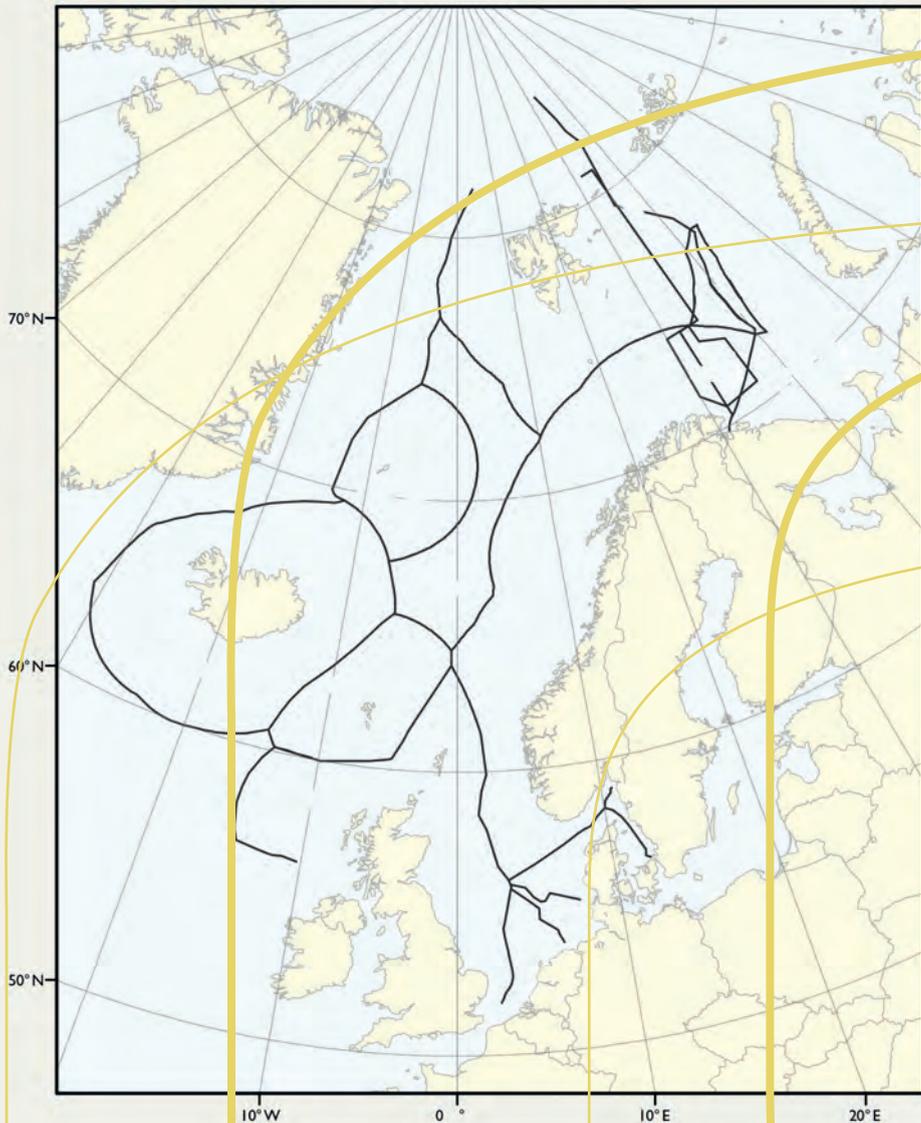




Allocation of Fishing Rights in the NEA

Discussion paper





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*Dorothy Dankel, Gunnar Haraldsson, Jesper Heldbo,
Kjartan Hoydal, Hans Lassen, Helle Siegstad, Mogens Schou,
Sten Sverdrup-Jensen, Staffan Waldo and Peter Ørebech*

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Nordic Council of Ministers

Ved Stranden 18

DK-1061 Copenhagen K

Phone (+45) 3396 0200

www.norden.org

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Preface

Sustainable exploitation of marine resources requires that overall fishing pressure is kept within sustainable limits. This report is about sharing this resource between the fishing nations and does not address setting the overall harvest which is often formulated in terms of a Total Allowable Catch (TAC). Without sharing arrangements the sum of individual national quotas risks exceeding sustainable limits and therefore sustainable management requires an agreed allocation system. Marine biomass such as fish is a basic natural capital asset. It should be managed to provide the highest possible return to ensure food supply and sustain economies.

International cooperation on the allocation among sovereign states of trans-boundary fish stocks is based on the notion that each stock is managed and allocated as individual and independent stocks. This practical approach has served the purpose of simplifying the political discussion on allocation keys. Furthermore these allocation keys are often discussed on the basis of relative few parameters, notably historical catches and geographic distribution.

The provisions provided for solving disagreements on allocation and utilization of fish stocks are non-existent in relation to countries not signatories of UNCLOS or the UN Straddling Stocks Agreement nor participating in the cooperation and/or disagreeing on the use and interpretation of the mechanisms provided by law and practice. However, the International Tribunal of the Law of the Sea (ITLOS) presents dispute settlement options.

The combination of weak rules and rules not followed poses a challenge for the international community cooperating on the management of migrating fish stocks.

This paper sets out to contribute to the development of a framework to secure improved and transparent international cooperation on the sharing and utilization of fish stocks. The situation we consider covers stocks that are typically distributed between Exclusive Economic Zones (EEZ's) and international waters.

The aim of the paper is to initiate an informed debate in the Nordic countries and territories on how to allocate the trans-boundary fish stocks in the North East Atlantic and how to resolve allocation conflicts.

This paper starts in chapter 1 by mapping the current legal framework and international agreements in the North East Atlantic Ocean. This forms the legal and historical basis for future agreements. Chapter 2 considers the relevance of the biological status of the fish stocks and the economic situation of the coastal states for the allocation of fishing rights. In chapter 3 a methodology for allocating fishing rights and in chapter 4 the handling of allocation conflicts is proposed and supplemented with chapter 5 on further considerations. The paper on page 45 includes a list of the concepts and acronyms used.

The paper is compiled during the period April through November 2014 by an inter-disciplinary Nordic Marine Think Tank (NMTT) project group with the members below:

- Dorothy Dankel, fisheries biologist, Norway
- Gunnar Haraldsson, fisheries economist, Iceland
- Jesper Heldbo, fisheries biologist, Denmark
- Kjartan Hoydal, fisheries biologist, Faroe Islands
- Hans Lassen, fisheries biologist, Denmark
- Helle Siegstad, fisheries biologist, Greenland
- Mogens Schou, fisheries economist/sociologist, Denmark
- Sten Sverdrup-Jensen, fisheries economist, Denmark (Chair)
- Staffan Waldo, fisheries economist, Sweden
- Peter Ørebeck, legal expert, fisheries and maritime law, Norway

I wish to thank all my co-authors for the excellent “Nordic” collaboration that we have had. I also want to thank NMTT member Odma Johannesen for her assistance in the editing and proof reading of the document. Finally a big thank to Hanne Lebech from the Nordic Council of Ministers’ Secretariat for her assistance with the lay-out of the document on very short notice. The work has received financial support from the Nordic Council of Ministers’ Fisheries Research Working Group.

Copenhagen, March 2015

Sten Sverdrup-Jensen

Chairman of the Nordic Marine Think Tank

Executive Summary

The problem

Today's allocation of national fish quotas in the North East Atlantic (NEA) is for most of the species done by use of the allocation key applied by the North East Atlantic Fisheries Commission, NEAFC, when the 200 nm EEZs were established in the late 1970'ies. This key is to a large extent based on the coastal states' fishing records during the period 1971–76. The same applies to the bilateral fisheries agreements from the late 1970'es on the allocation of fish quotas. These initial allocations have subsequently obtained the status of continuing "allocation keys."

During the 40 years when stable keys have been the leading principle for the allocation of fishing quotas among coastal states in the NEA the marine ecosystem(s) has changed including changes in the seasonal spatial distribution of many fish stocks in NEA waters. Some of them are related to climate changes and other changes in the conditions of the ecosystem(s). Also a technical development in the fishing fleets operating in the NEA has taken place towards larger vessels with longer range in time and space. The fishery dependency of coastal communities in the NEA areas has to a large extent been decreasing. An internationalization of the ownership of the fishing vessels, of the fishing quotas, and of the fish processing industries has also taken place together with an internationalization of the (decreasing) fisheries workforce both at sea and ashore.

The changes mentioned have in recent years led to complex and difficult discussion on quota allocation in the NEA. Dissatisfaction has among other issues/problems manifested itself in a multi-annual and still unresolved conflict between on the one side the EU and Norway and on the other side Iceland, Greenland and the Faroe Islands over the allocation of fishing rights for NEA mackerel. The conflict over mackerel entailed the loss of all the MSC certifications of mackerel fisheries in the NEA in 2012. This in turn created turbulence in the billion dollar global market for this species.

Another example is the conflict over NEA herring allocation which in 2014 led to punitive actions against the Faroe Islands by EU and Norway.

The problems manifest in the pelagic fisheries may in a 5–10 year time perspective also become manifest in the NEA demersal fisheries. This makes it very timely to consider if the allocation of fishing rights in the NEA in the future shall continue on the basis of stable allocation keys or if the allocation shall be based on more dynamic principles.

The legal context

The above mentioned allocation agreements preceded the 1982 United Nations Convention on the Law of the Seas (UNCLOS) agreement.¹ According to UNCLOS a coastal state has the exclusive right of fish harvesting in its economic zone (EEZ). This means that fish in the zone belongs to the coastal state, as long as it is in the zone. In its EEZ the coastal state may itself manage the stock by allowing, prohibiting and regulating the fishery. Accordingly each state, targeting the same stock, may unilaterally set its own total allowable catches (TAC). Where the same stock or stocks of associated species occur both within the EEZ and in an area beyond and adjacent to the zone, the coastal state and the states fishing for such stocks in the adjacent area, shall seek, either directly or through appropriate organizations, to agree upon the measures necessary for the conservation of these stocks. However, UNCLOS does not say anything about criteria governing the allocation of fishing rights such as e.g. historical fisheries or geographical distribution or other conditions attached to the stock and its exploitation.

UNCLOS is complemented by the 1995 UN Agreement on Migratory Fish Stocks (UNFSA).² According to this agreement states harvesting the same stock must “agree on the rights of participants, such as distribution of allowed catch or levels of fishing effort.” UNFSA provides no *explicit* indication of what the principles of distribution would be. However, UN-

¹Full name: United Nations Convention on the Law of the Sea of 10 December/1982. The convention entered into force 16 November 1994.

² Full name: Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (dated 8 September 1995). The agreement came to force on 11 December 2001.

FSA Article 11 states that participant rights for *new members or participants* – both as regards the fish species and the amount – must be assessed on the basis of the following considerations:

- a) “the status of the straddling fish stocks and highly migratory fish stocks and the existing level of fishing effort in the fishery
- b) the respective interests, fishing patterns and fishing practices of new and existing members or participants
- c) 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
- d) the needs of coastal fishing communities which are dependent mainly on fishing for the stocks
- e) the needs of coastal States whose economies are overwhelmingly dependent on the exploitation of living marine resources
- f) the interests of developing States from the subregion or region in whose areas of national jurisdiction the stocks also occur.”

These principles are valid when considering how a new state fits into an established fishery cooperation, but they must also be considered relevant where a coastal state that is already participant in a fishery cooperation wants to harvest a migrating species in its zone that it has not exploited earlier. UNFSA clearly states that coastal states shall cooperate to ensure effective conservation and management of straddling and highly migratory fish stocks. However, the obligation to cooperate is not an obligation to finalise negotiations with an agreement.

The World Summit on Sustainable Development³ in its Plan of Implementation, determines that the total (annual) fishing yields from fish stocks must be kept within the Maximum Sustainable Yield, MSY. However, the MSY criterion does not in itself deal with national sovereignty as

³ The Johannesburg agreement 2002.

laid down in UNCLOS. Thus it is the coastal state alone, which decides what the MSY is. There is no international court to settle this.⁴

All agreements on shared fishing in the NEA are based on the UNCLOS principles and agreed through negotiations between the involved parties. There is extensive cooperation based on multilateral and bilateral agreements for exchanging fishing opportunities between jurisdictions. Faroe Islands and Greenland have full jurisdictions and are accepted as coastal states in NEAFC. However, they are not always considered Contracting Parties in their own rights as they are part of the Danish Kingdom. Every agreement includes a scheme for the allocation of the fishing opportunities among the parties involved.

The agreements fall in two groups, Coastal State agreements involving three or more states and territories, and bilateral agreements: Examples of species covered by Coastal State agreements are: Mackerel, Atlanto-Scandian herring, Blue Whiting and Capelin. Bilateral agreements include: The Russia–Norway Agreement, The EU–Norway Agreement, The Norway – Faroe Islands Agreement, The Norway – Greenland Agreement, The Russia – Faroe Islands agreement and the agreement between Iceland and the Faroe Islands. The agreements primarily deal with shared fish stocks and the provision of mutual access rights.

Changes observed in fish abundance and seasonal distribution and their implications for fisheries agreements

Hollowed (et al.) in 2013 reviewed current literature on the projected effects of climate change on marine fish and shellfish, their fisheries, and fishery dependent communities throughout the northern hemisphere and came to the conclusion that the species composition, distribution, and abundance of fish species will change but offered not recipe on what specifically these changes will be. They realised that it is and will be difficult to tease out the additional effect of climate change from other anthropogenic activities. Other analysis concluded that fish stocks in general exhibit a poleward shift in their center of biomass, most with a simultaneous

⁴ In the NE Atlantic, ICES is asked to determine MSY and give its opinion if a management agreement based on a certain value is sustainable.

increase in depth, and a few stocks with a concomitant expansion of their northern range.⁵

Changes in the spatio-temporal distribution of fish stocks are a root cause to the disagreements about the allocation of fishing rights in the NEA. All spatio-temporal distributions of fish stocks whether measured in abundance, in biomass or in production are subject to annual variations and temporal drifts. How these changes impact the allocation schemes depends on the scale of the EEZ relative to the geographical range for the stock. In general, the range narrows with decreasing stock size and increases when the stock increases. Classical examples from the NEA includes the North Sea herring which disappeared from the Norwegian part of the North Sea during a depletion phase in the 1970s and the Atlanto-Scandian herring which for more than a decade during the 1970–1980 – also a period when the stock was depleted – only occurred in the Norwegian EEZ and mostly in Norwegian coastal waters. Changes in the spatial distribution of cod in the NEA have already been observed, but because of the shorter migrations of cod, allocation problems associated with “new entrants” have not (yet?) been encountered.

NEA mackerel occurs in EU, Faroese, Norwegian, Icelandic, East Greenlandic and international waters. Its distribution has changed after the mid-2000s with mackerel becoming more abundant in Icelandic, East Greenlandic and Faroese waters. Also, stock size has increased after the mid-2000s. The change in distribution effectively made Iceland a coastal state to the NEA mackerel stocks. Therefore, the allocation key used since 1977 became invalid in the eyes of Iceland and Faroe Islands. For this reason from 2008 to 2013 no agreement was reached on the total TAC and the TAC-sharing among the mackerel fishing countries (EU, Iceland, Norway, Faroe Islands).

NEA mackerel is fished by a variety of fleets from many countries ranging from open boats using hand lines and gillnets to large freezer trawlers and Refrigerated Sea Water (RSW) vessels. The three most important

⁵ Janet A. Nye, Jason S. Link, Jonathan A. Hare, William J. Overholtz. 2009. Changing spatial distribution of fish stocks in relation to climate and population size on the Northeast United States continental shelf. MARINE ECOLOGY PROGRESS SERIES. Vol. 393: 111–129.

countries fishing NEA mackerel are currently Norway, Iceland and the UK (Scotland). There is a distinct seasonal fishing pattern with about 50% of the catch being taken in the third quarter of the year in Faroese, Norwegian and Icelandic waters.

In early 2014 EU, Norway, and Faroe Islands reached a five year agreement (2014–2018). In the years 2015–2018 TACs should be based on levels advised by ICES and the sharing of the TAC was agreed. The parties also set aside a TAC reserve to accommodate Iceland, and Greenland and a quota for NEAFC to account for mackerel fishery in international waters. However, Iceland and Greenland have chosen to set unilateral mackerel TACs for 2014.

ICES in 2014 changed the assessment model to put more emphasis on the fishery independent survey results and less emphasis on the commercial catch data. The TAC MSY advice of about 1 mill tonnes that ICES has provided for 2015 is based on this revised model.

Fishery dependency

The dependency analysis made relates to the above mentioned UNFSA allocation criteria (b), (d) and (e). *National fisheries dependency* is measured by the fishery sector's contribution to Gross Domestic Product (GDP). In the Faroe Islands fisheries (and aquaculture) account for 20% of GDP. In Greenland and Iceland fisheries in 2011 contributed 13% and 11% of GDP respectively. Norway, Denmark and Sweden differ substantially from the Faroe Islands, Greenland and Iceland as fisheries contribute less than 1% of GDP.

Taking mackerel as a case, the importance of shared stocks is analysed in two steps: 1) the share of mackerel in the total value of landings. This provides information about how important the species is for the harvesting sector, and 2) the share of mackerel landings that take place in domestic ports reflecting the importance for the domestic supply of fish to the processing industry.

The analysis includes Denmark, Faroe Islands, Iceland, Netherlands, Norway, Sweden and UK. Norway and Denmark in recent years have had a mackerel share of the total national landing value of over 10%. This is considerably more than Sweden and the Netherlands with about 5%. UK (Scotland), Iceland and the Faroe Islands have seen an increase in the share of mackerel bringing Iceland on level with Denmark and Norway,

and bringing Scotland and the Faroe Islands up to 20%. This is, of course, only an indicator of the socio-economic importance of the species.

Iceland and Norway land almost 100% of the mackerel catch in domestic ports. The corresponding figure for Denmark and UK is about 55% (down from 75% in the mid 2000s), and for Sweden 10%. The Netherlands process all the catch on board the fishing vessels. These figures, however, do not necessarily imply that the fish is bought by the local processing industry. It could be exported without further or minimal processing. However, it is still an indicator of the share of fish that goes into the national economy.

The definition of the *local (regional) community* is important when using this as an argument for access to fish resources since it is important to compare the same kind of units and indicators. The definition of “local” is not as clear as “national” and the definition in the analysis is important for the results. Further, the link between the fish resource and the local community is complex and depends on ownership structure, labour markets, etc. Thus, it may be easier and also more relevant to deal with local dependency when allocating fish quotas at the national level as compared to the international level. Bringing the analysis to the legal UNFSA framework where consideration shall be taken in international negotiations to the fisheries dependency of local communities, this seems to be hard to clearly define and prove as more or less important.

Closely linked to the issue of dependency is the concentration in harvest capacity and quota ownership that has taken place in NEA coastal states over the last 10 years. This concentration is of particular significance in the pelagic sector, but is also manifest in the non-coastal demersal sector. The decrease in the number of registered fishing vessels > 45m in the period 2004 to 2012 ranges from 13% in Norway to 85% in the Netherlands. The decrease is to a large extent intended and in some countries comes as the result of national fisheries policies introducing ITQ/IQs in the fisheries. The aim of this policy is to generate/increase profits and obtain a subsequent modernization of the harvest “machinery”. The newer and fewer vessels that have replaced the previous ones in all the countries tend to operate on the basis of bigger quota shares in the hands of fewer quota owners/holders.

Another element in the context of “dependency” in the NEA is the increasing praxis of “quota hopping” where fishing companies based in one coastal state through subsidiaries own one or more fishing vessels flying the flag of another coastal state. It is quite common that a NEA vessel is reflagged from one flag state to another to take part in this praxis. Particularly Dutch fishing companies are known to be heavily involved with multi-national fishing vessel and quota ownership in the NEA. A recent development in the NEA is that a fishing vessel flying the flag of one country fish on a quota belonging to another country through a so-called “vessel quota swap” arrangement. Such swaps at vessel level are of the same nature as the commonly practiced quota swaps between countries, but has (until now) only been allowed for certain fish species.

The concentration and “internationalization” of the NEA off shore fisheries also characterize the fish processing industry in the NEA. Owners/decision makers of one or more processing plants in one country may be citizens of other countries and also possess the same type of processing plant elsewhere. Their decisions on from which fishing vessel to source raw material and where to process the fish is first and foremost determined from profit considerations rather than from social considerations and concern for local dependency.

Choice of allocation criteria

The recommendation from NMTT builds on the allocation criteria specified in UNFSA Article 11. The NMTT recommendations are intended to be universally applicable across all regulative fora in the NEA and to pelagic as well as demersal fisheries. The recommended allocation criteria are:

- a) The status of the straddling fish stocks and highly migratory fish stocks and the existing level of fishing effort in the fishery.

This criterion which considers the spatio-temporal distributions of the fish stocks in the NEA is considered the lead criterion for future allocation agreements as the changes in spatio-temporal distributions are the root cause of the allocation conflicts encountered. The issue is to find a way to determine the zonal attachment of the fish stocks that can be used as the scientific base for an agreement. Having investigated various ways in which to address the zonal attachment, NMTT has come to the conclusion

that the most practical approach is the one suggested by Norwegian fishery biologist Johannes Hamre in 1993.⁶ The Hamre approach is applicable to most if not all straddling/migratory fish species in the NEA.

Hamre reviews the zonal attachment based on three biological criteria:

- b) Spatio-temporal distribution of the fish stock by components such as immature-mature or fishable-non-fishable.
- c) Spatio-temporal distribution of the production of the fish stock, i.e. in which area/seasons does the fish reproduce, grow and die Occurrence of spawning and nursery grounds.

The third criterion is a particular application of the second criterion and is included because often data available to establish the spatial-temporal distribution is confined to the fishable components of the resource.

The main feature of the Hamre model is that it considers the production of biomass which includes the spawning and nursery grounds. Thus, an allocation key based on the Hamre model will not only include the fishable biomass, but the bio-mass for the entire life-cycle of the species. The model therefore implicitly assumes that all fisheries that are allocated quota will have access to the resource even if the fishable part of the stock should be in the EEZ of another country.

Fisheries science can provide extensive documentation on zonal attachment as background for an allocation scheme and can also offer a variety of approaches for the managers to choose from. This must be decided in each specific case. The key advantages include that the database and the calculations are transparent and built on sound biological science on the fish production capacity in each zone. Furthermore, the scientific database illustrates the annual variations that are to be expected and therefore should not form a basis for challenging the allocation scheme.

NMTT finds that the allocation scheme should include considerations of the distribution of the fishery not only by EEZ but also by season; the

⁶ J. Hamre. 1993. A model of estimating biological attachment of fish stocks to exclusive economic zones. ICES CM 1993/D:43.

fishery should provide optimal return not in weight but rather in economic terms and the value of one ton of fish most often varies by season. This suggests that the fish (*ceteris paribus*) should be fished during the seasons and in the areas where the value is highest. Therefore agreements on allocations should also include agreements on access to fishing grounds.

- d) The respective interests, fishing patterns and fishing practices of new and existing members or participants.

Fishing interests, patterns and practices are considered relevant for future allocation agreements in as much as history and practice is embedded in the investments made in fishing vessels and quotas and in income to governments from quota and other taxation. The time span and the weight that should be given to this criterion should be judged based on the stability of the fisheries and the stock distributions. Often a 10 years horizon is used in judging historic rights and this time span would seem reasonable if no other agreement can be made. Concerning the weight that should be given to this criterion it may be difficult to achieve an agreement. However, it should be recalled that fisheries are diverse and there is rarely a “one size fits all” solution readily available. Therefore, the issue would have to be considered and determined from case to case.

- e) 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.

There is a long tradition that all the NEA coastal states contribute to the scientific work of ICES on the fish stocks that they exploit and endeavour to conserve and manage the stocks sustainably. NMTT considers this criterion particularly relevant to newcomers into specific NEA fisheries and new members of a fishery should be expected to contribute with its share of the management.

- f) The needs of coastal States whose economies are overwhelmingly dependent on the exploitation of living marine resources.

NMTT considers this criterion relevant in the NEA where some coastal states are heavily dependent on fisheries.

- The needs of coastal fishing communities which are dependent mainly on fishing for the stocks in question.

Referring to the discussion above on difficulties defining local dependency, NMTT considers this criterion of limited relevance to future decision making at international level on allocation of fishing rights in the NEA.

- The interests of developing States in whose areas of national jurisdiction the stocks also occur.

This criterion NMTT considers of no relevance as there are no “developing states” in the NEA area.

Duration of allocation agreements

There are two time elements involved in reaching an agreement on allocation. The first concerns the period over which a data average should be applied. The second is the time for which the agreement should run before it is reopened for revision. The recent mackerel agreement (EU-Norway-Faroe Islands) is a 5 year agreement, the EU Common Fisheries Policy is up for revision every 10 years. The appropriate time horizon needs to strike a balance between many conflicting considerations and therefore it is a decision to be made by managers (or perhaps even at the policy level) prior to having the scientists start compiling detailed data.

How to resolve conflicts over allocation?

Most joint fisheries arrangements between countries do not include an explicit dispute settlement procedure beyond “consultations between the parties” and “withdrawal from the agreement”. Practise within fisheries dispute settlement is consultations among the involved parties with, if agreed, a mediator servicing the process.

The EU CFP has no explicit dispute settlement procedure except the European Court. The EU-Norway fisheries agreement stipulates that disputes are settled through “... consultations ...If, within three months from the request for consultations, a solution satisfactory to the Party which has requested consultations, is not found, that Party may, ... suspend or terminate the Agreement.”

A fast track dispute settlement procedure was decided in NEAFC in 2004 and made it mandatory to explain the reasons for any objections and established procedures for setting up arbitration panels to settle disputes. No such arbitration panel has been established up till now. The question of using the NEAFC dispute settlement procedures was raised when both the mackerel and the herring agreement on allocations came up for discussion and disagreement in the beginning of this decade. Although the Contracting Parties of NEAFC had agreed on the procedures they did not want to use the NEAFC rules as coastal states. In the opinion of the NMTT these procedures are in substance applicable to all NEA fisheries agreements.

1. Introduction – what is the problem?

Today's allocation of national fish quotas in the North East Atlantic (NEA) is for most of the species based on allocation keys negotiated in connection with the establishment of the EU Common Fisheries Policy or negotiated in the framework of the North East Atlantic Fisheries Commission, NEAFC, the Joint Norwegian-Russian Fisheries Commission (JNRFC) or in bilateral agreements between EU (at the time EC) and Norway and the Faroe Islands. Many of these allocations were established when the 200 nm EEZs were established in the late 1970'ies.

These keys are to a large extent based on the coastal states' fishing records during the period 1971–76 and has subsequently and with only a few amendments⁷ been used by the European Union (EU) for the annual allocation of fishing quotas among its Member States. Known as “the relative stability” this is one of the cornerstones of the EU Common Fisheries Policy, CFP.

The agreements in 1977 on the allocation of fishing quotas between the EU and third countries (i.e. coastal states in the North East Atlantic (NEA)) supplements the 1982 United Nations Convention on the Law Of the Seas (UNCLOS) agreement.⁸ They took as their point of departure the fishing zones to which the fish stocks are attached in combination with the

⁷ E.g. the so called Hague preferences agreed in 1976 and implemented for fishery dependent areas in United Kingdom, Ireland and Denmark (Greenland) with the adoption of the EU Common Fisheries Policy 25th January 1983.

⁸ Full name: Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (dated 8 September 1995). The agreement came to force on 11 December 2001.

national fishing records. Subsequently, these initial allocations have obtained the status of continuing “allocation keys”.

Most of the bilateral fishing agreements between coastal states in the NEA not involving the EU such as e.g. the agreement from 1975 between Norway and the Soviet Union (now Russian Federation) also builds on historical records turned into fixed allocation keys that have been applied unaltered since.

During the close to 40 years when stable keys have been the leading principle for the allocation of fishing quotas among coastal states in the NEA the marine ecosystem(s) has changed including changes in the seasonal spatial distribution of many fish stocks in NEA waters. At this point in time these changes are not understood in great details. Some of them are related to climate changes and other changes in the ecosystem(s) (e.g. changes in the marine currents etc.). Likewise, in all the countries/territories a technical development in the fishing fleets operating in the NEA has taken place towards larger vessels with longer range in time and space. The development towards the use of market based principles in fisheries management has implied that the fishery dependent coastal communities in the NEA areas have in general lost fishing rights. An internationalization of the ownership of the fishing vessels in the EU, the fishing rights at vessels’ level (ITQs etc.), and the fish processing industries have taken place as well as an internationalization of the (decreasing) fisheries workforce both at sea and ashore.

The changes mentioned above have all contributed to the fact that the existing allocation keys for the fishing rights in the NEA have been challenged by some coastal states. This has led to complex and difficult discussions on allocation. Dissatisfaction has among other issues/problems manifested itself in a multi-annual and still unresolved conflict between on the one side the EU and Norway and on the other side Iceland and (since 2014) Greenland and (until 2014) the Faroe Islands over the allocation of fishing rights for NEA mackerel. Another example is the conflict over NEA herring allocation and the setting of a unilateral Faroese TAC, which in 2014 led to a severe conflict escalation involving punitive actions on Faroese fish landings and trade. Outside the NEA the reallocation of pacific salmon between Canada and USA show the global nature of the problem.

The conflict over mackerel entailed the suspension and subsequent loss of all the MSC certification of mackerel fisheries in the NEA in April 2012. This in turn created turbulence in the billion dollar global market for mackerel. The image of the Nordic countries as members of a “premier league”⁹ in fisheries management also received deep scratches in consequence of the mackerel conflict.

The problems which to-day is obvious in the pelagic fisheries may very well in a 5–10 year time perspective also become manifest in the NEA demersal fisheries. Changes in the spatial distribution of cod have already been observed, but because of the shorter migrations of cod, problems are however not yet of “mackerel conflict magnitude” have not (yet) been encountered. This makes it very timely to consider if the allocation of fishing rights in the NEA in the future shall continue on the basis of stable allocation keys or if the allocation shall be based on more dynamic principles.

⁹The situation in the NE Atlantic is unique, when it comes to good governance and protection of biodiversity. There are convention based RFMOs (NEAFC and NAFO) a convention based Regional Seas Organisation (OSPAR), and a convention based advisory body (ICES). No other region of the seas has similar strong governance frameworks and long tradition of cooperation.

2. Fishing rights allocation in the North East Atlantic

2.1 The international legal and institutional setting

2.1.1 (a) *United Nations Convention on the Law of the Sea, UNCLOS 1982*

According to UNCLOS' Article 56.1.a the coastal state has the exclusive right of harvesting in its economic zone, i.e. "sovereign rights for the purpose of exploring and exploiting... the natural resources of the waters superjacent to the seabed... with regard to exploitation and exploration...". This means that fish in the zone belongs to the coastal state, as long as it is in the zone. In this zone the coastal state may itself manage the stock by allowing, prohibiting and regulating fishery, by limiting participation and quotas etc. "sovereign rights for the purpose of exploiting... natural resources." Accordingly each state, targeting the same stock, will unilaterally set its own total allowable catches (TAC). However, this rule must be seen in connection with the rule in Article 63.2: "Where the same stock or stocks of associated species occur both within the exclusive economic zone and in an area beyond and adjacent to the zone, the coastal state and the states fishing for such stocks in the adjacent area, shall seek either directly or through appropriate subregional or regional organizations, to agree upon the measures necessary for the conservation of these stocks in the adjacent area".

In consequence of Article 61.2 coastal states are under the obligation to cooperate to prevent the stock from being threatened by overexploitation and according to Article 63 the coastal states "shall seek to agree

upon the measures necessary” in that respect. However, as it appears, UNCLOS does not say anything about the criteria governing the allocation of fishing rights. Thus UNCLOS does not mention anything about distribution based on historical fisheries or based on geographical distribution or other conditions attached to the stock and its exploitation.

2.1.2 (b) The UN Straddling and Highly Migratory Fish Stocks Agreement, UNFSA, (1995)¹⁰

UNCLOS Articles 56 and 63 are complemented by the UN agreement on migratory fish stocks (The UN Fish Stocks Agreement, 1995 called UNFSA). According to this agreement states harvesting the same stock must “agree on the rights of participants, such as distribution of allowed catch or levels of fishing effort” (Article 10 b). However, there is no explicit indication of what the principles of distribution would be. This is then left for the individual Regional Fishery Management Organizations (RFMO) (as for instance NEAFC in the North East Atlantic) or other Regional Fisheries Bodies to decide upon.

If the parties should materially seek to achieve certain solutions or give priority to certain considerations or principles, the legal references are given in UNFSA Article 11. This Article states that participant rights for new members or participants – both as regards the species and the amount – must be assessed on the basis of the following considerations:

- a) “the status of the straddling fish stocks and highly migratory fish stocks and the existing level of fishing effort in the fishery
- b) the respective interests, fishing patterns and fishing practices of new and existing members or participants

¹⁰ Full name: Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (dated 8 September 1995). The agreement came to force on 11 December 2001.

- c) 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
- d) the needs of coastal fishing communities which are dependent mainly on fishing for the stocks
- e) the needs of coastal States whose economies are overwhelmingly dependent on the exploitation of living marine resources, and
- f) the interests of developing States from the subregion or region in whose areas of national jurisdiction the stocks also occur.”

Certainly these principles are valid when considering how a new state fits into an already established RFO or fishery cooperation, but they must also be considered relevant in the cases where the coastal state is already a member of an RFO or participates in a fishery-cooperation, but harvests a species in its zone that it has not exploited earlier. As a consequence of Article 11 the parties must consider the participants’ interests, fishing patterns and fishing practice, the need of the coastal communities participating in the actual fishery (paragraph (d)), and also the coastal state’s harvesting need (paragraph (e)). Each state’s contribution to stock conservation, management and research should also be assessed. This last aspect is probably straightforward for the coastal states in the North East Atlantic as they all are members of NEAFC as well as the International Council for the Exploration of the Sea, ICES. Also UNFSA makes it clear (in Article 8.1) that coastal states shall cooperate to ensure effective conservation and management of straddling and highly migratory fish stocks. However, the obligation to cooperate is not an obligation to finalise negotiations with an agreement.

2.1.3 (c) World Summit on Sustainable Development (Johannesburg Agreement 2002)¹¹

As a supplement to UNCLOS and UNFSA, the World Summit on Sustainable Development (the Johannesburg agreement 2002) Plan of implementation, paragraph 31, states: “Maintain or restore stocks to levels that can produce the maximum sustainable yield.” The MSY criterion does not deal with national sovereignty as laid down in UNCLOS. The WSSD-amendment changed not the MSY principle, but the timeline set. Thus it is the coastal state alone, which decides how the MSY principle is applied. There is no international court to settle this.¹²

2.1.4 (d) The North East Atlantic Fisheries Convention, NEAFC¹³

The NEAFC was established in 1963 and revised in 1982. The Contracting Parties are Denmark (in respect of the Faroe Islands and Greenland), the European Union, Iceland, Norway and the Russian Federation. The NEAFC Convention area covers the North East Atlantic and those parts of the Arctic Ocean that are adjacent to the NEAFC convention area. Most of this area is under the fisheries jurisdiction of the Contracting Parties (marked in blue on Map 1), but three large areas are international waters and constitute the NEAFC Regulatory Area (marked in orange on Map 1). This means that, basically, NEAFC only has competence outside the area of the national economic exclusive zone (NEAFC Article 8.1). For the area within EEZ, competence depends on the coastal states’ acceptance of the NEAFC fisheries regulations. In the Northeast Atlantic informal state groups, which call themselves “relevant coastal states” as contrary to the legally recognized notion of “coastal states” decide on total allowable catches and quota allocations. The group of the decision making states, the “relevant

¹¹ Google: Johannesburg Plan of Implementation 2002.

¹² In the NE Atlantic, ICES is asked to determine MSY and give its opinion if a management agreement based on a certain value is sustainable.

¹³ <http://www.neafc.org>

coastal states” decides according to a system of full discretion, whether a fishing nation is accepted as a coastal state or not. If the coastal state group cannot agree (as frequently is the case in recent years) NEAFC cannot act. Two external reviews (2006 and 2014) of the NEAFC performance highlight this fact.

The main fisheries in the NEAFC regulatory area are for Mackerel, Haddock, Norwegian Spring- Spawning Atlanto-Scandian herring, Blue Whiting and some deep sea species. The pelagic stocks, however, represents more than one third of the total landings from the NEA with very significant amounts are caught in national EEZs.

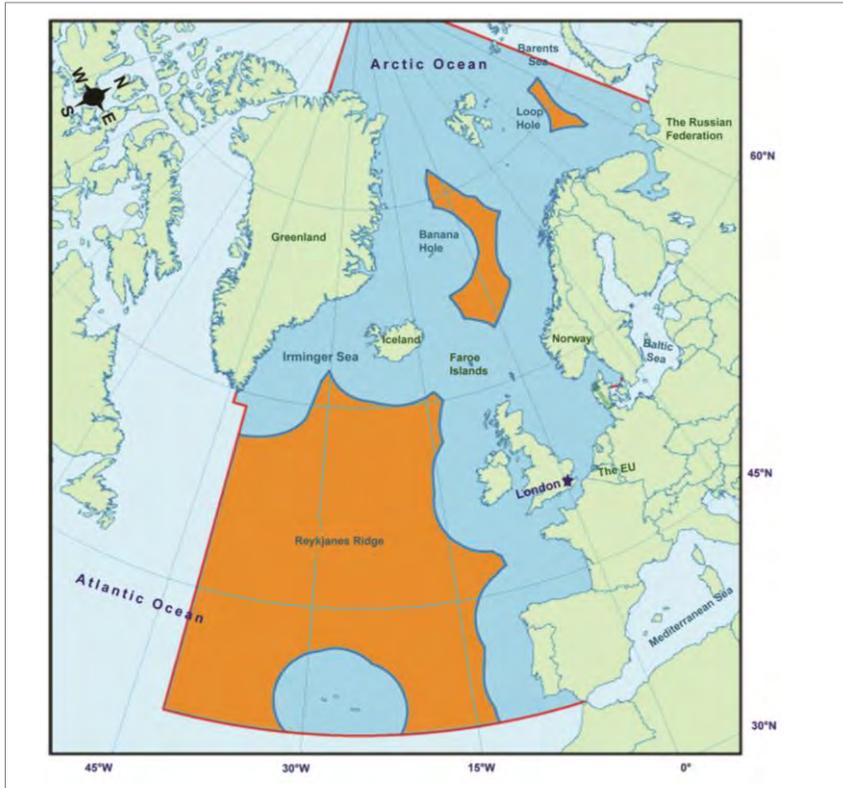
As made clear above there are not any exact criteria in UNCLOS, UNFSA or elsewhere for how NEAFC should allocate fishing-rights and fish quantities to member states and NEAFC has not itself laid down definite principles for the allocation of fishing-rights. The result is that it depends on the bargaining power of the parties what fish quantities in the NEAFC regulatory area each country will be allotted.

However, NEAFC has in 2003 adopted some “Guidelines for the expectation of future new Contracting Parties with regard to fishing opportunities in the NEAFC Regulatory Area.”¹⁴ The guidelines says that:

- “Non Contracting Parties of NEAFC should be aware that presently and for the foreseeable future, stocks regulated by NEAFC are fully allocated
- fishing opportunities for new members likely to be limited to new fisheries (stocks not currently allocated), and
- New Contracting Parties will participate, on the same basis as existing Contracting Parties, in future allocations of stocks.”

¹⁴ These guidelines were agreed at the 22nd Annual Meeting of NEAFC in November 2003.

Map 1: NEAFC regulatory area



2.1.5 (e) The European Union (EU)

The fisheries by EU Member States are regulated by the Common Fisheries Policy (CFP) which was established in 1983 as a coherent policy to allocate fishing opportunities to Member States and to manage their fisheries. Under the CFP the Council sets TAC's which are allocated between member states using fixed allocation keys known as "relative stability". Relative stability was established on basis of historic catches, losses in external catch opportunities as a result of extended fishing limits and the so called Hague preferences giving fisheries dependent areas a preferential allocation. The 1982 allocation keys have only rarely been modified during the more than 30 years in which the CFP has been in existence. The European Commission represents the EU member states in many international fisheries forums, e.g. NEAFC.

2.1.6 (f) *The International Council for the Exploration of the Seas (ICES)*

ICES is an international convention (since 1902, convention revised in 1964)¹⁵ promoting marine science particular on living marine resources. The ICES member states are those with a coast bordering the Baltic Sea and the North Atlantic, 20 states in total. The Faroe Islands and Greenland take part in the ICES work through the Danish membership, however, both mostly operate independently of Denmark in ICES.

ICES provides annual advice on the fishing opportunities for about 200 stocks in the Baltic Sea and the North East Atlantic. Many of these fish stocks are shared between two or more countries. However, the annual recurrent advice is confined to the overall TAC and general technical measures e.g. mesh sizes and closed areas for the protection of juveniles and spawning. ICES has on occasions been invited to contribute with background information that has been used in allocation negotiations, typically estimates of the geographical distribution of the fish species in question.

2.2 Existing Fisheries jurisdictions and allocation agreements in the North East Atlantic

Every agreement on shared fishing in the NEA includes a scheme for allocation of the fishing opportunities among the parties involved. The allocations are based on the UNCLOS principles and agreed through negotiations between the involved parties. The jurisdiction areas in the NEA are shown on Map 2.¹⁶ There is extensive cooperation based on multilateral and bilateral agreements for exchanging fishing opportunities between jurisdictions. The map shows that the Faroe Islands and Greenland have full jurisdictions in their fishing zones, but these territories are not always considered Contracting Parties in their own rights. The Faroe Islands and Greenland are accepted as coastal states in NEAFC.

¹⁵ <http://ICES.dk>

¹⁶ The Fisheries Protection Zone of Svalbard and Jan Mayen come under Norwegian jurisdiction.

The agreements fall in two groups, Coastal State agreements involving three or more states and territories, and bilateral agreements:

Examples of the *Coastal State Agreements* are:

Mackerel

The main fishery for mackerel before the general extension of fishery EEZs to 200 miles in 1977 was in the North Sea. ICES in 1978–79 produced two Cooperative Research Reports about the Biology and State of Exploitation of Shared Stocks^{17,18}, one on stocks in the North Sea and one on stocks elsewhere. The North Sea Report deals with Mackerel both in the North Sea and the Western and Southern component. The North Sea stock was in 1976 in sharp decline and eventually collapsed.

However, the zonal attachment of the mackerel in the North Sea was used as the basis for agreement between the EU and Norway on the sharing of mackerel. Norway and the EU dealt with other parties under bilateral agreements from 1977 to 1999. In practice Norway and the EU laid down a “reference TAC” which in addition to quotas for Norway and the EU, also includes a fixed quantity for the Faroe Islands.

An expansion of the unregulated mackerel fishery in international waters in the NEA in the 1990s raised concern in the three affected coastal states, the EU, Faroe Islands and Norway. At an extraordinary annual meeting in NEAFC in February 1999, they therefore put forward a joint proposal for regulating the mackerel fishery in international waters. The proposal was adopted against the votes of the Russian Federation and Iceland.

The submission of the joint coastal proposal in NEAFC meant the recognition of the Faroe Islands as a coastal state by Norway and the EU. This marked the beginning of a new trilateral management regime for mackerel in the North East Atlantic from 2000. In this regime annual quota distributions were agreed based on a fixed allocation key up to and including 2009. From 2008 to 2013 no agreement was reached on the

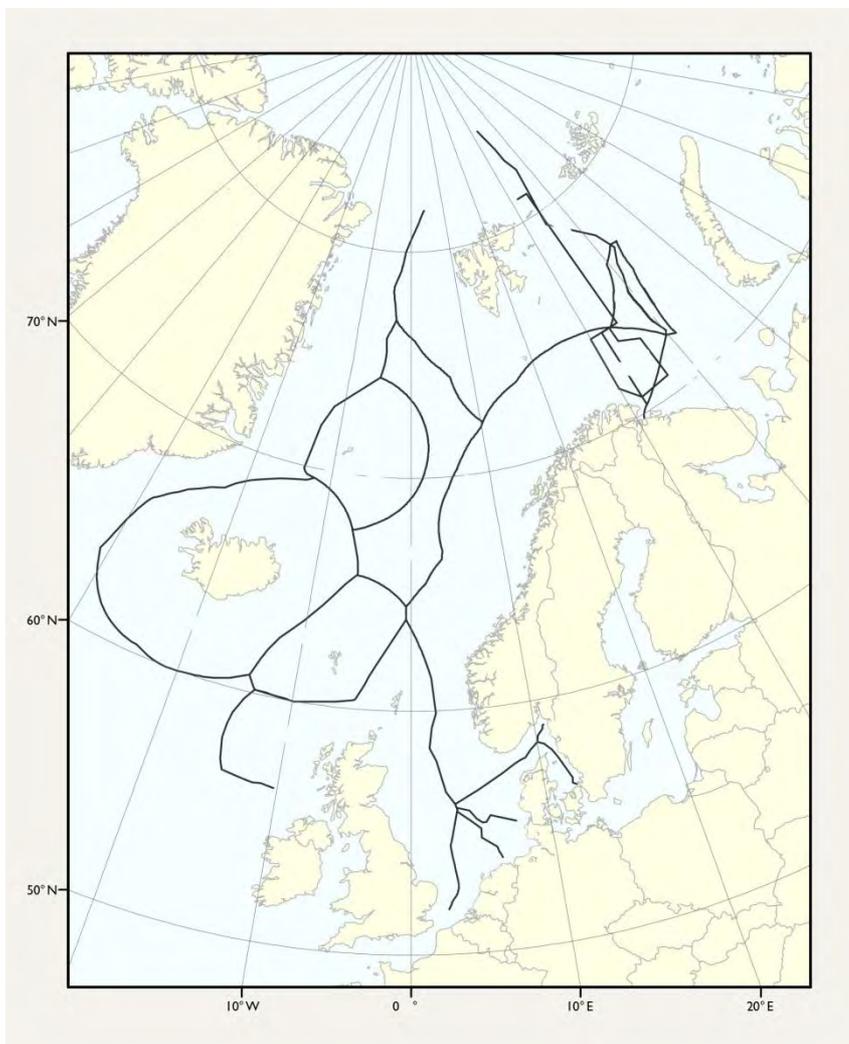
¹⁷ ICES Cooperative Research Report no 74 1978. The Biology, Distribution and State of Exploitation of Shared Stocks in the North Sea Area.

¹⁸ ICES Cooperative Research Report no 86 1979. The Biology, Distribution and State of Exploitation of Fish Stocks in the ICES Area.

total TAC and the TAC-sharing among the mackerel fishing countries. The disagreement was a result of the change in the population dynamics of the NEA mackerel.

In early 2014 EU, Norway, and Faroe Islands reached a five year agreement for 2014–2018. For further details of the mackerel dispute please refer to Ch. 3.1.

Map 2: EEZs in the North East Atlantic



Norwegian Spring Spawning (Atlanto-Scandian) herring

The stock development and fishery history of this herring stock is similar to that of the North Sea mackerel. The stock collapsed in the late 1960s after the fishery peaked in the early 1960s. The stock recovered during the 1980s and the fishery was reopened by mid 1990s.

The allocation of the Atlanto-Scandian herring TAC became a matter of concern to the coastal states, i.e. the countries in whose EEZs the stock was found before its collapse in the 1970s: Iceland, the Faroe Islands, Norway and the Russian Federation (Soviet Union).

Discussions started when the stock in the early nineties started to migrate out of Norwegian and Russian waters, following the recruitment of the large 1983 year class and good recruitment in the early 1990s. It was agreed between the Coastal States in 1995 to have an analysis undertaken by a group composed of scientists and a mandate from the four coastal states on the zonal attachment of the Atlanto-Scandian herring. This was the basis for an agreement between the 4 coastal states for 1996.

The EU set its own quota for 1996 (about 14% of the TAC). This led to new negotiations, which included the EU. An agreement was reached for 1997, which gave the EU the status of coastal state and a substantial allocation (8.4%). Denmark has by far the largest share of the EU allocation (34.3%).

In 2002 Norway opted out of the agreement because of dissatisfaction with the allocation key and there was no allocation agreement in the year 2003–2006. A new agreement was reached in 2007, giving Norway some compensation. In 2012 The Faroe Islands opted out and set its own quota. This led to sanctions from the EU and Norway against the Faroe Islands. Recently the Faroe Islands has set a quota for herring at a lower level than in 2013 and, in consequence, sanctions against the Faroe Islands have been revoked. The coastal states have agreed to update the analysis from 1995. A report was finalized in March 2014.

Blue Whiting

The fishery of blue whiting started in the 1970s. Especially Russia and Norway fished this species. Russia did not fish in its own waters, but mainly in the Faroe Islands and the Norwegian zone. The Faroe Islands,

the EU and Iceland have since then also caught large quantities of blue whiting. Blue whiting in the NEA was unregulated for many years. NEAFC discussed the problem in the 1980s and 1990s but there was no interest in discussing allocations until the late 1990s. A NEAFC Working Group analysed the zonal attachment in 1999 and the report was discussed in the following years. In 2006 an allocation agreement was reached for 2007 and onwards. A NEAFC Working Group has since 2009 attempted to update the 1999 analysis of zonal attachment. The work was finalised in November 2014.

Capelin

The capelin in the Iceland-East Greenland-Jan Mayen area is a stock shared by Norway, Iceland and Greenland. Capelin was originally in 1980 shared between Norway and Iceland. Later in 1989 Greenland became part of this agreement as well. The agreement was renewed in 1998 into the present agreement. The agreement is not part of NEAFC, as capelin is not fished in international waters. There is also a stock of capelin in the Barents Sea, which is shared between Norway and Russia.

The protocol entails a quota exchange element which gives Iceland access to fishing a certain quantity of cod in the Barents Sea while Norway may fish capelin and bottom fish in the Icelandic zone.

The Coastal State Agreements 1996 to 2014 on the pelagic species are shown in Table 1.

The Loophole Agreement

The agreement between Norway, Iceland and The Russian Federation concerning certain cooperation aspects in the fishing area (The Loophole Agreement) and a protocol between Norway and Iceland was concluded among the parties on May 15 1999. The reason for the agreement was the need for regulating the Icelandic fishery in the so-called Loophole in the Barents Sea.

Table 1: Coastal State Agreements 1996 to 2014

Stock/year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Norwegian Spring Spawning - (Altanto-scandian) Herring	-	X	X	X	X	X	X	-	-	-	X	X	X	X	X	X	X	-	-
Mackerel in the North-East Atlantic	-	-	-	-	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-
Blue Whiting (ICES Subareas I-IX, XII and XIV)	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X

No agreement = -.

Agreement = X.

There are many *Bilateral agreements on fisheries* in force in the NEA. Examples include:

The Russia-Norway Agreement

The most important fish stocks in the Barents Sea have an area of distribution, which covers the Norwegian and Russian zones and the Fisheries Protection Zone around Svalbard. The most important shared stocks are northeast arctic cod, northeast arctic haddock and Barents Sea capelin.

The bilateral cooperation in the fishery sector already began in the 1950s in the area of marine research. The fishery cooperation is based on a wide set of agreements, and the cooperation is formalized through the agreement of April 11, 1975.

Under the agreement the Joint Norwegian-Russian Fishery Commission was established. At the annual commission meeting the parties agree total quotas and distribute the quotas among Norway, Russia and third countries. The agreement also covers mutual fishing access in each other's zones and quota exchanges within common stocks and national stocks. Total quotas agreed by Norway and Russia in the fishery commission are based on the recommendations for exploitation, prepared by ICES, where both Norwegian and Russian researchers are represented.

The EU-Norway Agreement¹⁹

The fishery cooperation between Norway and the EU is based on a bilateral fishery agreement. Based on this bilateral agreement, Norway and the EU have from 1978 up to today concluded annual quota agreements on Norway's and the EU's fishery of shared stocks in the North Sea, Norwegian fishery west of The British Isles and in Greenland waters, as well as the EU's fishery in the Norwegian economic zone in the Barents Sea.

The agreement also includes North Sea herring. Just like Norwegian Spring Spawning herring the North Sea herring has a long history with almost extinction in the 1970s. In 1986 Norway and the EU agreed on sharing the North Sea herring, where Norway's share increases proportionally with the size of the spawning mass. This agreement was updated in 1996.

The Norway – Faroe Islands Agreement

In 1979 Norway and the Faroe Islands made a framework agreement about mutual fishing rights. The agreement is mutually balanced and regulates the exchange of quotas of exclusive stocks. In line with the agreement Norway and the Faroe Islands make an agreement every year about the exchange of fishing quotas in each other's economic zone. The agreement also gives the Faroe Islands access to fishing part of its mackerel quota in Norwegian zone, in accordance with the Coastal State Agreement on mackerel.

The Norway – Greenland Agreement

The agreement on mutual fishing cooperation between Norway and Greenland was concluded in September 1991. According to the agreement Norwegian and Greenland vessels may fish mutually in each other's economic zones. The extent of the fishery and the precise conditions are determined in the annual quota agreements. Quota exchanges must be balanced in an approximate manner.

¹⁹ For a detailed analysis of EU agreements with Norway and Greenland see: Suzannah F. Walmsley: EU Northern Agreements. Appendix F in "Trade in Fishing Services – Emerging Perspectives in Foreign Fishing Arrangements," World Bank, Dec. 2014.

Other agreements are the agreement between the Soviet Union (later the Russian Federation) and the Faroe Islands (1977) and the agreement between Iceland and the Faroe Islands (1974).

3. What is the resource situation today and what is likely to happen in the medium/long term?

3.1 Changes in abundance, seasonal distribution etc.

The inability of the allocation agreements to deal effectively with changes in the spatio-temporal distribution of fish stocks is a root cause to the disagreements about the allocation of fishing rights in the NEA. NMTT thus disagree that the root cause is the failure of international legal frameworks and agreements to recognize that the world is dynamic as they all assume a constant nature. This is simply because the Law of the Sea is not hindering a dynamic management of resource distribution. All spatio-temporal distributions of fish stocks whether measured in abundance, in biomass or in production are subject to annual variations and temporal drifts. How these changes impact the availability and thus the will for some countries to raise the issue about allocations depends on the location the EEZ relative to the geographical range for the stock. In general, the geographical range narrows with decreasing stock size and increases when the stock increases. Classical examples from the NEA includes the North Sea herring which disappeared from the Norwegian part of the North Sea during a depletion phase in the 1970s and the Atlanto-Scandian herring which for more than a decade during the 1970–1980 – also a period when the stock was depleted – only occurred in the Norwegian EEZ and mostly in Norwegian coastal waters. Recently the NEA mackerel has increased its range into Icelandic and Greenlandic waters associated with an increase in stock size.

Changes in the distribution of fish stocks are often explained through climate changes but there are many other processes that introduce a change in the distribution of fish stocks. Rijndorp et al. (2010)²⁰ reviewed the effects of climate change on fish stocks in the NEA and concluded that Lusitanian species have increased in recent decades (sprat (*Sprattus sprattus*), anchovy (*Engraulis encrasicolus*), horse mackerel (*Trachurus trachurus*), red mullet (*Mullus surmuletus*), John dory (*Zeus faber*)), particularly at the northern limit of their distribution areas, whereas Boreal species generally decreased at the southern limit of their distribution area (cod, plaice), but increased at the northern limit (cod). A shift in distribution to deeper waters was recorded in the Boreal species cod and plaice. Murawski (1993)²¹ presented evidence from trawl surveys of such changes, Walther et al. (2002)²² presented evidence on the ecological impact of climate change. Nye et al. (2009)²³ updating Murawski's analysis concluded that fish stocks in general exhibit a poleward shift in their center of biomass, most with a simultaneous increase in depth, and a few with a concomitant expansion of their northern range. Recently Hollowed et al. (2013)²⁴ reviewed current literature on the projected effects of climate change on marine fish and shellfish, their fisheries, and fishery dependent communities throughout the northern hemisphere. They found that the species composition, distribution, and abundance of fish species will

²⁰ Adriaan D. Rijnsdorp, Myron A. Peck, Georg H. Engelhard, Christian Möllmann and John K. Pinnegar (eds) 2010. Resolving climate impacts on fish stocks. ICES Cooperative Research Report No. 301.

²¹ Murawski SA (1993) Climate change and marine fish distributions: forecasting from historical analogy. *Trans Am Fish Soc* 122:647–658.

²² Gian-Reto Walther, Eric Post, Peter Convey, Annette Menzel, Camille Parmesan, Trevor J. C. Beebee, Jean-Marc Fromentin, Ove Hoegh-Guldberg & Franz Bairlein 2002. Ecological responses to recent climate change. *NATURE* |VOL 416 | 28 MARCH 2002 |www.nature.com

²³ Nye Janet A., Link Jason S., Hare Jonathan A., Overholtz William J., 2009. Changing spatial distribution of fish stocks in relation to climate and population size on the Northeast United States continental shelf. *MARINE ECOLOGY PROGRESS SERIES* Vol. 393: 111–129, doi: 10.3354/meps08220

²⁴ Anne B. Hollowed, Manuel Barange, Richard J. Beamish, Keith Brander, Kevern Cochrane, Kenneth Drinkwater, Michael G. G. Foreman, Jonathan A. Hare, Jason Holt, Shin-ichi Ito, Suam Kim, Jacquelyne R. King, Harald Loeng, Brian R. MacKenzie, Franz J. Mueter, Thomas A. Okey, Myron A. Peck, Vladimir I. Radchenko, Jake C. Rice, Michael J. Schirripa, Akihiko Yatsu, and Yasuhiro Yamanaka. 2013. Projected impacts of climate change on marine fish and fisheries. *ICES Journal of Marine Science*, 70(5), 1023–1037. doi:10.1093/icesjms/fst081

change but offered not recipe on what specifically these changes will be. They realised that it is and will be difficult to tease out the additional effect of climate change from other anthropogenic activities and they found it unclear how complex management systems involving measures such as catch shares, bycatch limits, mixed species catch or effort limits, and spatial or temporal closures will perform in response to these changes.

North East Atlantic mackerel

NEA mackerel is very much in focus in the discussions around the NEA and for this reason we here look at this stock in some detail.

Atlantic mackerel is a pelagic schooling species that is abundant in cold and temperate shelf areas. NEA mackerel occurs in EU, Faroese, Norwegian, Icelandic, East Greenlandic and international waters. The distribution of NEA mackerel has changed after the mid-2000s with mackerel becoming more abundant in Icelandic, East Greenlandic and Faroese waters. Also, stock size has increased after the mid-2000s. Mackerel have recently been reported from West Greenland waters as well and Greenland set a 10,000 t mackerel quota in NAFO area 1 for 2014.

NEA mackerel supports one of the most valuable European fisheries. Mackerel is fished by a variety of fleets from many countries ranging from open boats using hand lines and gillnets in the coastal areas to large freezer trawlers and Refrigerated Sea Water (RSW) vessels in the Northern area. The three most important countries fishing NEA mackerel are currently Norway, Iceland and the UK (Scotland). 5–10% of the catch is taken in international waters. There is a distinct seasonal fishing pattern with about 50% of the catch being taken in the third quarter of the year in Faroese, Norwegian and Icelandic waters. For details of quota allocations and landings see Annex 1.

Since 2005 NEA mackerel changed its spatio-temporal distribution pattern with larger amounts migrating northwest during summer and abundance in Faroese, Icelandic and Greenlandic (East Greenland) waters increasing significantly. The change in distribution effectively made Iceland a coastal state to the NEA mackerel stocks. Therefore, the allocation key used since 1977 became invalid in the eyes of Iceland and Faroe Islands. For this reason from 2008 to 2013 no agreement was reached on the total TAC and the TAC-sharing among the mackerel fishing countries (EU, Iceland, Norway, Faroe Islands, and with Russian Federation on the

side line). This disagreement was a result of the change in the population dynamics of the NEA mackerel.

In early 2014 EU, Norway, and Faroe Islands reached a five year agreement (2014–2018). In the years 2015–2018 TACs should be based on levels advised by ICES and the sharing of the EU/Faroese/Norwegian TAC (84.4% of total NEA TAC) was agreed as follows: EU 58.40%, Faroe Islands 14.93%, and Norway 26.67%. The parties also set aside 15.6% of the TAC for all years as a reserve to accommodate Iceland, and Greenland. The three parties also set aside 42,537 tonnes for NEAFC (Russian Federation) in 2014 to account for the fishery in international waters. Iceland has set its unilateral mackerel TAC for 2014 at 147,547 tonnes (11.9% of the total 2014 TAC agreed by EU, Faroe Islands and Norway) while Greenland has set its unilateral quota for East Greenland and West Greenland at 100,000 t (8%) and 10,000 t respectively.

In 2014 ICES changed the assessment model to place more emphasis on the fishery independent survey results (including recent ecosystem survey data) and less emphasis on the commercial catch data. The TAC MSY advice of about 1 mill tonnes that ICES has provided for 2015 is based on this revised model.

3.2 Social and economic dependency on fisheries

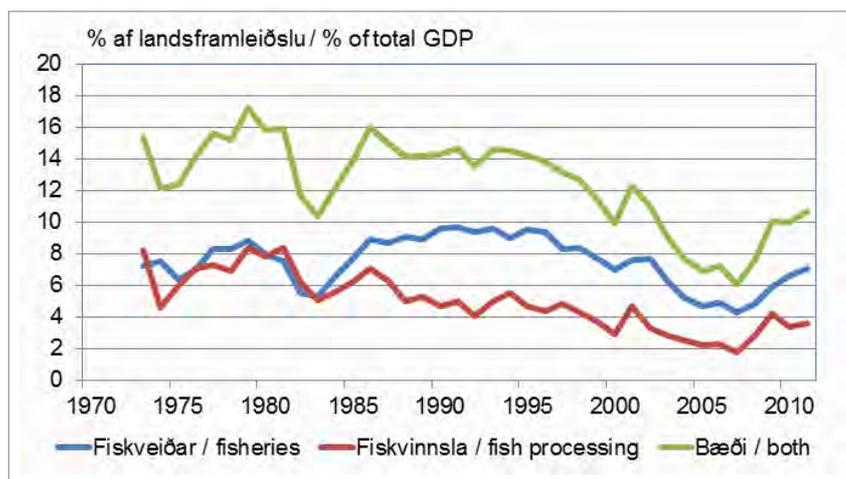
The analysis made here of the national and local fisheries dependencies for the coastal states in the North East Atlantic relates to the UNFSA allocation criteria (b)²⁵ *the respective interests, fishing patterns and fishing practices of new and existing members or participants; (d) the needs of coastal fishing communities which are dependent mainly on fishing for the stocks; and (e) the needs of coastal States whose economies are overwhelmingly dependent on the exploitation of living marine resources.*

²⁵ Cf. section 2.1.2 (b).

National fisheries dependency

National fisheries dependency is measured as the fishery sector's contribution to Gross Domestic Product (GDP). Before turning to the statistical analysis we observe that data is from different sources and contain figures compiled with slightly different methods. Thus, for part of the analysis only harvest is included while other parts include processing industry and/or aquaculture. We use available statistics to present a general overview of the national fisheries dependency and continue with an in-depth analysis of mackerel. The recreational fishing industry is not included in the analysis. For some species, e.g. salmon, the recreational fishing is an important contributor to the economic value of the resource.

Figure 1: Icelandic fisheries sector as percent of total GDP



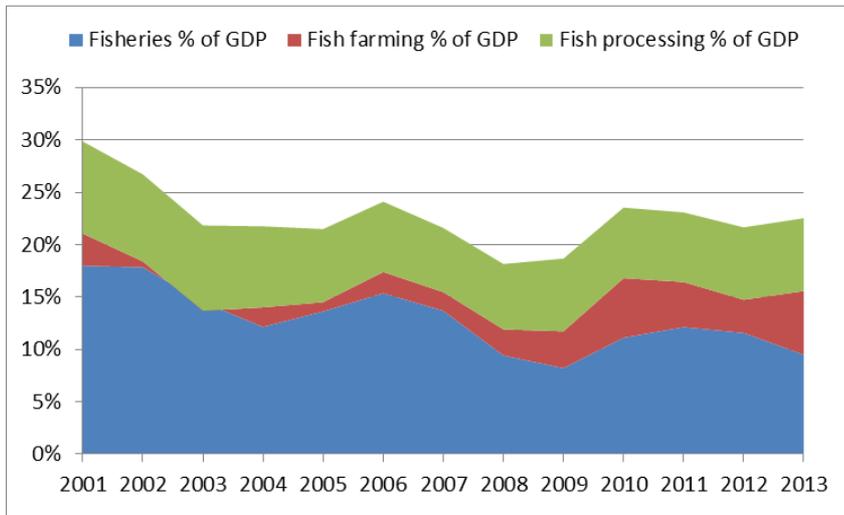
Source: <http://www.fisheries.is/economy/fisheries-impacts/gdp/>

Among the Nordic coastal states those with highest fisheries dependency are Greenland, Iceland and the Faroe Islands. In the Faroe Islands fisheries and aquaculture account for 20% of GDP and 95% of total commodity exports (Ministry of Fisheries and Natural Resources). In Greenland fish-

eries in 2011 contributed 13% of GDP.²⁶ The development of the Icelandic fisheries' share of GDP is presented in Figure 1.

Including both fisheries and fish processing, the sector contribute about 10% of GDP. This is a slight decline since the historically high figures in the 1980s but higher than the contribution below 8% in the mid-2000s. Norway, Denmark and Sweden differ substantially from the Faroe Islands, Greenland and Iceland as fisheries contribute less than 1% of GDP. However, also these countries face regional differences as some regions are actually close to the Greenland/Iceland situation. Norwegian fishing and fish farming represented 0.7 percent of the GDP in 2010.²⁷ In Sweden the fish catching and processing sectors contributed 0.2 per cent to GDP in 2003 and in Denmark these sectors contributed 0.15% in 2010.²⁸

Figure 2: The contribution of fisheries to Faroese GDP



Source: Data provided by Hans Ellefsen, fisheries economist Faroe Island.

²⁶ Fiskeriets økonomiske fodaftryk i Grønland (The economic footprint of fisheries in Greenland) Copenhagen Economics, 2013. In Danish.

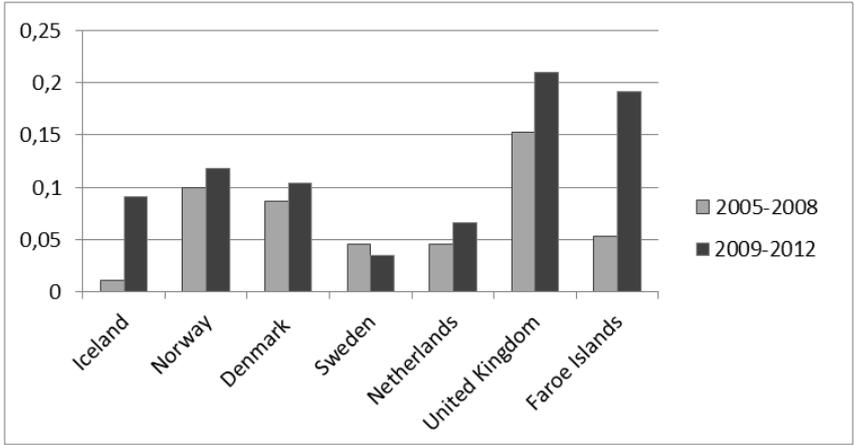
²⁷ FAO, <http://www.fao.org/fishery/facp/NOR/en>

²⁸ FAO, <http://www.fao.org/fishery/facp/DNK/en>

The next step in the analysis is the role of the shared stocks for each country. Here we begin by noting that for Faroe Islands, Greenland and Iceland a very substantial part of the catch is from local i.e. non-shared stocks. E.g. 95% of the West Greenland shrimp is in Greenland waters, the Faroese cod is in Faroese waters and also the Icelandic cod is in Icelandic waters. Looking at the shared stocks these include Herring (EU, Faroe Islands, Norway) Iceland and East Greenland capelin (Iceland, East Greenland and Jan Mayen area), Greenland halibut in Denmark Strait (Greenland and Iceland), redfish (under NEAFC management) and mackerel (EU, Iceland, Greenland, Norway). Taking mackerel as a case study to consider the importance of the shared stocks the analysis is performed in two steps: The first is to establish the share of mackerel in the total value of landings. This provides information about how important the species is for the harvesting sector. The second step is to establish the share of mackerel landings that take place in domestic ports reflecting the importance for the domestic supply of fish to the processing industry. The analysis includes Denmark, Faroe Islands, Iceland, Netherlands, Norway, Sweden and UK.

The share of mackerel in total landings is presented in Figure 3. Norway and Denmark in recent years have had over 10% mackerel in the total national landing value which is considerably more than Sweden and the Netherlands with about 5%. UK (Scotland), Iceland and the Faroe Islands have seen an increase in the share of mackerel bringing Iceland on level with Denmark and Norway, and bringing UK and the Faroe Islands up to 20%. This is, of course, only an indicator of the socio-economic importance of the species. E.g. in Sweden, the mackerel fishery is highly profitable while most other fisheries are not. In this case the economic contribution to society will be larger than the share of the landing value.

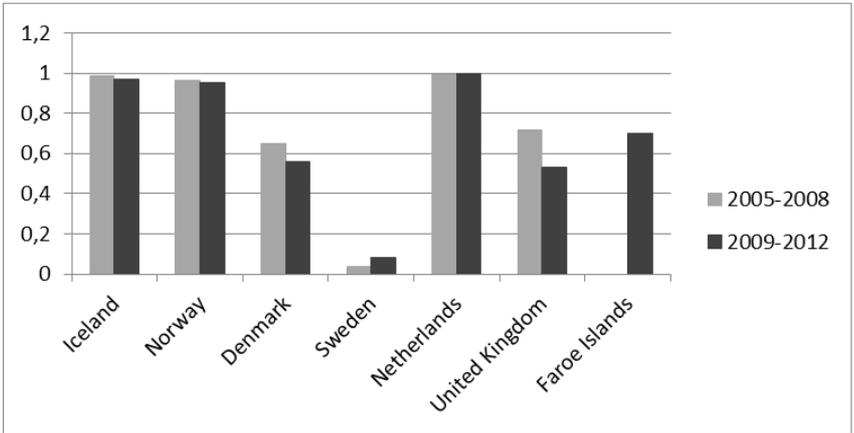
Figure 3: Mackerel, share of total landing value by national fleet (both in domestic and foreign ports)



Source: Data from OECD.

The share of mackerel landings that takes place in domestic ports is presented in Figure 4.

Figure 4: Share of National catches of mackerel that are landed in national ports



Source: Data from OECD.

As shown in Figure 4 both Iceland and Norway land almost 100% in domestic ports. The corresponding share for Denmark and UK is about 55% (down from 75% in the mid 2000s), and for Sweden 10%. The Netherlands process all the catch on board the fishing vessels. Thus, it is clear that Icelandic and Norwegian mackerel catches to a large extent return to the national land-based fishing industry. This, however, does not necessarily imply that the fish is bought by the local processing industry, but could be exported without further processing. However, it is still an indicator of the share of fish that goes into the national economy.

Local fisheries dependency

The indicators of national dependency presented above give a rough estimate of the importance of the fishery sector at the national level. This section provides a discussion about how the link between the fish resource and the local community might be viewed but provides no further statistical indicators. The term local is here used in a wide definition and includes regions that are larger than small fishing communities. Focus is on dependency indicators such as employment, income and fleet size. For the EU, these indicators are used in recent studies by Macfadyen, Salz, and Cappell (2011)²⁹ and Salz and Macfadyen (2007).³⁰ However, the literature on fisheries dependency in local communities reaches far beyond easily accessible indicators and includes i.e. cultural data providing information about social networks etc. (Delaney, 2009).³¹ This is important since the sector could be viewed as more important by citizens than seen in fisheries dependency indicators, if social identity for example is based on fisheries (Ross, 2013).³²

²⁹ Macfadyen, G., Salz, P., & Cappell, R. (2011). Characteristics of small-scale coastal fisheries in Europe (Vol. IP/B/PECH/IC/2010-158, pp. 1-162): European Parliament.

³⁰ Salz, P. & Macfadyen, G. (2007). Regional dependency of fisheries (Vol. IP/B/PECH/ST/IC/2006-198): European Parliament.

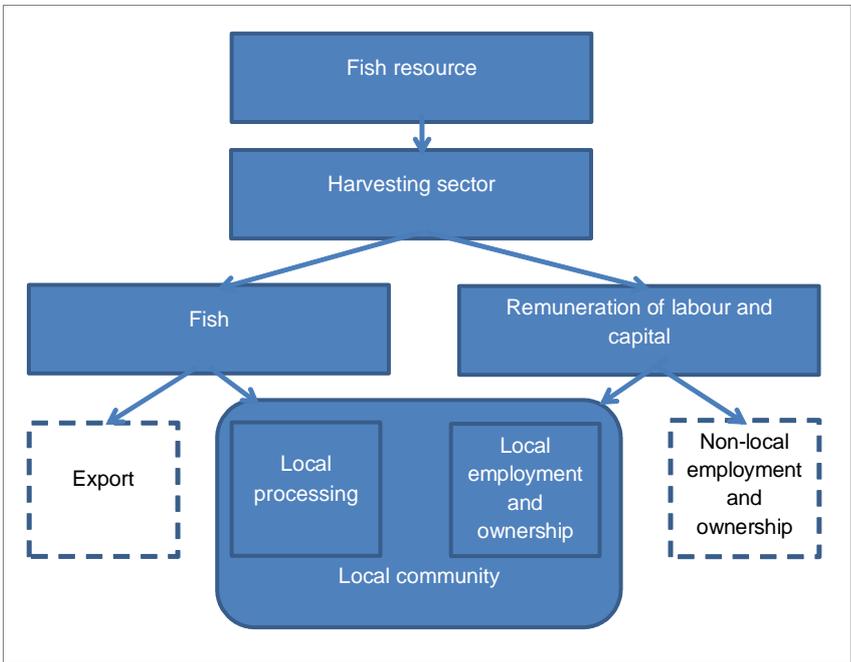
³¹ Delaney, A. 2009. *Social impact assessments for six communities affected by three existing recovery plans*. Deliverable 28 of the UNCOVER project (EU sixth framework programme no. 022717).

³² Ross, N. (2013). Exploring concepts of fisheries "dependency" and "community" in Scotland. *Marine Policy*, 37(1), 55-61. doi: 10.1016/j.marpol.2012.04.003

The definition of the local community is important for the resulting indicators and when using this as an argument for access to fish resources it is important to compare the same kind of units. Using a too large region would cause the fishing dependency of small communities to “disappear” if there is primarily non-fishery activity in this larger region. On the other hand, restricting the analysis to very small units, evidence will always show a degree of fisheries dependency since most coastal communities have some fishing activity.

Figure 5 shows the link between the resource and the local community as a base for the discussion. The harvesting industry has the right to use the fish resource and will generate remuneration to labour and capital, but also provide fish for further processing. Both the landed fish and the remuneration might end up locally or in other parts of the country (world).

Figure 5: Links between the fish resource and the local community



The first topic determining the links between the resource and the local economy is the *remuneration of labour and capital*. Starting with employ-

ment, a large share of locally employed fishermen will make the community more dependent on the resource. The share of local employment might depend on the harvest technology, where e.g. small-scale coastal fisheries could be expected to have a closer link between the community and the resource since fishing trips are short and the port where the vessel is registered is also predominantly the landing port. This is shown for the EU by Natale et al. (2013).³³

Turning to capital, the local dependency is determined by local command of capital. However, this does not imply that this capital is invested in the local community but could be used for other purposes. Thus, the link between remuneration to capital and the local economy could be expected to be weak in many cases.

The share of the economic returns that are allocated to labour and capital is of interest for the link between the resource and the fishing community. A recent analysis of pelagic fisheries in the NEA finds capital to get on average 52% of the socio-economic returns from the fishery, labour 38%, and society (through taxes etc.) 11%.³⁴ Workers get a share of the returns by having higher wages in fisheries than in alternative employment, and in the pelagic study mentioned this ranged from 85% higher in Iceland to about four times the alternative wages in UK.

The harvesting sector is only part of the socio-economic contribution from fisheries. The processing industry might be an important contributor to the economy as shown for Iceland in Figure 1 on national fisheries dependency. The link between the fish resource and the local processing industry depends on the share of the landings that takes place in local ports. This is discussed for the national cases in Figure 5, but also within countries the dependency of the resource might differ substantially among local communities. A topic in this discussion is the definition of “local employment” since many workers in e.g. Iceland and northern Nor-

³³ Natale, F., Carvalho, N., Harrop, M., Guillen, J., & Frangoudes, K. (2013). Identifying fisheries dependent communities in EU coastal areas. *Marine Policy*, 42, 245–252.

³⁴ Nielsen, M., Andersen, P., Ravensbeck, L., Laugesen, F. M., Andersen, J. L., Kristófersson, D. M., Ellefsen, H. (2010). Samfundsøkonomisk afkast af pelagiska fiskerier i Nordøstatlantten: TemaNord 2010:573.

way are immigrant workers that might only stay for a short period in the local community.

To summarize: the definition of “local” is not as clear as “national” and the definition in the analysis is important for the results. Further, the link between the resource and the local community is complex and depends on ownership structure, labour markets, etc. Thus, bringing the analysis back to the legal framework where consideration shall be taken to the fisheries dependency of local communities, this seems to be hard to clearly define and prove as more or less important.

Concentration of fishing capacity and vessel/quota ownership in the NEA

Closely linked to the issue of dependency is the concentration in harvest capacity and quota ownership that has taken place in NEA coastal states over the last 10 years. This concentration is of particular significance in the pelagic sector, but is also manifest in the non-coastal demersal sector.

Table 2 shows the decrease in the number of registered fishing vessels > 45m in the period 2004 to 2012 and is indicative of this development. The table shows a reduction ranging from 13% in Norway to 85% in the Netherlands. This decrease is to a large extent intended and in some countries comes as the result of national fisheries policies introducing ITQs in the off shore fisheries. The aim of this policy is to generate/increase profits and obtain a subsequent modernization of the harvest “machinery”. For reasons of efficiency and economies of scale the newer and fewer vessels that have replaced the previous ones tend to operate on the basis of bigger quota shares in the hands of fewer quota owners/holders.

Table 2: Fishing vessels > 45 meters

	2004	2012	%
Denmark	24	18	-25
Iceland	98	79	-21
Netherlands	107	16	-85
Norway	161	140	-13
Sweden	4	2	-50
UK	52	35	-33

Source: OECD 2014.

An element in the context of “dependency” is the increasing praxis of “quota hopping” where fishing companies based in one coastal state through subsidiaries own one or more fishing vessels flying the flag of another coastal state. It is also quite common that a NEA vessel is reflagged from one flag state to another to take part in this praxis. Particularly Dutch fishing companies are known to be heavily involved with multinational fishing vessel and quota ownership in the NEA. A recent development in the NEA is that a fishing vessel flying the flag of one country fish on a quota belonging to another country through a so-called “vessel quota swap” arrangement. Such swaps at vessel level are of the same nature as the commonly practiced quota swaps between countries, but only allowed for certain fish species involved.

The concentration and “internationalization” of the NEA off shore fisheries also characterize the fish processing industry in the NEA. Owners/decision makers of one or more processing plants in one country may be citizens of other countries and also possess the same type of processing plant elsewhere. Their decisions on from which fishing vessel to source raw material and where to process the fish is first and foremost determined from profit considerations rather than from social considerations and concern for local dependency.

Although an internationalization of the fleets is observed, it is important to note that the foreign direct investments in the harvesting sector are facing stricter regulations than in most other sectors. Examples are restrictions on foreign equity capital, national approval procedures, and requirements for investors to demonstrate economic links to the local fishing sector (OECD, 2009). The OECD (2009) ranks the UK, Sweden, Denmark, Norway and Iceland as having higher barriers to direct foreign investments in the fish harvesting sector than the OECD average.³⁵

³⁵ OECD. 2009. Review of fisheries in OECD Countries. Policies and Summary Statistics 2008.

4. The NMTT recommendation on allocation of fishing rights

4.1 Suggested allocation principles

The recommendation from Nordic Marine Think-Tank builds on the allocation criteria specified in UNFSA Article 11. The NMTT recommendations are intended to be universally applicable across all regulative fora in the NEA and to pelagic as well as demersal fisheries. The allocation criteria apply to coastal states and to states that because of changes in the distribution effectively become coastal states, i.e. fish occur in its EEZ. The allocation criteria are (with reference to UNFSA):

- UNFSA: The status of the straddling fish stocks and highly migratory fish stocks and the existing level of fishing effort in the fishery

This criterion which considers the spatio-temporal distributions of the fish stocks in the NEA should be the main criterion. The inability of the management systems to deal with changes in spatio-temporal distributions is the root cause of the allocation conflicts encountered. This criterion will be dealt with in detail below.

- UNFSA: the respective interests, fishing patterns and fishing practices of new and existing members or participants

This criterion focusing on the history of fishing is the lead principle behind the stable allocation philosophy which lies behind most if not all agreements on fisheries made in the NEA over the last 40 years. NMTT considers fishing interests, patterns and practices relevant for future allocation agreements in as much as history and practice is embedded in the investments made in fishing vessels and quotas and in income to govern-

ments from quota taxation. What time span is reasonable and what weight should be given to this criterion should be judged based on the stability of the fisheries and the stock distributions. Fisheries are in general dynamic not least because of technological changes and therefore the time span considered should be limited. Some fish stocks show distributions that on the large scale are fairly stable while other have shown major variations introduced by overfishing (e.g. North Sea and Atlanto-Scandian herring) or they exhibit large recruitment fluctuations (e.g. anchovy) that are reflected in their spatial distribution. However, often a 10 years horizon is used in judging historic rights in an attempt to average out these fluctuations. NMTT proposes the general use of the 10 year average, if no agreement can be made. Concerning weight given to the criterion it should be expected that it will be difficult to achieve agreement. However, it should be recalled that fisheries are diverse and there is rarely a “one size fits all” solution readily available. Therefore, the issue would have to be considered and determined from case to case. The main principle is that the concept of “coastal state” is determined by the UNCLOS 1982, and there is no such thing as “relevant coastal states” or “less relevant coastal states.” NEAFC – or member states – should follow the general concept here. A coastal state engaged in a particular fishery is a state that in its EEZ benefits from a fish stock’s distribution here. If so, the coastal state should be invited in to the decision-making organ.

- UNFSA: 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

NMTT considers this criterion particularly relevant to newcomers in NEA fisheries. There is a long tradition that all the NEA coastal states contribute to the scientific work of ICES on the fish stocks that they exploit and endeavour to conserve and manage the stocks sustainably.

- UNFSA: the needs of coastal fishing communities which are dependent mainly on fishing for the stocks

Referring to the discussion above on local dependency (p.47–50) NMTT considers this criterion of limited relevance to future decision making at international level on allocation of fishing rights in the NEA. The reason is simply that the operationality of this criterion is extremely difficult to handle. However, the criterion may well be relevant at the national level and dealt with at that level.

- UNFSA: needs of coastal States whose economies are overwhelmingly dependent on the exploitation of living marine resources

The NMTT considers this criterion relevant in the NEA where some coastal states are heavily dependent on fisheries as demonstrated in section 3.2.

- UNFSA: the interests of developing States from the subregion or region in whose areas of national jurisdiction the stocks also occur.

This criterion NMTT considers of no relevance in the NEA context where there are no “developing states.” With regard to the special benefits following from UNCLOS 1982 to states defined as developing countries, none of them are located in the NEA. Of course Greenland, Norway and Russia populations include indigenous people and thus enjoy specific rights but this is a responsibility of the domestic state in its internal allocation of its share of the TAC.

4.2 Incorporating spatio-temporal distributions of fish stocks in the NEA in fishing rights allocation

The coastal state has rights to the fish when they occur in its EEZ. Therefore, the spatio-temporal distribution of the fish (zonal attachment) is fundamental to the allocation discussion. However, this distribution can be viewed in various ways: Are we considering the biomass, the abundance, or the production, should the distribution of the different life stages (spawning, egg and larvae, juveniles, mature) be weighted equally, should areas and seasons with high production (fast growth) be weighted differently to areas and seasons with little or no growth (i.e. winter) or should

special importance be attached to particular life stages? These are not trivial considerations. For example in the Northeast Atlantic to give preference to areas with high production means that the summer distribution is given a higher weight over the winter distribution.

Fisheries science can provide extensive documentation on zonal attachment as background for an allocation scheme offering a variety of possibilities for the managers to choose from. Engesæter³⁶ reviews how science influenced the allocation schemes that were established in the 1970s and 1980s. He concludes that while information was available, e.g. the ICES 1978 and 1979 reports *op. cit.* this information is not referred explicitly in the agreements. Later, in 2009, Cox³⁷ reviewed the allocation principles that were applied in several Regional Fisheries Management Organisations (RFMO) without identifying a well-defined algorithm for zonal attachment. The key advantage offered by science is that database and calculations are transparent and reflect the occurrence of fish or the fish production in each zone. Furthermore, the database documents the annual variations in the distribution that are to be expected. However, the quality of the data is an issue. The NEA mackerel can exemplify this point as historic landing data are unreliable for reasons that have varied over time. As the quality of the data has improved in recent years there is a tendency to use recent data only and also to place more weight on research survey results.

Hamre³⁸ and Caddy³⁹ discuss from a scientific biological point of view how zonal attachment can be established and Hamre *op. cit.* suggests that three biological criteria on which to base zonal attachment may be quantified:

³⁶ S. Engesæter. 1993. Scientific input to international fisheries agreements. *International Challenges*. The Fritjof Nansen Institute Journal Vol 13: 85-106.

³⁷ A. Cox. 2009. Quota Allocation in International Fisheries, OECD Food, Agriculture and Fisheries Papers, No. 22, OECD Publishing. <http://dx.doi.org/10.1787/218520326143>

³⁸ J. Hamre. 1993. A model of estimating biological attachment of fish stocks to exclusive economic zones. ICES CM 1993/D:43

³⁹ J.F. Caddy. 1996. "An Objective Approach to the Negotiation of Allocations from Shared Living Resources," *Marine Policy*, Vol. 20, No. 2, pp. 145-55.

- Spatio-temporal distribution of the fish stock by components such as immature-mature or fishable-non-fishable
- Spatio-temporal distribution of the production of the fish stock, i.e. in which areas/seasons do the fish reproduce, grow and die
- Occurrence of spawning and nursery grounds.

The following, mainly based Hamre's presentation, reviews how the various biological elements of zonal attachment can be quantified.

Biological elements of Zonal Attachment

Fish move around, in some cases over large distances and occupy different grounds dependent on the life stage, there are well-defined spawning grounds often quite limited areas, there are nursery areas and there are feeding areas. The spatio-temporal distribution of the different life stages of the fish resource is frequently represented as the migration triangle shown in Figure 6. Egg and larvae drift from the spawning grounds to the nursery grounds and during this process larvae metamorphose into immature (juvenile) fish. As part of the maturation process the fish move to the feeding grounds and when they finally mature they gather on the spawning grounds. After spawning the fish return to the feeding grounds from which they return to the spawning grounds the following year. This migration is illustrated with the double arrow between the feeding and the spawning grounds in Figure 6. This life stage cycle can cover large areas as is illustrated for the Atlanto-Scandian herring in Figure 7.

Figure 6: Migration triangle showing how the three life stages in the fish life cycle are interconnected

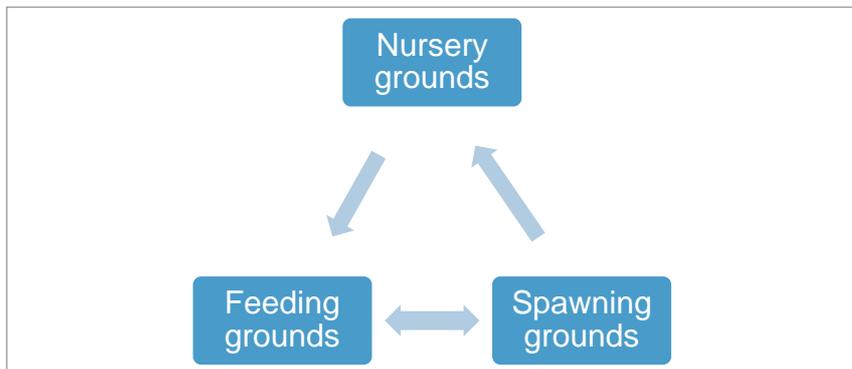
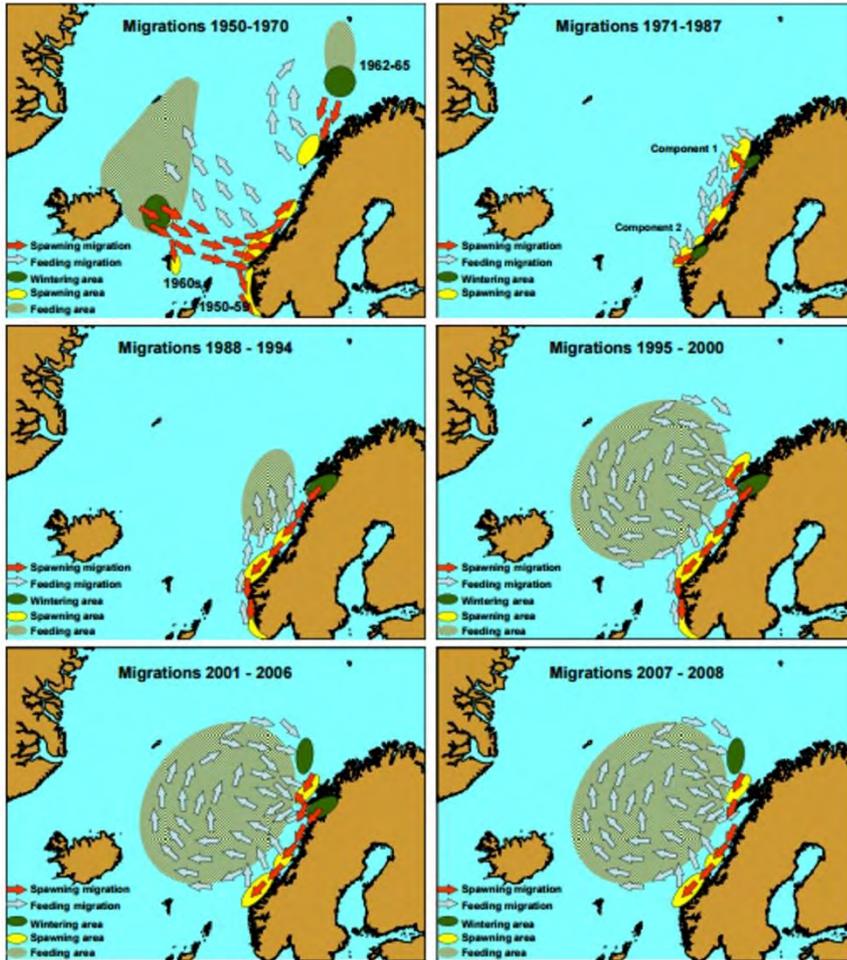


Figure 7: Atlanto-scandian Herring migrations 1950–2008



Distribution and migrations of Atlanto-Scandian herring during a period of: high abundance (1950-1970); low abundance (1971-1987); recovery (1988-1994) and the recovered stock (since 1995). Source: Petitgas, P. (Ed) 2010. Life cycle spatial patterns of small pelagic fish in the Northeast Atlantic. ICES Cooperative Research Report No. 306. 93 pp. Figure 2.1.

The Hamre Model of biomass distribution by zones

Zonal attachment on biological basis is to map the proportions of the stock by zones and by seasons. In calculating the zonal attachment we must decide if we measure occurrence as biomass, abundance (number) and/or production (growth minus mortality). We must decide if all life stages are

to be included in the calculation or e.g. only the fishable components are considered. Engesæter op. cit. notes that often only the fishable component is considered and that zonal attachment in general is defined on a biomass basis. The allocation principles and which numerical criteria are to be used for allocation must be decided politically. This is not a science issue. Science can, based on these management decisions, organize and present the available data.

Data that inform on the distribution of fish between zones are available either from commercial fisheries (e.g. logbooks) or from research vessel abundance surveys. Both these data sets have drawbacks. The fisheries data only inform on the fishable component and only where densities are sufficient for an effective fishery while research survey data are most often only available for a single season (e.g. a summer survey) and surveys are often designed to cover only a particular stock component, e.g. the juveniles. Also, survey techniques vary dependent on which component is to be sampled. The immature and mature components of the Atlanto-Scandian herring (Figure 7) can be estimated by acoustic surveys while larvae sampling techniques are required to map the larvae distribution.

Distributions vary between years and we must decide on the period for which we want to calculate an average situation on which to base the allocation negotiations. In deciding this period we should recall that the ratio between immature and mature fish depends on the exploitation pressure, the more heavily a stock is fished the fewer mature fish exist in the population. Furthermore, the migration pattern may well be influenced by the population size, e.g. North Sea herring⁴⁰ and the Atlanto-Scandian herring⁴¹ both radically changed migration pattern when depleted by contracting their area of occurrence. The North Sea herring withdrew within EU waters in the North Sea while the Atlanto-Scandian herring remained completely within Norwegian EEZ.

⁴⁰ Schmidt, Jörn, van Damme, C.J.G., Röckmann, C. and Dickey-Collas, M. (2009) *Recolonisation of spawning grounds in a recovering fish stock: recent changes in North Sea herring* Scientia Marina, 73 (S1). pp. 153–157. DOI 10.3989/scimar.2009.73s1153

⁴¹ DRAGESUND, OLAV, ARNE JOHANNESSEN and ØYVIND ULLTANG 1997 08 15. Variation in migration and abundance of Norwegian spring spawning herring (*Clupea harengus* L.). Sarsia 82:97–105.

Allocation schemes are built on temporal average distribution of the stocks. As Hamre considers the life cycle of a fish, the relevant averaging period should be measured by generation time which for many marine fish is 2–5 years. Since we may want to average over several generations the time period to be considered would be 10–15 years. However, migration patterns and the fishing grounds may change significantly in such a long period and shorter time periods may be desirable.

Hamre suggests that zonal attachment is calculated based the observed biomass distribution for each age group (p_{it} : area, t : age(%)). He combines the age group data into a single map of zonal attachment by weighting these percentages together. Instead of a simple averaging of the p_{it} over the age groups t he weights the age groups by the term $W_t * e^{-Zt}$ which is the relative biomass of age group t in a cohort in equilibrium, i.e. he removes the effect of varying recruitment and thereby avoids that very strong year classes dominate the average. Also, this formulation allows Hamre to use results from different surveys that are not directly comparable between age groups. Surveys are often directed at specific age groups and for trawl surveys catchability vary with size. This means that the age composition observed may not reflect that of the population but remains valid as the geographical distribution of each age group. Hamre gives as his formula

$$B_{it} = p_{it} * R * e^{-Z*t} * W_t$$

R is the recruitment at the nominal age 0 and W_t is the weight of an individual at age t . Hamre operates with the same weight of an individual in all areas and with a total mortality Z independent of age. The formula is easily changed to operate with age dependent total mortality, the term e^{-Z*t} is replaced by $\sum_{age=1}^t Z_{age-1}$. Also the weight term can be area dependent and a more general formulation is

$$B_{it} = p_{it} * R * e^{\sum_{age=1}^t Z_{age-1}} * W_{it}$$

Hamre works with seasonal data – his example uses quarterly data – The percentage share P_i (zonal attachment) – in our slightly generalised version – the formula is

$$P_i = \frac{B_i}{B} * 100 = \frac{\sum_{t=0}^{nage} p_{it} * e^{\sum_{age=1}^t Z_{age-1}} * \bar{w}_t}{\sum_{t=0}^{nage} e^{\sum_{age=1}^t Z_{age-1}} * \bar{w}_t} * 100\%$$

$$\bar{w}_t = \frac{\sum_{i=1}^{nzone} W_{it} * q_{it}}{\sum_{i=1}^{nzone} q_{it}}$$

where q_{it} is the relative abundance of area i for age group t . “nzone” is the number of zones and “nage” the number of age groups. The sum over the age “ t ” is over all seasons.

It is not trivial, how we define the nominal age 0 i.e. which life stages we include in the calculations, mortality Z varies grossly between age groups. The following is intended to give an impression of the magnitude of central parameters in the model.^{42,43} Mortality at the egg stages may be 50% or higher while fish larvae have more than 99% mortality rate as they make the transition from their yolk sac stage to 0-group fish. For small fish the natural mortality may be 70–80% per year, while for mature longer-lived fish the mortality drops to 10–20% per year. The mortality generated by fishing is added to these figures but of course only applies for the fishable component. Also, the weight per individual varies dramatically between life stages. Larvae develop from yolk sac larvae (~0.5 cm) to fingerling fish (~5 cm) in 20–50 days. 0-group fish grow to 15–20 cm within a year after which time growth is slower.

The total mortality Z includes the fishing mortality and Hamre proposes that the zonal attachment is based on the unfished situation ($F=0$). However, as is noted for the North Sea and Atlanto-Scandian herrings the migration pattern may change with the exploitation pressure and the resulting stock status. By applying $F=0$ he gives higher weight to mature fish than directly observed. As the international stated policy UN WSSD⁴⁴ is to fish at MSY it should be considered to replace the $F=0$ option with a

⁴² E. Houde, 1989. Comparative Growth, Mortality, and Energetics of Marine Fish Larvae: Temperature and Implied Latitudinal Effects. Fishery Bulletin, U.S. 87:471–495.

⁴³ H. Gislason, N. Daan, J. C. Rice and J. G. Pope, 2010. Size, growth, temperature and the natural mortality of marine fish, Fish and Fisheries 11:149–158.

⁴⁴ UN WSSD 2002. Plan of Implementation of the World Summit on Sustainable Development. § 31 (a) Maintain ... stocks to levels that can produce the maximum sustainable yield.

F_{MSY} level. The observed distribution is obtained for an exploited stock and Hamre assumes therefore that the distribution of an age group is independent of the exploitation pressure an assumption as noted above that is not always true. The application of the model requires input from the managers: about which life stages and age groups to consider, the time period to be used to calculate the average distribution by age group, the exploitation pattern to be used and the required areal detail of the mean weight per individual.

Distribution of Biological production by zone

Hamre op. cit. investigates another suggested index for zonal attachment. This is the distribution by zone of the growth in biomass (growth – mortality) and he follows the same route as above, i.e. look at an equilibrium cohort for weighting the different age group distributions. Application of this criterion means that the summer distribution is upgraded over the winter distribution e.g. for NEA mackerel this would mean that the occurrence in EU waters (winter) is down weighted. The proposal has – as far as the author is aware – never been considered seriously in political allocation discussions and is not further explored in this presentation.

Distribution of Spawning and Nursery grounds by zone

This criterion can be measured either by the proportion of the spawning biomass by zone, by the size of the grounds or more complicated, by the production (recruitment) that results from each ground. Using either production or distribution of biomass reuses the same information that is included in the biological biomass distribution.

Should this criterion be of interest to Parties this is best measured by the size of the areas. This is often a 0/1 type parameter, e.g. NEA mackerel spawning and nursery grounds are in EU waters, while for the Atlanto-Scandian herring these grounds are in Norwegian waters.

Weighting different zonal attachment indicators together

The above presentation introduced a variety of ways in which the temporal and geographical distribution can be viewed:

- Biomass by season and EEZ, possibly by life stage
- Abundance by season and by EEZ, possibly by life stage
- Production by season and EEZ, possibly by life stage
- Existence of spawning and nursery grounds.

There is no scientific biological argument that suggests any of these should be given higher priority than the rest. Also weighing between life stages is in scientific terms arbitrary as all life stages are necessary for a healthy fish stock. Traditionally, zonal attachment is considered in biomass terms rather than in abundance.

Both Hamre *op. cit.* and Caddy *op. cit.* distinguish in the negotiating process between the proposal of technical factors by interested parties, their quantification for each party, best accomplished by an impartial party (e.g. ICES in the Northeast Atlantic area), and the relative weightings finally given to each technical factor, decided by negotiation. They suggest that negotiations could efficiently focus on these weightings. Caddy *op. cit.* argues that the inclusion of an extra factor is of little importance as it is the weight that is given to the factor that decides its relevance. Therefore, defining the set of factors to be considered could be done with few restrictions, except for the costs involved with the technical work. Science cannot guide on weighting – weighting can only be decided either inferred based on a set of well-defined objectives or explicitly by managers; weighting the factors is the managers' responsibility and as noted by Engesæter *op. cit.* and Cox *op. cit.* rarely if ever are these weights clearly specified. Furthermore, zonal attachment on a biological basis have not and will probably never be applied in isolation; in a concrete allocation discussion, other arguments typically based on economic indicators such as historical fishing rights but also arguments based on other criteria as laid down in UNFSA will influence the outcome.

Conclusion

Having investigated various ways in which to address the zonal attachment, NMTT has come to the conclusion that the best and most practical

approach is the one suggested by Norwegian fishery biologist Johannes Hamre.⁴⁵ This approach is based the distribution of the fish excluding egg and larvae. The distribution is measured in biomass terms and data are weighted together under the assumption that the stock is in equilibrium. NMTT proposes that exploitation pattern to be considered reflects the MSY target internationally agreed. Application of the model requires prior agreement by management of relevant time period and required area and seasonal detail and is based on the availability of biomass distribution by zone, season and by age group together with an assessment of individual weights, and mortality for the stock.

Final comments

The fishery is unlikely to be evenly distributed over the year. For NEA mackerel⁴⁶ the distribution by quarter in 2013 of the landings was 19:5:52:24. Before 2010 the distribution was rather (data for 2000) 36:5:22:37. This variation is relevant in the allocation discussion as two states may both have all the fish in their zone for some period of the year and therefore argue that they can take 100% of the sustainable TAC in their zone.

NMTT finds that the allocation scheme should include considerations of the distribution of the fishery not only by EEZ; the fishery should provide optimal return not in weight but rather in economic terms and the value of one ton of fish mostly varies by season. This suggests that the fish (*ceteris paribus*) should be fished at seasons and in areas where the value is higher or when there is surplus capacity available and therefore also implies a solution to the problem of access to fishing grounds.

⁴⁵ J. Hamre. 1993. A model of estimating biological attachment of fish stocks to exclusive economic zones. ICES CM 1993/D:43

⁴⁶ ICES, 2014. Report of Widely Distributed Stocks. Section 2 North East Atlantic Mackerel.

4.3 Roles of ICES/states/industry

In reaching an agreement all the contracting parties (i.e. states and territories) must accept the outcome. The prime decision makers are the governments of the coastal states/territories. In the NEA all involved parties are democracies giving the national parliaments a role in the process. The contracting parties are influenced by stakeholders in particular from the fishing industry. For this reason the development of fisheries regulations involves extensive stakeholder consultations. These consultations are organized differently: the EU uses the Advisory Council system while the Faroe Islands, Greenland, Iceland and Norway more direct contacts are established. Zonal attachment, economic dependency, science activity and also issues external to fisheries may be elements in the evaluation by a country/territory on whether an agreement is satisfactory/acceptable or not.

ICES⁴⁷ is used as the vehicle for compiling and analysing data and summarizing these findings. The mechanism is to bring national data to the table in a transparent process and to allow scientists freedom in their analysis. The ICES banner casts protection over the scientists that may arrive at controversial results. This “protection” is under constant attack from a variety of NGO and industry lobbyists. The ICES mechanism is well established with a long tradition (more than 100 years). ICES also advises on fisheries management but in the case of allocation discussions this advice does not go beyond compilation of data and quality check and, perhaps most important, assurance that the data are organized such that comparisons between areas and seasons are possible.

4.4 Duration of allocation agreements

There are two time elements involved in reaching an agreement on allocation. The first concerns the period over which an average should be applied. The second is the time for which the agreement should run before

⁴⁷ International Council for the Exploration of the Sea. <http://www.ices.dk/Pages/default.aspx>

the agreement is reopened for revision. The recent mackerel agreement (EU-Norway-Faroe Islands) is a 5 year agreement, the EU Common fisheries policy is up for revision every 10 years.

The tradition within fisheries science in Europe is to use 5–10 years (e.g. relative stability in 1982) for establishing a distribution pattern (if possible). This is based on the lifespan of a fish of typically 10–15 years, the period in which a reasonable strong year class is in the fishery for 3–5 years but e.g. a strong yearclass of Atlanto-Scandian herring will last longer. There are fish that can become 100 years of age (typically deep water species) and there are fish that only reach 2–3 years of age (e.g. Norway pout and sprat). Furthermore, the stability of the distribution is an important factor together with the distribution of the fishery. As “historical rights” are most often used as an indicator of the zonal attachment, changes in the fisheries play an important role in deciding the time period for which an average distribution is considered acceptable to the extent that this period becomes an element in the negotiations. Finally, the quality of the data may be an element in these judgements, e.g. that data for certain periods are not included because of doubts on their reliability.

Weighting these factors together has led to a general understanding that the appropriate compromise is to use a time series of 5–10 years with a tendency to lean towards 10 years.

However, where there are trends in distribution such as in the case of the NEA mackerel shorter periods are applied.

As noted above the appropriate time horizon needs to strike a balance between many conflicting considerations and therefore it is a decision to be made by managers (or perhaps even at the policy level) prior to having the scientists start compiling detailed data. Informed decisions require data and a general understanding of the dynamics of the system.

5. The NMTT recommendations on decision making

What negotiation strategy to choose is a theme outside the scope of this NMTT discussion paper. It should, however, be noted that in the NEA we deal with “repetitive players” and that a number of fish stocks are involved. This means that a “grand bargain solution” may be relevant. Every negotiation approach will have to take a point of departure that each coastal state has the competence by international law to harvest fish stocks present in its own waters cf. UNCLOS Article 56. However, new states may enter the scene and that means that more states shall “share the cake”.

Each coastal state is responsible for setting the TAC for a given fish stock within its own EEZ cf. UNCLOS Article 61. The TAC should not be set at a level which exposes the stock to overfishing. This responsibility rests with each and every coastal state. The states whose fishermen exploit the same stock have to take the catches of other states into consideration when estimating their own TAC. This arrangement applies “both ways” and not only for newcomers on the scene. It applies also to states that have exploited the stock in question for years. This means that track record of fisheries, historic allocation keys and other evidence of previous fishing practices should not be in focus. The considerations to take shall focus on the present and future and not on the past. The measures to be taken at national level for the fish stock to thrive are essentially an issue for the long term perspective.

Whether one likes it or not, newcomers have to be included in the holistic thinking. On the one hand no state can be forced to enter a RFMO, but on the other hand no member state can close their eyes to the fact that newcomers “de facto” will fish. This means that states with a long track record in a particular fishery may experience that the fishery decreases and that other states take over the hegemony.⁴⁸ The concern for newcomers is mentioned in detail in Article 11 of the UNFSA: newcomers have to be included in the club if this is necessary to keep/get the exploitation under control.

If some states are concerned about the stock being overfished they will have to react themselves by reducing their “level of ambition”. The pie is limited and because of the new distribution pattern of the stock the parties have to make the best of it and calculate the take out in the other EEZ before setting their own quota. If an agreement cannot be reached it would be a mistake to make the newcomer a scapegoat. The responsibility is on everybody and when a multilateral agreement cannot be made all parties must be prepared to take their share of the reduction. This is how it works from the perspective of international law.

The Box (below) shows the stages in the decision process recommended by the NMTT. It specifies the objectives of the various stages in the process, and also specifies the contribution of the various parties/stakeholders involved.

⁴⁸ As it has been with the herring fisheries since the 13th century and until our days where regulations reflect the continuous changes in the spatio-temporal distribution. cf. Peter Ørebech, *Reguleringer i fisket* (Tromsø 1986) p. 14–58.

Table 3 The NMMTT approach

	Aim	Policy makers	Management	Stakeholders	Science
Stage 0					
Setting the overall scene	Agreeing the membership of the club of coastal states	Discuss the membership of the club of coastal states, and the general framework for the process (e.g. should this be a process for a specific fish species or for a group of fish species)			
Stage 1					
Achieving transparency on Zonal Attachment calculations	Agreeing the allocation approach based on the UNFSA principles i.e. how to calculate zonal attachment including weight given occurrence of spawning and nursery grounds		Review science input with a view to understand the implications of the options for choosing an allocation scheme	Review science input with a view to understand the implications of the options for choosing an allocation scheme	Review the available data and decide on which data are representative for the biological situation and the fishery Present series of distribution maps based on a range of data and UN-CLOS/UNFSA
Stage 2					
Tweaking the allocation key	Agreeing the weight associated with other criteria than zonal attachment national dependency history of fishing science activities		Discuss the allocation key	Counsel management	Provide background information as required, e.g. on science activities and studies of regional dependence
Stage 3					
Reaching final decision	Final decision of the allocation key	Review, if required revise and agree the results of stage 2			

How to resolve conflicts over allocation?

UNCLOS 1982 provides for four alternative means for the settlement of disputes: the International Tribunal for the Law of the Sea, the International Court of Justice, an arbitral tribunal constituted in accordance with Annex VII to the Convention, and a special arbitral tribunal constituted in accordance with Annex VIII to the Convention. A State Party is free to choose one or more of these means by a written declaration to be made under Article 287 of the Convention.

Most joint fisheries arrangements between countries do not include an explicit dispute settlement procedure beyond “consultations between the parties” and “withdrawal from the agreement.” Practise within fisheries dispute settlement is consultations among the involved parties with, if agreed, a mediator servicing the process.

The EU CFP has no explicit dispute settlement procedure except the European Court. The EU-Norway fisheries agreement stipulates that disputes are settled through “... consultations ...If, within three months from the request for consultations, a solution satisfactory to the Party which has requested consultations, is not found, that Party may, ... suspend or terminate the Agreement.”

Because of the widespread use of the NEAFC objection procedure by a number of member states, *a fast track dispute settlement procedure* was decided and the Convention amended accordingly in 2004. The amendments made it mandatory to explain the reasons for any objections, which in the past had been done on a voluntary basis, and established procedures for setting up arbitration panels to settle disputes. The dispute settlement procedures are now a part of the Rules of Procedure of NEAFC. In the opinion of the NMTT these procedures are in substance applicable to all NEA fisheries agreements. The details of the NEAFC dispute settlement procedure is found in Annex 5.

No such arbitration panel has been established up till now. The question of using the NEAFC dispute settlement procedures was raised in the beginning of this decade when both the mackerel and the herring agreement on allocations came up for discussion and disagreement. Although the Contracting Parties of NEAFC had agreed on the procedures they did not use the NEAFC rules as coastal states.

6. Further considerations

The solution/recommendation presented in Chapter 4 and 5 can be taken further: It might be necessary to consider mechanisms which support the need for reaching a compromise on the allocation of quotas among the states involved. Such a mechanism should be founded on the three requirements/rights on which the allocation system builds:

- Fish occurring in an EEZ is owned by the coastal state.
- If the fish stock is shared with the adjacent zone (meaning that there are fish migrations taking place between the two areas) the two or more coastal states shall cooperate on the exploitation. This can be on a bi- or multilateral basis cf. UNCLOS Article 63.
- The total exploitation shall be within MSY.

The total exploitation level has little to do with the allocation scheme but in cases when there is no allocation agreement can be used as a common yardstick states individually aim for. As already mentioned the requirement for MSY is today a moral requirement more than anything else, as there is no transfer of sovereignty. It may be that regulating fisheries based on national sovereignty is not sufficient to achieve MSY. One may therefore reflect on the possibility to get away from the situation where it is the coastal state only that decides what MSY should be. One such model could be to have a supranational authority (e.g. NEAFC) by majority to decide on overall TAC or other restrictions that prevent overfishing. The rules of the game might be changed so that entering an agreement is rewarded. What is needed is a supranational body and court that can 1) decide on the TAC (and if no decision $TAC = 0$) and 2) the court should be able to overrule a TAC that is not sustainable.

It might also be necessary to consider transition from one allocation regime to another, i.e. from one set of rules for TAC setting and -allocation to another. UNFSA does not consider this issue. However, given the in-

vestments tied to fishing rights in the North Atlantic and the rigidity of the market for fishing rights it seems relevant to consider a mechanism that allow for a viable transformation from one allocation key to another. NMTT has not considered the criteria for such a mechanism in detail. A rule of thumb that has been argued in the internal setting of TAC's in EU has been that yearly changes in fishing opportunities should be kept within a 15% margin. NMTT suggests that the issue is given attention prior to its eventual application.

Sammenfatning

Debatoplægget er skrevet af en tværfaglig nordisk ekspertgruppe med ekspertise indenfor havret, ressourcebiologi, fiskeriforvaltning og fiskeri-økonomi og er resultatet af et års analysearbejde og ekspertdrøftelser.

Baggrunden for debatoplægget er de konflikter om fordeling af fiskekvoter i Nordøstatlanten som har udspillet sig gennem de seneste 4 år. Konflikterne har bl.a. medført handelsboykot og indklagelse for WTO, suspension af alle MSC's bæredygtigheds certificeringer af makrel fiskerierne i Nordøstatlanten og en underminering af de nordiske landes internationale omdømme som "verdens bedste" til bæredygtig, ansvarlig forvaltning af fiskeressourcer.

Debatoplægget klarlægger de internationale spilleregler for fordeling af fiskeressourcer mellem nationer og anviser hvorledes disse regler bør forstås og anvendes. Debatoplægget præsenterer en dynamisk ressourcebiologi "model", som kan bruges ved fastsættelse af kvotefordelingen af fisk i Nordøstatlanten – et havområde som i stigende grad oplever effekter af klima- og andre økosystemforandringer på sine fiskebestandes størrelse og udbredelse både i tid og rum.

Debatoplægget anviser hvorledes konflikter om fiskerettigheder mellem lande kan løses gennem brug af allerede eksisterende institutioner, som er etableret af Nordøstatlantens kyststater.

Debatoplægget skal bidrage til en informeret debat i offentligheden og mellem politikere, fagfolk og administratorer om kriterier og videngrundlag for fordelingen af fiskeressourcer og fiskerirettigheder mellem nationer i Nordøstatlanten. Kun gennem vedtagelse af fordelingskriterier som afspejler de til enhver tid eksisterende ressourcebiologiske og økonomiske realiteter kan der skabes enighed mellem de involverede nationer om kvotefordeling og bæredygtig udnyttelse af fiskebestandene.

7. List of concepts and acronyms

Allocation key

The allocation key is the basis that is used to allocate fishing opportunities of defined fish stocks between countries. The allocation key is essentially based on each country's historical (long-established and continuous) fishing activities of specific fish stocks in specific migration area. By on a regular basis exchanging information of catches, fishing effort, and other data countries document historical fishing in the migration area. The allocation key is adjusted by taking into account the fish stocks zonal attachment, see Zonal Attachment. About the EU key to allocate fishing opportunities between EU-member states, see Relative Stability.

Demersal fisheries

Fisheries that occur near the bottom of seas (in contrast to pelagic fisheries).

EEZ

Exclusive Economic Zone, is a sea zone defined by the United Nations Convention on the Law of the Sea over which a state has special rights regarding the exploitation and use of marine resources, including fish stocks.

EU JRC

EU's Joint Research Centre is the Commission's in-house science service organised as a directorate. The JRC draws on scientific work experience and continually builds its expertise based on its seven scientific institutes, which host specialist laboratories and unique research facilities. While most of the scientific work serves the policy Directorates-General of the European Commission, the JRC addresses key societal challenges while stimulating innovation and developing new methods, tools and standards. The JRC shares know-how with the EU Member States, the scientific com-

munity and international partners. The JRC collaborates with over a thousand organisations worldwide.

Fishing capacity

Harvesting capacity of the fishing fleet. The capacity is what is available for fishing at a particular point in time. However, the existing capacity may not be fully deployed in the fishing. The capacity is measured through the fleet register and is measured in units of number of vessels detailed by Length-over all, KW or GT.

Fishing effort

Fishing capacity used during a time period. The fishing effort is measured in fishing logbooks and may be measured in fishing hours or fishing days.

Fish stocks

Fish stocks are subpopulations of a particular species of fish that form a reproductive unit. Intrinsic parameters (growth, recruitment, mortality and fishing mortality) are traditionally regarded as the significant factors determining the stock's population dynamics, while extrinsic factors (immigration and emigration) are traditionally ignored.

Historical Fishing Rights

Also called traditional fishing rights. When fish stocks migrate from one National Economic Zone to others or to and from waters outside national jurisdictions, the coastal states of the migration area shall cooperate to manage and to utilize such fish stocks. When sharing the fishing opportunities of migratory fish stocks they recognize and approve to use an allocation key, see allocation key.

ICES

International Council for the Exploration of the Sea, ICES is an intergovernmental organisation whose main objective is to increase the scientific knowledge of the marine environment and its living resources and to use this knowledge to provide advice to competent authorities. The ICES members are by its convention countries that have coasts bordering the North Atlantic Ocean and the Baltic Sea.

International waters

Waters outside national jurisdictions (outside EEZs).

ITQ

Individual Transferable Quota is a share of the total allowable catches (fishing opportunities) of a specific fish species by weight and for a given time period which a country has allocated to an individual. Such quotas can typically be bought, sold and leased, a feature called transferability.

Marine biomass

The mass of living biological organisms in a given area or ecosystem at a given time.

MSC

Marine Stewardship Council certifies specific fisheries that meet the MSC standard for sustainable fishing i.e. fisheries that are well managed and sustainable according to the science-based MSC standard. Fish and fish product are labelled by the MSC eco-label when the fish originates from a MSC-certified fishery.

MSY

Maximum Sustainable Yield that can be obtained on a long-term sustainable basis from a resource. Natural resources are considered a natural capital. The fishery should be conducted without reducing the base of capital/fish stocks itself. The base of fish stocks should allow a production of the highest growth rate possible.

NEA

North East Atlantic Ocean.

NEAFC

North East Atlantic Fisheries Commission is the Regional Fisheries Management Organisation (RFMO) for the North East Atlantic Ocean. The Convention area stretches from the southern tip of Greenland, east to the Barents Sea, and south to Portugal. NEAFC's objective is to ensure the long-term conservation and optimum utilisation of the fishery resources in the Convention Area.

NMTT

Nordic Marine Think Tank is a network of people in the Nordic countries with experience in marine and fisheries issues and in international fisheries cooperation. NMTT participates in the debate on the exploitation of marine living resources on evidence and a sound scientific basis.

OECD

Organisation for Economic Co-operation and Development is an international economic organisation of 34 countries founded in 1961 to stimulate economic progress and world trade. OECD provides a platform to compare policy experiences, seeking answers to common problems, identify good practices and coordinate domestic and international policies of its members

Pelagic fisheries

Fisheries of fish that live in the pelagic zone (free swimming in midwater) – neither close to the bottom nor near the shore (in contrast with demersal fisheries).

Relative stability

The EU key to allocate fishing opportunities between EU member states. EU agreed on the allocation key 25. January 1983. The key reflects the recorded catches in each Member State (reference period) in 1973–1978 and preferences for Scotland, Ireland (and Greenland) as well as losses in third country waters after the extension of fishing limits. The key has been adapted over the years to accommodate the rights of new Member States.

RFB

Regional Fisheries Body, See RFO.

RFMO

Regional Fisheries Management Organisation, See RMO.

RFO

Regional Fisheries Organizations are international organizations of countries with an interest in fishing in areas in specific region such as the North East Atlantic Ocean. Some RFOs often referred to as Regional Fisheries Management Organizations (RFMO) manage fishing of all species in a

the regional area, while others referred to as Regional Fisheries Bodies (RFB) focus on certain highly migratory species.

TAC

Total Allowable Catches are fishing opportunities with catch limits (tons or numbers) set for most commercial fish stocks in certain geographical areas. For fish species that migrate between two or more EEZs and in waters outside national jurisdiction the TAC for each species is shared between these countries.

Trans-boundary fish stocks

Fish species that migrate between habitats in two or more EEZs/international waters to complete their life-cycles.

UNCLOS

United Nations Convention on the Law of the Sea. UNCLOS is the “constitution” of the ocean. UNCLOS provides the basis for regulating the use (including fisheries) of all maritime areas, air space and the deep seabed.

UNFSA

United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Fish Stocks Agreement/Straddling Stocks Agreement 1995). The objective is to ensure the long-term conservation and sustainable use through effective implementation of the relevant provisions of the Convention. The agreement addresses inadequate management in many areas and over-utilization, and lack of sufficient cooperation between States.

Zonal Attachment

The term used to identify a country’s interests in (share of) fish stocks that migrate into their waters (zones) from other waters (other countries’ zones and/or from waters outside national jurisdictions). The interests of a country depend on the zonal attachment of the fish stocks. The zonal attachment depends on how long and when the fish stocks are in the national zonal waters compared to the attachment in other zones. These

attachment zones could be defined as: a spawning area, by the distribution of eggs and larvae, by the occurrence of juvenile and pre-recruit fish, by the occurrence of the fishable part of the stock. The history of the fishery including the distribution of catch, rate of exploitation, and fishery regulations are considered in the zonal attachment as well. If zonal attachment is not taken into account in the allocation key, there is a risk that fishing is carried on a stock in an area and at a time that is considered inappropriate by other parties exploiting the stock.

Annexes

Annex I

Table Mackerel quota components (tonnes). From ICES (2013a, 2014c)

	'000 tonnes (2013)	'000 tonnes (Quotas 2014)
EU	338	611
Norway	154	279
Russia	68	(42) Not confirmed
Iceland	123	148
Faroe Islands	126	156
Greenland	50	100

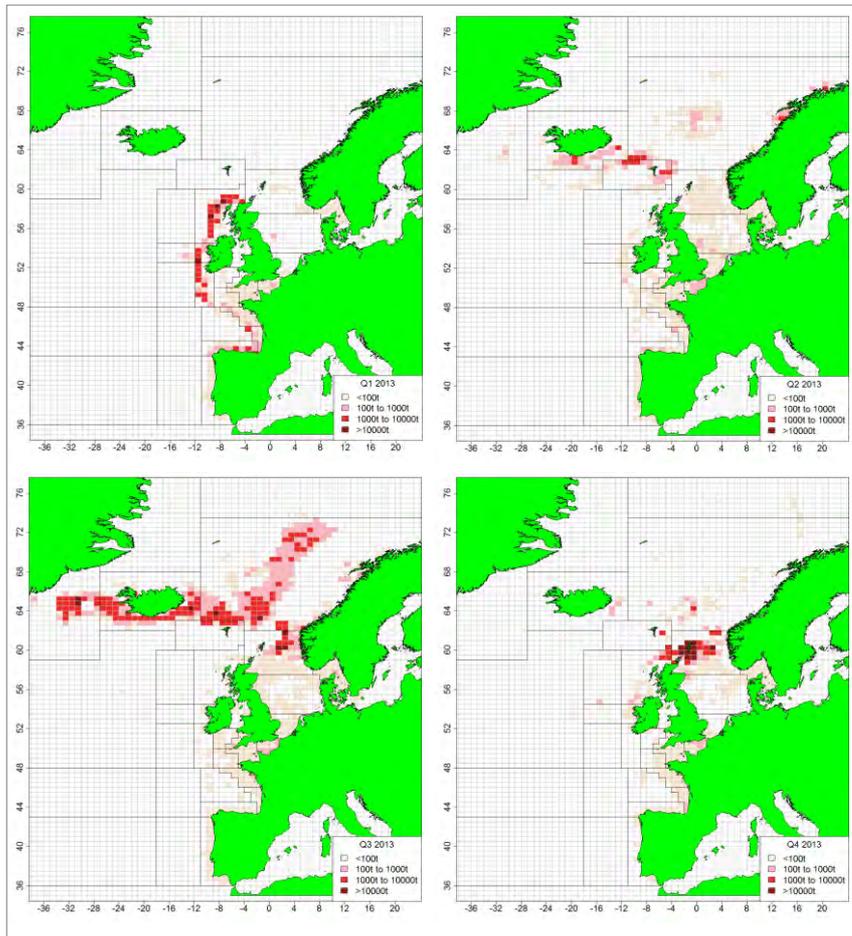
Annex II

Table: Mackerel landings in the North East Atlantic (combined Southern, Western, and North Sea spawning components). In tonnes by country 2002–2012.
From ICES (2014c) Table 2.1

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Belgium	22	2	5	1	3	1	2	3	29	21	39
Denmark	34,376	27,900	25,665	23,212	24,219	25,223	26,726	23,491	41,445	35,958	36,501
Faroe Islands	19,768	14,014	13,029	9,769	12,067	13,429	11,289	14,062	70,987	122,050	107,630
France	21,878	22,906	20,266	16,338	14,953	20,038	15,602	18,340	11,379	12,766	20,467
Germany	26,532	24,061	23,244	19,040	16,608	18,221	15,502	22,703	19,055	24,083	18,944
Greenland										62	5,284
Guernsey					10					10	5
Iceland	53	122		363	4,222	36,706	112,286	116,160	121,008	159,263	149,282
Ireland	72,172	67,355	61,102	45,687	40,664	49,260	44,759	61,056	57,994	61,596	63,049
Lithuania					95	7				23	
Netherlands	33,444	30,424	27,532	25,127	24,157	24,234	19,972	23,568	23,089	28,395	25,817
Norway	184,291	163,406	157,364	119,678	121,993	131,691	121,524	121,229	233,952	208,065	17,6023
Poland				570		978					
Portugal	2,934	2,749	2,289	1,509	2,620	2,605	2,381	1,753	2,363	962	824
Spain	50,123	23,762	34,455	52,753	54,136	62,946	64,648	114,074	52,845	18,725	24,623
Sweden	5,232	445	4,437	3,204	3,209	3,858	3,664	7,303	3,428	3,249	4,564
United Kingdom	194,045	183,008	174,730	152,801	95,815	133,688	112,149	157,010	160,403	180,971	169,734
Russian Federation	45,811	40,026	49,489	40,495	33,580	35,408	32,728	41,414	59,292	73,601	74,587
Misreported	6,009		31								
Unallocated	50,543	59,172	46,596	13,171	4,954	12,453	1,069	-139	5,163		5,236
Discards	23,774	9,481	10,972	19,760	17,970	8,615	26,766	12,854	6,977	9,012	15,380
Total	771,007	668,833	651,206	543,487	471,283	579,367	611,074	734,889	880,671	938,819	892,762

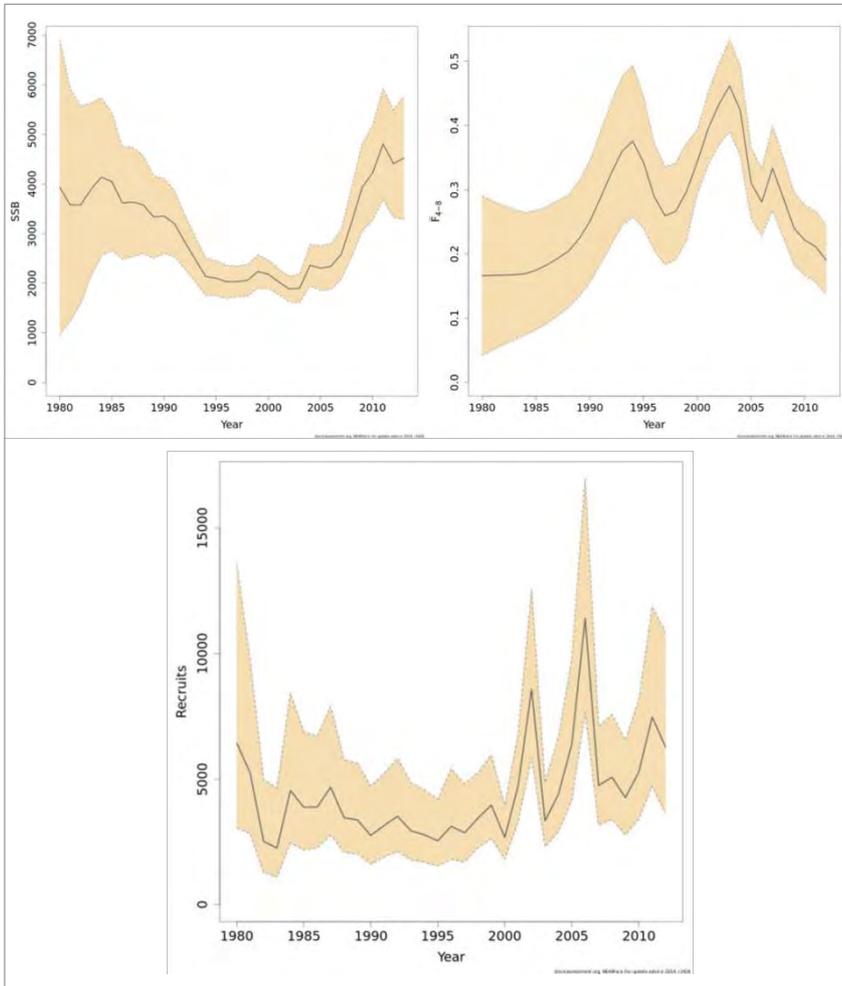
Annex III

Mackerel Fishery by statistical rectangles and by quarter for 2012. Catch (t). North East Atlantic



Annex IV

Figure: Summary of the stock assessment for NEA mackerel. Spawning Stock Biomass: upper left, Fishing mortality ($F_{bar\ 4-8}$): upper right and Recruitment: lower graph. The shading indicates the 95% confidence interval



Source: Figure 4.2.1. ICES (2014c).

Annex V

NEAFC rules of procedure for dispute settlement⁴⁹

1. Contracting Parties shall co-operate in order to prevent disputes referred to in paragraph 2 and 3.

2. If any dispute arises between two or more Contracting Parties concerning the interpretation or application of the Convention, those Contracting Parties shall expeditiously seek to resolve the dispute by consultation, negotiation, inquiry, mediation, conciliation, arbitration, judicial settlement or other peaceful means of their own choice.

3. Where a dispute concerns the application of the Convention or the interpretation or application of a recommendation adopted by the Commission, the parties to the dispute may refer the dispute to an *ad hoc* panel constituted in accordance with rules of procedure adopted by the Commission. The panel shall at the earliest possible opportunity confer with the Contracting Parties concerned and shall endeavour to resolve the dispute expeditiously.

4. Where the parties to a dispute have agreed to refer the dispute to the *ad hoc* panel procedure, they may agree at the same time to apply provisionally the relevant recommendation adopted by the Commission until the panel finalizes its work or the dispute is resolved by the parties to the dispute, whichever occurs first. Pending the settlement of a dispute in accordance with paragraph 5, the parties to the dispute shall apply provisionally any measure described by the panel. That provisional application shall cease when the parties to the dispute agree on arrangements of equivalent effect, when a judicial body to which the dispute has been referred in accordance with paragraph 5 has taken a provisional or definitive decision or, in any case, at the date of expiration of the recommendation of the Commission at issue.

5. Where a dispute is not resolved by recourse to the means set out in paragraphs 2 and 3, one of the parties to the dispute may refer the dispute

⁴⁹ <http://www.neafc.org/rules/dispute-settlement>

to compulsory procedures entailing binding decisions. Such procedures shall be governed *mutatis mutandis* by the provisions relating to the settlement of disputes set out in Part XV of the United Nations Convention on the Law of the Sea of 10 December 1982 (1982 UN Convention) or, where the dispute concerns one or more straddling stocks, by the provisions set out in Part VIII of the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks of 4 August 1995 (1995 Agreement). The relevant parts of the 1982 UN Convention and the 1995 Agreement shall apply whether or not the parties to the dispute are also Parties to these instruments.

6. A panel or judicial body to which any dispute has been referred under this Article shall apply, as appropriate, the relevant provisions of the Convention, of the 1982 UN Convention, of the 1995 Agreement, and other rules of international law compatible with the said instruments, as well as recommendations of the Commission which are applicable to the parties of the dispute, with a view to ensuring the conservation and optimum utilisation of the fish stocks concerned.



norden

Nordic Council of Ministers

Ved Stranden 18
DK-1061 Copenhagen K
www.norden.org

Allocation of Fishing Rights in the NEA

This discussion paper aims to initiate an informed debate in the Nordic countries and elsewhere on how to allocate the trans-boundary fish stocks in the North East Atlantic in the future and how to resolve possible allocation conflicts.

The paper maps the current legal framework and international fisheries agreements in the North East Atlantic Ocean which forms the basis for allocation agreements. It considers the relevance of the biological status of the fish stocks and the economic situation of the coastal states in the area for the allocation of fishing rights and further proposes a dynamic allocation methodology and a decision making process including the handling of allocation conflicts.

The paper is compiled by an inter-disciplinary Nordic group of fisheries experts.

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