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# Guide to Fisheries Management

This guide describes the political and science framework in which fisheries management operates at a local, national and international level.

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## Summary

Fisheries resources are not inexhaustible, and many wild fish stocks are considered to be exploited at levels which result in full or over-exploitation. Management of fisheries is therefore the key to stock sustainability and hence ensure catch levels are adequate to support commercial and/or recreational fisheries in the long term.

Fishery managers use advice from scientific assessments to implement practical measures such as catch limits, restrictions in the amount of fishing ('fishing effort') and other measures to manage fisheries in line with agreed policies. Wild fish stocks are mostly 'common resources' and the fishermen and nations exploiting the stocks are in competition for those resources. Therefore, fisheries management has to be practiced within a political framework at local, national and international levels. At international level, stocks which migrate between different States' waters (territorial waters and Exclusive Economic Zones or EEZs) are termed transboundary stocks and those which also migrate on the high seas are termed straddling or highly migratory stocks.

The United Nations Convention on the Law of the Sea; (UNCLOS;1982) obligates States to seek agreement to manage transboundary stocks and, where the stocks migrate in high seas areas, the Regional Fisheries Management Organisations (RFMOs) are put in place by States under the United Nations Fish Stocks Agreement (UNFSA; 1995) to advise and/or regulate fisheries on these stocks. Prior to UK exit from the EU, most stocks within a pooled EU EEZ were managed under the EU Common Fisheries Policy, with some transboundary stocks in the North Sea shared with Norway. Now that the UK is an independent Coastal State, many more stocks are transboundary stocks, with management shared between EU and UK and in some cases Norway.

The appropriate fisheries management approach varies, depending on the issues facing a particular stock or fishery. Demersal fisheries, which catch species such as cod, haddock or flatfish living on or close to the seafloor, tend to be mixed fisheries with several species' stocks being caught in the same fishery. In these fisheries, there is a balance to be struck between the management needs of the various stocks being caught. In the European waters management plans have focused on long-term sustainability of stocks using measures to control fishing effort and catches and, in many cases, have been successful in recovering stocks from the over-exploitation which occurred during the 1980s and 1990s.

For pelagic fisheries targeting shoaling fish such as mackerel or herring, the catches are largely composed of single species, and it is feasible to manage stocks by controlling the overall catch of fish or even banning fishing altogether for particular stocks. The successful recovery of the North Sea herring stock was achieved after a 5-year ban on herring fisheries in the North Sea from 1977.

Many productive stocks are highly migratory, migrating through the Exclusive Economic Zones of several States and also through high seas areas. This means that management of these stocks requires international agreement with Total Allowable Catch limits, shared into catch quotas for the different parties exploiting the stock. If migratory patterns change, the United Nations Fish Stocks Agreement UNFSA obligates exploiting nations to collaborate to manage stocks sustainably.

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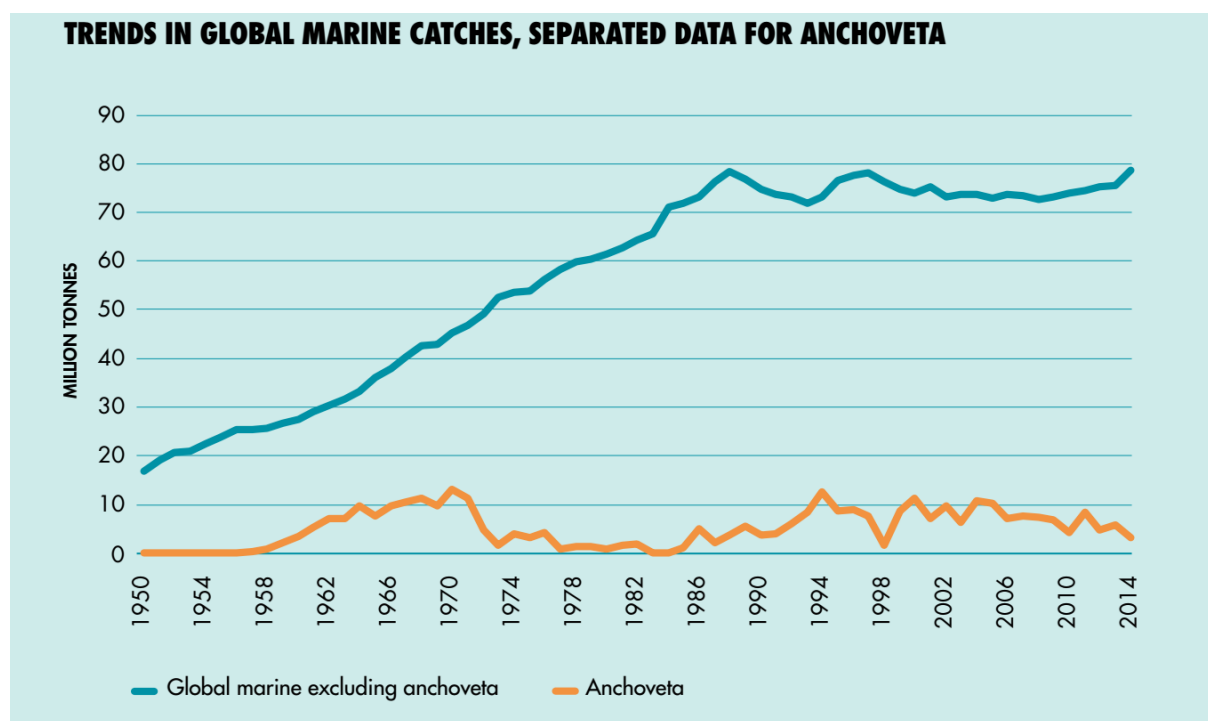
## Glossary

Term	Definition
<b>Advisory Councils</b>	The Advisory Councils (ACs) are stakeholder-led organisations that provide the European Commission and EU countries with recommendations on fisheries management matters.
<b>Coastal State</b>	International law provides that Coastal States have sovereign rights to manage fisheries in waters under their jurisdiction. In the case of transboundary and straddling stocks they have a duty to seek agreement with other States with an interest in these stocks
<b>Contracting party to an RFMO</b>	State or other Entity (example the European Union) which is signatory to the convention setting up a RFMO
<b>Cooperating Non Contracting Parties</b>	State or other Entity which is not a signatory to the convention setting up a RFMO but has rights to fish within the RFMO jurisdiction and co-operates in relation to fisheries management.
<b>Exclusive Economic Zones; EEZ</b>	Area between coast and the 200-mile limits or the median line between jurisdictions where States have rights to exploit marine resources including fish stocks.
<b>Inshore Fisheries and Conservation Authorities; IFCAs</b>	Inshore Fisheries and Conservation Authorities are responsible for management of certain non-quota (mostly shellfish) stocks within six miles of the English Coast
<b>Regional Fisheries Management Organisations; RFMOs</b>	RFMOs are international organisations formed by countries with fishing interests in an area or particular highly migratory species, notably tuna, throughout vast geographical areas. They are open both to countries in the region ("Coastal States") and countries with interests in the fisheries concerned. While some RFMOs have a purely advisory role, most have management powers.
<b>Straddling or highly migratory stocks</b>	Stocks which migrate through the High Seas as well as individual State's waters
<b>Territorial waters</b>	Waters out to 12 miles from the baseline, or the median line between jurisdictions
<b>Transboundary stocks</b>	Stocks which migrate between different States' waters (EEZ and territorial)
<b>United Nations Convention on the Law of the Sea; UNCLOS</b>	The Law of the Sea Convention defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources
<b>United Nations Fish Stock Agreement; UNFSA</b>	Agreement for the Implementation of the Provisions of the UNCLOS relating to the conservation and management of shared stocks

## 1 Introduction

Fisheries' management is the process by which human behaviour is controlled in relation to the exploitation of wild fishery resources. In essence, we do not manage the fish stocks themselves, because these are wild fish stocks beyond our control, but we can manage the activity of fisheries exploiting those resources.

Whilst world fish catches increased year on year from the 1950s to the mid-1980s, there are clear indications of overall catches levelling off at between 70 and 80 million tonnes per annum since then (Figure 1). This indicates that, worldwide, fish stocks are in a condition where further increases in fishing may not yield more catch. This, coupled with FAO's findings that the proportion of assessed stocks that are overfished increased from 10% in 1974 to around 30% in 2013, indicates the need for better exploitation of stocks through good fisheries management (FAO, 2016).



**Figure 1 Trends in global marine wild fish catches from 1950 until 2014. Annual catches rose from around 20 million tonnes in 1950 to a level of between 70 and 80 million tonnes from 1986 onwards. Anchoveta are pelagic fish whose catches are highly variable due to climatic effects, so these data are shown separately (FAO, 2016)**

There is international consensus that stocks should be managed so that they produce 'Maximum Sustainable Yield' (MSY); this means catching the maximum quantity that can safely be removed from the stock while, at the same time, maintaining its capacity to produce sustainable yields in the long term. This follows commitments made at the World Summit on Sustainable Development (WSSD), in Johannesburg in 2002, to aim towards MSY in world fisheries. See Seafish (2022c).

## 2 Management constraints

Fundamentally, most fishery resources are common resources, where competitors ranging from individual fishers to nation States seek to catch their 'share' or quota of the resource. Ideally, fisheries' managers should have access to science-based stock assessments, be able to control fishing pressure on the stocks through enforcement of management measures

to limit catch and fishing effort (numbers of boats and days they spend fishing). The presence of these elements enhances progress towards effective fisheries' management (Melnychuk, et al., 2016).

However, even when these conditions are not fulfilled because of commercial, political or technical realities, there is scope for fisheries' managers to improve sustainability, provided that the approach is practical and robust enough to be enforced within this competitive environment. For example, the status of individual stocks exploited within a mixed fishery may vary, but measures which limit effort can be used to reduce fishing pressure on all stocks if required (see Section 8.1 page 12).

Changes in the distribution of stocks due to climatic change and other factors can have an important effect on the availability of the stocks to different States. Here, science can help fisheries' managers by providing information on stock distributions and levels, but political agreement is needed to adjust shares of the catch where that is perceived to be required.

### 3 FAO Code of conduct

The FAO has recognised the need to guide fisheries management and has agreed a '[Code of Conduct for Responsible Fishing](#)' (FAO, 1995a) which, with the technical documents derived from it, has become a basic set of guidelines for responsible fishing at all levels from fishers through to governments and international organisations. One area where it has formed the basis for action is providing a basis for the FAO guidance on Ecolabels; for further information see Seafish (2022e)

## 4 Fisheries management regimes

Fisheries are managed on a local, national and international scale as appropriate to the characteristics of the stocks and fisheries. The United Nations Convention on the Law of the Sea 1982 recognises twelve-mile territorial limits, the seas within which are considered sovereign territory, and 200-mile Exclusive Economic Zones (EEZ) where states have sovereign rights to explore and utilise marine resources.

The boundaries of these waters nominally extend out to twelve and 200 miles respectively from the baseline, defined as the mean low water mark along coastal nations' shorelines.

However, their extent may be influenced by topographical features such as bay enclosures; straight lines can be drawn across bays for twelve-mile limits; and, although EEZ limits to 200 miles were originally declared, these limits can be modified under some circumstances to follow the continental shelf edge. Where States' waters are adjacent, limits are drawn at agreed median lines.

Beyond the EEZs, international waters are termed 'high seas' where fisheries' management is agreed within the framework of Regional Fisheries Management Organisations (RFMOs) set up to advise and/or regulate fisheries under the [United Nations Fish Stocks Agreement](#) (see also FAO, 1995b).

### 4.1 European Union and UK regimes

In the European Union (EU), the Common Fisheries Policy means that Member States pool their EEZs and there are reciprocal rights for some European States to fish in each other's territorial waters from six to twelve miles under the London Fisheries Convention of 1964. On 3<sup>rd</sup> July 2017 the UK gave 2 years' notice of withdrawal from this Convention, effectively leaving in July 2019.

Leaving the EU implies that the UK has become an independent Coastal State with corresponding rights and responsibilities. Whilst this enables the UK to manage fisheries within its own waters, it also implies responsibility to seek agreement on the management of shared stocks (see below). Many of the major European stocks are shared between the UK, EU and Norway in the case of North Sea stocks.

During the transition period (until 30<sup>th</sup> June 2026) of the [Trade and Cooperation Agreement](#) (TCA) between the UK and the EU, the parties have agreed to grant access to fish for specified TAC and non-quota species in their respective EEZs (12-200 nautical miles or the median line) and a specified part of their 6-12 nautical mile zones. The TCA also specifies how other fisheries management measures are to be agreed between the parties.

Figure 2 illustrates the 6 and 12 nautical mile fishery limits around the UK, and the Exclusive Economic Zone (200 nautical mile limit, or median lines).

Within territorial waters, the management regime may vary. For example, in English waters statutory local authority bodies, the Inshore Fisheries and Conservation Authorities (IFCAs<sup>1</sup>), manage some fisheries (mostly shellfish) within six miles, whilst the Marine Management Organisation<sup>2</sup> (MMO) manages fisheries in (including the EEZ) English waters beyond this limit.

Different arrangements are in place for the territorial and EEZ waters of the devolved administrations of Scotland, Wales and Northern Ireland where these administrations are the management bodies. They are advised by local advisory groups which vary in their composition by administration:

- In **Scotland** Inshore Fisheries Groups (IFGs) (Marine Scotland, 2015) are composed of representatives of commercial fishermen and advise on management of fisheries out to six miles.
- In **Northern Ireland** (DAERA, 2014) waters the Inshore Fisheries Partnership Group (IFPG), composed of fish catching, processing, the environmental sector, government policy, inspectorate, science and Seafish.
- In **Wales** the advisory body is the Wales Marine Fisheries Advisory Group (WMFAG<sup>3</sup>), which consists of representatives of the fishing associations in Wales, the environment sector, Seafish and local Government.

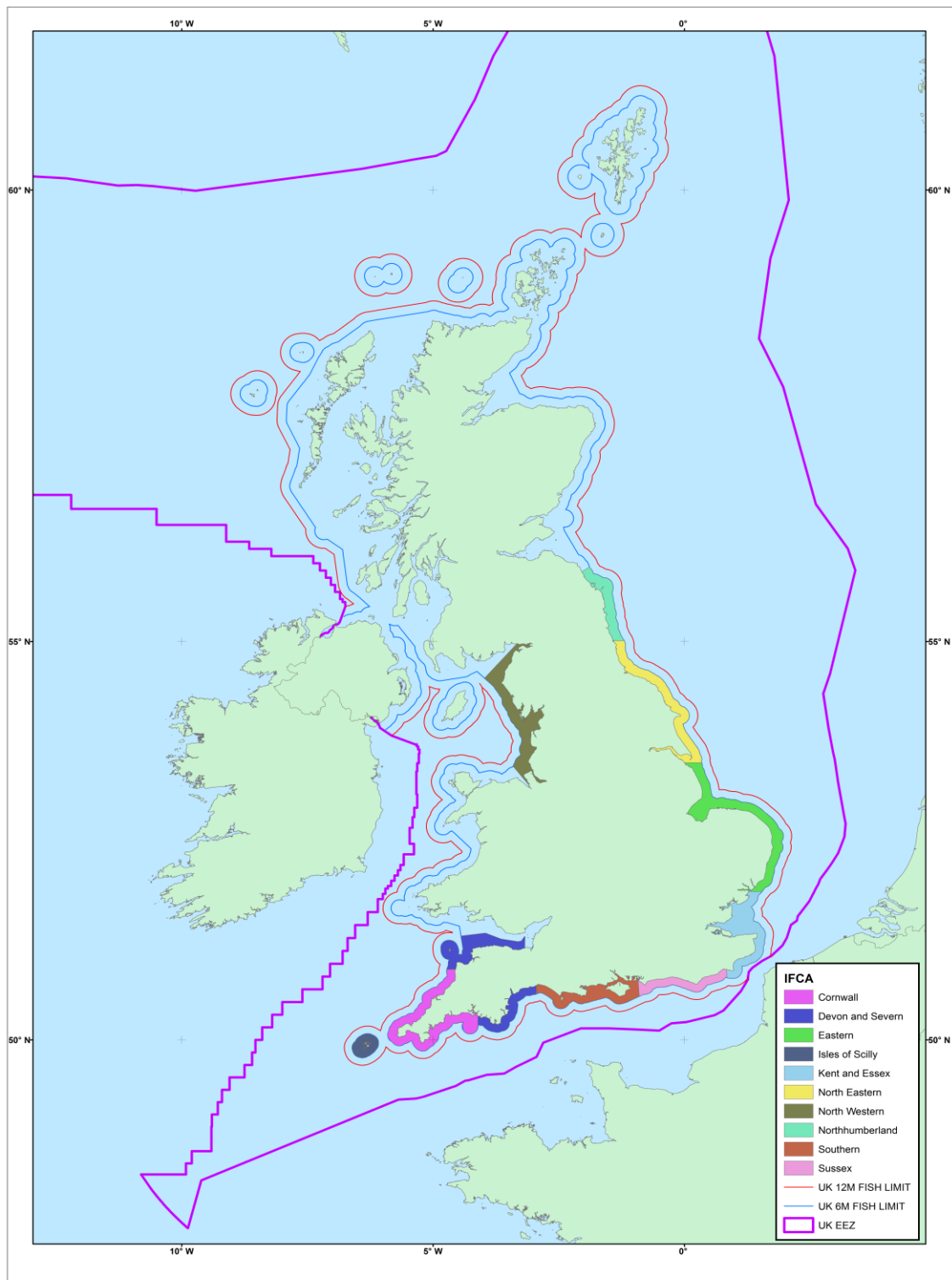
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<sup>1</sup> [www.association-ifca.org.uk](http://www.association-ifca.org.uk)

<sup>2</sup> <https://www.gov.uk/government/organisations/marine-management-organisation>

<sup>3</sup> [Wales Marine Fisheries Advisory Group | GOV.WALES](#)





**Figure 2 Map showing UK Exclusive Economic Zone, UK 12 and 6 nautical mile limits and IFCA areas inside the 6 nautical mile limits**



## 4.2 Transboundary and straddling stocks

Many fish stocks, termed transboundary stocks, migrate between different States' waters (territorial and EEZ). Those which migrate between States' waters and the high seas are termed straddling stocks. Some of which, for example, tuna, are considered 'highly migratory' because of their ocean wide migrations.

Coastal States have sovereign rights which enable them to manage fisheries within their 200-mile EEZs. They can allow other States to exploit the resources under access agreements, and in the case of transboundary or straddling stocks, they have a duty under the United Nations Convention on the Law of the Sea (UNCLOS, 1982; see FAO, 1983) and United Nations Fish Stocks Agreement (UNFSA, 1995) to seek agreement with other States with an interest in these stocks.

On the high seas, the UNFSA has been signed by 80 parties and enables management of stocks in these zones with the relevant organisations being the RFMOs (Ásmundsson, 2016). These organisations are set up under the umbrella of the United Nations, whose membership consists of relevant member States with interests in the fisheries of the region. The membership consists of two types; Contracting Parties<sup>4</sup>, who are the signatories to the Convention setting up the RFMO, and Cooperating Non-Contracting Parties<sup>4</sup>, which may have rights to fish, but are not signatories to the Convention setting up the RFMO, although they co-operate within the RFMO on fisheries assessment and management.

This principle is generally known as the duty to cooperate, which means that a State that has not sought to reach an agreement on the management of a stock does not have the right under international law to authorise its nationals to fish for it in the high seas (Ásmundsson, 2014).

## 4.3 Management plans

Management plans can be of key importance and are used by national and international bodies to manage fisheries. If parties are able to agree on an objective for a given stock, for example to bring the stock to MSY, and implement a management plan in the form of a set of decision rules guiding the management of the stock with pre agreed reference points, this contributes to progress. This is particularly important when the aim is to recover a stock from a depleted state.

Science can support the design of these management plans, through assessing their implications for stock sustainability and robustness under the precautionary approach. However, agreement to design and implement a plan has to be made at a political level and is subject to political constraints.

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<sup>4</sup> Parties or Cooperating non Contracting Parties can be States or other entities such as the European Union

## 5 The fishery management cycle

The common components of fisheries assessment and management are;

1. **Scientific assessment;** which assesses the status of the stock in relation to reference points, for example MSY, and provides advice for management on catch limits, technical measures to improve selectivity or other measures. Scientific assessments therefore provide the evidence base to support decision-making by managers.
2. **Political agreement;** meeting of government representatives from the States(s) exploiting the stocks; here the stock status information and future projections from the assessment are used to agree future management measures, such as catch limits.

Where there is a well-developed governance structure for fisheries management, scientific advice and implementation of management measures is carried out on a cyclical basis. In some areas, such as the European Union, there is a consultation process involving regional stakeholder bodies such as the European Advisory Councils which advise on fisheries management.

For many stocks in Europe this is carried out on annually, with advice given by the International Council for Exploration of the Seas (ICES<sup>5</sup>), the scientific body responsible for carrying out stock assessments in the Northeast Atlantic and Baltic Seas.

In Northwest European waters agreement on management measures in terms of catch limits ('Total Allowable Catches' or TACs for many species) and other measures for shared stocks is made annually through the UK-EU Trade and Cooperation Agreement and the EU Council of Fisheries Ministers, for some stocks additional agreement is reached with Norway. For the straddling stocks such as Northeast Atlantic mackerel and blue whiting, the North East Atlantic Fisheries Commission (NEAFC)<sup>6</sup> is the appropriate RFMO.

In other areas of the world, such as the RFMOs which manage tuna stocks, the timescale varies with stocks being assessed and managed on a longer cycle, typically three yearly for tuna.

## 6 Implementation of fisheries management

Types of management measures can be broadly classified as input controls, technical measures and output controls. For a full discussion of types of controls see for example Cochrane & Garcia, (2009) and FAO, (1997).

**Input controls** can be designed to regulate the quantity and type of fishing 'effort', often quantified in terms of vessel, size, power and time at sea. Days at sea regulations, where vessels of a given power and gear type are restricted to a certain number of days at sea in a given time period, are input controls. **Technical measures** can be considered a subset of input controls as they directly control the design and deployment of the gear, including selectivity devices and mesh sizes and also seasonal and area closures. They include restricting zonal access to vessels of a given size or power, for example restricting the maximum power of vessels permitted to fish within the 12-mile limit.

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<sup>5</sup> ICES [www.ices.dk](http://www.ices.dk)

<sup>6</sup> North East Atlantic Fisheries Commission <http://neaftc.org/>

Kingfisher Information Services has created a [website](#) which enables commercial fishers to find out spatial restrictions by gear type in the UK EEZ. The information, which is regularly updated, is designed to better inform fishers of the location of restricted fishing areas and the prohibited and permissible fishing operations in each area – ensuring that fishers are aware of, and able to comply with, fisheries regulations.

**Output controls** are designed to control the quantity and composition of the catch and include Minimum Landing Sizes, Total Allowable Catches (TACs), which may be shared into quotas for individual nations or fishers, and so-called ‘bag limits’ which limit the quantity of fish a fisher can remove in a day.

Fisheries’ managers use a combination of controls as appropriate to the management objectives of the fishery, the information available and the practicality of enforcement, given the characteristics of the fishery. Social and economic objectives are often included as considerations in the management of a fishery, which may influence the pace at which fisheries move towards optimal exploitation.

Large scale fisheries with good information and control measures can use quantitative control of catches through TACs and other limits. Smaller scale fisheries may use simple input measures such as control over the overall number of boats and/or spatial management and/or minimum landing sizes to conserve young fish or maximum landing size to conserve parent stock (more effective for shellfish such as crabs and lobsters where survival of rejected individuals is good).

## 7 Enforcement of management controls

Ultimately, fisheries management can only be successful if the rules made by managers are obeyed by the fishers. **Monitoring, Control and Surveillance** is the process by which fisheries’ managers ensure that fisheries regulations are enforced. The legally competent authorities, need to be able to identify contraventions and prosecute and punish offenders.

Fisheries which contravene these regulations are termed Illegal, Unregulated or Unreported (IUU), and are considered a threat to sustainable fisheries; see Guide to IUU (Seafish, 2022f) for more information. Some RFMOs have lists of vessels suspected to have been engaged in IUU activities, examples can be found on [www.tuna-org.org](http://www.tuna-org.org).

Since fishing is, by its nature, carried out in remote areas, where surveillance and enforcement of management measures by patrol vessels or aircraft are potentially difficult, and expensive, fisheries are increasingly reliant on technology to monitor compliance. Measures such as satellite tracking of vessels (Vessel Monitoring Systems; VMS) are routinely used in European fisheries, where the vessel’s location is reported periodically to the surveillance authorities and electronic logbooks where the Skipper enters catches on to a database on a haul by haul basis. This information is verified when catches are landed at the dockside.

Though discarded bycatch is conventionally monitored by onboard observers at sea, there is growing use of surveillance cameras (Remote Electronic Monitoring or REM), which monitor the activities of the crew and the composition of the catch as it is brought aboard and processed on the vessel. Sandeman et al., (2016) describe the trial introduction of these methods into the UK demersal fisheries in the North Sea.

## 8 Fishery management examples

In this section we outline the implementation of fisheries management in selected European demersal and pelagic fisheries. Management of European Fisheries is governed by the Common Fisheries Policy<sup>7</sup> and agreements with third parties for transboundary and straddling stocks. This policy governs management of shared stocks within the European EEZ and applies to European fishing vessels on the high seas. More recently with UK exit from the European Union, many stocks are shared between the EU, Norway and the UK. Here we provide an overview of the main issues facing these fisheries set in the historical context of the past three decades.

### 8.1 European North Sea demersal fisheries

Demersal fish are caught on or near the seabed by gears such as demersal otter trawls, seines, gill nets and longlines<sup>8</sup>. Whilst European fisheries experienced considerable technological advance in the 1970s and 1980s, catches of whitefish such cod and haddock decreased in the early 1980s. Increases in catching capacity resulted in excessive fishing mortality and changes in the environment are considered to have affected the food supply to the planktonic larvae of some of these species. By the 1990s, many of the demersal stocks were considered depleted, and there was an urgent requirement to implement management measures to help these stocks recover.

However, simply trying to constrain catches by introducing restrictive Total Allowable Catches (TACs) for depleted stocks was of limited value in decreasing catches, because the North Sea demersal fisheries take a mixture of species, with varying stock status. Catches of cod continued but were discarded under tight catch controls, whilst the fishers pursued other species such as haddock.

The imperative was to reduce fishing pressure on the cod and the other main demersal stocks, which was achieved through measures to control fishing effort over the period from 2000 to 2012 (days-at-sea regulation). Other measures were introduced to avoid catches of cod through monitoring catches in real time and closing areas which contained high concentrations of cod and also incentivising selective fishing through catch monitoring. This approach has coincided with a reduction in average fishing pressure on North Sea demersal stocks over this period (ICES, 2021a).

However, although there was a recovery in the North Sea cod stock in the period 2006-2017, since then there has been a decline (ICES, 2021b). Therefore, there is a need for further reductions in fishing pressure, particularly on North Sea cod. The European Commission has implemented a 'Multi Annual Plan'<sup>9</sup> for demersal stocks and new technical measures regime<sup>10</sup>, designed to improve regulation of the multi-species ('mixed fisheries') fisheries which exploit North Sea demersal stocks.

When the UK exited from the EU, fisheries within the UK EEZ have been governed by the UK Fisheries Act 2020<sup>11</sup> and the technical measures have been incorporated into UK legislation<sup>12</sup>. Since then, there have been several amendments to technical measures in force within the UK EEZ, the most relevant of which is the new [National North Sea cod](#)

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<sup>7</sup> EU Common Fisheries Policy [https://ec.europa.eu/fisheries/cfp\\_en](https://ec.europa.eu/fisheries/cfp_en)

<sup>8</sup> See Seafish Gear Database <http://www.seafish.org/gear>

<sup>9</sup> Multiannual plans (europa.eu)

<sup>10</sup> Technical measures (europa.eu)

<sup>11</sup> Fisheries Act 2020 <https://www.legislation.gov.uk/ukpga/2020/22/contents>

<sup>12</sup> See Regulation 2019/1241 <https://www.legislation.gov.uk/eur/2019/1241/contents>

[avoidance plan](#) that includes spatial and technical measures designed to conserve cod. It applies to all vessels (EU and UK) fishing within the UK EEZ. Agreement on catch limits (TACs) are reached between the parties, EU and UK on the basis of the Trade and Cooperation Agreement and with Norway for shared stocks including North Sea cod.

With changes in legislation under the Common Fisheries Policy, European fisheries' managers have phased in the 'Landing Obligation' which has also been implemented in UK legislation<sup>13</sup>. The requirement to land all fish caught that are subject to TACs in Northwest Europe or TACs and/or minimum landing sizes in the Mediterranean. The idea is to do away with the wasteful practice of discarding and will include all fish of these species smaller than the Minimum Landing Size, which has been re-named the Minimum Conservation Reference Size (MCRS). However, these small fish are not permitted to be sold for direct human consumption; they are expected to be used for fishmeal.

This change in regime is intended to serve as a driver for improving gear selectivity characteristics, and potentially provides more reliable catch data, provided that discarding does not continue illegally. There are exemptions for fish that are considered to survive well after returning them to the sea (e.g. skates, rays, sharks and dogfish), as well as a specific discard allowance for small quantities discarded (so called '*de minimus*') under certain conditions.

The days-at-sea regulations in the North Sea were repealed in January 2017 (Regulation (EU) 2016/2094), with the intention to increase flexibility and improving fishers' ability to fulfil the requirements under the Landing Obligation. Overall fishing capacity in terms of numbers and size of vessels remains capped.

The main risks are from fisheries being 'choked' because they have run out of quota of one species, when they still have quota for others. Such risks are compounded by shifts and expansion of the distribution of fish stocks between management areas due to climate change and other factors. This means that some fishers may not have available quota for these species.

An example is the Northern hake stock, the distribution of which has expanded to the north from the western shelf into the North Sea and the TAC has increased over the past decade (ICES, 2017). Though hake is being caught by UK boats at an increasing rate, the EU relative stability policy meant that the quota share to each state remains the same each year, so the quota available to UK fishers remained small. However, under the EU-UK TCA quota shares for the North Sea catches of this stock will change, phased year on year, from 60.67:39.3% in favour of the EU in 2021 to 46.45:53.55% in favour of UK from 2026 onwards.

Management of European demersal fisheries will rely on an appropriate balance between catching capacity and available resource, facilitated by better scientific advice on mixed fisheries, improved gear selectivity and targeting of individual stocks, control of catches through limiting TAC and trading of quota between fishers and nations.

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<sup>13</sup> [Landing obligation general requirements - GOV.UK \(www.gov.uk\)](#)

## 8.2 Scientific advice in mixed fisheries

In order to provide advice to improve management of stocks in multi-species fisheries at or close to MSY, two important scientific advances have been made since 2010.

Firstly, mixed fisheries assessments have been developed, with which ICES can provide advice based on mixed fishery considerations, where managers are informed on the impact of a range of fishing scenarios on the stock status and catches of all the relevant stocks. Mixed fisheries advice is based on the assumption that fishing patterns are broadly the same from year to year and uses information from single stock assessments and catch compositions from the fisheries. As the advice is currently delivered, it does not give a specific recommendation but presents a range of scenarios enabling the managers to understand the trade-offs between stocks and which stocks are likely to become limiting so called 'choke species'.

Secondly, MSY ranges have been developed to enable managers to understand the implications of trade-offs between stocks and use the mixed fisheries advice more effectively. To this end, ICES has introduced a new set of reference points and produced advice on fishing mortality for maximum sustainable yield ranges which have been chosen to deliver no more than a 5% reduction in long term yields compared with MSY (corresponds to 95% of MSY), consistent with the stock being inside safe biological limits. For further information see Guide to Fish stock assessment and ICES reference points (Seafish, 2022b).

This approach has been incorporated into the Multi Annual Plans<sup>14</sup> for demersal stocks introduced by the European Union into the North Sea (Council Regulation (EU) 2018/973) and Western Waters (Council Regulation (EU) 2019/472) demersal fisheries under the European Common Fisheries Policy<sup>15</sup>.

However, after UK exit from the EU the headline ICES advice is given by ICES under the ICES MSY approach as there is not currently an overarching management plan for North Sea demersal fisheries. The projected catches corresponding to the MSY ranges are given in the 'Catch scenarios' produced in the ICES advice, to provide further information to fisheries managers.

## 8.3 Gear selectivity

Research into improving gear selectivity has been a longstanding theme for fisheries science and technology and, for many years, there have been efforts to develop more selective gears and measures to reduce by catch. Examples are shown on the [Seafish gear database](#). The Landing Obligation has recently led to a renewed focus on improving collaboration between fishers, technologists and scientists in an effort to improve gear selectivity, for example the [Northern Ireland Gear trialling project](#) in Northern Ireland.

## 8.4 Northeast Atlantic pelagic fisheries

These are dominated by large scale fisheries for mackerel, herring, sprat and blue whiting, mostly using mid-water trawls, and smaller-scale fisheries for sardine using ring nets to encircle the shoal, and mackerel using hand lines. These fisheries locate shoals of these species using sonar technology, which usually results in "clean" catches of one species, so mixed fisheries issues do not arise as frequently for pelagic as they do for demersal stocks.

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<sup>14</sup> [https://ec.europa.eu/fisheries/cfp/fishing\\_rules/multi\\_annual\\_plans\\_en](https://ec.europa.eu/fisheries/cfp/fishing_rules/multi_annual_plans_en)

<sup>15</sup> [https://ec.europa.eu/fisheries/cfp\\_en](https://ec.europa.eu/fisheries/cfp_en)



It is therefore possible to regulate fishing pressure on pelagic stocks by management action with fewer effects on the catches of other stocks. A well-known example was the five year ban on fishing for herring in the North Sea introduced in 1977 after scientists had warned of severe stock depletion (Dickey-Collas et al., 2010). Although there were profound effects on the fishing industry and market for herring, an enforceable ban was feasible once the North Sea States' 200-mile EEZs had been declared and governments around the North Sea had accepted the perilous state of the herring stock. This contrasts with the mixed demersal fisheries discussed above, where fishing effort was decreased gradually over a number of years because of the implications for catches of other stocks within the mixed fishery.

Fish stocks are sensitive to ocean scale variations in climate, which can result in changes in migratory behaviour and distributions. The best known recent example is the expansion in the migratory range of the North Atlantic mackerel over the past decade (Nøttestad et al., 2015; ICES, 2017). Originally the EU, Norway and the Faroes exploited the stock under a Coastal States' agreement facilitated by the North East Atlantic Fisheries Commission, the appropriate RFMO.

Since 2008, first Iceland then Greenland and Russia have increased their catches substantially as the mackerel stock size increased and the stock's migratory range increased in the western and northern regions of the Nordic seas. These changes pose a challenge to management: established agreements on quota (or catch share) become less tenable when a stock's migratory pattern changes (see the Northern hake example above) and new parties exploit the stock.

However, all the parties exploiting the stock are Contracting Parties to the North East Atlantic Fisheries Commission and they have ratified the United Nations Fish Stocks Agreement, which implies a duty to co-operate on straddling stocks, so will be expected to work towards an agreement to manage the stock sustainably.



## 8 Other guides in this series

These Guides are designed to enable understanding without the need for previous training or expertise in fisheries science. Concepts are presented graphically and in words and the key elements are explained in the summaries.

The full list of Guides is given below, with the date and letter used for cross reference within this document

Seafish (2022a)  
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SR741 ISBN 978-1-911073-47-5

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Guide to Protected Species  
SR755 ISBN 978-1-911073-61-1

These can be accessed through the search facility on <https://www.seafish.org/>

The content of these Guides can be used by Seafood business [apprentices](#) and others to study towards two occupational standards units:

- Principles of marine finfish product knowledge – Ref F-602-0617  
<http://seafoodacademy.org/pdfs/f-602-0617.pdf>
- Principles of shellfish, non-marine finfish and marine food products, product knowledge – Ref A-602-0616  
<http://seafoodacademy.org/pdfs/a-602-0616.pdf>

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UK-EU (2020) TRADE AND COOPERATION AGREEMENT BETWEEN THE EUROPEAN UNION AND THE EUROPEAN ATOMIC ENERGY COMMUNITY, OF THE ONE PART, AND THE UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND, OF THE OTHER PART  
[EU-UK Trade and Cooperation Agreement 24.12.2020.pdf \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/555095/2015_North_Sea_Cod_catch_quota_trials_Final_Report-new.pdf)

EU version [The EU-UK Trade and Cooperation Agreement | European Commission \(europa.eu\)](https://ec.europa.eu/eu-uk-trade-cooperation-agreement/)

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