This is particularly important for these pelagic stocks, where stock size can fluctuate according to environmental conditions, to ensure that fishing pressure is aligned with stock biomass, and the scientific advice is able to advise on TAC limits within this management framework.

The coastal states have chosen to pursue management arrangements for each stock individually through direct cooperation between relevant states, rather than operating through the RFMO, the North East Atlantic Fisheries Commission (NEAFC). NEAFC takes management measures for the part of each stock that occurs within the Regulatory Area, but only after the relevant coastal states have agreed on TACs and allocations outside of NEAFC (OECD, 2009).

Coastal states undertake annual consultations to agree on conservation and management measures for the stocks. Scientific advice from the International Council for the Exploration of the Sea (ICES) is taken into account, and TACs are generally set in line with scientific advice. However, the agreements all currently lack defined quota shares. As a result, the sum of quotas set by individual countries exceed the TAC, risking overexploitation of the stocks.

3 NEA Pelagics Stock Status and Management

The latest scientific advice (for 2023) for the three pelagic stocks indicates that while stock biomasses are currently healthy (above MSY $B_{trigger}$, B_{pa} and B_{lim}), fishing pressure exceeds the MSY reference points (F_{MSY}), and for herring and blue whiting is also higher than the precautionary reference point (F_{pa}) (Table 2). Fishing mortality is not currently constrained by the management arrangements for the stocks, due to unilateral quotas being set that exceed the scientific catch advice, risking stock sustainability.

Table 2. Summary of stock status

Stock	Spawning Stock Biomass	Fishing Mortality
Mackerel (*Scomber scombrus*) in subareas 1–8 and 14, and in Division 9.a (Northeast Atlantic and adjacent waters)	☑ Above MSY $B_{trigger}$, B_{pa}, and B_{lim}	⊗ Fishing pressure on the stock is above F_{MSY} but below F_{pa} and F_{lim}
Herring (*Clupea harengus*) in subareas 1, 2, and 5, and in divisions 4.a and 14.a, Norwegian spring-spawning herring[4] (Northeast Atlantic and Arctic Ocean)	☑ Above MSY $B_{trigger}$, B_{pa}, and B_{lim}	⊗ Fishing pressure on the stock is above F_{MSY} and F_{pa} but below F_{lim}
Blue whiting (*Micromesistius poutassou*) in subareas 1–9, 12, and 14 (Northeast Atlantic and adjacent waters)	☑ Above MSY $B_{trigger}$, B_{pa}, and B_{lim}	⊗ Fishing pressure on the stock is above F_{MSY} and F_{pa} but below F_{lim}

Source: ICES, 2022a, b, c

The ICES advice highlights, for all three stocks, that the setting of unilateral quotas that exceed the TAC is not in line with the management plans. The scientific advice assumes catches will be limited to the level of the advised TAC, yet there has been a consistent overshoot of the TAC. ICES highlights that the F_{MSY} reference point that is used as a basis for the advice (and Fmgt for herring) has been derived from an evaluation that assumed that annual catches would be aligned with the scientific advice based on the MSY approach. Failing to adhere to the advised catches may not be precautionary. Specifically, ICES says that "**this may result in an increased risk for the stock to fall below Blim, loss of catch in the long term, and unsustainable utilization of the resource**" (ICES, 2022a; 2022b; 2022c).

Blue whiting and herring both have long-term management strategies agreed by all relevant coastal states, which establish a reduction in fishing mortality as stock biomass falls below the precautionary reference point. However, mackerel does not currently have such a management strategy in place (Table 3). Further details on management arrangements and history for each stock are provided in the following sections.

[4] Atlanto-Scandian herring

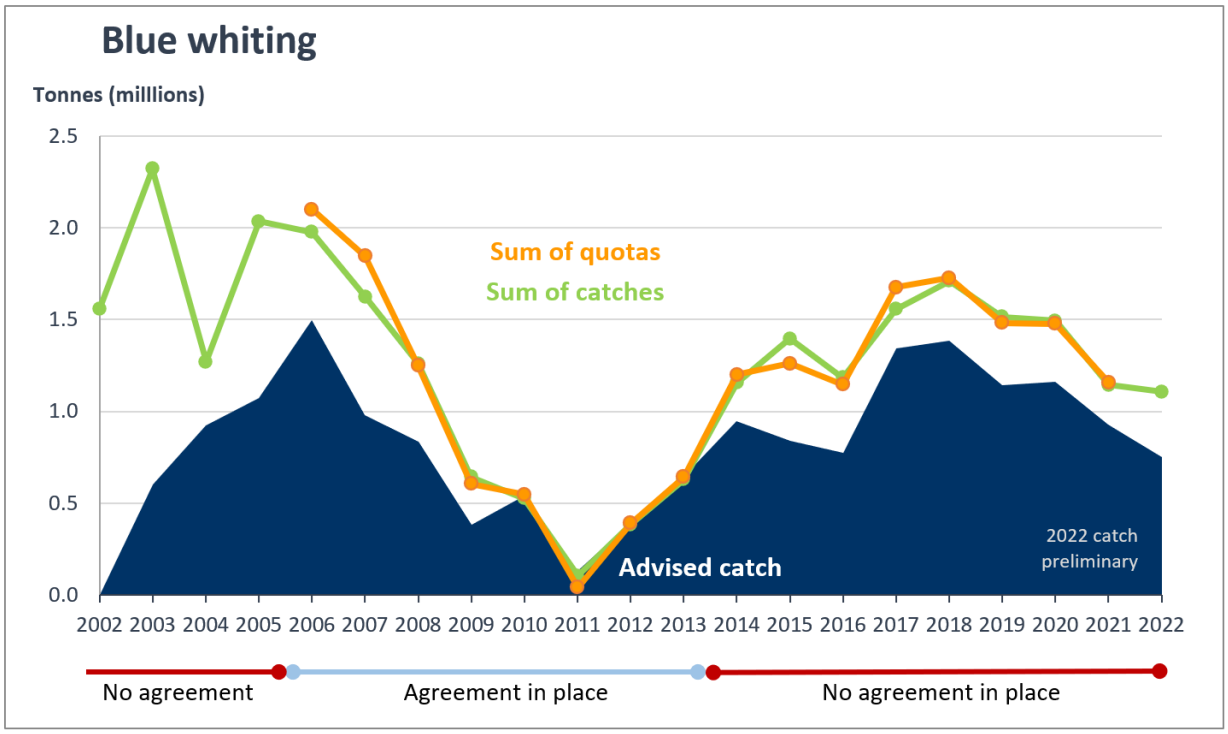
Table 3. Management plan status and HCRs for each stock

Stock	Management Plan HCR	Parties (CS) Involved	Notes
Blue whiting	✓ Target F reduces if SSB<SSB Btrigger	EU, Faroe Islands, Iceland, Norway, UK (✓ all CS)	Greenland and Russia as observers
AS herring	✓ Target F reduces if SSB<SSB Btrigger	Russia, Faroe Islands, Iceland, Norway, UK (✓ all CS)	EU and Greenland as observers
Mackerel	× No management plan agreed by all parties involved in the fishery	EU, Faroe Islands, Greenland, Iceland, Norway, UK	Russia as observer

3.1 Blue whiting

3.1.1 Summary of ICES advice for 2023

The combined unilateral quotas, and catches, for blue whiting have been exceeding the ICES-advised TAC since 2014 (Figure 3). In 2021, the combined unilateral quotas exceeded the ICES advised catches by 25%.



Source: ICES, 2022a.

Figure 3. Scientific advice on catch levels, and the sum of unilateral quotas and catches for blue whiting, 2002-2022

For 2023, the ICES advice is an 81% increase in the TAC (compared with the 2022 advice); hence, the total catch must not exceed 1,359,629 tonnes (ICES, 2022a). This equates to a 23% increase in catch, compared with 2022. The increase in the 2023 ICES advice is due to a large upward revision of the estimated recruitment in 2021 (age 1). This 2020 year class was an historical high and will be fully recruited to the fishery in 2023. The ICES advice for 2023 also highlights that fishing mortality has exceeded the

precautionary reference point since 2014. This does not adhere to the precautionary approach and in the long term could result in increased risk of stock collapse and loss of yields.

A long-term management strategy exists for blue whiting, agreed by the European Union, the Faroe Islands, Iceland and Norway in 2016 (Anon, 2016) (and subsequently by the UK in 2021 following its exit from the European Union). It was originally agreed for five years, but remains in place until the parties to the agreement decide that the necessary information to review it is available (Anon, 2021a). It includes a reduction in the target fishing mortality as the spawning stock biomass drops below the MSY Btrigger reference point (2,250,000 tonnes) (Figure 4), and a TAC constraint that avoids changes of more than 20% below or 25% above the previous year's TAC. ICES evaluated the management strategy and found it to be precautionary. Subsequently, the TAC constraint was removed in the event of catch advice being more than 40% above the previous year's advice. This has not been assessed by ICES. The management plan also allows inter-annual transfers of up to 10% of unutilised quotas, and fishing of up to 10% beyond quotas allocated (deducted from the following year's allocation).

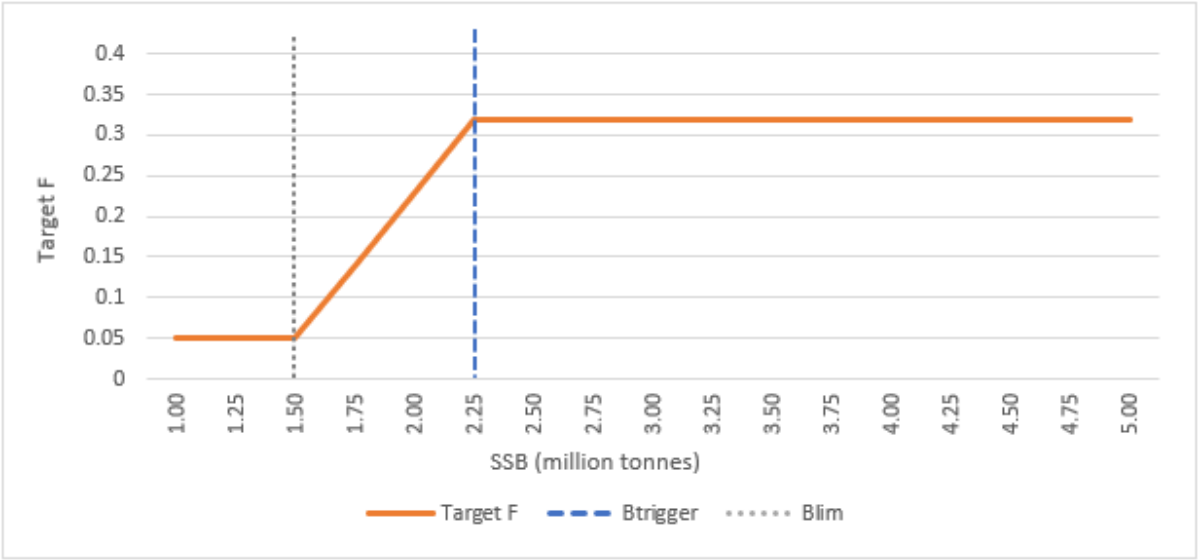


Figure 4. Target fishing mortality for blue whiting based on spawning stock biomass as set out in the management plan

3.1.2 History of management arrangements and quota shares

In the 1990s, fishing nations agreed that a cooperative sharing scheme was necessary to prevent overexploitation of blue whiting, but could not agree on how to share the TAC. Countries often set their own quotas, which greatly exceeded the recommended TAC and the stock was being harvested outside of safe biological limits.

Coastal states started discussing a possible management regime and quota sharing arrangement for the blue whiting stock. Different coastal states had different views on the appropriate method to determine quota shares. Norway claimed that the stock should be shared according to zonal attachment[5], whereas the EU, Faroe Islands and Iceland, claimed that TAC allocation should be on the basis of recorded catches from each state's exclusive zones. Economic dependency was also included as an argument in some cases,

[5] Zonal attachment considers the biomass in each zone or country's waters, integrated over the whole year, and considering different life history stages.

and historical fishing patterns were also used by all sides to support their position or invalidate others. The sum of the quota claims totalled 160% of the TAC (OECD, 2009).

An agreement was reached in 2006 between the four coastal states (EU, the Faroe Islands, Iceland and Norway), which also provided an allocation to NEAFC for Greenland and Russia. This included a long-term management plan, maximum catch limits and allocation based on fixed percentages (EU 30.5%, Faroe Islands 26.1%, Iceland 17.6%, Norway 25.7%, and an additional allocation to NEAFC). The multi-annual management plan would progressively reduce the TAC until fishing mortality reached the target level (Anon, 2005). This successfully reduced the total catch limits and catches, and over the years 2010–2013 these were broadly in line with scientific advice.

Interestingly, during the summer of 2005, prior to the coastal state agreement, various fishermen's organisations from the EU, Iceland, and Norway negotiated and signed an agreement, similar to the one signed by officials from the coastal states later that year (Bjørndal, 2009).

The blue whiting agreement broke down in 2014, and each party started to set its own unilateral quotas, the total of which exceeded the scientific advice (Figure 3). The breakdown in the arrangements followed changes to the stock assessment methodology and the report of a NEAFC Working Group (which had been convened on request of the coastal states) to collate information on the distribution of blue whiting in the North East Atlantic (NEAFC, 2013). This indicated that the agreed quota allocation percentages might not be in line with the spatial distribution of the stock, prompting the questioning of the percentages that had previously been agreed.

Coastal states have been unable to reach an agreement since. Despite agreeing on the TAC in line with scientific advice, each party sets its own quota. Over the period 2014-2021, quotas exceeded the scientific advice by 32% and catches by 35%.

3.2 Atlanto-Scandian herring

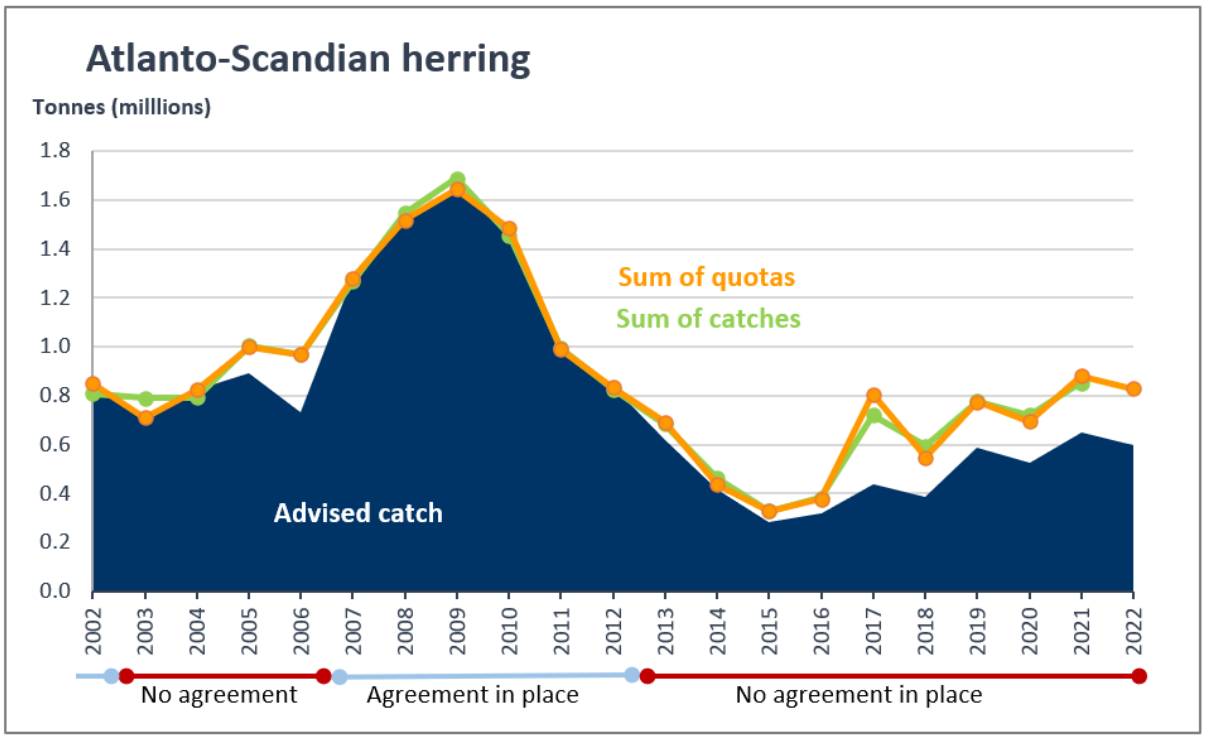
3.2.1 Summary of ICES advice for 2023

The combined unilateral quotas, and catches, for AS herring have exceeded the ICES advised TAC since 2013 (Figure 5). In 2021, the combined unilateral quotas exceeded the ICES advised TAC by 35%, and in 2022 by 38%.

For 2023, the ICES advice is a 15% reduction in TAC (compared with the 2022 ICES advice); hence, the total catch must not exceed 511,171 tonnes (ICES, 2022b). This equates to a 38% reduction in catch, compared with 2022, because catches have been exceeding the scientific advice. The ICES advice for 2023 also states that SSB is predicted to decline by a further 11% in 2023 (it has been in decline since 2008), and is predicted to fall below MSY Btrigger in 2024. The stock size has been declining as a result of low recruitment since the large 2016 year class. Furthermore, while fishing mortality (F) is below Flim, it exceeds both the F_{MSY} and Fpa reference points.

A long-term management strategy for the stock has been agreed by the European Union, the Faroe Islands, Iceland, Norway and Russia in 2018 (Anon, 2018) (and subsequently by the UK in 2021 following its exit from the European Union) and is due to be reviewed in 2023. It includes a reduction in the target fishing mortality as the spawning stock biomass drops below the MSY Btrigger reference point (3,184,000 tonnes) (Figure 6), and a TAC constraint that avoids changes of more than 20% below or 25% above the previous year's TAC. When the stock size is above or equal to MSY Btrigger, the fishing mortality to be applied is Fmgt (0.14), which is more precautionary than F_{MSY} (0.157). The management plan also allows inter-annual transfers of up to 10% of unutilised quotas, and fishing of up to 10% beyond quotas

allocated (deducted from the following year's allocation). ICES evaluated the management strategy and found it to be precautionary. The management strategy is due to be reviewed in 2023.



Source: ICES, 2022b.

Figure 5. **Scientific advice on catch levels, and the sum of unilateral quotas and catches for Atlanto-Scandian herring, 2002-2022**

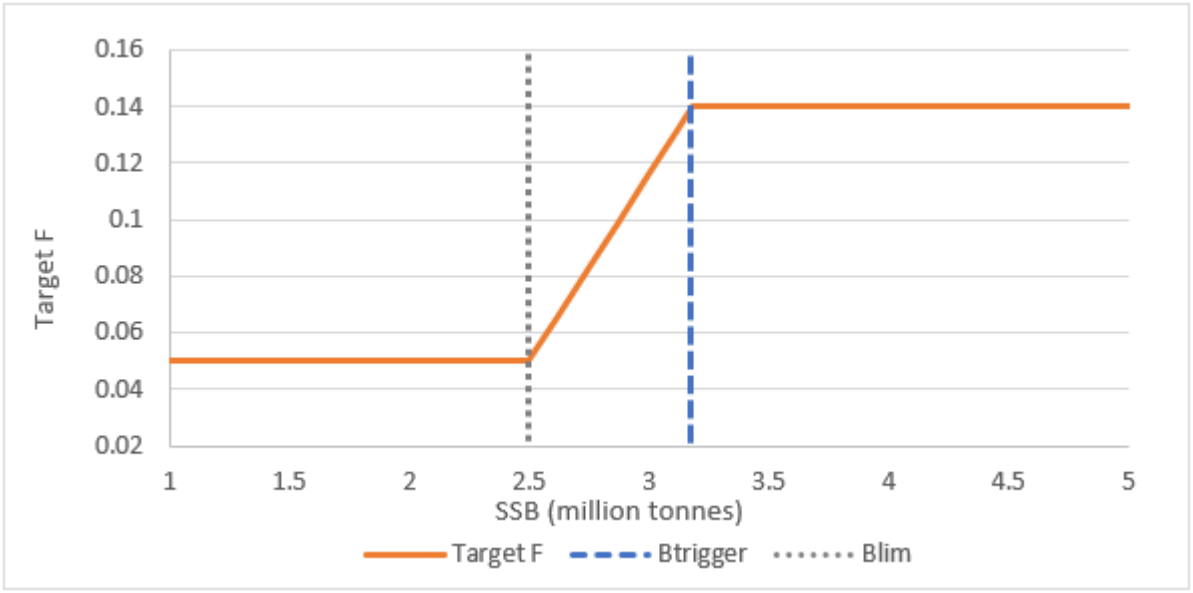


Figure 6. **Target fishing mortality for Atlanto-Scandian herring based on spawning stock biomass as set out in the management plan**

3.2.2 History of management arrangements and quota shares

There has been no quota sharing agreement for Atlanto-Scandian herring since 2012 (Figure 2). The sum of the unilateral quotas for herring have exceeded the scientific advice since 2013 (Figure 5) and the resulting catches have exceeded the scientific advice by on average 31% since then.

After the herring stock collapsed in the late 1960s, the fishery reopened in the mid-1990s, and a coastal states' agreement was put in place that included setting and sharing the TAC among the four coastal states at the time (Norway, Iceland, Faroe Islands and Russia). The harvest allocations were based on the zonal attachments of the resource. However, the EU set its own quota in 1996, and was subsequently brought into the agreement in 1997. The stock was managed cooperatively by the five states and was considered a model of cooperative resource management (Lodge *et al.*, 2007).

Changes in the abundance and distribution of herring caused a breakdown in cooperation in 2003, with Norway and Russia demanding a higher allocation based on zonal attachment arguments (Bailey *et al.*, no date; OECD, 2009). A new agreement was reached for 2007, which allocated Norway 61%, Iceland 14.51%, the Russian Federation 12.82%, the EU 6.51%, and the Faroe Islands 5.16% of the TAC.

Once again, in 2012, stock distribution changes prompted a coastal state – this time the Faroe Islands – to request a revision to its allocation, which equated to 31,000 tonnes. The Faroe Islands withdrew from the agreement and in 2013 set a unilateral national catch limit of 105,000 tonnes (Weissenberger, 2013). The introduction of trade sanctions against the Faroe Islands and restrictions on the use of EU ports by Faroese vessels fishing for herring and mackerel stocks prompted the Faroe Islands to set a lower quota, but an agreement has not yet been reached by coastal states.

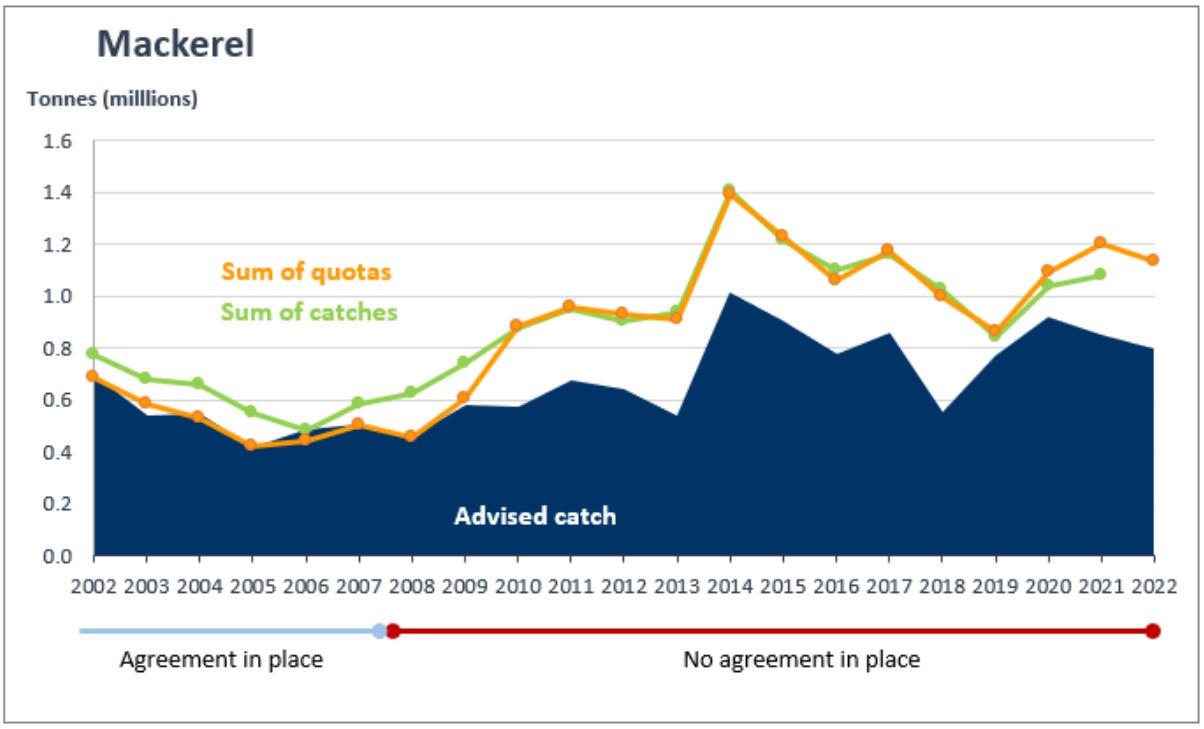
The coastal states agreed to establish a Working Group to collect and collate information on the distribution of all life stages of herring, to update the zonal attachment analysis. This reported in 2014 (Coastal States WG Herring, 2014), but quota shares have not yet been agreed. While the TAC is agreed in line with scientific advice, with a lack of agreed quota shares, unilateral quotas continue to result in overall catches above scientific advice.

3.3 Atlantic mackerel

3.3.1 Summary of ICES advice for 2023

The combined unilateral quotas for Atlantic mackerel have exceeded the ICES advised TAC since 2009 (Figure 7). In 2022, the combined unilateral quotas exceeded the ICES advised TAC by 42%.

For 2023, the ICES advice is a 2% reduction in TAC (compared with the 2022 ICES advice); hence, the total catch must not exceed 782,066 tonnes. Due to catches exceeding the scientific advice in 2022 (catches of 1,131,416 tonnes compared to scientific advice of 794,920 tonnes), this would result in a 31% decline in catches compared to 2022. The 2022 ICES advice also states that SSB is predicted to decline by 1% in 2024, but will continue to be above MSY Btrigger, Bpa, and Blim. However, while fishing mortality (F) is below Fpa, and Flim, it exceeds F_{MSY}.



Source: ICES, 2022c.

Figure 7. Scientific advice on catch levels, and the sum of unilateral quotas and catches for mackerel, 2002-2022

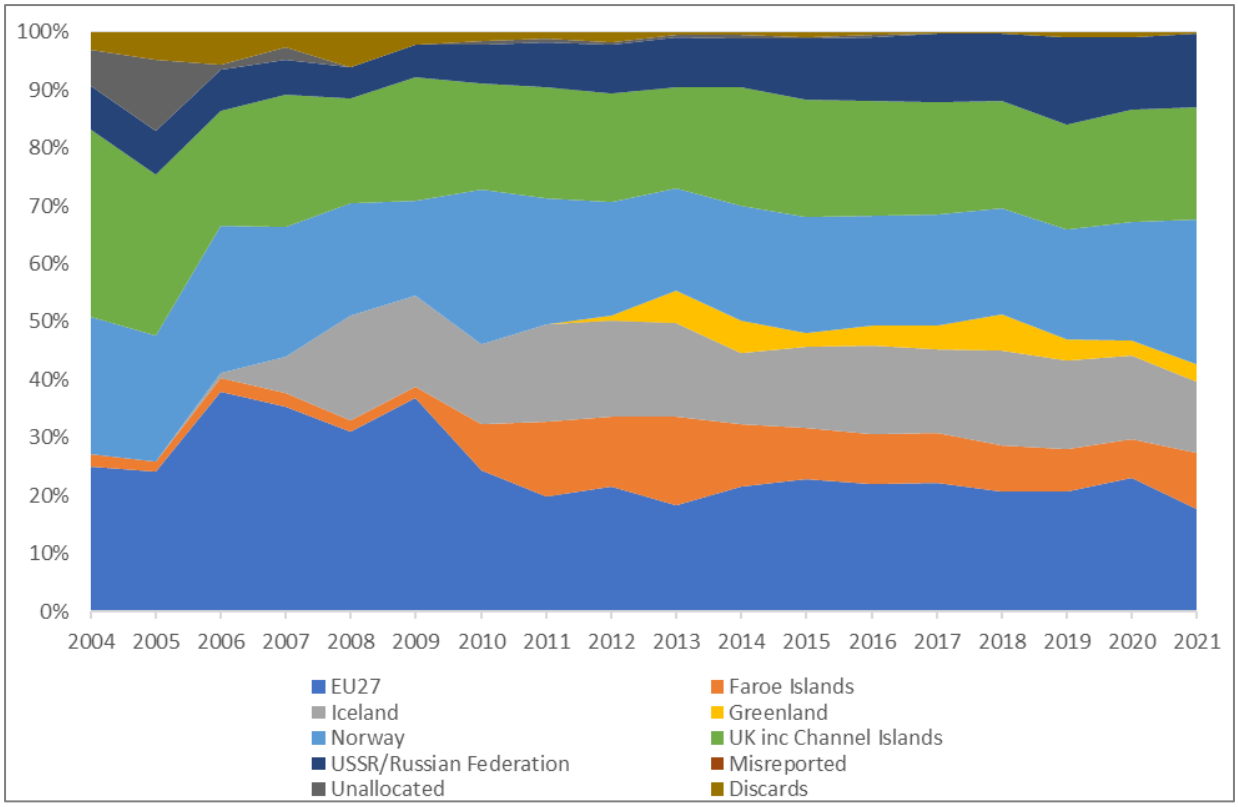
3.3.2 History of management arrangements and quota shares

There has been no quota sharing agreement for mackerel since 2007 (Figure 2). The sum of the unilateral quotas for mackerel has exceeded the scientific advice since 2009 (Figure 7) and the resulting catches have exceeded the scientific advice by on average 40% since then.

Prior to 2006, the mackerel stock was predominantly present in Norwegian, EU (including UK), and Faroese waters, and a stable agreement existed between the three parties, keeping quotas and catches in line with scientific advice.

Expansion of the mackerel stock, and changes to its migratory pattern resulted in the stock being present in coastal states' waters where it had not previously been (Iceland, Greenland), and increasing in abundance in others (Faroe Islands). This led to setting unilateral quotas outside of the agreement in 2007/2008, and some parties claiming a greater proportion of the TAC. The quota sharing arrangement between Norway, EU and Faroe Islands broke down in 2009 (although unilateral quotas had been set by states outside of the agreement since 2007/8).

All three states significantly increased their catches of mackerel (Figure 8). Iceland increased its catches of mackerel from 363 tonnes to 112,000 tonnes in the space of a few years (from 2005 to 2008) and set a national annual quota of 152,141 tonnes in 2021. The Faroe Islands increased its quota from 25,000 to 150,000 tonnes (Scottish Parliament, 2014), and its catches increased from around 13,000 tonnes annually over the period 2002-2009, to 130,000 tonnes annually over the period 2011-2014. Greenland also began setting its own quota for mackerel, going from just 62 tonnes of catches in 2011 to 78,581 tonnes in 2014 (ICES, 2022c).



Source: ICES, 2022c.

Figure 8. Mackerel catches by nationality, as a percentage of total catch, 2004–2021

A tripartite agreement was achieved between the EU (including UK), the Faroe Islands and Norway from 2014–2018, which also provided an allocation to other fishing states (e.g. Russia) through NEAFC, set at 15% of the TAC[6]. However, Iceland and Greenland, who claimed coastal state status due to the stock now occurring in their waters, were not party to the agreement. As a result, the agreement did not involve all relevant parties and did not constrain overall effort on the stock. Over this period, quotas were still 46% above the scientific advice on average, and catches 47% above. The tripartite agreement was time-limited because the Faroe Islands were only prepared to agree to the allocation key for a specific time period, so that if the distribution of the mackerel stock were to shift further, renegotiation of the allocation key could be undertaken (ABPmer, 2018).

Since 2018, each party has set its own unilateral quota, based on the percentage of the TAC that it thinks it has the right to. This has resulted in total quotas exceeding scientific advice by 28% on average (over the period 2019-2022) and catches by 16% (over the period 2019-2021). A comprehensive agreement that involves all relevant parties is still elusive.

A recent report on mackerel distribution found that the stock has experienced a large-scale northward and westward expansion particularly from 2010-2019. However, from 2018 onward there has been a reduction in abundance of mackerel in the western area, and a substantial decline of mackerel in the Icelandic and Greenland waters from 2018-2020 (Anon, 2022b). This has coincided with an increase in mackerel catches from international waters, from 21% in 2018 to 24% in 2020 (ICES, 2022c). In 2021, the Russian Federation did not report catches inside versus outside the NEAFC Regulatory Area, but ICES notes that around 90% of Russian catches in the past have been taken from inside the NEAFC Regulatory Area. Applying this to Russia's catches for 2021 results in around 29% of all catches potentially coming from international waters (Table 4).

[6] https://www.arctictoday.com/greenland-moves-to-join-north-atlantic-mackerel-fishing-agreement/

Table 4. Catches inside the NEAFC Regulatory Area (international waters), and outside the NEAFC Regulatory Area (within coastal states' EEZs), 2018-2021

Year	Inside the NEAFC RA	Outside the NEAFC RA	Total catch	Percentage inside the NEAFC RA
2018	213,608	809,536	1,023,144	21%
2019	207,200	632,527	839,727	25%
2020	247,901	791,612	1,039,513	24%
2021 (excl Russia)*	195,939	749,427	945,366	21%
2021 (Russia)**	122,558	13,618	136,176	90%
2021 incl Russia**	318,497	763,045	1,081,542	29%

* 2021 data are reported without catches from the Russian Federation, as it did not report catches inside/outside the NEAFC RA for 2021.

** In the past, around 90% of Russian catches were taken inside the NEAFC RA. This assumes the same split of catches inside vs outside the NEAFC RA by the Russian Federation, applied to 2021 official catch data.

Unlike blue whiting and herring, there is no long-term management strategy agreed to by all parties for the mackerel stock. In 2019, Norway, the EU (including the UK) and the Faroe Islands requested ICES to review Harvest Control Rule (HCR)[7] options for a long-term management strategy. The advice was published in August 2020 (ICES, 2020). The request does not specifically address the inclusion of Russia, Greenland and Iceland in the implementation of the strategy (Lloyds Register, 2021). However, an important aspect of a comprehensive management plan is to ensure that it includes all nations applying pressure on the stock.

[7] A Harvest Control Rule is an algorithm for pre-agreed management actions as a function of variables related to the status of the stock, e.g. a control rule can specify how F or yield should vary as a function of spawning biomass; also known as 'decision rules' or 'harvest control'.

4 Certification and Market Implications

4.1 Sustainability and certification

The lack of overarching agreements between all relevant states on management of the stocks and allocation of quota shares has significant implications for sustainability. As shown in Section 3, this has resulted in quotas, and catches, being above sustainable levels as advised by ICES, for many years. As a result, fisheries for these stocks have had their MSC certification suspended and have subsequently withdrawn from the Program (Table 5). The suspension from the MSC Program has been primarily related to the management frameworks, and their inability to effectively constrain fishing effort on the stocks.

The lack of agreement on TAC shares, resulting in unilateral quotas being set, and both quotas and catches exceeding the ICES scientific advice, means that the harvest strategy (where one exists) is not achieving its objectives, and the harvest control rules and tools (i.e. TACs and quotas) do not constrain the exploitation levels of the stock. Further details on the reasons for the lack of progress on certification conditions, and failures against the MSC Fisheries Standard, are provided in Appendix A.

4.2 Market implications and response

The suspension of certification for these fisheries and their subsequent withdrawal from the MSC Program causes supply chain issues for companies that have commitments to source from certified sustainable fisheries. The suspension has resulted in a significant reduction of pelagics in the MSC Program (Table 5), affecting the availability of certified, sustainable product. It has contributed to the 20 % reduction in MSC global sales of fish in 2021-2022, as well as a 6% drop in worldwide production of certified marine feed ingredients between 2020 and 2021 (Makefood International, 2022).

Many processing businesses, producers of aquaculture feed, and retailers have sustainable sourcing policies that commit them to buying from certified fisheries and the suspension and/or subsequent withdrawal of blue whiting, AS herring and mackerel from the MSC Program affects the availability of certified product. Some buyers are switching, or considering switching, their sourcing for pelagics to Chilean jack mackerel (MSC certified) to replace the loss of certified product from the NEA pelagic fisheries (Makefood International, 2022). North Sea herring (also MSC-certified) offers another option for supply chains seeking sustainable product.

The North Atlantic Pelagic Advocacy Group (NAPA)[8] is a supply chain initiative which was established to help drive improvements in the NEA pelagic fisheries. It was created in 2019 in response to the suspension of the mackerel fishery from the MSC Program. NAPA was formed by processors, retailers, food service businesses and buyers from Europe, Africa, Canada, Australia and Japan. It represents nearly 50 members that collectively account for €800 million of NEA pelagic purchasing. In 2022, NAPA released a position paper with three key demands for resolving the issues around the pelagic stocks: to agree an appropriate allocation mechanism; to employ a dispute resolution mechanism; and to consider a cap on catches in international waters (NAPA, 2022).

[8] https://napafisheries.org/

Table 5. NEA pelagic fisheries withdrawn and suspended from the MSC Program

Fishery	Stock/Species	Status	Annual Tonnage
PFA, DPPO, KFO, SPSG & Compagnie des Pêches St Malo Northeast Atlantic blue whiting Pelagic Trawl	Blue whiting	Withdrawn	292,000 t (2019)
Faroese Pelagic Organization North East Atlantic blue whiting	Blue whiting	Withdrawn	340,808 t (2019)
ISF Iceland North East Atlantic blue whiting	Blue whiting	Withdrawn	270,870 t (2019)
Norway North East Atlantic blue whiting	Blue whiting	Suspended	438,426 t (2018)
SPSG, DPPO, PFA, SPFPO & KFO Atlanto-Scandian purse seine and pelagic trawl herring	AS herring	Withdrawn	36,000 t (2019)
Faroese Pelagic Organisation Atlanto-Scandian herring	AS herring	Withdrawn	115,502 t (2019)
ISF Icelandic summer spawning herring trawl and seine	AS herring	Withdrawn	81,726 t (2019)*
Norway spring spawning herring	AS herring	Suspended	309,322 t (2016)
MINSA North East Atlantic mackerel	Atlantic mackerel	Withdrawn	778,341 t (2019)
Northern Ireland Pelagic Sustainability Sea herring fishery Group (NIPSG) Irish Sea-Atlantic mackerel & North Sea herring	Atlantic mackerel	Withdrawn	10,701 t (2020)
ISF Iceland mackerel	Atlantic mackerel	Withdrawn	129,584 (2019)
Faroese Pelagic Organisation North East Atlantic mackerel	Atlantic mackerel	Withdrawn	61,021 t (2019)
* AS herring only (the fishery used to target two herring stocks and only AS herring has been withdrawn)			

Fishery Improvement Projects (FIPs) have been established for the three stocks. These are multi-stakeholder initiatives that aim to help fisheries work towards sustainability. Responsible sourcing policies usually allow sourcing to continue from FIPs, although FIPs must be credible and show measurable improvement. Mackerel and AS herring are in a NAPA policy FIP, which is working with stakeholders to implement management improvements with a goal to re-certify the fisheries against the MSC Standard by 2024 (Pickerell, 2022). Blue whiting, which is predominantly used to produce fish meal, is in a MarinTrust Improver Programme FIP[9]. MarinTrust is an international certification programme for marine ingredient (fish meal and fish oil) certification.

Industry bodies are calling for a resolution to the issue, and the establishment of agreed quota shares to ensure the sustainability of the stocks (SPSG, 2022; EAPO, 2022). Individual companies have made statements that if a FIP for one of these stocks should fail to make progress, they may:

- Stop sourcing from the fishery;
- Reduce sourcing from the fishery;
- Pay a lower price; and
- Review their sourcing policies.

[9] https://www.marin-trust.com/ne-atlantic-blue-whiting

In particular, Youngs Seafood, the largest seafood processor in the UK, has indicated it would stop sourcing from these fisheries if coastal states do not reach an agreement on managing the stocks (The Guardian, 2022):

> *"Young's considers that the unilateral setting of quotas is an unacceptable threat to shared-stock fisheries and that the coastal states involved in these fisheries should support securing an agreement on total allowable catches in line with ICES [International Council for the Exploration of the Sea] advice and strive for a long-term science-based management agreement"*

The loss of MSC certification has implications for the fisheries themselves, including a reduction in price achieved for their product (Makefood International, 2022). Blue whiting prices fell by more than 20% in 2021, alongside the loss of MSC certification, although prices are also influenced by quotas and fisheries for other species such as capelin, Peruvian anchovy and sandeel (Fishing News, 2022). Despite the loss of MSC certification, the fisheries have been able to continue selling their catch, partly due to the implementation of the FIPs and rating guides that have green ratings for these stocks, but also through selling to other overseas markets, particularly in Africa and Asia, that may not have the same sustainability requirements for certified seafood products.

5 Options and Approaches

"The negotiation of …[the] allocation of participatory rights,
and the outcome, is subjective and highly politicized"

Lodge *et al.*, 2007.

The NEA pelagic stocks are succeeding in two out of three key aspects of management, failing when it comes to agreeing quota shares (Figure 9).

	Management plan for the stock, agree on setting the TAC in line with scientific advice (for herring and blue whiting – a long term management plan is not currently in place for mackerel)
	No agreement of shares of the TAC, resulting in the sum of individual quotas exceeding the TAC and risking catches exceeding the scientific advice
	Enforcement and compliance with quota limits set

Figure 9. NEA pelagics' performance against key aspects of management

Quota shares are recognised as one of the key difficulties in managing shared stocks. Lodge *et al.* (2007) identified the main difficulties encountered in allocation mechanisms (specifically in relation to RFMOs, but they also apply to coastal state agreements) as:

- The inability to agree on a TAC because of the concomitant limits it would impose on national fleets;
- An inability to accommodate new members with an interest in fishing within allocation regimes; and
- Non-compliance with national allocations owning to perceived inequalities.

NEA coastal states agree on the TAC aligned with scientific advice, but then set unilateral quotas that exceed the TAC. This has the same effect as not being able to agree on the TAC or follow scientific advice. Difficulties in accommodating new members are reflected in the break-down of arrangements as stocks shift in their distribution and abundance (e.g. the expansion of mackerel distribution, which resulted in Iceland and Greenland becoming new coastal states as the stock became increasingly abundant in their waters). However, coastal states and fishing states do demonstrate good compliance and enforcement of their national quota allocations.

Game theory approaches provide an indication of the conditions required for a stable and cooperative outcome for shared management (Bjørndal *et al.*, 2022). Specifically:

1. There must be effective communication between all parties;
2. There must be an anticipated return from a cooperative arrangement that is at least as great as that from non-cooperation;
3. The arrangement should be collectively rational for all parties, i.e. there is not an alternative solution that would make one or more players better off, without harming the others;
4. The arrangement must be resilient in the face of unpredictable shocks (environmental, economic or political).

Based on an analysis of game theory and the historical development of the NEA pelagic fisheries, Bjørndal *et al* (2022) conclude that. The fourth condition – resilience in the face of external shocks – has also not been met, illustrated by the repeated breakdown of arrangements for the different stocks over time. They find that there may be incentives for cooperation when stock sizes are declining or low[10], so that the stock can recover, but the incentives reduce when stock sizes are healthy, leading to cycles of more and less cooperation.

The key requirement for a stable agreement is political will. Assuming that this exists – and the continued discussions and willingness of coastal states to engage with each other suggests it does – an agreement is possible. The right incentives need to be in place to help ensure that the benefits of reaching an agreement outweigh the costs. Market demands for sustainable and well-managed fisheries have an important role to play in this, including benefits of medium- to long-term sustainability and stability of production. This section therefore explores a series of options for different ways of establishing quota shares and possible agreement structures, and their pros and cons. Additionally, a series of options that could be adopted to avoid catches exceeding scientific advice are considered.

5.1 Options for establishing quota shares and agreement structures

This section explores various approaches to establishing quota shares, to defining them and the overarching agreement structure. Experience to date shows that allocations have invariably been a political decision, a negotiated outcome between sovereign states (Lodge *et al.* 2007).

Quota shares can be based on a range of different criteria. Most common are those based on historical landings records, although zonal attachment criteria are gaining increasing visibility (Figure 10). Historical landings is a relatively straightforward way of determining allocations, as supporting data are usually readily available, and it reflects the available catching capacity of the states involved. However, it can limit the potential for new entrants to the fishery, and can result in states increasing their targeting of a stock to support their claim for higher quota shares. The EU's Relative Stability is predominantly based on historical landings records, although there have been adjustments to account for the loss of distant water fishing grounds, and economic dependency of coastal communities on fishing.

Zonal attachment can be used to determine quota shares, taking into account the distribution of the various life history stages of the species, including nursery and spawning grounds. The resulting allocations reflect the distribution of the stock, but determining zonal attachment can require large amounts of data and it may be subject to changes as stock distributions shift, putting agreements under pressure. Quota shares under the EU-Norway bilateral agreement are based on zonal attachment, and have not been revisited since the original agreement (except to accommodate a three-way agreement between the EU, UK and Norway after Brexit).

Other criteria can also be incorporated in, or form the basis of, quota allocations. These might include the level of contribution to science and management of the stock, dependency of coastal communities on fishing the stock, and the national level of economic dependency on fisheries. Possible criteria are set out in UNFSA, although the ways of calculating such criteria quantitatively are not (see Appendix B). Furthermore, incorporation of multiple criteria may require the relative weighting of each one to be determined and agreed, which presents an additional area for agreement and various national interests will be at play.

[10] The likelihood of a coalition increases with falling stock biomass, perhaps because a stock collapse will be harmful to all parties and the only way to avoid it is through cooperation.

	Historic landings	Zonal attachment	Other criteria
Description	Quota shares are based on historic landings by each country's fleet, from an agreed reference period. Favours those parties with historical participation in the fishery.	Quota shares are determined by the proportion of the stock biomass (over all life history stages). Favours those parties in whose waters the stock resides.	Various other criteria can be incorporated, such as: level of contribution to science and management of the stock; dependency of coastal communities on fishing the stock; level of economic dependency on fisheries.
Pros	▪ Reflects past interest and involvement in the fishery ▪ Data easily available to determine relevant quota shares	▪ Reflects distribution of the stock in coastal states' waters	▪ A variety of criteria can be considered, and tailored to specific interests of the parties involved
Cons	▪ Does not enable new entrants to the fishery, although they may have a valid claim to a quota share ▪ Parties may delay allocation decisions until they have increased their participation in the fishery to a level that they feel will give them a 'fair' share	▪ Data hungry approach and may never be possible to achieve full knowledge of complete distribution of all life history stages ▪ May not provide a stable basis for quota allocations in the face of environmental changes	▪ Additional criteria make the process of defining shares more complicated ▪ Criteria options are set out in UNCLOS, but their quantitative definition is not agreed ▪ Weighting between criteria may be difficult to agree on, and ultimately is a subjective and political choice
Examples	EU Relative Stability (with adjustments to take account of other aspects)	EU-Norway bilateral agreement	EU Relative Stability includes some adjustments to compensate for loss of distant-water fishing grounds and dependence on fisheries

Figure 10. Quota share criteria

If the criteria can be agreed on for an initial quota allocation, a further issue is to decide whether quota allocations should stay fixed indefinitely, or whether there should be an agreed mechanism for their adjustment and review (Figure 11). Since quota allocations can be difficult to agree, having fixed quota allocations can provide stability and predictability. Several long-standing agreements use fixed quota shares without specific mechanisms for their revision, e.g. EU Relative Stability, the EU-Norway bilateral agreement (now EU-Norway-UK trilateral agreement), and the more recent EU-UK Trade and Cooperation Agreement. However, fixed does not mean inflexible, and it should be noted that the EU Relative Stability quota allocation key has been updated to accommodate new entrants (e.g. Spain and Portugal's accession

to the European Economic Community) and more recently the exit of the UK from the European Union. However, fixed quota allocations mean that shares may not reflect the current distribution of stocks, nor current national interests in fishing those stocks, and may be put under strain as stock distributions change.

	Fixed Quota Shares	Adjustable Quota Shares
Description	Quota shares are agreed and remain fixed for an indefinite period, with no process for review or adjustment	Quota share agreements have a built-in review period and agreed approach to adjust shares according to changes in stock distribution, new entrants
Pros	▪ Provides clear and stable quota shares for involved parties ▪ Avoids continual revisiting of shares and possible breakdown/ disagreement	▪ Quota shares adjust (periodically) to reflect changes in stock distribution, adaptable to climate-induced shifts
Cons	▪ Shares may not reflect current distribution of stocks, nor interest in fishing those stocks – a mechanism for quota transfers can help address this ▪ Can break down when changing stock distributions become apparent, e.g. NEA pelagic stocks	▪ Creates winners and losers as quota shares change* ▪ May be difficult to negotiate agreement on criteria for determining adjustment of quota shares ▪ Additional costs involved in data collection and analysis for revision of quota shares
Examples	▪ EU Relative Stability (Peñas-Lado, 2016) ▪ EU-UK Trade and Cooperation Agreement (after phase-in period) ▪ EU-Norway bilateral agreement, and now EU-Norway-UK trilateral agreement	▪ Parties to the Nauru Agreement (PNA) tuna fishery (see Box 1) ▪ Pacific Halibut Convention (see Box 1)

* although additional mechanisms can be incorporated to allow parties to trade and access quota that their industry needs

Figure 11. Fixed and adjustable quota shares

In contrast to fixed allocations, quota shares can be adjusted, so that they adapt to changing stock distributions or have an agreed process for accommodating new entrants where appropriate. This does not necessarily mean that quota shares change annually, but a periodic review system, and agreed process for revising allocations, can be put in place. This can enable quota allocations to be updated as stock distributions shift, without needing to renegotiate the whole agreement. However, this is likely to create winners and losers, and creates an added level of complexity to be agreed along with the initial quota shares. This may be worth pursuing, as the alternative may be the breakdown of the agreement and potential over-fishing of the stock, which would mean that all parties would be losers in the longer-term.

With both fixed and adjustable quota shares, building in additional flexibility to agreements, such as the potential for parties to swap, trade or lease quota, can help to match fishing opportunities with fish availability on the ground, and industry needs (ABPmer, 2018).

There are some examples of agreements with adjustable quota shares (Box 1).

Box 1: Case studies – Adjustable quota shares

Pacific halibut

Pacific halibut (*Hippoglossus stenolepis*) are found along the continental shelf in the North Pacific and the Bering Sea, and are commercially harvested by Canada and the USA. Through the Canada-USA Halibut Convention, the International Pacific Halibut Commission (IPHC) sets out management areas, conducts stock assessments and decides on total removals of Pacific halibut in all management areas on an annual basis. The management areas are delineated along national boundaries, so that the determination of removals from each management area effectively represents the division of the TAC between the two parties (ABPmer, 2018).

Through annual stock assessments, IPHC estimates the coastwide exploitable biomass. Exploitable biomass by regulatory area (eight areas in total) is then calculated based on survey data, and a fixed exploitation rate is applied to that biomass to obtain an allowable yield for each regulatory area (Bailey *et al*., no date). As such, the percentage of the TAC allocated to different management areas varies by year according to the stock assessment results; it is not a fixed percentage.

The IPHC sets catch limits, fishing seasons, and can also adopt other regulatory recommendations, which are enforced by national authorities. The governments of Canada and the USA also adopt domestic regulations to manage the portions of the fishery in their respective waters.

This provides an example of an approach to quota shares between two parties, where the percentage allocations vary annually based on biomass estimates from surveys, such that they adjust each year to the distribution of the fishable portion of the stock.

Parties to the Nauru Agreement (PNA) Vessel Day Scheme

The tuna fishery of the Western Central Pacific Ocean (WCPO) is one of the largest and most valuable fisheries in the world, with an estimated delivered value to processors on the order of US$3.4 billion (World Bank, 2016). The tuna resources are distributed in large part across the interlocking EEZs of coastal states, which cover 14.8 million square kilometres, but are also in high seas areas. The eight Pacific States in the PNA have developed a Vessel Day Scheme (VDS) for purse seine tuna vessels, which aims to establish a management system that both conserves the resource and secures the flow of net economic benefits from the fishery (Arnason *et al*., 2015).

There is a limit on the total number of fishing vessel days, and these are allocated among the coastal states according to an agreed formula (Havice, 2013, cited in World Bank, 2016). The allocation key is based on several criteria, including one which adjusts according to stock distribution – a seven-year moving average of the distribution of tuna catch in the waters of member countries. The allocation is unlikely to be skewed or manipulated by strategic fishing behaviour, because fishing is mostly carried out by third country vessels, which will fish in the area that is most advantageous to them in terms of the cost of a vessel day and the anticipated returns from fishing (ABPmer, 2018).

Vessel days can be transferred between the parties, and sold to fishing states/companies. A minimum price is set to avoid distant water fishing nations from pitting PNA members against each other to see which offer the lowest price. The ability to transfer days between the parties mean that if one party has sold all its fishing days, it can purchase more from another member, if foreign vessels are still interested in fishing in its waters. This helps to ensure that all parties receive benefits from the agreement.

Under the Pacific Halibut Convention, quotas are set for specific areas which align with national boundaries, and are based on annual biomass surveys, effectively providing an allocation mechanism that adjusts with changing stock biomass distribution. The Parties to the Nauru Agreement (PNA) tuna fishery provides an example of a data-driven, adaptive allocation system, that also provides for trading of fishing opportunities between parties, maximising their potential uptake.

Agreements for quota sharing can be reached for individual, single stocks with the relevant parties, or a single agreement may cover multiple stocks (Figure 12). A series of single-stock agreements is the approach that has so far been taken with the NEA pelagics. In this case, each stock is treated in isolation, and lack of agreement for one stock does not prevent agreement being reached for another. However, where the same parties have interests in several stocks, a single agreement can be reached which incorporates all relevant stocks. Multi-stock agreements may be more difficult to reach initially, as several stocks are under consideration, and it may increase the number of parties involved (as there may be different combinations of coastal and fishing states for the different stocks). However, they may provide an opportunity to facilitate agreement by allowing compromises to be made that trade-off benefits between different stocks and other associated issues such as access to waters, and may be more resilient in the longer term, as withdrawing from the agreement would put the associated and wider benefits at risk.

	Series of single-stock agreements	Multi-stock agreement
Description	Individual, separate agreements for each stock	Single agreement that encompasses management and quota shares for several stocks
Pros	▪ Each stock treated in isolation, agreement can be made for one stock even if it is not reached for other stocks	▪ Benefits can be traded off between stocks, and include other associated benefits such as access to waters, which may facilitate compromise ▪ May discourage parties from withdrawing from the agreement as the potential losses across several stocks may be greater than under a single stock agreement
Cons	▪ If a party decides to withdraw from the agreement, there are no other consequences in terms of their access to other stocks (unless other countries impose other measures, e.g. trade sanctions)	▪ May be difficult to reach agreement across several stocks ▪ Increases the number of parties involved, as different stocks may have different combinations of coastal states and fishing states
Examples	Tripartite agreement for mackerel between the EU, Faroes and Norway from 2014-2018	EU Relative Stability (Peñas-Lado, 2016) EU-UK Trade and Cooperation Agreement

Figure 12. Single-stock and multi-stock agreements

5.2 Process for reaching agreement

The process for reaching agreement is predominantly a political one, and while data can be used to inform decisions, different data sources can also be used in support of differing negotiating positions. Science-driven approaches may be used to determine quota shares, such as through analysis of population dynamics, stock distribution, abundance and life histories, to determine zonal attachment shares. Such an approach may be considered to be objective and neutral, but there is still a level of subjectivity in selecting the criteria and approach to analysing the data to determine zonal attachment. There are disadvantages to data-driven approaches; the more data-hungry an approach is, the more expensive it is to collect and analyse the required data. Having perfect knowledge of all aspects of a stock is not possible to achieve, so there will always be a level of uncertainty, and all approaches will be open to criticism. However, it is not necessary to have perfect data on the stocks in order to reach an agreement. Agreements are ultimately political and represent a trade-off in the interests of the parties involved. There is a level of subjectivity, and the relative power of the players in the negotiating process can influence the overall outcome.

Currently in the NEA pelagic fisheries, agreements are based on consensus decisions, meaning all involved parties must agree. This avoids minority interests being overruled by others, but also means a lack of consensus results in no agreement and unsustainable practices continuing. The South Pacific Regional Fisheries Management Organisation (SPRFMO) and Chile manage the Chilean jack mackerel fishery, and SPRFMO uses majority voting in instances where consensus cannot be reached, together with an objection procedure which enables decisions to be reviewed by a panel, and dispute resolution procedure (Box 2). Such an approach enables agreement to be made, and issues of concern challenged, without the complete breakdown of agreements.

Box 2: Case study – Chilean jack mackerel

The Chilean jack mackerel (*Trachurus murphyi*) stock occurs in the South Pacific in the Chilean EEZ and in international waters. The South Pacific Regional Fisheries Management Organisation (SPRFMO) Convention came into force in 2012, aiming to address the international conservation and management of fishery resources and protection of marine biodiversity in high seas areas of the region. In 2013, Chile introduced a new Fisheries Law which allowed the adoption of SPRFMO TAC limits and Conservation and Management Measures within the Chilean EEZ (Lloyds Register, 2019).

The TAC is set by the RFMO and there are agreed percentage allocations and quotas for each Member and cooperating non-contracting party (CNCP). Ten different states have an allocation of jack mackerel quota, and are based on previous catch proportions. These were originally set based on their share of 2010 catches as reported to the Executive Secretary (PCA, 2013), and are periodically reviewed (for example quota shares were set and agreed for the period 2018 to 2021). Transferability is incorporated – a Member or CNCP may transfer all or part of its catch entitlement to another Member or CNCP.

In instances where consensus cannot be reached in SPRFMO, majority voting is used. For questions of procedure, a simple majority vote is used, and for questions of substance a three-fourths majority is required. An objection procedure is available which allows contracting parties to object to a Commission decision and for it to be reviewed by a panel. If resolution cannot be reached, Article 34 (Settlement of Disputes) is initiated, which implements the dispute resolution of the UNFSA (SPRFMO, 2015). The SPRFMO objection process has been tested and proven to be effective in relation to quota share disputes for jack mackerel, including objections involving Ecuador and Russia.

5.3 Options in the absence of quota share agreements

If quota shares cannot be agreed, there are some options that could be brought into agreements and their overarching frameworks, that could help to avoid a lack of consensus on quota shares resulting in catches exceeding scientific advice. Building these fall-back options into agreements would also increase the incentives for agreeing quota shares, making resilient arrangements more likely. These are explored below.

If coastal states fail to reach agreement on catch shares, **the TAC for the stock could be set to zero** and the fishery would be effectively closed for that year, if the closure is enforced. This 'zero TAC' option has been proposed by Dankel *et al.* (2015). The zero TAC would make the benefits of an agreement outweigh the costs of no agreement, encouraging agreement of catch shares. However, there is no mechanism to implement this, and coastal states would lose out compared to the current non-cooperation option which is to continue fishing under nationally-set unilateral quotas. It would therefore be very difficult to envisage coastal and fishing states adopting such an approach.

Alternatively, the **fishery could be closed when total catches reach the agreed TAC**. This would involve all coastal and fishing states stopping fishing when catches reach the agreed TAC. This would prevent total catches exceeding the TAC, ensuring scientific advice is adhered to for the fishery. However, it would encourage an 'olympic' fishery where participants seek to fulfil their quota as quickly as possible. This can lead to a glut of supply (affecting processors and markets) and the fish being caught at a non-optimal time. Different states fish at different times of the year, so this would introduce inequalities of access to the resource. It also presents problems with enforcement, as currently there is no mechanism for real-time sharing of catch data, which would be needed to implement this option. This option is unlikely to be acceptable to coastal and fishing states.

The current agreements allow for an inter-annual quota flexibility, where states can fish up to 10% in excess of the current year's quota (which is then deducted from the following year's quota), and any unfished quota from one year is transferred and added to the following year's quota. In the current situation where the sum of quotas exceeds scientific advice, the ability to transfer unfished quota to subsequent years does not reflect sustainable management practices. Having **no transfer of unfished quota between years**, when there is a lack of agreement on quota shares, would help to reduce the degree to which catches exceed scientific advice in subsequent years through the transfer forward of quota. This would not be sufficient to avoid catches exceeding scientific advice, but it represents a responsible action that states could easily incorporate into the existing agreements.

If coastal states fail to reach agreement on catch shares, states could agree to a **reduced TAC**. This reduced TAC should take into account the level to which unilateral quotas have overshot the scientific advice in the past. By agreeing a TAC lower than the scientific advice, this would help ensure that the sum of unilateral quotas would not exceed the scientific advice itself (on the basis that coastal and fishing states continue to set their unilateral quotas as the same percentage of the agreed TAC as before). This would make the benefits of an agreement outweigh the costs of no agreement, encouraging agreement of quota shares, as parties should be able to achieve higher shares by coming to a TAC allocation agreement and setting the TAC in line with scientific advice. However, there would still be a risk that, in the absence of a quota sharing agreement, states could set quotas that still exceed the scientific advice. Coastal states would have to agree to this as a fallback position in the event of lack of agreement on catch shares, and it would be unlikely to be in their interests to agree to this (as they could achieve a higher quota by setting unilateral quotas, continuing the status quo). It would also affect coastal states that have maintained, rather than increased, their quota shares in recent years. However, such an approach could provide a starting point for quota share negotiations, allowing some headroom for quota shares to be

adjusted to account for: recent expansion of catches beyond stock availability; historic dependency and investment in the fishery; national economic dependency on fisheries, etc.

In the absence of agreed quota allocations, states and the market could **establish a level of 'responsible' quota for each party**, independent of the quota that each party actually sets. This could be based on, for example: catch from their EEZ in recent years; the most recent sharing agreement that was in place; and taking into account other countries not included in that agreement. This level of 'responsible quota' could then be used as the basis for other decisions and actions, such as withdrawing bilateral access arrangements for countries not setting 'responsible' quotas; or supply chain sourcing decisions so that purchases are only made from fleets whose competent authorities have set 'responsible' quotas. This may provide additional leverage and act as an incentive for states to reach agreement on quota allocations. However, there is no specific body or organisation that has the remit, nor agreed approach, for setting such quota levels, and the current situation with the NEA pelagics fisheries has demonstrated that there are global markets available for the catches of these fisheries where sustainable certification considerations are not of prime importance.

Management of fishing pressure in international waters could help to restrict excessive exploitation on the high seas. In recognition of the recent Treaty on Marine Biodiversity of Areas Beyond National Jurisdiction (BBNJ, the 'High Seas Treaty'), biodiversity considerations in high seas areas are increasingly being recognised. This demonstrates the need for comprehensive agreements involving both coastal states and fishing states, to ensure that all sources of fishing pressure on the stocks is accounted for and managed within sustainable limits.

6 Conclusions

The history of management and exploitation of the pelagic stocks is peppered with failed agreements as stocks shift and states increase their quotas to force a renegotiation of previous arrangements. With climate change likely to bring further alterations to stock distributions (Fernandes *et al.,* 2020), similar future challenges to the management of these stocks are foreseeable.

More data may not be the answer. Reports on distribution of stocks have in some cases resulted in the breakdown of existing arrangements. A 2014 report on the distribution of herring has not resulted in the agreement of quota shares. The recent report on the distribution of mackerel was not conclusive in defining zonal attachment shares, and the complexities of the natural world mean there will never be perfect knowledge on stock biology and distribution. The zonal attachment principle is not always easy to apply, as there are a number of complicating factors such as fish stock migrations, shifting distributions due to climate change, and feeding grounds (Bjørndal *et al.,* 2022), which mean that there is a level of subjectivity in its calculation. As a result, determination of quota shares is likely to be a political rather than scientifically-driven process, representing a negotiated outcome between sovereign states (Lodge *et al.* 2007) – while they may (and should) take scientific information into account, they are unlikely to be decided by it (Shepherd & Horwood, 2019, cited in Bjørndal *et al.,* 2022).

The management arrangements for the pelagic stocks need to ensure sustainable exploitation and be robust to future changes. A framework is required that includes quota allocations and does not allow unilateral quotas to be set in excess of scientific advice, nor for states to walk away from agreements. There must be compliance with, and enforcement of, agreed TACs and quotas. An effective decision-making framework, objection procedure and dispute resolution process are needed that recognise the lack of an agreed quota allocation key as a dispute among states that must be resolved as part of responsible and sustainable fisheries management. The use of majority voting, backed up by objection procedures and dispute resolution mechanisms, may be a way of enabling agreements to be made and adjusted, and issues of concern challenged, without the complete breakdown of agreements.

To increase the chance of a stable cooperation arrangement, the scope of negotiation should be as wide as possible, including for example other fisheries, access to waters, landing ports, and wider issues such as trade and security arrangements. The UK-EU Trade and Cooperation Agreement (TCA) is an example of an agreement that includes fisheries, trade, transportation, aviation and more (UKTPO, 2021), and therefore the fisheries aspects agreed to are likely to persist due to the negative consequences of a breakdown of the other aspects of the agreement.

The fishing industry has potential for a key role in the process, as it is their interests that coastal states' governments are trying to protect in the negotiations. Agreeing quota shares could help to prevent stock decline and lead to higher future harvests, and a reduction in overall quotas may increase prices, raising profit margins for industry. Industry bodies in the relevant countries can put pressure on national competent authorities and negotiating teams to reach quota share agreements, and potentially could discuss and reach their own agreement for catch shares for the various stocks. This approach was successful in achieving an agreement for blue whiting in 2006. Agreement at coastal state government level would then likely follow swiftly.

Wider stakeholders and supply chain NGOs, should continue to raise the visibility of this issue and support affected fisheries in finding a resolution to the quota share issue. The supply chain should continue to ensure strong sourcing commitments to only source from sustainable fisheries with an effective overarching management framework.

A future agreement or agreements should consider the following, and the recommendations on allocation practices for RFMOs are also relevant to all parties involved in the NEA pelagic fisheries (see Box B2 in Appendix B):

- Each party will have to accept that a reduction in the percentage of the TAC that they currently allocate themselves will be necessary to reach agreement. The currently healthy stock biomasses should help facilitate agreement by avoiding the need for substantial reductions in absolute tonnages. Agreement on quota shares could consider trade-offs between stocks to reach an overall agreement encompassing all three pelagic stocks.
- A mediator, expert reviewer or panel could be appointed to help resolve issues (as provided for in the Model Framework Agreement, see Appendix B). Such an approach can be incorporated into arrangements to prevent any one member from exercising a *de facto* veto over the agreement of quota shares.
- Where there is no agreement on quota shares, and unilateral quotas are likely to exceed scientific advice, there should not be any transfer of unfished quota between years, and other penalties or incentives could be considered to encourage cooperation.
- Arrangements should provide flexibility to adapt to future changes in stock distribution while maintaining the resilience of the agreement. This could be achieved through an agreed period and approach to adjusting quota shares, or by ensuring that the agreement sets out alternative arrangements for a situation where agreement cannot be reached. Arrangements to allow transfer of quota (e.g. through swaps or leasing) between parties can help match interest in fishing the stocks with the quota allocated to each party.
- All relevant parties should be involved in the agreements. For example, although mackerel is no longer in Greenland waters, their involvement in the agreement and quota share arrangement could enable trade-offs and agreements across other stocks. If bilateral or multi-lateral arrangements are made that do not include all fishing pressure on a stock, measures must be taken to ensure the total effort does not exceed the scientific advice and that the other states are brought into the management plan and quota share arrangement.
- The inclusion of wider aspects such as access to waters, permitted landing ports and trade measures might provide additional benefits to an agreement and could help balance reductions in quota shares.

Sustainable management of internationally shared fish stocks is a challenge that is common to all ocean areas. The North East Atlantic pelagic stocks benefit from a strong science base, relatively few coastal and fishing states involved in their exploitation and management, and currently healthy stock biomasses. The coastal states follow scientific advice in setting the Total Allowable Catch, but the lack of a quota sharing agreement involving all relevant coastal and fishing states means that the sum of individual quotas is above sustainable levels, threatening the long-term sustainability of the stocks. Climate and political changes are likely to continue and potentially increase in the future. Management frameworks therefore need to be adaptive and resilient, incorporating the best available evidence and involving all relevant stakeholders, to be able to effectively manage these dynamic and economically important stocks.

The three stocks currently have healthy stock biomass levels, but biomass can fluctuate with both environmental variability and levels of fishing pressure, underlining the importance of international frameworks that can effectively manage exploitation levels and respond to changes in biomass. The coastal states have made good progress engaging in negotiations, but a comprehensive agreement including quota shares has so far remained elusive. There are different approaches available for determining quota shares and for structuring agreements, as well as options that could be used to limit fishing pressure in the absence of a quota sharing agreement. However, the key factors for driving an agreement are political will and compromise, together with a commitment to ensuring sustainable exploitation of the stocks. A collective effort by all stakeholders with an interest in the future health and

sustainability of these fisheries including governments, civil society actors, industry, supply chain interests, academia and others can help to secure long-term and lasting fisheries agreements.

By finding a path forward to achieve a comprehensive agreement on management and quota shares for these stocks, the coastal states and fishing states can demonstrate that they are globally at the forefront of fisheries sustainability, helping to ensure the future productivity of the stocks, while maintaining the food security and economic benefits that the fisheries provide.

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8 Abbreviations/Acronyms

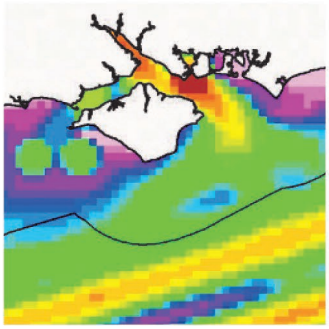
AS	Atlanto-Scandian herring
BBNJ	Biodiversity of Areas Beyond National Jurisdiction
CNCP	Cooperating Non-Contracting Party
CS	Coastal States
$	Dollar (US)
EAPO	European Association of Fish Producers Organisations
EEZ	Exclusive Economic Zone
EU	European Union
excl	Excluding
F	Fishing mortality
FAO	Food and Agriculture Organization
FIP	Fishery Improvement Project
FS	Fishing States
HCR	Harvest control rule
ICES	International Council for the Exploration of the Sea
incl	Including
IPHC	International Pacific Halibut Commission
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
NAPA	North Atlantic Pelagic Advocacy Group
NEA	North East Atlantic
NEAFC	North East Atlantic Fisheries Commission
NGOs	Non-Governmental Organisations
OECD	OECD Publishing
PCA	Permanent Court of Arbitration
PI	Performance Indicator
PNA	Parties to the Nauru Agreement
RA	Regulatory Area
RFMO	Regional Fisheries Management Organisation
SPRFMO	South Pacific Regional Fisheries Management Organisation
SPSG	Scottish Pelagic Sustainability Group
SSB	Spawning stock biomass
TAC	Total Allowable Catch
TCA	Trade and Cooperation Agreement
UK	United Kingdom
UKTPO	UK Trade Policy Observatory
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement
UNTC	United Nations Treaty Collection
USA	United States of America
VDS	Vessel Day Scheme
WCPO	Western Central Pacific Ocean
WG	Working Group

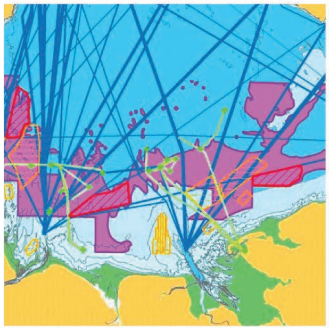
Cardinal points/directions are used unless otherwise stated.
SI units are used unless otherwise stated.

9 Glossary

B_{lim}	Limit reference point for spawning stock biomass (SSB)
B_{pa}	Precautionary reference point for spawning stock biomass (SSB)
Coastal state	A state in whose waters a fish stock is present
EEZ	Exclusive Economic Zone, an area of the sea in which a sovereign state has special rights regarding the exploration and use of marine resources, defined under the United Nations Convention on the Law of the Sea
Fishing mortality (F)	Instantaneous Rate of Fishing Mortality; when fishing and natural mortality act concurrently, F is equal to the instantaneous total mortality rate (Z), multiplied by the ratio of fishing deaths to all deaths; expressed on an exponential scale: F=0.5 means
Fishing state	A state that fishes for fish stocks, either on the high seas or in other coastal states' waters through access agreements
F_{lim}	Limit reference point for fishing mortality (over defined age range)
F_{mgt}	Fishing mortality target defined in the management plan
F_{MSY}	Fishing mortality consistent with achieving Maximum Sustainable Yield (MSY)
F_{pa}	Precautionary reference point for fishing mortality (over-defined age range)
Harvest Control Rule (HCR)	An algorithm for pre-agreed management actions as a function of variables related to the status of the stock, e.g. a control rule can specify how F or yield should vary as a function of spawning biomass; also known as 'decision rules' or 'harvest control'
Maximum Sustainable Yield (MSY)	The largest average catch or yield that can continuously be taken from a stock under existing environmental conditions
MSY Btrigger	A biomass reference point that triggers a cautious response within the ICES MSY framework
Overexploitation	A stock that is overfished, or overexploited, has a biomass level depleted to a degree that the stock's capacity to produce MSY is jeopardised
Overfishing	A stock that is subject to overfishing has a fishing mortality (harvest) rate that is higher than the rate that produces maximum sustainable yield (MSY)
Quota	An allocation of a right [privilege] to harvest a certain amount of fish in a certain period of time
Spawning stock biomass (SSB)	Total weight of all sexually mature fish in the stock
Total Allowable Catch (TAC)	A catch limit set for a particular fishery, generally for a year or a fishing season. TACs are usually expressed in tonnes of live-weight equivalent, but are sometimes set in terms of numbers of fish

Appendices




Innovative Thinking - Sustainable Solutions

ABP mer

A MSC Fisheries Standard and Conditions

A.1 MSC Fisheries Standard requirements

The MSC Fisheries Standard sets out requirements for fisheries to ensure that stocks remain healthy, environmental impacts are minimised, and fisheries are managed effectively. These form the three principles of the Standard.

MSC Principles of the Fisheries Standard:

- **Principle 1** **Sustainability** of the stock: fishing must be at a level that ensures it can continue indefinitely, and the fish stock can remain productive and healthy
- **Principle 2** **Ecosystem impacts:** fishing operations need to be managed to maintain the structure, productivity, function and diversity of the ecosystem upon which the fishery depends, including other species and habitats
- **Principle 3** **Effective management:** all fisheries need to meet local, national and international laws and have an effective management system in place that is able to adapt to changing environmental circumstances

All fisheries have to meet a certain level against all three principles to achieve certification, assessed against a number of individual Performance Indicators (PIs) for each Principle. The Standard also encourages fisheries to make improvements and work towards best practice, through the setting of specific **conditions** which must be resolved, usually within the five-year period of certification.

All fisheries targeting the three NEA pelagic stocks had conditions set relating to aspects of stock sustainability and the management framework, to ensure that stocks are healthy and the management framework is robust in protecting the future health of the stocks. Progress against these conditions was being monitored through annual surveillance audits. Ecosystem impacts of the fisheries are minimal, and no conditions have been set under Principle 2 for the pelagic fisheries.

The re-assessment of the Icelandic Atlanto-Scandian herring fishery identified a potential concern relating to effective decision-making processes and their ability to respond to serious issues (a potential fail for PI3.2.2b) and prompted a re-scoring of all MSC-certified AS herring fisheries. They failed to reach the minimum required score under PI 1.2.2 and PI 3.2.2. Because similar management systems and decision-making processes exist for all the NEA pelagic fisheries, the re-scoring and harmonisation was extended to blue whiting and mackerel fisheries as well. The latest Fisheries Certification Process (v2.1) requires **harmonisation** 'in scoring and condition setting in overlapping fisheries'.

The key aspects of the standard for pelagic fisheries are interlinked:

- **Principle 1 – Harvest strategy (PI1.2.1) and Harvest Control Rules and tools (PI1.2.2)**
  - This requires a **harvest strategy** (PI1.2.1) with well-defined and effective harvest control rules to be in place. In conjunction with this, **harvest control rules and tools** (PI1.2.2) must be in place and consistent with the harvest strategy, that reduce exploitation rates as limit reference points are approached; take into account the main uncertainties; and tools for implementing them (such as TACs) are appropriate and effective in achieving the exploitation levels required under the HCRs.

- **Principle 3 – Management framework, specifically the legal and/or customary framework (PI3.1.1) and decision-making processes (PI3.2.2)**
    - This requires a **management system** that is capable of delivering sustainable fisheries in accordance with P1 and P2, and which incorporates an appropriate dispute resolution framework (PI3.1.1). Coupled with this, effective **decision making processes** (PI3.2.2) must result in measures and strategies to achieve the objectives, and an appropriate approach to disputes.

A.2 Certification conditions and failures for NEA pelagics

MSC-certified fisheries for the three pelagic stocks had several conditions that needed to be met within the five-year certification period, relating to Principles 1 and 3. In addition, the rescoring of PI1.2.2 and PI3.2.2 across all the pelagic fisheries found that these fisheries no longer met the requirements of the MSC Fisheries Standard, and in 2020 the blue whiting and herring fisheries were suspended from the MSC Program, i.e. they lost their certificate temporarily. The fisheries at the end of their certification cycle have subsequently withdrawn from the program.

- Blue whiting – conditions were set that required coastal states to reach a quota-sharing agreement by November 2020;
- AS herring – conditions were set for the MSC-certified herring fisheries that required coastal states to reach a quota-sharing agreement by November 2020;
- Mackerel – conditions were set for the MSC-certified mackerel fisheries that required all the relevant states to reach a quota-sharing agreement by November 2021. In March 2019, the certificates were suspended in advance of this deadline, due to a stock assessment which found stocks to be below the threshold for sustainable reproduction. Although the stock assessment was later revised and the stock status was found to be above the threshold, the certificate was not reinstated due to the lack of progress on the condition requiring a quota sharing agreement to ensure long-term sustainability.

The failure to continue to meet the requirements of the Standard, and to close out conditions, across all three fisheries, is ultimately due to the lack of a quota sharing agreement among the coastal states (Table A1). The stocks are highly migratory stocks, and therefore overarching management at the international level is a necessary prerequisite for any national management system to work within[11].

[11] In accordance with GSA4.1 and GSA4.1.1 (MSC Guidance to the Fisheries Standard v2.01), the fishery-specific management system considered is, "the management system directly applied to the fishery. The focus should be on the management system of the fishery, which for some fisheries will include both national and international components" (Table GSA9). Consequently, the management system considered here consists of the wider international framework that the highly migratory species are managed under, not just that part of the decision-making process that occurs within the national system.

Table A1. Reasons for lack of progress on conditions, and failure against the MSC Standard

PI	Aspect	Reason for Failure/Lack of Progress
1.2.1	Harvest strategy	With no quota allocation key, and unilateral quotas being set, catches are consistently exceeding scientific advice, and fishing mortality is above F_{MSY} levels, therefore the harvest strategy is not achieving its objectives.
1.2.2	HCRs and tools	With no quota allocation key, the actual TAC (i.e. sum of unilateral quotas) does not follow scientific advice nor the long-term management plan. Therefore, the tools (TAC) and arrangements for sharing the TAC are not working and not effective at constraining the exploitation of the stock. In addition, for mackerel, there are no well-defined HCRs in place to ensure the exploitation rate is reduced as the precautionary reference point is approached.
3.1.1	Management framework	International cooperation mechanisms exist but are not completely effective – they do not result in the agreement and delivery of management actions consistent with sustainable management advice. Ongoing disputes are a clear indication that the management system does not have a mechanism to address disputes that is 'effective in dealing with most issues. For herring, the withdrawal of Faroes from the agreement in 2012 with no formal resolution indicated that the dispute resolution framework was not effective.
3.2.2	Decision-making processes	Lack of agreement on TAC shares, resulting in unilateral quotas being set, and both quotas and catches systematically exceeding the ICES advice. Coastal states are not responding to this serious issue in any meaningful way, therefore the requirement for decision-making processes to address 'serious issues' is not being met.

Source: MSC Surveillance Reports.

B Management Framework

B.1 International framework

Coastal states must cooperate in the conservation of shared, straddling and high seas fisheries resources through arrangements to determine sustainable stock levels and management measures (Miller 2011).

The United Nations Convention on the Law of the Sea (UNCLOS) sets the overarching legal framework for the conservation and management of fish stocks in coastal states' waters (EEZs) and on the high seas. It has been ratified by all relevant states in the region (UNTC, 2022).

It requires states to cooperate in the management of shared stocks (stocks whose distribution extends across two or more coastal states' jurisdictions), straddling stocks (stocks that occur both within the EEZ and in an adjacent high seas area) and highly migratory stocks listed in Annex I (tuna and tuna-like species, oceanic sharks and cetaceans). UNCLOS sets out that coastal and fishing states should cooperate, either **directly**, or through appropriate **subregional or regional organisations**, such as Regional Fisheries Management Organisations (RFMOs).

The United Nations Fish Stocks Agreement (UNFSA) sought to strengthen the implementation of provisions in UNCLOS relating to straddling and highly migratory fish stocks with a view to ensuring their long-term conservation and sustainable use (UN, 2013). It has been ratified by all relevant states in the region (UN, 2022) and includes the key principle to follow the agreement's legal obligations to "ensure the long-term conservation and sustainable use of straddling fish stocks and highly migratory fish stocks."

UNFSA sets out more detail than UNCLOS in relation to matters which states are expected to agree on for sustainable fisheries management, including:

- Management measures;
- Agreement on participatory rights (e.g. allocation of allowable catch and/or effort);
- Decision-making rules;
- Mechanisms to acquire scientific advice; and
- Ensuring compliance with management measures.

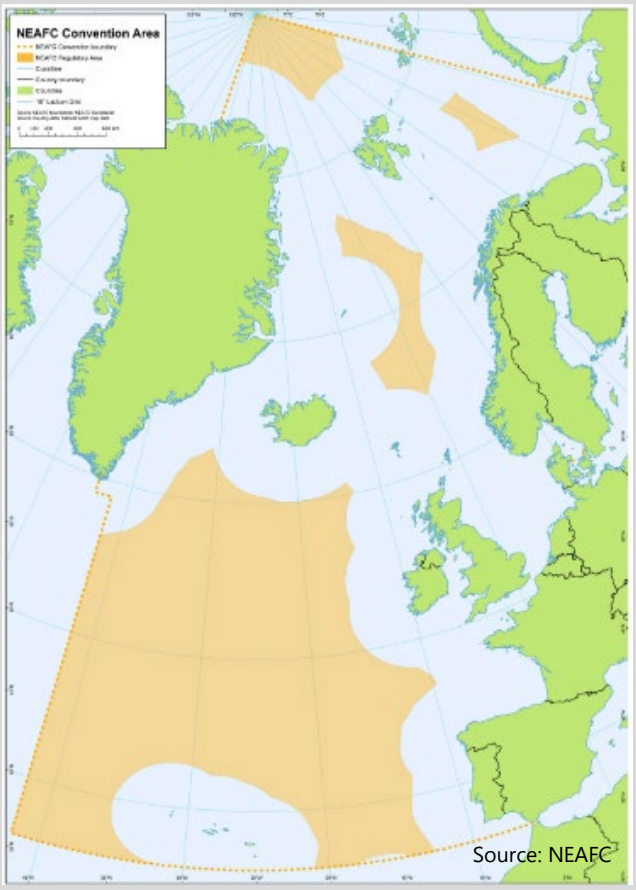
While the UNFSA indicates a preference for cooperation to take place through regional fisheries organisations (FAO, 2004), for straddling stocks such as the NEA pelagics, Örbech *et al.* (1998), conclude that it permits each regional fisheries organisation to choose a bottom-up (coastal states determine management measures which then apply in the high seas), or top-down (the regional fisheries organisation determines the management measures, which then also apply in the EEZ) approach.

It is therefore clear that:

- The international legal framework requires states to ensure long-term conservation and sustainable use of shared and straddling fish stocks;
- This requires states to cooperate (either directly or through RFMOs) to agree on management measures;
- Management measures should be informed by scientific advice, and compliance and enforcement of management measures must be ensured;
- Agreement on the allocation of participatory rights (quota shares) is a key part of this, to ensure that the agreed management measures are adhered to in practice.

Box B1: Role of NEAFC in the NEA pelagics management

NEAFC is a regional fisheries management organisation (RFMO) with international legal competence to manage fisheries in the North East Atlantic. Its management role is mainly on the high seas, but measures can apply to areas within national jurisdiction where the relevant coastal state suggests such an arrangement (Ásmundsson & Corcoran, 2016).



Source: NEAFC

Most of the waters within the NEAFC Convention Area are under the fisheries jurisdiction of the Contracting Parties, which results in management for many stocks being led by coastal states' arrangements. Four large areas of international waters make up the NEAFC Regulatory Area (see map).

There are six contracting parties to NEAFC: Denmark (with respect to the Faroe Islands and Greenland, the EU, Iceland, Norway, the Russian Federation, and the United Kingdom. This includes all the coastal states and major fishing states in the region. In addition, the Cooperating Non-Contracting Parties are the Bahamas, Canada and Panama (NEAFC, 2022).

NEAFC's involvement in management varies depending on the distribution of the stocks (OECD, 2009):

- For stocks that primarily fall within the NEAFC Regulatory Area, NEAFC takes management measures for the whole stock (e.g. pelagic redfish, deep-sea species).
- For stocks that occur both inside the Regulatory Area and the EEZ of a single coastal state, NEAFC takes management measures for the part of the stock that occurs within the Regulatory Area (e.g. Rockall haddock).
- For stocks which occur both inside the Regulatory Area and the EEZs of several coastal states, NEAFC takes management measures for the part of the stock that occurs within the Regulatory Area, but only after the relevant coastal states have agreed on TACs and allocations outside of NEAFC (OECD, 2009). This is the case for blue whiting, Atlanto-scandian herring and mackerel, which are commercially the most significant stocks in the region.

The result is that NEAFC's role in the management of the NEA pelagic stocks is relatively constrained. The coastal states take the main decisions (often on a stock-by-stock basis, with different coastal states involved in the negotiations for the different stocks). NEAFC fisheries conservation and management measures only apply to the portion of the stock within the NEAFC Regulatory Area (unless parties agree that NEAFC measures should also apply to areas within national jurisdiction). As a result, other NEAFC processes, such as the dispute resolution mechanism, also do not apply *de facto* to the pelagic fisheries. Furthermore, NEAFC's dispute resolution mechanism has not yet been ratified by the Russian Federation and therefore is not yet in force.

UNCLOS does not specify criteria for the allocation of fishing rights, but Article 11 of UNFSA sets out a number of principles to be taken into account for the allocation of participant rights for *new members or participants* (in addition to the status of the stocks and the existing level of fishing effort in the fishery):

i) The respective interests, fishing patterns and fishing practices of new and existing members or participants;
ii) The respective contributions of new and existing members or participants to conservation and management of the stocks, to the collection and provision of accurate data and to the conduct of scientific research on the stocks;
iii) The needs of coastal fishing communities which are dependent mainly on fishing for the stocks;
iv) The needs of coastal states whose economies are overwhelmingly dependent on the exploitation of living marine resources; and
v) The interests of developing states from the subregion or region in whose areas of national jurisdiction the stocks also occur.

Box B2: Recommendations on Allocation Practices from Lodge *et al*, 2007

In the following text, 'RFMO' has been replaced with 'coastal states' arrangement', and 'participatory rights' with 'quota shares', to ensure direct relevance to the NEA pelagics.

In each coastal states' arrangement, members should ensure that:

1. To the extent practicable, quota shares are allocated only when the membership of a coastal states arrangement includes all relevant coastal States and States fishing on the high seas for the relevant stocks.
2. Decisions on total allowable catch or total allowable effort are insulated and separate from decisions on allocation. Quota shares should be expressed as percentages of agreed allowable catch or effort rather than as absolute tonnages.
3. There is agreement in advance as to how new members will be accommodated in the scheme of quota shares. Accommodating new members must not be allowed to result in increases of catch or effort with regard to stocks that are fully subscribed or oversubscribed.
4. There is a pre-agreed formula about how any increases or decreases in catch or effort limits will be distributed among members.
5. Strong measures exist to ensure the integrity of allocations, including penalties for breaches of national allocation and reductions in future allocations for breaches of other conservation measures. Coastal states' and fishing states' records of compliance with conservation and management measures should be an essential criterion for allocation.
6. The process through which allocations are negotiated and the basis for the allocation are transparent. When decisions on allocation require mandatory consensus there is provision for a 'circuit breaker', such as the appointment of an *ad hoc* expert panel or a conciliator, that prevents any one member from exercising a de facto veto over the allocation of quota shares.
7. There is an agreed process and timeframe for the review of quota shares.
8. New coastal states' arrangements or coastal states' arrangements with no previous history of allocation consider establishing an advisory panel of external experts in order to facilitate reaching agreement on decisions about allocation.
9. The impacts of the allocated rights, including any measures on the transferability of those rights, are closely monitored for their potential to change fishing dynamics and to have unintended consequences on both target stocks and the broader marine ecosystem.

How to assess each of the principles, and what weight to give to each one in an allocation system, is of fundamental importance and likely to be subject to intense discussion and negotiation. Political considerations and the implications of each criterion to the possible allocation will be weighed up by each state involved. Lodge *et al.* (2007) also provide recommendations on allocation practices, directed at RFMOs, but relevant for coastal state arrangements as well (Box B2).

B.2 Regional arrangements

For blue whiting, AS herring and mackerel, which predominantly occur within coastal states' waters rather than in international waters, the coastal states have chosen to pursue management arrangements through direct cooperation between relevant states for each stock, rather than cooperating through NEAFC, the RFMO.

The coastal states undertake annual consultations to agree on conservation and management measures for the stocks. They take scientific advice from ICES on the stocks, and regularly agree to set TACs in line with scientific advice. A portion of the agreed TAC is allocated to NEAFC (to be fished against by non-coastal states) and NEAFC takes management measures for the part of the stock that occurs within the Regulatory Area.

Once the TAC is agreed, the next step would be for the states to agree on what portion of the TAC is to be fished by each party (quota shares). There have been periods for which this has worked for each stock, with agreed fixed allocation percentages for each country. However, in many cases, this has been the point at which all involved states are unable to reach agreement, or for agreements breaking down. Reasons include:

- States that are not part of the agreement believe they have a claim to fish a portion of the stock (for example, due to changes in the stock distribution which brings it increasingly into their EEZ) and therefore set their own unilateral quotas in addition to those quotas set under the agreement.
- States that had previously been part of an agreement, believe they are entitled to a greater share of the TAC and leave the agreement to set their own (higher) unilateral quota.

These types of actions have caused the various agreements for mackerel, blue whiting and AS herring to break down.

B.3 Coastal states arrangements

This section provides an overview of the state-of-play in the NEA region for the pelagic stocks. In 2016, two Working Groups were established in NEAFC to consider allocation criteria and a framework for coastal state negotiations. Information on the work of these groups is presented, followed by the latest state-of-play of coastal states' consultations, and work to support allocation discussions.

B.3.1 Coastal states Working Group on Allocation Criteria

The Working Group on Allocation Criteria was established at the 34th Annual Meeting of NEAFC in 2015, in response to the second Performance Review of NEAFC which recommended that NEAFC agrees on and applies objective criteria for determining allocations (although noting that these are not necessarily within NEAFC's remit but the responsibility of the coastal states). It was highlighted that criteria-based allocation keys should allow allocations to respond to changes, and would be likely to include both

historical levels of participation and the distribution of the stock under consideration. The terms of reference for the group were to consider:

- The criteria for quota allocations on stocks occurring in the North East Atlantic, both discrete stocks in the Regulatory Area and straddling stocks occurring both in the waters of the Coastal States and the Regulatory Area;
- The appropriate reference period;
- The weighting to be given to each of those criteria;
- The minimum time period for which the allocation criteria should apply and the consequent timing of any review.

The group met three times in 2016, conducting extensive discussions on all points and in particular weightings and time periods, but was unable to reach conclusions and therefore further work was considered necessary. The Working Group discussed a series of criteria to be taken into account in allocation decisions (NEAFC, 2016):

- zonal attachment;
- fishing patterns;
- the needs of coastal states whose economies are overwhelmingly dependent on the exploitation of living marine resources;
- the needs of coastal fishing communities which are dependent mainly on fishing for the stock;
- conservation and management of the stock;
- the collection and provision of accurate data; and,
- the conduct of scientific research on the stock.

The group agreed that zonal attachment was a 'major criterion' in allocation exercises and the most important one, however there was no common understanding on the meaning or interpretation of a number of criteria, nor on the relative importance or weighting of criteria in quantitative terms (NEAFC, 2016).

Two further meetings were conducted in 2017, and followed a scientific sub-group meeting on applying zonal attachment in practice. Discussions in 2017 focussed on the definition of different criteria, but again there was no final agreement on the issues (NEAFC, 2017). The group has not met since 2017.

B.3.2 Coastal states Working Group on Coastal State Negotiations

The Working Group on a Framework for Coastal State Negotiations aimed to develop principles, guidelines and good practice aimed at enhancing predictability and cost-effectiveness of negotiations, reducing uncertainty and promoting an atmosphere of trust. It met three times in 2016 and once in 2017.

The terms of reference for the Working Group were to discuss and agree on:

- A common approach to the conduct of negotiations taking into account international principles and guidelines as well as good practices;
- Rules on the duration, termination and opting out of coastal state arrangements; and a negotiation process in the event that the arrangement ceases to function;
- The process to be followed in the case of negotiating a new arrangement, e.g. the developing of a report of the parties on the recent trends in the spatial distribution of the stock(s) and associated catches;
- A model arrangement, including management options;

- Practical arrangements on the organisation of the coastal State negotiations, including inter alia, location, timing and duration, and the possible role of the NEAFC secretariat to the negotiations;
- Rules of procedure to address inter alia, agenda, appointment and role of chairperson(s), use of media, and presence of observers.

The group developed Draft Guidelines for Coastal State Consultations in the North East Atlantic, and an example Model Framework Arrangement (NEAFC, 2017b). The guidelines propose annual consultations on conservation and management measures for each stock, and also framework arrangements which should be in place for at least five years. Coastal states should 'endeavour' to reach consensus on framework arrangements involving all coastal states. The proposals allow for coastal states to opt out of the framework arrangements, and in the absence of consensus for more limited framework arrangements to be established that do not include all participants.

A chapter was included in the 2016 draft on 'settlement of disagreements', but no content was provided and this was removed from the final draft. However, the final draft did include a proposal for a mediator to help resolve issues where a framework arrangement is not reached.

The Model Framework Arrangement includes the requirement for scientific advice from ICES, a long-term management plan, and established quota shares. However, it does not provide a mechanism for resolving disputes, instead allowing parties to opt out of the agreement, and for reports on zonal attachment to be produced, to support a new framework arrangement to be agreed. Some parties expressed a desire for more robust provisions on decision making and settlement of disagreements (NEAFC, 2017b).

The inclusion in the Guidance and Model Framework Arrangement of the possibility for parties to opt out does not advance the current status quo in relation to the lack of any mechanism to resolve disagreements, and is likely to result in a reversion to the practice of setting unilateral quotas that exceed the scientific advice.

The Draft Guidelines and Model Framework Arrangement were adopted by the NEAFC Annual Meeting in 2017, and it was agreed there was no need for further meetings of the working group (NEAFC, 2017b). The Annual meeting noted that the Guidelines would have a non-binding nature even after formal adoption, and the Model Framework Arrangement remains as an example only (NEAFC, 2017c). The MSC surveillance report for the MINSA mackerel fishery also notes that the recommendations remain as guidelines and do not require mediation to resolve disputes (Lloyds Register, 2021).

B.3.3 Coastal states consultations since 2021

In 2021, coastal states failed to reach quota sharing agreements for 2022 in the October meetings. However, those meetings did set out steps for continuing to consider quota shares:

- For herring and blue whiting, they agreed to address the issue of quota-sharing arrangements as early as possible in 2022, and to develop and coordinate their scientific research activities to improve the information available for the assessment and the management of the stocks. They also agreed to establish Working Groups to continue to update existing reports on distribution of the stocks (the Report of the Coastal States Working Group on the distribution of Norwegian Spring Spawning Herring in the North-East Atlantic and the Barents Sea, and the 'Report from the NEAFC Working Group on Collating Information on the Distribution of All Life Stages of Blue Whiting in the North-East Atlantic and the Distribution of Catches from the Stock, London, 26-28 November 2013') (Anon, 2021a; Anon, 2021b).

- For mackerel, they agreed to continue consulting on a comprehensive and inclusive quota-sharing arrangement as early as possible in 2022, with the best endeavours to reach a swift conclusion, and Parties were invited to provide concrete proposals from January 2022. Terms of Reference for a Working Group on mackerel distribution were set out, with a report to be presented by the end of February 2022, to inform the delegations on the distribution of the mackerel stock (Anon, 2021c).

In February 2022, they received updates on the status of technical reports on the geographical distribution of each stock, and affirmed their ambition to agree long-term, comprehensive, and inclusive quota-sharing arrangements on each stock in the course of 2022 (Anon, 2022a).

The mackerel distribution report was presented in March 2022. Whilst the report found that each survey provides a representative, overall view of the stock distribution at the time of the survey, they do not provide complete coverage of the stock distribution. No single methodology or survey strategy is capable of providing data on all life stages (i.e., from eggs to adults), over a complete annual cycle and the entire spatial distribution of the stock (Anon, 2022b).

There are gaps in the data in relation to some life history stages of the stock, and surveys do not encompass the whole distributional area of each life history stage. The EU pelagic industry concluded that the report 'does not provide a basis for taking a zonal attachment approach to the quota-sharing arrangements for this stock' (EAPO, 2022), and coastal states failed to reach agreement on quota shares at the meeting. The report therefore was not conclusive in defining zonal attachment shares, and deficiencies in the available data mean there will never be perfect knowledge on the stock biology and distribution.

Russia's invasion of Ukraine could present further difficulties for the negotiations in 2022 (Undercurrent News, 2022), particularly for herring for which Russia is a coastal state.

In 2023, coastal states met several times in the first quarter to discuss a new suite of management measures for the mackerel stock, including a long-term quota-sharing arrangement. However, whilst they reported that good progress had been made, a comprehensive and inclusive set of arrangements including quota shares was not achieved. They agreed to continue their consultations, and that those consultations for the remainder of 2023 would be chaired by Iceland (Defra, 2023).

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