



The European Commission's Knowledge Centre for Bioeconomy



Brief on biomass production of fisheries and aquaculture¹

Key messages

1. EU-27 fisheries and aquaculture produced 6.0 Mt live weight equivalent in 2017, with 4.9 Mt originating from capture fisheries and 1.1 Mt from aquaculture. It accounted for 3.5% of global production (see section 1).
2. Global capture fisheries production has been relatively stable since the late 1980s, at around 90 Mt per year. The EU-27 capture production decreased by 43% between 1990 and 2012 and shows a slight upward trend in recent years (see section 1).
3. Global aquaculture produced 80.1 Mt in 2017 and is the fastest-growing animal-food-producing sector in the world. EU-27 aquaculture production remains rather stable (see section 1).
4. In EU fishing areas, many of the assessed fish stocks were overfished (38% in the Northeast Atlantic in 2018 and 93% in the Mediterranean and Black Seas in 2017). While the situation has been improving in the Northeast Atlantic over the past 15 years, no apparent change concerning fishing pressure or stock biomass has been observed in the Mediterranean and Black Seas (see section 2). Furthermore, the status of many fish stocks remains unknown due to poor data availability (see knowledge gaps).

¹ This brief is based on the JRC Science for Policy report "Biomass production, supply, uses and flows in the European Union. First results from an integrated assessment" (Camia et al., 2018), unless stated otherwise.

² EU-27 refers to the 27 Member States comprising the EU since the departure of the UK on 31 January 2020. EU-28 also includes the UK.

1. How much fisheries and aquaculture biomass is produced in the EU and globally?

Production from fisheries and aquaculture by the EU-27 Member States reached 6.0 Mt (7.0 Mt for EU-28) live weight in 2017, representing 3.5% (4.0% for EU-28) of global production. In the EU-27, 81.2% (80.5% for EU-28) was produced from wild fisheries and 18.9% (19.5% for EU-28) from aquaculture (Figure 1). Fisheries production is measured as live weight equivalents of fish landed.

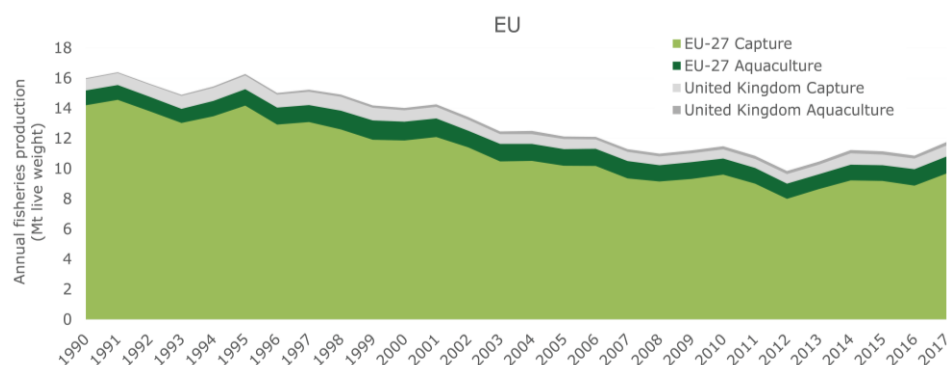


Figure 1. Capture fisheries and aquaculture production volume in the EU-27 and the United Kingdom (Mt live weight): 1990-2017. Source: FAO (2020)

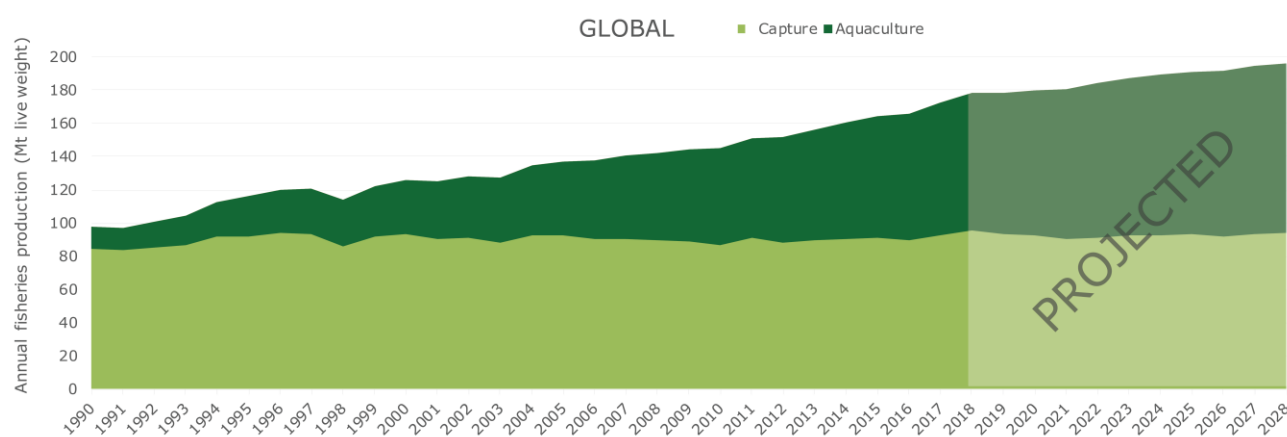


Figure 2. Global capture fisheries and aquaculture production volume (Mt live weight): 1990-2018 and projection to 2028. Source: OECD-FAO (2019)

Global capture fisheries production has been relatively stable since the late 1980s, fluctuating around 90 Mt per year (Figure 2). According to the projections of the OECD-FAO Agricultural Outlook (2019), it is expected to increase by on average 0.2% per annum over the outlook period (to 2028), partly due to improved management conditions. The EU-27 capture production decreased by 43% between 1990 and 2012 but shows a slight upward trend in recent years.

Spain, Denmark and France were the leading capture fisheries producers in terms of volume in 2017 in the EU-27 (Figure 3); Spain, France and Italy led in terms of value (Figure 4). The marine fish capture production sector leads in terms of volume, followed by marine molluscs and crustaceans and freshwater fish (Figure 5).

Global aquaculture produced 80.1 Mt in 2017 and is the fastest-growing animal-food-producing sector in the world. The increase in production is, however, far from evenly distributed, and most of the growth has been in Asian countries. Aquaculture is still a relatively young economic sector, especially when compared to agriculture, and has great potential for further growth and development. According to the OECD-FAO Agricultural Outlook (2019), the sector is expected to grow by an average of 2.0% per annum.

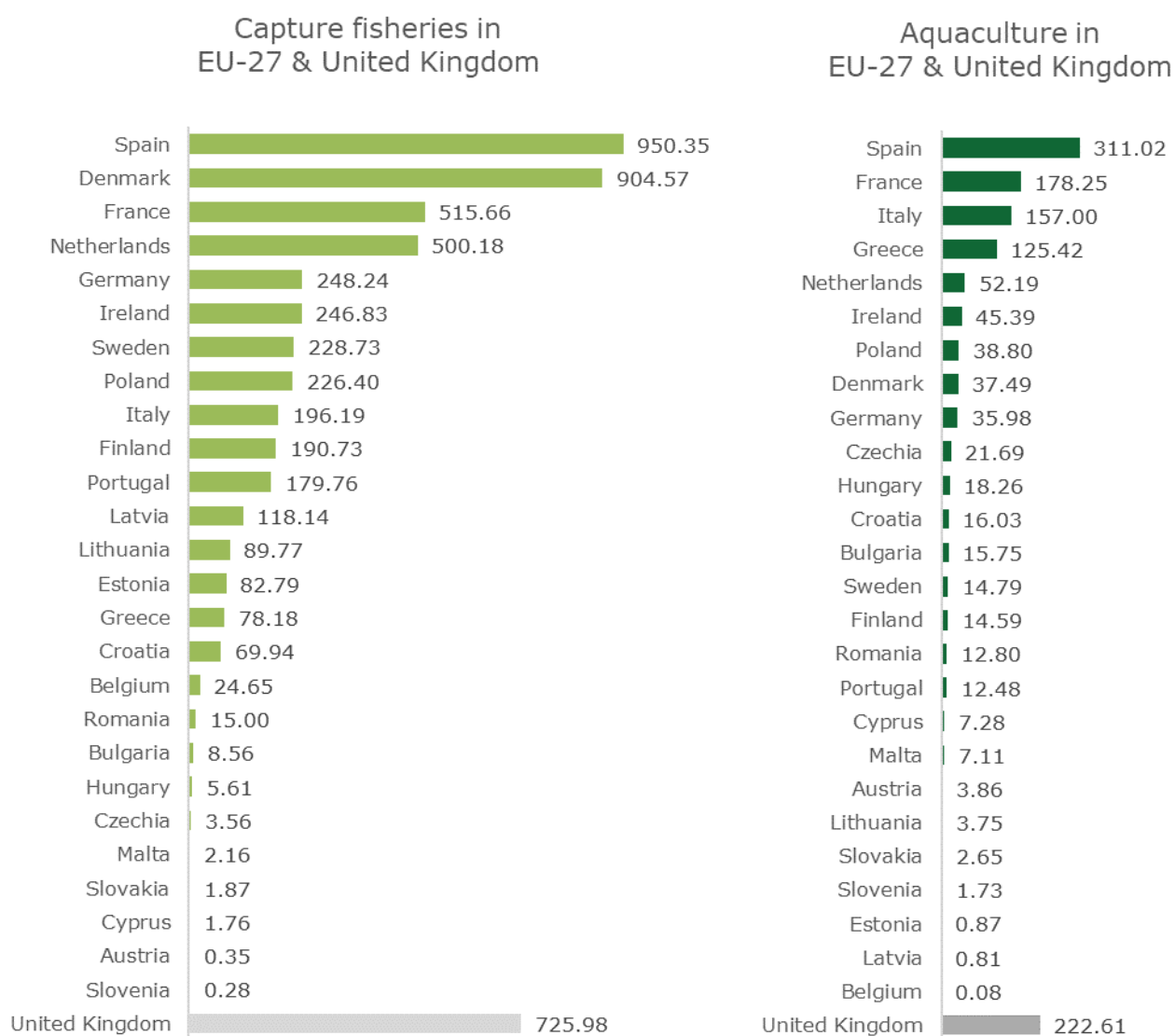


Figure 3. Capture fisheries and aquaculture production volume (thousand tonnes live weight equivalents) in the EU-27 and the United Kingdom in 2017. Data: FAO (2020)

EU-27 annual aquaculture production fluctuates around 1 Mt (FAO, 2020). In 2017, the EU-27 aquaculture sector represented about 1.4% (1.7% for EU-28) of the world production in volume. Spain, France and Italy were the leading aquaculture producers in terms of volume in 2017 in the EU-27 (Figure 3), while France, Greece and Spain led in terms of value (Figure 4). The marine mollusc aquaculture sector is the biggest producer in terms of volume, followed by freshwater fish and marine fish (Figure 5)³.

During the past decade, EU aquaculture production increased in value and decreased in volume. There has been a decline in the number of species with low economic value (e.g. mussels), mainly due to environmental factors, and an increase in the number of higher-value species (e.g. salmon, seabass and seabream) whose production is subject to a greater degree of control by the farmer (e.g. feeding, medicines, juveniles, broodstock, etc.).

³ A brief on algae biomass production prepared for the Knowledge Centre for Bioeconomy is also available (<https://ec.europa.eu/jrc/en/publication/brochures-leaflets/brief-algae-biomass-production>).

The European Commission provides guidance to Member States for the sustainable management of aquaculture through an open method of coordination, a voluntary process that provides a framework for the development of national strategies and coordination of policies between Member States. The Commission's "Strategic Guidelines for the sustainable development of EU aquaculture" (EC, 2013), designed to help Member States define their own national targets, is currently under revision. The aquaculture sector has been identified in the EU's Blue Growth Strategy as one of the five sectors with high potential for sustainable jobs and growth.

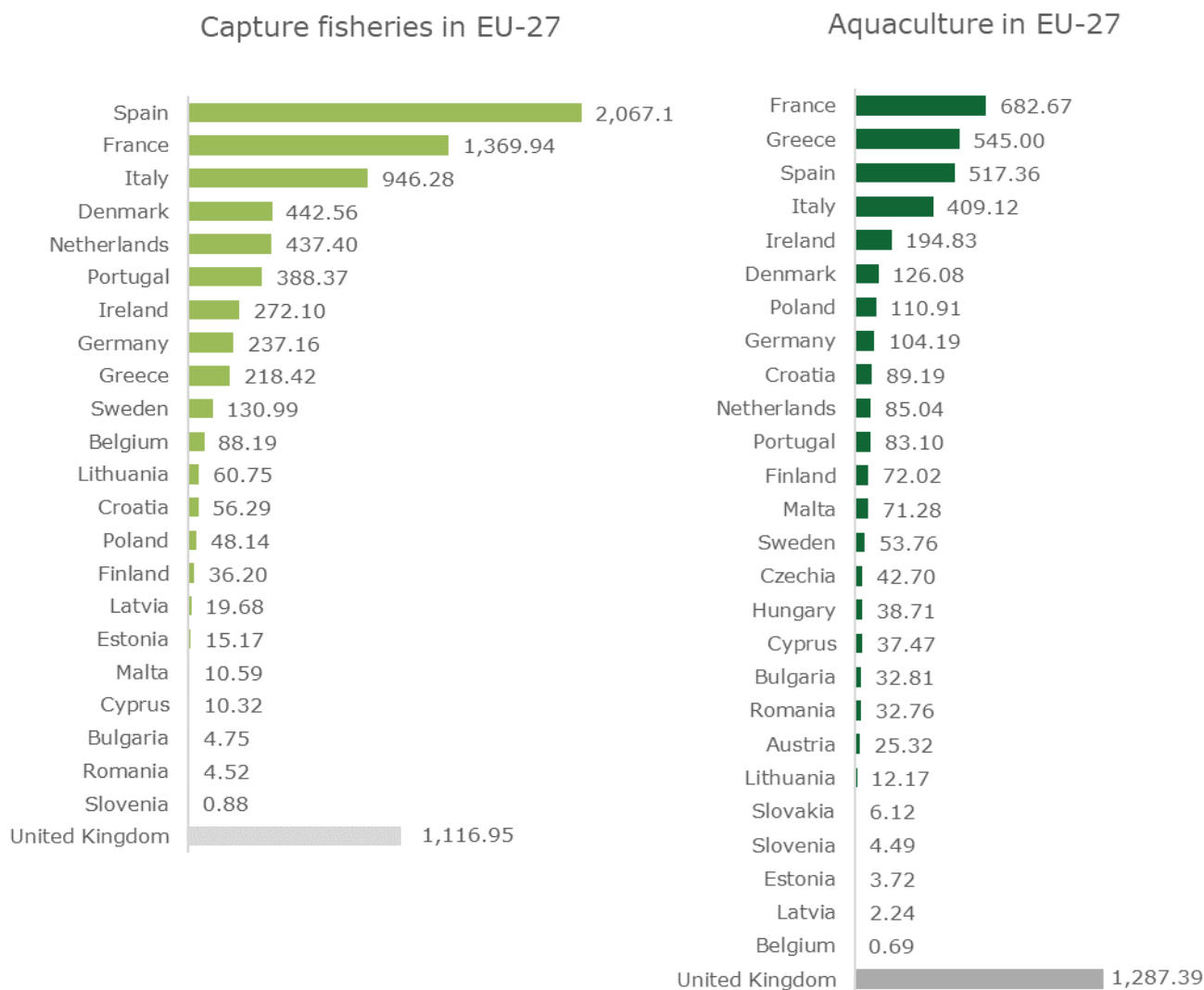


Figure 4. Capture fisheries and aquaculture production value (M EUR) per country in the EU-27 and the United Kingdom in 2017. Whereas aquaculture data cover marine and inland production, available data for capture fisheries only cover marine production. Therefore, no capture fisheries data are reported for landlocked countries. Data: Capture fisheries: Annual Economic Report (STECF, 2019); Aquaculture: FAO (2020)

Fish and shellfish are widely used for human food consumption, and are therefore essential to food and nutrition security. As domestic production cannot meet the EU demand for fish and shellfish, the EU imports slightly more than half of what it consumes. A small fraction of the EU landings and an increasing percentage of fish by-products (e.g. trimmings) are also used to produce fishmeal and fish oil. Fishmeal is mainly used in aquaculture to feed fish, and a smaller percentage is used to feed pigs and poultry. While fish oil is almost fully used for aquaculture feed, the pharmaceutical industry is increasingly using it to produce omega-3 capsules and other nutraceuticals. However, fish and shellfish, and in particular their by-products, are increasingly being used in innovative applications and new products such as in the pharmaceutical industry and in nutraceutical products (EUMOFA, 2018).

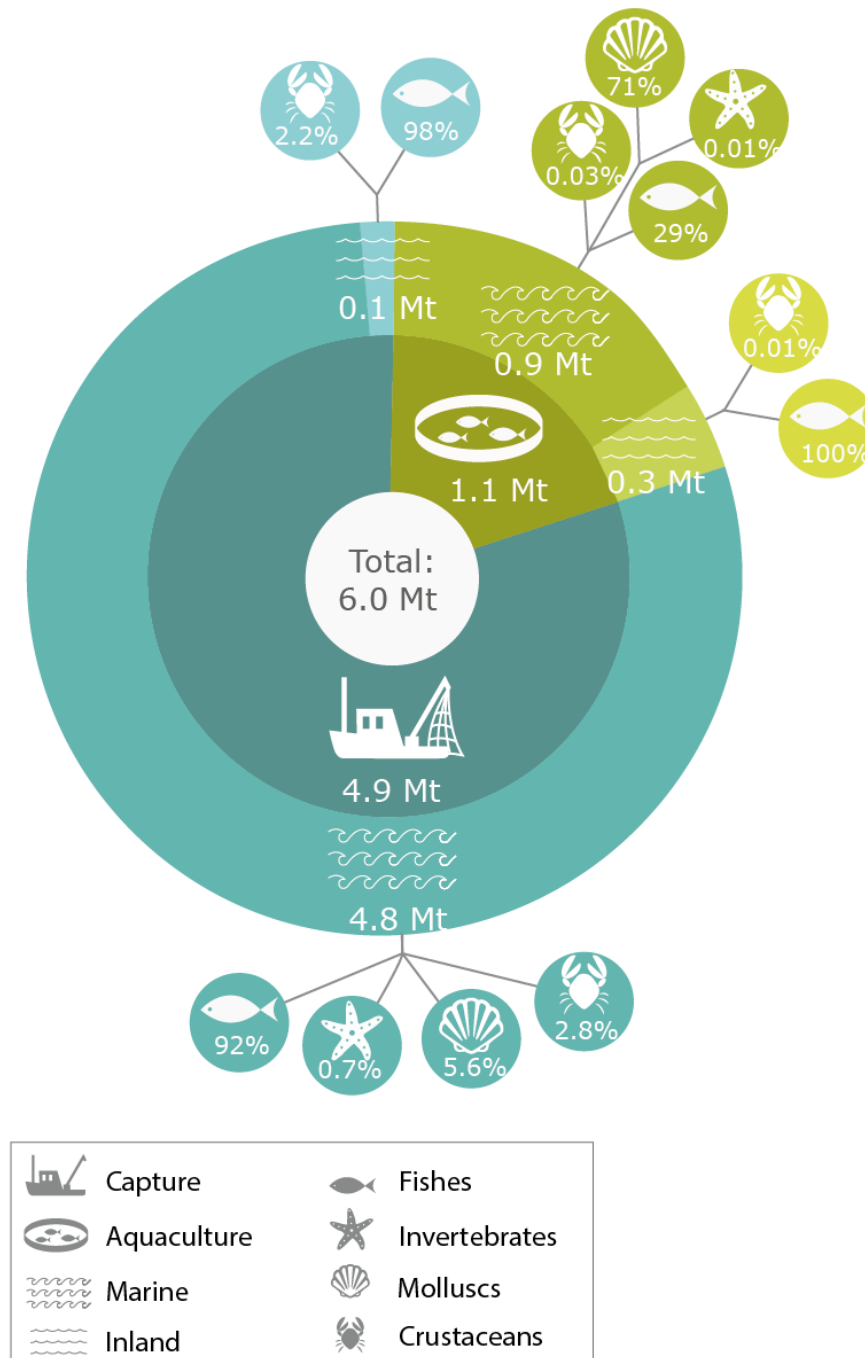


Figure 5. Capture fisheries (in turquoise) and aquaculture production (in green) volume (Mt live weight equivalents) in the EU-27 in 2017. Data: FAO (2020)

2. Are fisheries managed sustainably?

Globally, many commercially exploited fish stocks are under pressure from intense levels of fishing: 33% of the marine fish stocks monitored by the FAO are estimated to be overfished, 60% are exploited at their sustainable limits, and only 7% are underfished (FAO, 2018).

Fisheries management in the EU is carried out under the provisions of the Common Fisheries Policy (CFP, EC, 2013), which aims to ensure that fishing and aquaculture are environmentally, economically and socially sustainable and that they provide a source of healthy food for EU citizens. Article 2 of the CFP lists more specific objectives and targets for EU fisheries management, notably the aim of ensuring that the exploitation

of living marine biological resources is carried out sustainably⁴. This approach implies the need to maintain and/or restore populations of harvested species above levels that can produce the maximum sustainable yield (MSY). MSY is defined as “the highest theoretical equilibrium yield that can be continuously taken on average from a stock under existing average environmental conditions without significantly affecting the reproduction process” (EC, 2013).

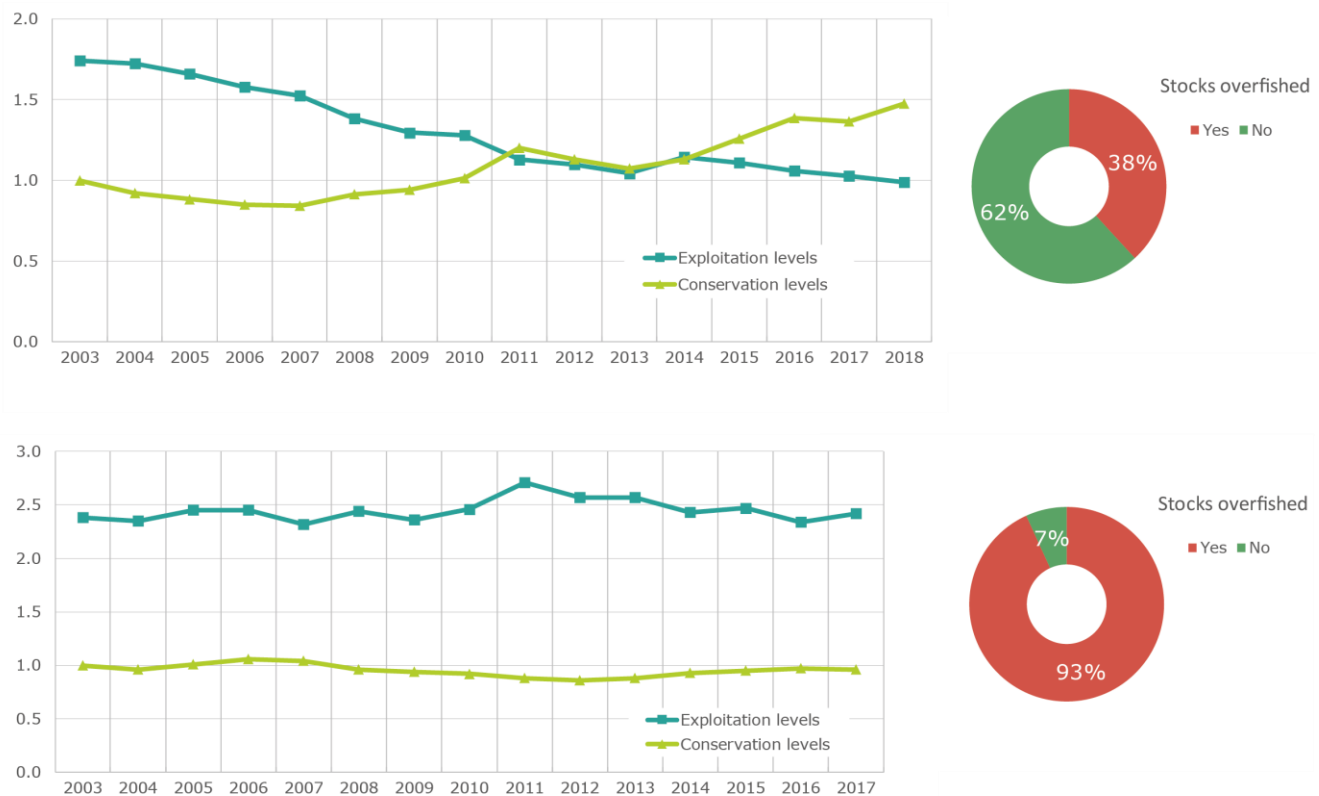


Figure 6. Status of fish stocks in EU waters; Northeast Atlantic (top chart), and Mediterranean and Black Seas (bottom chart):

The turquoise line depicts the exploitation level (fishing mortality relative to MSY level), which should be no greater than 1. The green line represents the conservation level (i.e. the weight of the adult biomass) relative to the 2003 level. Ideally it should be above 1 and show an increasing trend.

Every year, the JRC analyses and submits the trends of stock status in the Northeast Atlantic (FAO Fishing area 27) and in the Mediterranean and Black Seas (FAO Fishing area 37) to the Scientific, Technical and Economic Committee of Fisheries (STECF) (see for example STECF, 2020). This serves to monitor the impact of the CFP since its penultimate revision in 2003, in order to inform future management decisions. The estimation of stock status is based on relevant stock assessments carried out by the International Council for the Exploration of the Sea (ICES) in the Northeast Atlantic, and by the STECF and the FAO’s General Fisheries Commission for the Mediterranean (GFCM) in the Mediterranean and Black Seas.

Figure 6 shows that, in the Northeast Atlantic, conservation levels (in green) are increasing and exploitation levels decreasing. Nevertheless, 38% of stocks remained overfished in 2018. In the Mediterranean Sea and Black Sea, no apparent change is observed concerning fishing pressure or stock biomass. In 2017, 93% of the stocks were overfished.

⁴ According to Article 2 of the Common Fisheries Policy (CFP) (EU, 2013), “The CFP shall ensure that fishing and aquaculture activities are environmentally sustainable in the long-term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and of contributing to the availability of food supplies”.

3. Methodology

Estimation of fish populations in the oceans (stock assessment) is based on catch data and scientific surveys. There are many sources of uncertainty related both to the data and the statistical models used. For example, incidental and unwanted catches are commonly discarded, mostly dead, and they are often not adequately monitored. Also, frequently some catches go unreported ('black landings').

There are several sources of fisheries and aquaculture data, including the databases held by the Food and Agriculture Organization of the United Nations (FAO), Eurostat and the Scientific, Technical and Economic Committee for Fisheries (STECF). All three sources include data on production weight from EU Member States; the FAO database has global coverage. The STECF also regularly reports production value and economic performance data.

Although all three data sources are based on data reported at national level, their databases do not completely match. This is particularly the case for aquaculture data, which can be partly explained by the fact that there is a significant amount of data that Eurostat does not report due to confidentiality reasons, while the FAO tends to estimate missing data. Minor divergences are also due to FAO data including weights and values of juveniles. Eurostat reports only quantities in number of eggs and juveniles in a separate dataset from the main one for aquaculture (reported in weight). STECF data also have certain limitations:

- reporting of freshwater fisheries is not compulsory and therefore not reported by all countries (e.g. data for Poland and Germany are missing);
- landlocked countries such as Austria, Czechia, Hungary, Luxembourg and Slovakia were not involved in this data collection exercise;
- some countries apply thresholds and so do not report their entire production (e.g. Italy);
- aquaculture production data only covers companies whose main activity is aquaculture.

Overall, the FAO database includes the most complete data and therefore was used in this brief.

Knowledge gaps

1. As the status of many fish stocks remains unknown due to poor data availability, new and innovative modelling approaches are needed to estimate these "data-limited stocks" and reduce uncertainty.
2. Knowledge concerning newly farmed species, advanced feeds with no or little animal content, innovative vaccines and treatments, tools for spatial planning and research on consumer behaviour could help to boost aquaculture production in the EU.
3. The management of fisheries and aquaculture requires a solid knowledge base to ensure the sustainability of production and supply.
4. The potential environmental impacts of fisheries and aquaculture need to be comprehensively assessed. Sustainable production systems need to be further developed to meet demand for seafood and socio-economic needs while preserving the environment.

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