The Stock Book
Leabhar Na Stoc

November 2022

Annual Review of Fish Stocks in 2022
with Management Advice for 2023

Léirmheas Bliantúil ar na Stoic Éisc in 2022
le Comhairle Bainistiochta do 2023

Foras na Mara
Marine Institute
Fisheries Ecosystems Advisory Services
..to research, assess and advise

Dr. J. Paul Hillis

This year's Stock Book is dedicated to Dr. J. Paul Hillis.
Paul was one of the originators of the Stock Book. His work on fisheries biology, assessment and economics with his wider interest in wildlife anticipated what is now embraced by the ecosystem approach to fisheries management.

Foras na Mara
Marine Institute

Fisheries Ecosystems Advisory Services,
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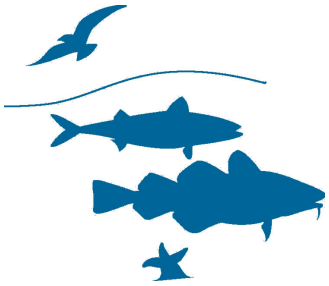
THE STOCK BOOK

Report to the Minister for Agriculture, Food and the Marine

Annual Review of Fish Stocks in 2022 with Management Advice for 2023



NOVEMBER 2022

The data that underpins the advice provided in this book is collected under the Data Collection Framework, which is financed by the Irish government and the European Maritime, Fisheries and Aquaculture Fund as part of the EMFAF Operational Programme for 2021-2027

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Có-mhaoinithe ag an Aontas Eorpach

Co-funded by the European Union

In the 2022 Stock Book, every effort has been made to use the most up to date version of the ICES and STECF advice. However, the final official ICES ACOM and STECF Reports should be consulted for the definitive advice.
For more detailed information on specific stocks the relevant ICES Working Group Reports should be consulted. The official EU journal should be consulted for definitive TAC's and Quotas for 2022.

Cover Image
Photo of Ireland's national marine research vessel, the RV Tom Crean.
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Illustrations of fish throughout the book: have been sourced with thanks to the following

- Most illustrations (i.e. if not otherwise stated) come from "Day, F. (1880-1884). The fishes of great Britain and Ireland. Volumes 1 and 2. Williams and Norgate, London".
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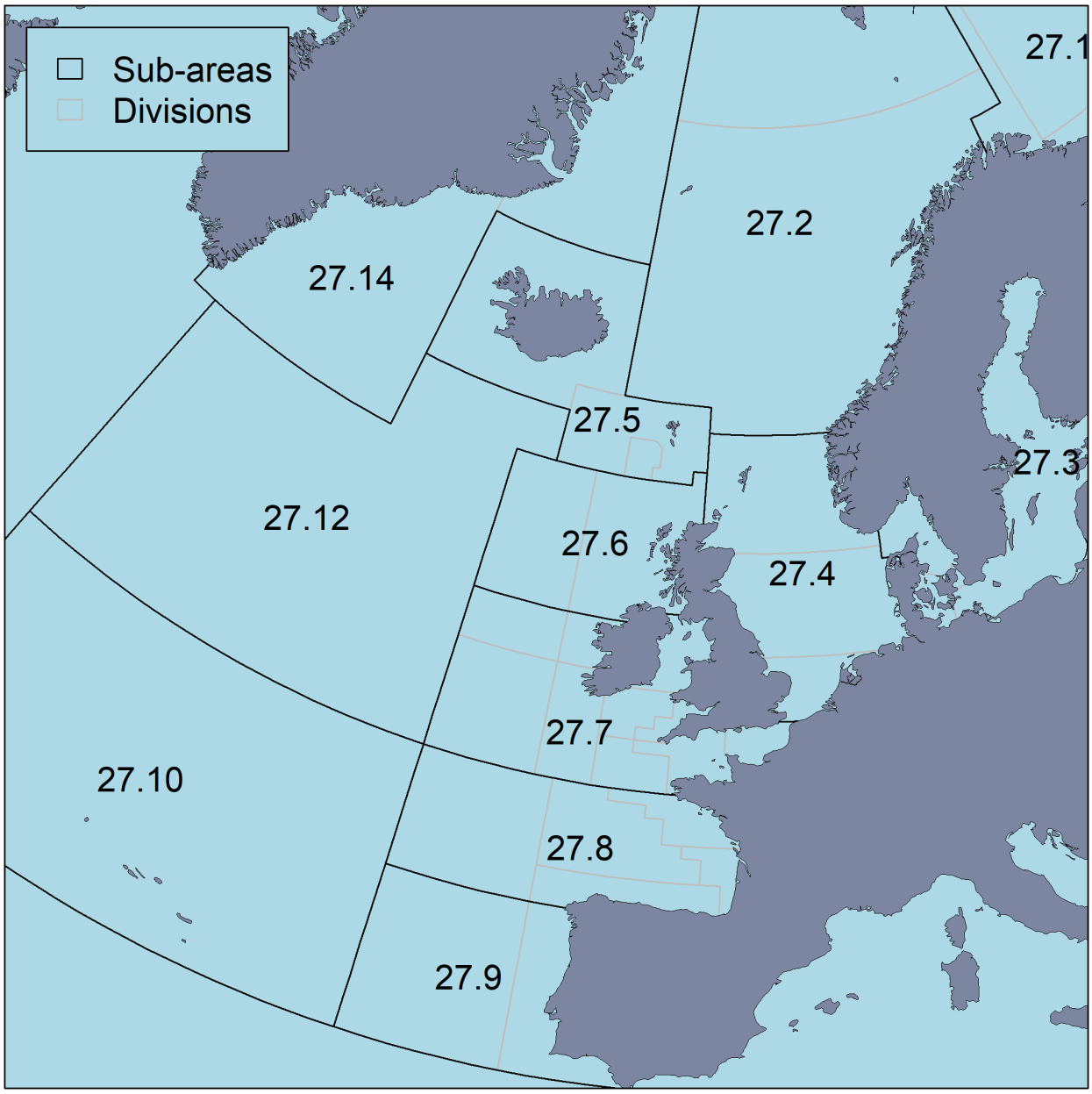
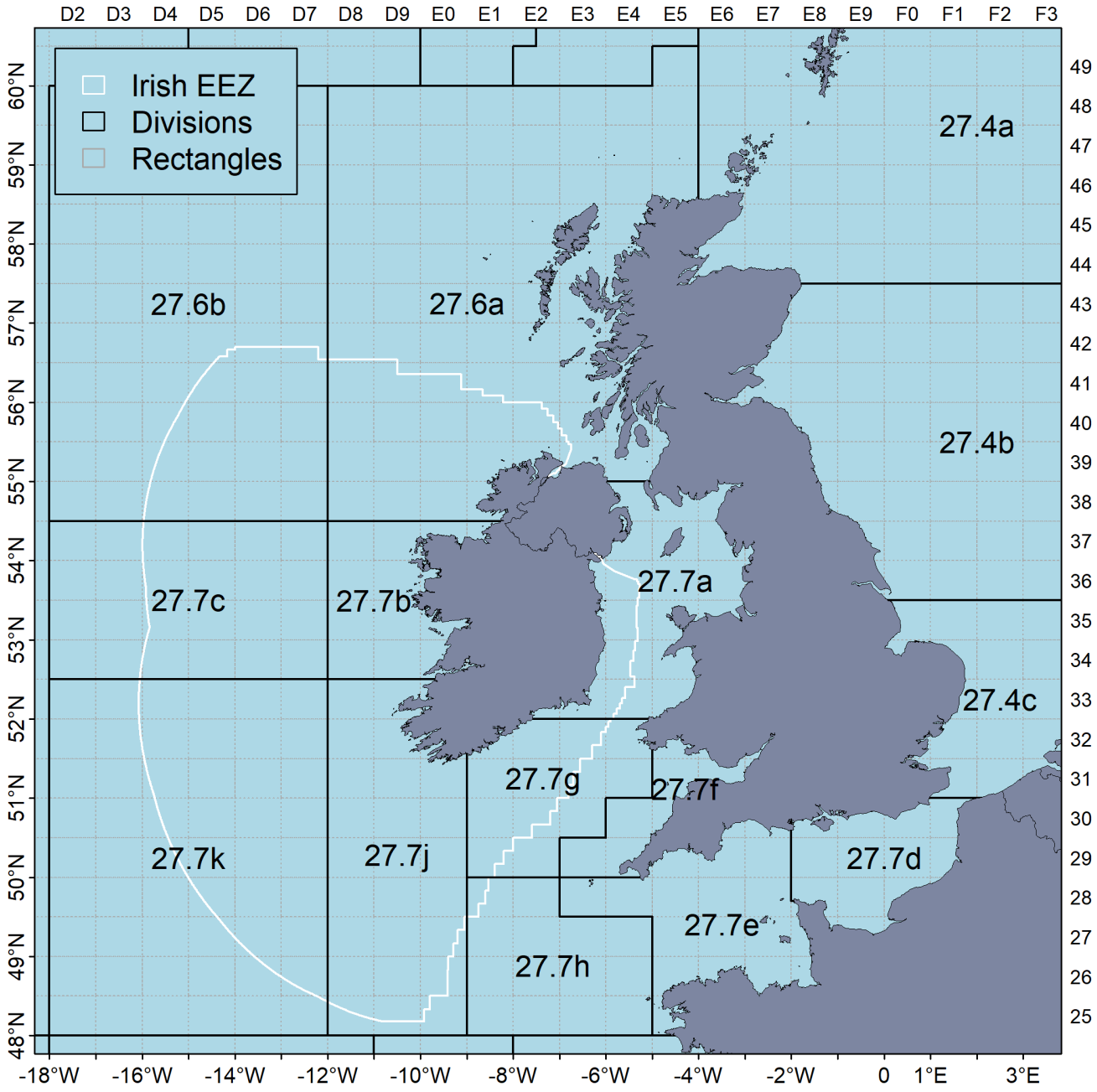
ICES Fishing Sub-areas



ICES Fishing Divisions around the Irish Coast



INTRODUCTION

About the Stock Book

The Stock Book is produced annually by the Marine Institute's Fisheries Ecosystems Advisory Services (FEAS) team and provides up to date scientific information on the state of the fisheries resources exploited by the Irish fleet. It provides the latest scientific advice developed in 2022, which informs fishing opportunities for 2023. The Stock Book has been published by the Marine Institute (MI) since 1993 and has evolved considerably over time. It continues to evolve to meet the needs of decision makers and stakeholders while addressing evolving EU and national legislation and policies.

The majority of the scientific advice presented in the Stock Book is formulated by the International Council for the Exploration of the Seas (ICES). Relevant scientific advice from the EU's Scientific, Technical and Economic Committee for Fisheries (STECF) and the International Commission for the Conservation of Atlantic Tunas (ICATT) are also used. The Stock Book draws on both the ICES and relevant STECF material and the resultant scientific advice it contains relates to those stocks exploited by the Irish fleet, which are managed under the Common Fisheries Policy (CFP). The provision of scientific advice on fisheries resources is a key pillar of the CFP and informs the basis for the management decisions made under the CFP (e.g. annual fishing opportunities and technical measures).

Scientific fisheries advice is developed by the Marine Institute staff working with other international scientists, and produced *via* international organisations such as ICES and ICCAT, and expert committees of the EU such as STECF. This advice is based upon the latest available data, research, assessments and information on the fisheries resource. Assessment data, Irish and EU sampling programmes are co-ordinated international through Region Coordination Groups (https://www.fisheries-rcg.eu/rcg-nansea/). Scientific fisheries advice is formulated by consensus, which does not imply unanimity of all experts but allows the expert groups and the international scientific organisations to communicate an advice based on best available science.

Brexit, the Covid-19 pandemic and the energy crisis arising from the war in Ukraine have impacted negatively on the fishing industry and on the provision of scientific advice. In recent years sampling and surveys programmes were adapted to maintain adequate data collection. In 2022 Russia was suspended from ICES, while there was disruption on the data flows and to stock assessment processes in some areas this did not significantly impact on the ability of the scientific community to provide 2023 advice for most stocks in western waters. Where issue did occur these are detailed in the 2022 Stock Book.

The information contained within the Stock Book informs the decision making process around setting fishing opportunities for the following year and it serves as a valuable reference throughout the year at other fisheries management meetings. The Stock Book is also of interest to a wider audience, including the fishing industry, marine scientists, managers, environmental NGO's, third level institutes, financial institutions and those with an interest in the pressure on and state of marine fisheries resources in the waters around Ireland. The Stock Book makes use of many technical terms and acronyms; these are explained the end of the book in the "Definition of fisheries technical terms and acronyms".

Marine Institute scientists meet with stakeholders on a regular basis throughout the year to explain how advice is formulated and to discuss fisheries issues *e.g.* through the Irish Fisheries Science Research Partnership forum, which consists of industry representatives, the Marine Institute and Bord Iascaigh Mhara. Marine Institute scientists also host meetings for the environmental NGO's for the same purpose.

The Stock Book is available electronically on the Marine Institute's web site at www.marine.ie. and as an interactive app which can be found at https://shiny.marine.ie/stockbook/. We will endeavour to keep the electronic versions of the Stock Book up to date with any amendments which are released by the advisory authorities after this version goes to print.

While every effort has been made to ensure that the Stock Book contains the most up-to-date and accurate information, the final ICES, ICCAT, STECF reports and various cited reports should be consulted for the definitive advice. More detailed information on specific stocks is available in the relevant ICES Working Group Reports. Definitive information on TAC areas and quota allocations should be obtained from the official EU Journal.

Fish Production, Fishing Fleets, Employment

The following information is taken from the latest version of "European Commission, Directorate-General for Maritime Affairs and Fisheries, Facts and figures on the common fisheries policy : basic statistical data : 2022, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2771/737237"

Fish Production

The EU accounted for 6,191,066 tonnes of fish production (catches and aquaculture) in 2019, which represents about 2.9% of global production. The EU had about 5.2% of global fisheries catches in 2019. Although the EU fleets operate worldwide, EU catches are taken primarily in the North East Atlantic, the Mediterranean and the Eastern Central Atlantic. The greatest volume species in EU catches are Atlantic herring, European sprat, Blue whiting, Atlantic mackerel and Skipjack tuna, which together account for almost 42 % of EU catches. Spain, Denmark, the UK and France account for over 54% of the catches (note: the UK is no longer an EU member since Jan 2021 but was at the time of the report). Ireland accounted for 4.94% of EU total catches in 2019.

Fishing Fleets

Fleet capacity management is an essential tool for the sustainable exploitation of fisheries resources, which is one of the main objectives of the Common Fisheries Policy. The EU fishing fleet is very diverse, with vessels ranging from under six metres to over 75. The total number of EU fishing vessels in 2021 was 74,635 (6,186 fewer than in July 2013 for the 27 Member States that now make up the EU) with a gross tonnage of about 1.32 million tonnes, a combined engine power of 5.3 million kW, and an average age of 31.5 years. Vessels >24m account for 3% of the overall fleet, and make up 64% of the gross tonnage. Ireland has 1,935 vessels (2.6% of EU total), with a gross tonnage of 58,954 tonnes (4.5% of EU total) and an engine power of 173,852 kW (3.3% of EU total). Over the past 24 years, the EU fishing fleet capacity has declined in terms of both tonnage and engine power. Overall, the EU fleet was profitable in 2019. This consolidates the gradual recovery in recent years, during which both the gross profit and the net profit margin of the fleet have shown an upward trend.

Employment

In several EU regions the fishing sector plays a crucial role in employment and economic activity – in some European coastal communities as many as half the local jobs are in the fishing sector. Employment in the fishing sector tends to be concentrated in a handful of countries. Spain alone accounts for a quarter of total employment, and the three countries with the highest levels of employment (Spain, Italy and Greece) make up around 62%. In Ireland 2,758 people are employed in fisheries (2019 figure), and 3,138 in processing (2017 figure).

The Fisheries Resource

The seas around Ireland are among the most productive and biologically sensitive areas in EU waters. In 2021 Irish vessels landed 181,791 tonnes into Irish Ports, worth an estimated €267 million with an additional €36.3 million landed by Irish Vessels abroad (SFPA, 2022). The most valuable species landed was mackerel with a first sale value of ~€70 million, followed by *Nephrops* (~€54 million), anglerfish (~€16 million), horse mackerel (~€17 million) and blue whiting (~€9 million).

Most of the fisheries resources within the area come under the remit of the Common Fisheries Policy (CFP). Ireland's quota total share of these TACs in 2022 amounted to 158,639 tonnes (Table 1.1).

Table 1.1 does not include the valuable shellfish fisheries (*e.g.* crab, lobster, whelk, scallops, etc.), worth around ~€58 million annually, which are not managed by TACs but do come within the remit of the CFP. These shellfish fisheries resources represent a very important resource base for the coastal communities around Ireland and are particularly targeted in inshore areas (Marine Institute & Bord Iascaigh Mhara, 2022).

Organisation of the Stock Book

The Stock Book is divided into the following parts:

- Introduction
  - About the Stock Book
  - Fish Production, Fishing Fleets, Employment
  - The Fisheries Resource
  - Organisation of the Stock Book
- Quality Assurance
- Rationale for ICES Advice and the Commission Proposal on Fishing Opportunities for 2023
- Long Term Management Plans in Place for Stocks of Irish Interest
- Marine Institute Summary on the Status, Scientific Advice and Proposed 2023 Fishing Opportunities
- The Sustainability Assessment
- Recent advice on ecosystem services and effects
- Marine Institute At-Sea Sampling 2021 – including COVID-19 Response

The introduction to the Stock Book gives some general statistics on the fisheries resource, fish production, the fishing fleets and employment for the EU and for Ireland. It also provides an overview of the format of the Stock Book and the approach taken in the formulation of the ICES advice and the EU Commission proposals for fishing opportunities for 2023.

The Quality and Assurance section details the processes which underpin the quality assurance of data and information produced by the MI upon which scientific fisheries advice is dependent.

The Stock Book provides a summary table on the status, scientific advice and proposed fishing opportunities for 2023 on page 15. This table is used to brief DAFM, Industry and the ENGOs on the latest scientific advice and is a valuable summary reference. This table is a summary reference and the individual advice sheets from ICES should be consulted for the details.

The Sustainability Assessment provides information on the state of the resource base in relation to pressure and state indicators. These are fishing mortality (F) in the last year of the assessment relative to F_{MSY} (the fishing pressure which is expected to deliver maximum sustainable yield) and the spawning stock biomass (SSB) in the year of the assessment in relation to a defined biomass trigger point (below which the stock is at risk of recruitment impairment). An earlier version of this evaluation was presented by the Minister to the Oireachtas Committee on Agriculture, Food and the Marine on the 25th of October 2022. The version here includes several additional stocks where ICES advice was released on the 28th of October 2022.

A summary of the Good Environmental Status (GES) assessment in relation to Commercial Fish Stocks (Descriptor D3) based on Ireland's second cycle submission under Articles 8, 9 and 10 of the Marine Strategy Framework Directive (MSFD) in 2020 was provided in the 2020 Stock Book (Marine Institute, 2020).

A summary of the long-term management plans used as a basis for advice are also presented in the Stock Book. This section now deals primarily with the Multi Annual Plan for Western Waters (WWMAP) which is the primary framework for managing demersal stocks which can be caught in mixed fisheries.

The section on mixed fisheries is not included in the printed version of Stock Book this year because the ICES advice is scheduled after publication of this volume. This section will be added to the electronic version of the Stock Book in early December. The Marine Institute continues to play a key role in the development and delivery of mixed fisheries advice at ICES.

The main part of the Stock Book contains the species information and the individual stock advice. The format is organised by species and then stocks rather than on an area-based approach (*e.g.* Irish Sea). The species overview provides information on the general biology, national and international landings distributions, Irish landings and values.

The individual stock advice provides a summary of the advice for 2023, outlines key points in relation to the stock (*i.e.* ICES stock category, Advice Basis; Management Plan options – where relevant; Landing Obligation). The current management of the stock is also summarised and key considerations of relevance to the stock for Ireland is given. The complete ICES advice for the stock is also given for most stocks.

This advice is principally based on MSY (Maximum Sustainable Yield) considerations or agreed Management Plan considerations. The status of the stock in relation to the landing obligation and management plans are also given. The long-term management plans in place for stocks of Irish interest are shown on page 13.

The Management in 2022 section gives information on the 2022 TAC and quotas by country, and describes any mismatches between assessment area and management area. The reader will note that there are several instances where the TAC management area does not match exactly with the ICES advice area. This often forms the basis of confusion when seeking to compare the TACs set against the ICES advice. For a useful reference to the correspondence between fishing opportunity proposals and the final agreed TAC, the reader is referred to the European Council website, where the media section usually contains this information after December Council (https://ec.europa.eu/oceans-and-fisheries/news_en).

ICES Fisheries and ecosystem overviews can be found in an annex to the online Stock Book and does not appear in this printed version as it is not due to be updated before this book is printed.

Table 1.1 2022 Irish quota in tonnes

SPECIES	TAC AREA	TONNES
ALBACORE TUNA	Atlantic, north of 5'N	3,317
ANGLERFISH	7	2,977
	5.b, 6, 12, 14	439
ARGENTINES	3, 4	5
	5, 6, 7	821
BLACK SCABBARD	5, 6, 7, 12	55
BLUE LING	2, 4	2
	5.b, 6, 7	30
BLUE WHITING	5.b, 6, 7, 12, 14	28,438
BOARFISH	6, 7, 8	15,749
COD	1, 2	290
	6.a, East 5.b	219
	6.b, West 5.b, 12, 14	14
	7.a	104
	7.bc,e-k, 8, 9, 10	338
GREENLAND HALIBUT	2.a, 4, 6	29
HADDOCK	5.b, 6.a	682
	6.b, 12, 14	385
	7, 8, 9, 10	2,920
	7.a	1,171
HAKE	5.b, 6, 7, 12, 14	2,383
HERRING	1, 2 (Atlanto-Scandic)	3,098
	5.b, 6.aN, 6.b	470
	6.aS, 7.bc	1,236
	7.a	719
	7.ghjk	750
HORSE MACKEREL	2.a, 4.a, 6, 7.a-c, 7.e-k, 8.abd, 5.b, 12, 14	15,737
	4.bc, 7.d	202
LING	6, 7, 8, 9, 10, 12, 14	1,059
MACKEREL	6, 7, 8.abde, 5.b, 2.a, 12, 14	54,992
MEGRIM	7	2,827
	5.b, 6, 12, 14	627
NEPHROPS	7	5,682
	5.b, 6	160
PICKED DOGFISH	1,5,6,7,8,12,14	47
PLAICE	5.b, 6, 12, 14	248
	7.a	1,031
	7.bc	15
	7.fg	237
	7.hjk	47
POLLACK	7	572
	5.b, 6, 12, 14	22
ROUNDNOSE GRENADIER	5.b, 6, 7	150
	8, 9, 10, 12, 14	2
SAITHE	5.b, 6, 12, 14	353
	7, 8, 9, 10	1,404
SKATES & RAYS	6.ab, 7.a-c, 7.e-k	1,177
SMALL-EYED RAY	7.fg	12
SOLE	5.b, 6, 12, 14	46
	7.a	105
	7.bc	28
	7.fg	39
	7.hjk	95
TUSK	5, 6, 7	238
UNDULATE RAY	7.de	25
WHITING	5.b, 6, 12, 14	561
	7.a	274
	7.b-k	3,972
OTHER		12
Grand Total		**158,639**

QUALITY ASSURANCE

Data quality and assurance are critical components of the scientific advisory process and are the responsibility of individual member states (*e.g.* Ireland) and the providers of advice (*e.g.* ICES). They must work together to ensure that data collection, stock assessments and the formulation of advice are quality assured and free from errors. Ireland takes data quality and assurance very seriously and has developed a data strategy and policy to ensure this is achieved. The MI's Data Management Quality Management Framework (DM-QMF) is used to guide all of its data management processes including collection, storage, quality control, provision and statutory reporting (http://hdl.handle.net/10793/1589). As a result of the DM-QMF the International Oceanographic Data and Information Exchange (IODE) have awarded the MI the status of an Accredited Data Centre. The objective of the DM-QMF is to ensure that the data products that the Marine Institute deliver to the providers of advice are error free and of high quality. A key concept of quality assurance is continuous improvement – to that end the MI continues to bring more data processes within its DM-QMF. Internal working groups are also looking at how the DM-QMF can be improved and if there are other international quality standards that the MI can work towards fulfilling.

The MI's Data Management Quality Management Framework consists of 3 key elements:

1. A **Manual** – Data Management Quality Management Framework Manual – detailing how the framework operates within the Marine Institute
2. A **Model** – Visual representation of the activities described in the Manual (Figure 1.1).
3. An **Implementation Pack** – A series of templates and guidelines to implement what is described by the Manual.

This framework encourages and supports continual improvement of the quality of the delivered data products and services by assuring the quality of the processes and procedures used in the generation of data or data products.

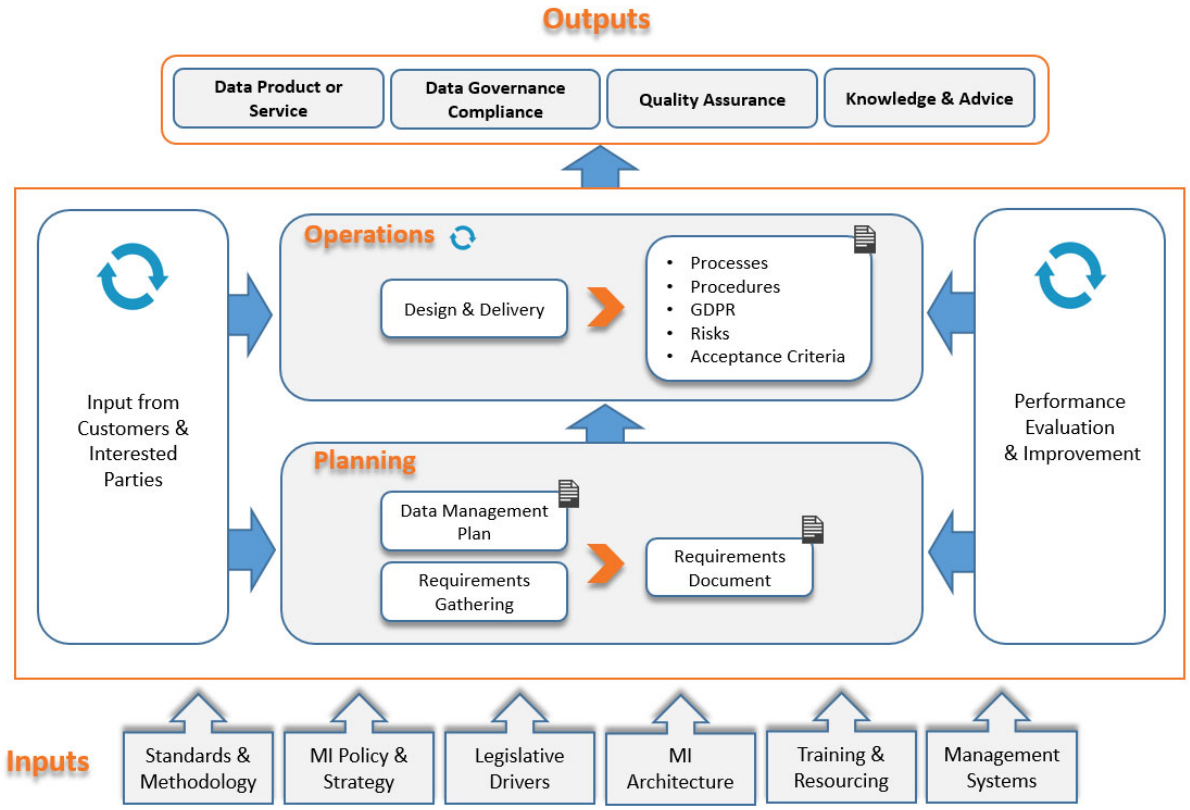


Figure 1.1: Data Management Quality Management Framework Model

The MI also collaborates closely with other member states through the EU Regional Coordination Groups (RCG) with Terms of Reference that include identifying and promoting best practices, and finding common approaches to measuring and improving data quality. See https://www.fisheries-rcg.eu/ for more details.

The MI is also currently participating in the EU "FishN'Co" project which aims to strengthen regional and EU-wide cooperation on fisheries data collection and enhance data quality https://www.fisheries-rcg.eu/fishnco/.

ICES is the key scientific advice provider for EU fisheries management. It has a number of ongoing initiatives to assure quality of data, stock assessments and advice. The ICES Advice Plan includes assuring quality as the first key priority area. The tasks planned include:

1. Mapping process flows and critical control points and feedback loops in the advisory system and begin to address identified critical control points as part of the Quality Assurance Framework (QAF).
2. Developing comprehensive ICES quality management including the Regional Database and Estimation System (RDBES) and the Transparent Assessment Framework (TAF) – this should allow for fully reproducible assessments and advice calculations.
3. Where possible, ensure that all advice products are based on data that adhere to the FAIR principles (Findable, Accessible, Interoperable and Re-useable).
4. Develop and apply the benchmarking system to ensure that it is fit for evolving advisory demands.
5. Published frameworks and guidelines for production of the advice.
6. Many expert groups and training courses *etc.* have ToRs associated with improving the quality of the advice product *e.g.* WKFORBIAS, WKGMSE2, WKCOSTBEN..

ICES has also established WGQUALITY, a working group on quality assurance, chaired by the Marine Institute, which is developing and promoting quality assurance within ICES advisory processes. ICES has received international accreditation ("CoreTrustSeal") for its data management system. ICES has undertaken to make key investments in several of the processes outlined above over the next few years, as part of its commitment to quality. As the demand for detailed scientific information to support public policy increases, ICES strives to meet that need in an open and transparent way, and is constantly seeking to improve its performance. To this end, ICES is engaged in a process of continual learning where it reviews its performance in relation to the quality of the advice it delivers as it seeks to improve outcomes.

RATIONALE FOR ICES ADVICE AND THE COMMISSION PROPOSAL ON FISHING OPPORTUNITIES FOR 2023

The ICES approach to advice on fishing opportunities integrates the precautionary approach (PA) with the objective of achieving maximum sustainable yield (MSY), unless otherwise requested (ICES, 2022). The aim is, in accordance with the aggregate of international guidelines, to inform policies for high, long-term yields while maintaining productive fish stocks in marine ecosystems that meet expected environmental standards (e.g. good environmental status [GES] in the EU). ICES provides advice in line with its advisory framework (see Figure 1 in ICES, 2022). For category 1 and 2 stocks (stocks with analytical assessments), advice is given according to the ICES MSY approach or agreed management precautionary management plans (provided they have been adopted by all the relevant management authorities). Recently, ICES has developed new methods to provide advice for stocks in category 2 and 3 (stocks with analytical or survey-based assessments that are indicative of trends only). This is being phased in since 2021 (ICES, 2022) and results in MSY or PA advice for category 3 stock depending on the applicable methodology. For category 4, 5, and 6 stocks, data limited stocks, ICES gives advice according to the precautionary approach.

Each year the European Commission reports on the progress made towards sustainable fishing in the EU and reviews the balance between fishing capacity and fishing opportunities, the sector's socioeconomic performance and the landing obligation implementation. It then presents the main orientations that will shape the Commission's proposals and consultations with third countries on fishing opportunities for 2023 (COM(2022) 253 final). This year the Commission highlight how Russia's military aggression against Ukraine has impacted fisheries from several perspectives: disruptions in trade flows; impact on the provision of scientific advice and certain negotiations at international level; and to increased energy prices. This shows the importance of developing resilience to ensure food security in Europe, and of meeting the Green Deal objectives, especially through further innovation and energy transition.

The Commission highlight that "In 2020, overall fishing pressure in EU waters continued to decrease, and the status of stocks to improve. It is particularly welcome to see that, thanks to the efforts made by the sector, in 2020 the overall fishing mortality ratio fell below 1 in the North East Atlantic for the first time. However, certain other stocks remain overfished and/or outside safe biological limits, which calls for further progress to reach the objectives of the common fisheries policy (CFP). Advice by STECF and ICES (International Council for the Exploration of the Sea) indicates that levels of unwanted catches remain high in many mixed demersal fisheries in EU waters. Control and enforcement of the landing obligation remain problematic."

The European Commission has first competency in making TAC proposals for the year ahead. The Commission has set out the key steps towards setting the next fishing opportunities. In the first instance the Commission will base its proposals on ICES and STECF scientific advice, on the decisions taken during bilateral negotiations with third countries, on decisions taken by the RFMOs in 2022 and on a socio-economic analysis. The Commission invites Member States and stakeholders to consider the scientific advice as soon as it is publicly available. Stakeholders can also make recommendations through the Advisory Councils and national authorities. The Commission will conduct various consultations with the UK, Norway and Coastal States between October and December 2022, with the aim of concluding in time to process the outcome into the December AGRIFISH Council.

For stocks shared with third countries (UK, Norway, Coastal States), the number of TACs set in line with the scientific advice has increased in 2022, both for stocks with MSY advice and for those receiving precautionary advice. For 2023, the EU will build on the 2022 exercise and continue to pursue sustainable TACs in line with the scientific advice, as provided for under the CFP and the TCA. The Commission will seek to start the consultations, notably with the UK and with Norway, as early as possible in the autumn, subject to the availability of the scientific advice.

Beyond the state of fisheries resources, attention must also be given to the wider marine ecosystems. In that spirit, the Commission is preparing an Action Plan to conserve fisheries resources and protect marine ecosystems. It will aim at further protecting sensitive species and habitats, with measures supported by an improved knowledge base, enhancing synergies between fisheries and environmental stakeholders, and supporting the sector to ensure a fair and just transition. Such support will remain key in the coming months and years to ensure fisheries' resilience in particular in the context of the Russia's military aggression against Ukraine and the ecological and climate crisis.

LONG TERM MANAGEMENT PLANS

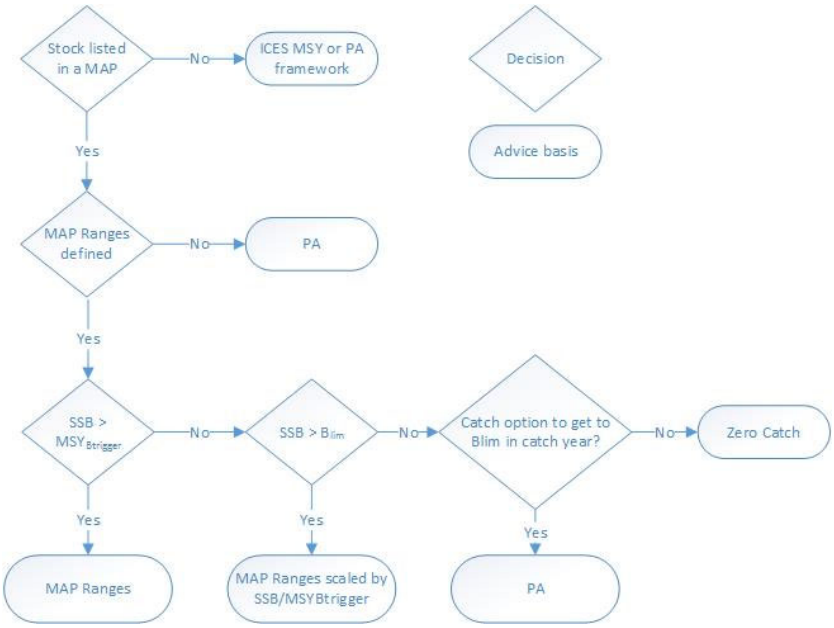
Several of the stocks of interest to Ireland are or have been managed under Long Term Management plans. Details on these plans are given in the table below. Normally the process of formulation and adoption of these plans has required scientific input to generate and test a harvest control rule (HCR) which is used as part of the setting TAC procedure. These plans are normally proposed by the competent management authority (e.g. European Commission and/or coastal states), tested for adherence to the precautionary approach and maximum sustainable yield by ICES and then could be adopted by the management authorities.

Since 2016 the Commission has developed multiannual sea basin plans for demersal species caught together in multi species fisheries. The sea basin plans have been adopted already for the Baltic Sea (2016/1193), and the North Sea (2016/0238), and in 2019 for the Atlantic area which is referred to as Western Waters (2019/472). These plans are commonly referred to as Multi-Annual Plans (MAPs). The stocks included in the Western Waters MAP and those in the North Sea MAP of relevance to Ireland are given in Appendix IX. The MAPs set out to achieve the objectives of the CFP, facilitate the implementation of the landing obligation and promote a fair standard of living for those who depend on fishing activities. Because ICES gives advice in the context of the policies of several clients, ICES only gives headline MAP advice for stocks that are fished by the EU only. Since the majority of western waters stocks are fished with the UK the MAP is only used as the headline advice for a hand full of stocks, while catch scenarios are provided in table 2 consistent with the MSY ranges.

The framework for providing advice is given below. It should be noted that ICES also applies an advice rule when stock fall below a MSY $B_{trigger}$ reference point. This implies that the F_{MSY} reference points are scaled when the SSB is below MSY $B_{trigger}$ (by SSB/MSY$B_{trigger}$). It should also be noted that when no F_{MSY} reference points are available ICES defaults to a PA approach for the advice. This is the case for some target stocks in the MAPs such as pollack and anglerfish in areas 4&6.

The applicable advice basis is dependent on the following series of points:

- Is the stock listed in an EU MAP and not fished by other countries?
- Is there a range (upper and lower values) defined for the stock?
- In the assessment of the stock, is spawning stock biomass (SSB) above the MSY $B_{trigger}$ reference point?
- Is the SSB above the B_{lim} reference point?
- If there is no catch option to bring SSB above B_{lim} in the catch advice year, zero catch advice is given.



Long Term Management Plans in Place for Stocks of Irish Interest

History of Implementation of Strategies Shown in Each Case

	Species	Stock area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Description	Notes	Endorsed by Science
West of Scotland	Cod	6.a															Bycatch in WWMAP shared with UK	Previous plans in abeyance	ICES MSY advice in headline MSY ranges provided
	Cod	6.b															Bycatch in WWMAP shared with UK	Previous plans in abeyance	ICES MSY advice in headline MSY ranges provided
	Anglerfish	3a, 4 and 6															Included in North Sea MAP, 2016		ICES MSY advice in headline MSY ranges provided
	Haddock	4,6a and SD 20															Included in North Sea MAP, 2016 shared with UK and Norway		ICES MSY advice in headline MSY ranges provided
	Saithe	4 & 6 and 3.a															Included in North Sea MAP, 2016 shared with UK and Norway	EU-Norway MP 2000-2015	ICES MSY advice in headline MSY ranges provided
	Herring	6.aN															Adopted in law 2008	In abeyance, as stock boundary changed	No, but subject of a peer reviewed publication.
Celtic Sea West of Ireland	Angel shark	6, 7, 8															Prohibited species not to be taken in any fishery	Appendix I, II Convention of Migratory Species 2017	n.e.
	Undulate ray	7.b,j																Prohibited 2010-2013	Not supported by ICES
	Hake	2, 3, 4, 6, 7, 8															Target stock in WWMAP shared with the UK, no agreement with Norway	MP proposed 2009, not implemented	ICES MSY advice in headline MSY ranges provided
	Sea Bass	4.bc, 7.a, and 7.d–h															Ban on commercial fishing IRL, since 1990. EU probibition 2018, target stock in WWMAP 2019 shared with UK	SI 128, 1990; SI 230 2006; SI 99 2018	ICES MSY advice in headline MSY ranges provided
	Common skate species	6, 7															Prohibited species not to be taken in any fishery		n.e.
	White skate	6, 7															Prohibited species not to be taken in any fishery		n.e.
	Sea Bass	6.a, 7.b, and 7.j															Ban on commercial fishing IRL, since 1990. EU probibition 2018	SI 128, 1990; SI 230 2006; SI 99 2018	n.e.
	Herring	7.aS 7.g,j																MP followed 2013-2017	ICES, 2009; 2012
	Herring	6.aS 7.bc																RP followed 2014-2015	STECF, 2013
Irish Sea	Cod	7.a															Target stock in WWMAP shared with the UK	Previous plans in abeyance	PA advice from ICES
Pelagic / Widely Distributed/Migratory	NEA mackerel	Northeast Atlantic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MPs 2000-2017 under Coastal States	Coastal States 1999-2009	ICES, 2008;2014; ICES 2002, ICES 2020 conditional
	Blue whiting	Northeast Atlantic	X					X	X		X	X	X	X	X	X	MPs 2003-2015 under Coastal States	Coastal States MPs in 2003 and 2008, new proposal 2015	ICES, 2008
	Western Horse mackerel	2.a, 4.a, 5, 7.a-c, 7.e-k, 8															EU plan followed 2008-13, discontinued		ICES, 2007, overruled 2013. rebuilding plan advice ICES 2021
	Herring Atlanto-Scandian	1. 2					X	X	X	X	X	X	X	X	X	X	MPs since 1997 under Coastal States	Coastal States, 2000	ICES, 2013
	Porbeagle	Northeast Atlantic															Prohibited species not to be taken in any fishery		n.e.
	Picked dogfish	Northeast Atlantic															Prohibited species not to be taken in any fishery		n.e.
	Boarfish	6, 7, 8					X		X								New plan proposed by PAC, 2015	Interim plan 2011, MP 2013, new MP proposed 2015	Latest plan endorsed by ICES, 2015
	Bluefin Tuna	East Atlantic & Med.															RP since 2006, later in EU law.	ICCAT, 2006, 2008	ICCAT SCRS, 2014

X Not implemented in that year or not agreed by all parties	formal legal status
MP Management plan	Irish legislation
RP Rebuilding Plan	EC legislation
n.e. Not evaluated, or not fully evaluated	country)

Irish and EC legislation
EU legislation / 3rd-country agreement
North Sea MAP
Western waters MAP*

* the full list of stocks in the Western Waters Map is not given in this table, for a full list of stocks please see appendix IX

Marine Institute Summary On The Status and Scientific Advice For 2023 For Those Stocks Of Interest To Ireland

	Stock name	F[1]	B[2]	Advice 2023[3]	Advice change[4]	Implied TAC change[5]	Advice 2022[3]	Overall TAC 2022[6]	Quota 2022[7]	Tac Code[8]
West of Scotland	Cod 6a	✗	✗	0	0%	-100%	0	1,279	219	COD/5BE6A
	Cod 6b	?	?	14	0%	-81%	14	74	14	COD/5W6-14
	Haddock 3a,4,6a	✓	✓	137,058	+6%	+160%	128,708	52,691	2,761	HAD/03A.
									5,006	682	HAD/5BC6A.
									44,924	0	HAD/2AC4.
	Haddock 6b	✓	✓	4,078	-30%	-30%	5,825	5,825	385	HAD/6B1214
	Whiting 6a	✓	✓	4,155	+1%	+131%	4,114	1,800	561	WHG/56-14
	Plaice 6	-	-	No advice	NA	NA	NA	658	248	PLE/56-14
	Sole 6	-	-	No advice	NA	NA	NA	57	46	SOL/56-14
	Anglerfish 3a,4,6	✗	✓	9,881	-30%	-35%	14,116	15,116	9,014	0	ANF/2AC4-C
									1,000	0	ANF/04-N.
									5,102	439	ANF/56-14
	Megrim 4,6a	✓	✓	7,200	-1%	-1%	8,344	8,344	5,581	627	LEZ/56-14
	Megrim 6b	✓	✓	1,022	8,222				2,763	0	LEZ/2AC4-C
	Saithe 4,6,3a	✗	✗	58,912	+19%	+19%	49,614	49,614	44,950	0	POK/2C3A4
									4,664	353	POK/56-14
Irish Sea	Cod 7a	✓	✗	0	-100%	-100%	74	206	104	COD/07A.
	Haddock 7a	✓	✓	2,648	-13%	-13%	3,038	3,038	1,171	HAD/07A.
	Whiting 7a	✗	✗	0	0%	-100%	0	721	274	WHG/07A.
	Plaice 7a	✓	✓	2,039	-30%	-26%	2,925	2,747	1,031	PLE/07A.
	Sole 7a	✗	✓	605	-23%	-23%	787	787	105	SOL/07A.
Celtic Sea	Cod 7e-k	✗	✗	0	0%	-100%	0	644	338	COD/7XAD34
	Haddock 7b-k	✗	✓	11,901	-25%	-21%	15,946	15,000	2,920	HAD/7X7A34
	Whiting 7bk	✗	✗	1,715	-61%	NA	4,452	10,696	3,972	WHG/7X7A-C
	Whiting 7d	✓	✓	23,953	+48%	NA	16,229	NA	NA	(WHG/7X7A-C)
	Plaice 7bc	?	?	19	0%	+0%	19	19	15	PLE/7BC.
	Plaice 7fg	✗	✗	402	-77%	-77%	1,735	1,735	237	PLE/7FG.
	Plaice 7hjk	✓	✓	132	+20%	+16%	110	114	47	PLE/7HJK.
	Sole 7bc	?	?	19	0%	-44%	19	34	28	SOL/7BC.
	Sole 7fg	✓	✓	1,338	+0%	+0%	1,337	1,337	39	SOL/7FG.
	Sole 7hjk	?	?	213	0%	+0%	213	213	95	SOL/7HJK.
	Hake Northern	✓	✓	83,130	+11%	+3%	75,052	80,926	2,379	0	HKE/03A.
									44,268	2,383	HKE/571214
									2,754	0	HKE/2AC4-C
									2,000	0	HKE/04-N.
									29,525	0	HKE/8ABDE.
	Anglerfish (black) 7,8	✓	✓	23,436	+10%	+11%	52,936	52,205	41,173	2,977	ANF/07.
	Anglerfish (white) 7,8	✓	✓	34,540	57,976				11,032	0	ANF/8ABDE.
	Megrim 7b-k,8abde	✓	✓	23,596	+3%	+18%	23,831	20,786	18,916	2,827	LEZ/07.
	Megrim (4-spot) 7,8	?	?	867	24,463				1,870	0	LEZ/8ABDE.
	Pollack 6,7	✓	?	3,360	0%	-59%	3,360	8,168	8,012	572	POL/07.
									156	22	POL/56-14
	Saithe 7-10	-	-	No advice	NA	NA	NA	2,541	1,404	POK/7/3411
	Sea Bass 4bc,7ad-h	✓	✗	2,542	+15%	NA	2,216	NA	NA	No TAC
	Sea Bass 6a,7bj	?	?	3	0%	NA	3	NA	NA	No TAC
Nephrops	Nephrops 6 no FU	?	?	209	+12%	+12%	11,862	11,862	160	NEP/5BC6.
	Nephrops FU11	✓	✓	3,688	13,311					
	Nephrops FU12	✓	✓	5,103						
	Nephrops FU13	✗	✓	4,311						
	Nephrops 7 no FU	?	?	150	+8%	+8%	17,018	17,038[9]	5,682	NEP/07.
	Nephrops FU14	✓	✓	735	18,353					
	Nephrops FU15	✓	✓	9,271						
	Nephrops FU16	✓	?	3,787						
	Nephrops FU17	✓	✗	312						
	Nephrops FU19	✓	✗	230						
	Nephrops FU20-21	✓	✓	1,620						
	Nephrops FU22	✓	✗	2,248						

	Stock name	F[1]	B[2]	Advice 2023[3]	Advice change[4]	Implied TAC change[5]	Advice 2022[3]	Overall TAC 2022[6]	Quota 2022[7]	Tac Code[8]
Rays / Skates	Small-eyed ray 7fg	?	✓	86	-30%	-30%	123	123	12	RJE/7FG.
	Undulate ray 7de	✓	✓	4,836	+2543%	+1967%	183	234	25	RJU/7DE.
	Undulate ray 7bj	?	✗	0	0%	NA	0	NA	NA	No TAC
	Blonde ray 4a,6	?	?	7						
	Blonde ray 7afg	?	?	573						
	Blonde ray 7e	?	?	213						
	Cuckoo ray 6,7,8abd	✓	✓	7,826						
	Sandy ray) 6,7	?	?	27						
	Shagreen ray 6,7	?	?	134						
	Spotted ray 6,7bj	✓	✓	36	11,729	+60%	+24%	7,336	9,482	1,177	SRX/67AKXD
	Spotted ray 7ae-h	✓	✓	814						
	Thornback ray 6	✗	✓	96						
	Thornback ray 7afg	✓	✓	1,833						
	Thornback ray 7e	?	?	170						
	Other rays 6,7	?	?	No advice						
	Skate (common) 6,7	?	?	No advice	NA	NA	NA	NA	NA	No TAC
Pelagic / widely distributed	Albacore tuna NEA	✓	✓	37,801	0%	+0%	37,801	37,801	3,317	ALB/AN05N
	Basking Shark NEA	?	?	0	0%	NA	0	NA	NA	No TAC
	Blue whiting NEA	✗	✓	1,359,629	+81%	+110%	752,736	648,226	28,438	WHB sum quota
	Bluefin tuna	-	-	No advice yet	NA	NA	36,000	36,000	0	BFT/AE45WM
	Boarfish 6,7,8	→	↗	22,791	0%	+0%	22,791	22,791	15,749	BOR/678-
	Herring 1,2	✗	✓	511,171	-15%	-15%	598,588	598,588	3,098	HER/1/2-
	Herring 6aN	✓	?	1,212	NA	-65%	NA	3,480	470	HER/5B6ANB
	Herring 6aS,7bc	✓	?	1,892	+1892t	+39%	0	1,360	1,236	HER/6AS7BC
	Herring 7aN	✓	✓	7,309	-14%	-14%	8,455	8,455	719	HER/07A/MM
	Herring 7aS,7g-k	✓	✗	0	0%	-100%	0	869	750	HER/7G-K.
	Horse mackerel NS	✗	↗	8,969	0%	+0%	8,969	8,969	202	JAX/4BC7D
	Horse mackerel W	✗	✗	0	-100%	-100%	71,138	71,138	9,722	0	JAX/08C.
									61,416	15,737	JAX/2A-14
	Ling NEA	?	↗	15,092	0%	-21%	15,092	19,023	700	0	LIN/04-N.
									144	0	LIN/03A-C.
									3,127	0	LIN/04-C.
									15,052	1,059	LIN/6X14.
	Mackerel NEA	✗	✓	782,066	-2%	+129%	794,920	341,871	54,992	MAC sum quota
	Porbeagle NEA	✓	✗	219	+219t	NA	0	NA	NA	No TAC
	Sprat 6,7	?	?	2,240	0%	NA	2,240	NA	NA	No TAC
	Spurdog NEA	✓	✓	17,353	+17353t	+6327%	0	270	47	DGS/15X14
	Swordfish NA	✓	✓	13,200	0%	+0%	13,200	13,200	0	SWO/AN05N

1 F in 2021 relative to F reference point (red=above; green=below; grey=unknown).
2 SSB in 2022 relative to Biomass reference point (red=below; green=above; grey=unknown).
3 MSY or PA catch advice (landings advice for *Nephrops* and rays/skates).
4 Difference between the advice for 2023 and advice for 2022.
5 Difference between the advice for 2023 and the TAC for 2022.
6 TAC (including non-EU countries), or sum of (unilateral) quota where TAC is not relevant.
7 Irish quota (before swaps).
8 TAC code in Council Regulation (EU) 2022/515.
9 The advice for FU19 was replaced after the TAC was set; the new advice was 20t lower, explaining the discrepancy between the advice and TAC

THE SUSTAINABILITY ASSESSMENT

FEAS ADVICE FOR 2023

FEAS advise that number of sustainably fished stocks has increased from 35 (in 2021) to 40 (in 2022) out of 75 (53%). The number of stocks with biomasses higher than sustainable trigger reference levels has increased from 26 (in 2021) to 36 (in 2022) out of 75 (48%). There is gradual progress towards long-term sustainable utilisation of the resource base since 2012.

Note: A previous version of this Sustainability Assessment informed the statement by the Minister to The Joint Committee on Agriculture, Food and the Marine on 25 Oct. Since then the advice for *Nephrops* and several other stocks was released by ICES on the 28th of October. This analysis includes the latest information on those stocks. Only the latest ICCAT advice on the status of Bluefin tuna is pending for 2022.

Results

ICES and ICCAT evaluate the state of the resource base in relation to pressure and state indicators. These indicators are fishing mortality (F) in the last year of the assessment relative to an F target (F_{MSY} or a proxy of F_{MSY}) and SSB in the year of the assessment in relation to a biomass trigger point (below which fishing mortality should be reduced). For some stocks ICES or ICCAT provide a qualitative assessment of the stock status if these reference points are not defined. The MI aims to gives overview of progress towards management targets by reporting of the status of 75 fish stocks that are of relevance to Ireland in a consistent way each year in the Stock Book.

Table 1 summarises the fishing pressure status relative to F_{MSY} of the 75 reference stocks and compares with the same evaluation presented in previous years' Stock Books. The number of sustainably fished stocks has increased to 40 (over half the stocks evaluated; 53%). The percentage (21%) and number of stocks (16) overfished has increased by four compared to last year. The number of stocks with unknown status has decreased to 19 (25%).

Table 2 compares the state of the resource base in terms of SSB in relation to biomass trigger points with the same evaluation presented in previous years. The number of stocks that are above MSY biomass trigger points has increased to 36 (48%) and the number of stocks below MSY biomass trigger points has also increased to 15 (20%). The number of stocks with unknown biomass status has decreased to 24 (31%) this year.

There are multiple reasons why stocks have unknown status including short time series of biological data, conflicting input data, low catches and/or insufficient sampling data or missing catch information (e.g. angling catches or discards). Over time the percentage of stocks with unknown pressure and state indicators has declined. However, when ICES undertakes a benchmark and the assessment issues cannot be resolved occasionally stocks are downgraded and their status in relation to reference points becomes unknown. It is likely that for some stocks these will remain with unknown pressure or state category and the management and advisory framework should take this into account.

Table 1 Summary of FEAS evaluation of fishing mortality in relation to F_{MSY} for stocks of interest to Ireland.

	2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022	
Fishing pressure status	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Fished Below Fmsy	24	41%	20	34%	25	34%	26	36%	28	38%	31	42%	33	45%	35	47%	33	45%	35	47%	40	53%
Fished Above Fmsy	14	24%	14	24%	22	30%	19	26%	15	20%	17	23%	16	22%	13	18%	13	18%	11	15%	16	21%
F unknown or Fmsy or not defined	21	36%	25	42%	26	36%	27	38%	31	42%	26	35%	25	34%	26	35%	28	38%	28	38%	19	25%
Total number of stocks	**59**		**59**		**73**		**72**		**74**		**74**		**74**		**74**		**74**		**74**		**75**	

Table 2 Summary of FEAS evaluation of SSB in relation to biomass reference points for stocks of interest to Ireland.

	2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022	
Spawning Stock Biomass status	**Num**	**%**	**Num**	**%**	**Num**	**%**	**Num**	**%**	**Num**	**%**	**Num**	**%**	**Num**	**%**	**Num**	**%**	**Num**	**%**	**Num**	**%**	**Num**	**%**
Biomass above MSY $B_{trigger}$	19	32%	19	32%	17	23%	20	28%	22	30%	27	36%	26	35%	25	34%	25	34%	26	35%	36	48%
Biomass below MSY $B_{trigger}$	10	17%	6	10%	12	16%	14	19%	19	26%	15	20%	16	22%	16	22%	15	20%	14	19%	15	20%
Biomass unknown or MSY $B_{trigger}$ not defined	30	51%	34	58%	44	60%	38	53%	33	45%	32	43%	32	43%	33	45%	34	46%	34	46%	24	32%
Total number of stocks	**59**		**59**		**73**		**72**		**74**		**74**		**74**		**74**		**74**		**74**		**75**	

Detailed analysis

A detailed breakdown of the evaluations of stock status in relation to sustainable fishing rates and biomass levels as given in previous Stock Books is presented in Table 3. Note that the stock status in a certain year may retrospectively be adjusted as more data become available. These adjustments are not included in Table 3; the table represents the data as it was reported at the time. The stock status of individual stocks varies over time but there is a clear overall trend, showing an increasing number of stocks fished below F_{MSY} and with biomasses (SSB) above MSY $B_{trigger}$ since 2012 (Figure 1). This demonstrates a gradual progress towards long-term sustainable utilisation of the resource base.

The status of 23 stocks changed between the 2021 and 2022 assessments. These changes are highlighted in Table 4 and described below.

The status of F in relation to F_{MSY} changed for 19 stocks. Six stocks which were assessed to be sustainably fished last year saw increases in fishing mortality above F_{MSY} (Haddock 7b-k, Horse mackerel W, Mackerel NEA, *Nephrops* FU13, Plaice 7fg, Sole 7a). The two herring stocks (Herring 6aN, Herring 6aS,7bc) were split after a benchmark and both are now also assessed as sustainably fished. Because F_{MSY} is a target reference point, it is to be expected that a well-managed stock will fluctuate slightly around F_{MSY}. Three stocks that were previously overfished are now exploited below F_{MSY} (Haddock 6b, Plaice 7hjk, Sole 7fg). The exploitation status for 6 stocks changed from unknown to sustainably exploited (Cuckoo ray 6,7,8abd, Porbeagle NEA, Spotted ray 6,7bj, Spotted ray 7ae-h, Thornback ray 7afg, Undulate ray 7de), while the exploitation status two stocks changed from unknown to over exploited (Anglerfish 3a,4,6 and Thornback ray 6).

The status of SSB in relation to the reference points changed for 16 stocks. One stocks is now considered to have recovered above the MSY $B_{trigger}$ (Spurdog NEA) while 10 stocks have changed to unknown biomass status to above MSY $B_{trigger}$ or the MSY $B_{trigger\ proxy}$ (Anglerfish 3a,4,6, Anglerfish (black) 7,8, Cuckoo ray 6,7,8abd, Plaice 7hjk, Small-eyed ray 7fg, Spotted ray 6,7bj, Spotted ray 7ae-h, Thornback ray 6, Thornback ray 7afg, Undulate ray 7de). One stock fell below MSY $B_{trigger\ proxy}$ (Plaice 7fg) and two stocks changed to unknown biomass status to below MSY $B_{trigger}$ (Cod 7a, Porbeagle NEA). The two herring stocks (Herring 6aN, Herring 6aS,7bc) were split after a benchmark and both have unknown status of SSB in relation to the reference points.

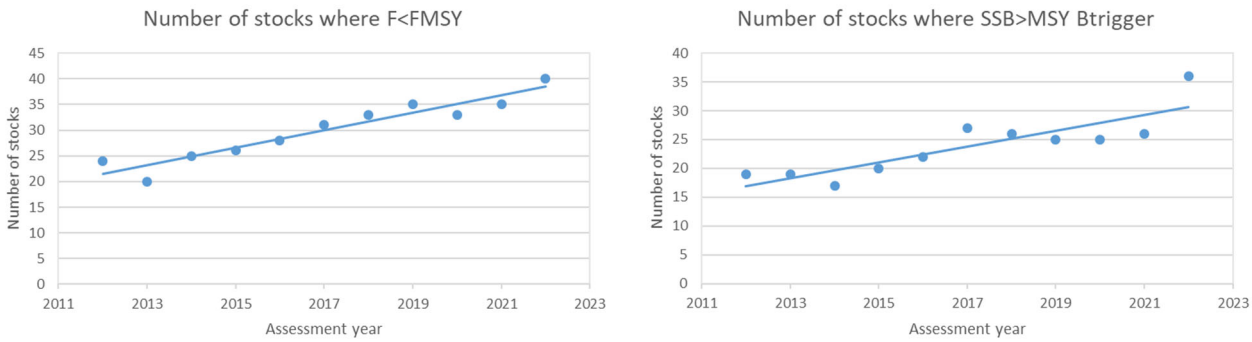


Figure 1 Number of stocks assessed to be fished below F_{MSY} and where SSB is above MSY $B_{trigger}$ in the Stock Book each year, with trends indicated.

Table 3 Details of FEAS evaluation of fishing mortality in relation to F_{MSY} and SSB in relation to biomass reference points for stocks of interest to Ireland.

Table 4 Stocks with a status change between the 2021 and 2022 assessments.

	Fishing Mortality Status		
Stock	2021	2022	Explanation
Anglerfish 3a,4,6			New assessment applied, F now estimated above FMSY
Cuckoo ray 6,7,8abd			New assessment applied, F now estimated below FMSY
Haddock 6b			New assessment applied, F now estimated below FMSY
Haddock 7b-k			F has been gradually declining and is now marginally below FMSY.
Herring 6aN			Benchmarked in 2022
Herring 6aS,7bc			Benchmarked in 2022
Horse mackerel W			F has been scaled up by the update assessment
Mackerel NEA			Fishing mortality is increasing and is now above FMSY
Nephrops FU13			Fishing mortality is increasing and is now above FMSY
Plaice 7fg			F has fluctuated around FMSY and is now marginally below the FMSY proxy.
Plaice 7hjk			F has fluctuated around FMSY and is now above the FMSY proxy.
Porbeagle NEA			Benchmarked in 2022, F now estimated below FMSY
Sole 7a			F has been increasing and is now above FMSY
Sole 7fg			F has fluctuated around FMSY and is now marginally below the FMSY
Spotted ray 6,7bj			New assessment applied in 2022, F now estimated below FMSY
Spotted ray 7ae-h			New assessment applied in 2022, F now estimated below FMSY
Thornback ray 6			New assessment applied, F now estimated above FMSY
Thornback ray 7afg			New assessment applied in 2022, F now estimated below FMSY
Undulate ray 7de			New assessment applied in 2022, F now estimated below FMSY

	SSB Status		
Stock	2021	2022	Explanation
Anglerfish 3a,4,6			New assessment applied, SSB is above MSYBrigger proxy
Anglerfish (black) 7,8			The stock was benchmarked, SSB is now assessed above MSY Btrigger
Cod 7a			The stock was benchmarked the stock status is now below MSY Btrigger.
Cuckoo ray 6,7,8abd			New assessment applied, SSB is above MSYBrigger proxy
Herring 6aN			Benchmarked in 2022
Herring 6aS,7bc			Benchmarked in 2022
Plaice 7fg			SSB has decreased in recent years and is now just below MSY Btrigger proxy
Plaice 7hjk			A biomass reference point was defined for the first time for this stock.
Porbeagle NEA			SSB has is now just below MSY Btrigger
Small-eyed ray 7fg			New assessment applied, SSB is above MSYBrigger proxy
Spotted ray 6,7bj			New assessment applied, SSB is above MSYBrigger proxy
Spotted ray 7ae-h			New assessment applied, SSB is above MSYBrigger proxy
Spurdog NEA			New assessment applied, SSB is above MSYBrigger
Thornback ray 6			New assessment applied, SSB is above MSYBrigger proxy
Thornback ray 7afg			New assessment applied, SSB is above MSYBrigger proxy
Undulate ray 7de			New assessment applied, SSB is above MSYBrigger proxy

RECENT ADVICE ON ECOSYSTEM SERVICES AND EFFECTS

In addition to the fisheries advice ICES provides are range of recurrent and non-recurrent Advice on Ecosystem Services and Effects (ICES, 2022). This advice is developed according to ICES procedures and approved by the Advisory Committee (ACOM) and follows the ICES Advisory framework and principles (ICES, 2021). The most up to date ICES advice is available here: https://www.ices.dk/advice/Pages/Latest-Advice.aspx . A summary of the advice most relevant to Ireland issued by ICES in 2022 is provided below (See links below):

EU - Lists for Descriptor 3 (commercially exploited fish and shellfish) reporting by EU Member States under MSFD Article 17 in 2024

ICES developed regional lists of commercially relevant taxa for each MSFD (sub)region, presented in Annex 1. The lists are based on landing weights and values aggregated from FDI landings data 2015–2020 from EU Member States and include UK landing statistics. ICES advises that EU Member States report for Descriptor 3 (D3) on all taxa provided in Annex 1 for their MSFD (sub)regions to support regional coherence within MSFD (sub)regions. ICES notes that reporting does not necessarily require an assessment of GES. The total number of landed taxa within each MSFD (sub)region should be taken into account when setting regional thresholds for the selection of relevant D3 taxa. The regional lists presented here include the relevant widely distributed species for the MSFD (sub)regions; no further criterion is required for this species group. The D3 taxa lists should be updated for each MSFD assessment cycle.

https://doi.org/10.17895/ices.advice.21332967

NEAFC - The efficacy of the Rockall haddock closure in protection of juvenile haddock

The Rockall Haddock Box does coincide with areas of high juvenile and adult haddock densities, with high densities also observed outside the box to the northeast. For most years since the closure, haddock densities of age classes 1+ have been higher inside than outside the box. The overall impact of the current closure area on the Rockall haddock stock continues to be difficult to assess.

https://doi.org/10.17895/ices.advice.10057

NEAFC - New information regarding vulnerable habitats in the NEAFC Regulatory Areas

ICES advises to maintain the existing bottom-fishing closures to protect vulnerable marine ecosystems (VMEs). No addition to, or extension of, the existing closed areas to protect VMEs in the NEAFC Regulatory Areas are advised. ICES advises that any bottom-contact fishing on VME habitats using static or mobile bottom-contacting gears will result in damage to these habitats and poses a risk of significant adverse impacts (as described by FAO [2009]). ICES advises that the inclusion of gear code in the daily catch reports would greatly improve the VMS data and understanding of potential adverse impacts of bottom-fishing activity on VMEs.
https://doi.org/10.17895/ices.advice.21261369

NEAFC request on appropriateness of NEAFC bottom-fishing closures

ICES advises that the current NEAFC bottom-fishing closure areas are still appropriate to protect VMEs, based on cumulating evidence of VME occurrence within these areas. The reopening of such closures to bottom fishing would present a risk of significant adverse impacts to VMEs, in particular as evidenced for mobile bottom-contacting gear. This includes some area in the Irish EEZ on the Rockall bank (Figure 1.)

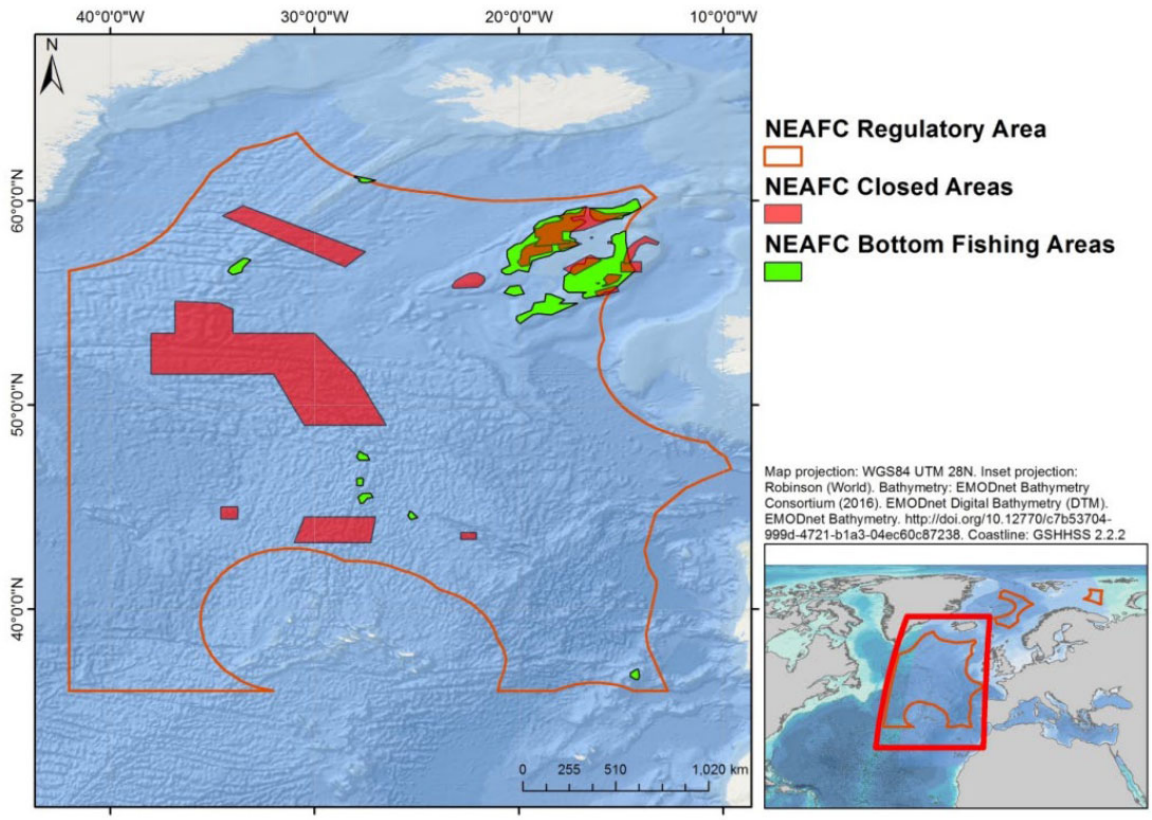


Figure 1. NEAFC Regulatory Area 1 with NEAFC bottom-fishing closures for VME protection (NEAFC closed areas) and NEAFC bottom-fishing areas.

https://doi.org/10.17895/ices.advice.21261387

Celtic Seas ecoregion – Aquaculture Overview

Following the publication of an Aquaculture Overview for the Norwegian Sea Ecoregion in 2021, ICES has recently published the Celtic Seas Aquaculture Overview, providing up to date information on aquaculture activities and science within the eco-region.

Total aquaculture production in the ecoregion in 2018 represents 21% of the overall aquaculture production in Europe by volume and 34% by value. Total production increased from 1950 up to 2004 but has since then stabilized fluctuating around 240,000 tonnes annually. Marine aquaculture production within the ecoregion is currently strongly dominated by Atlantic salmon (> 80% of the total production by volume), largely produced in Scotland. Shellfish aquaculture predominates in terms of the number of licensed sites and enterprises. Production volumes of other invertebrates and seaweeds are relatively small.

Major changes have occurred in the average price per tonne for some important cultured taxa in the last decade: mussel prices have decreased by approximately 49% while Pacific oyster prices have increased by approximately 31%. Small production units (fewer than five employees) predominate in all jurisdictions although larger, more capital-intensive operations characterize the finfish sector and are also increasing in the mussel sector. Employment status is more stable for the finfish sector than the shellfish sector. The aquaculture sector has a high socio-economic importance in rural coastal communities.

The primary environmental interactions relate to habitats and species. Sea lice and genetic introgression from farmed salmon are considered as the main aquaculture threats to wild salmon populations. Other important environmental interactions considered include disease transmissions, emissions of dissolved nutrients, particulate organic matter, pollutants, and therapeutants. Increased species richness, diversity, and abundance of sessile and mobile organisms relative to ambient conditions have been observed nearby some mussel farms. The introduction of several non-indigenous invertebrate species (carpet sea squirt, leathery sea squirt, slipper limpet, Asian shore crab, Chinese mitten crab) has also been directly linked to shellfish aquaculture. In response, the British-Irish Council has established an *Invasive Non-Native Species* subgroup to develop aquaculture biosecurity protocols for these species.

Sustainable aquaculture growth is a vital element for future global and regional food security in addition to the socio-economic development of rural areas within the ecoregion. Innovative developments include the diversification of existing culture systems in response to changing environmental or biological drivers, application of diverse and innovative delousing techniques, expansion of seaweed aquaculture, diversification of fish culture species other than salmonids, and development of offshore and recirculation aquaculture technologies.

Future aquaculture development and management should increasingly consider interactions with other human activities, such as wild capture fisheries, recreation/tourism, offshore renewables, and the designation of marine protected areas. Climate change can further hamper sustainable growth and existing capacity for aquaculture in the ecoregion due to elevated temperatures affecting productivity, altering disease outbreaks and increasing the risk of harmful algal blooms. An increase in the frequency of extreme weather conditions may impact on safety and increase the risk of damage and escapes.

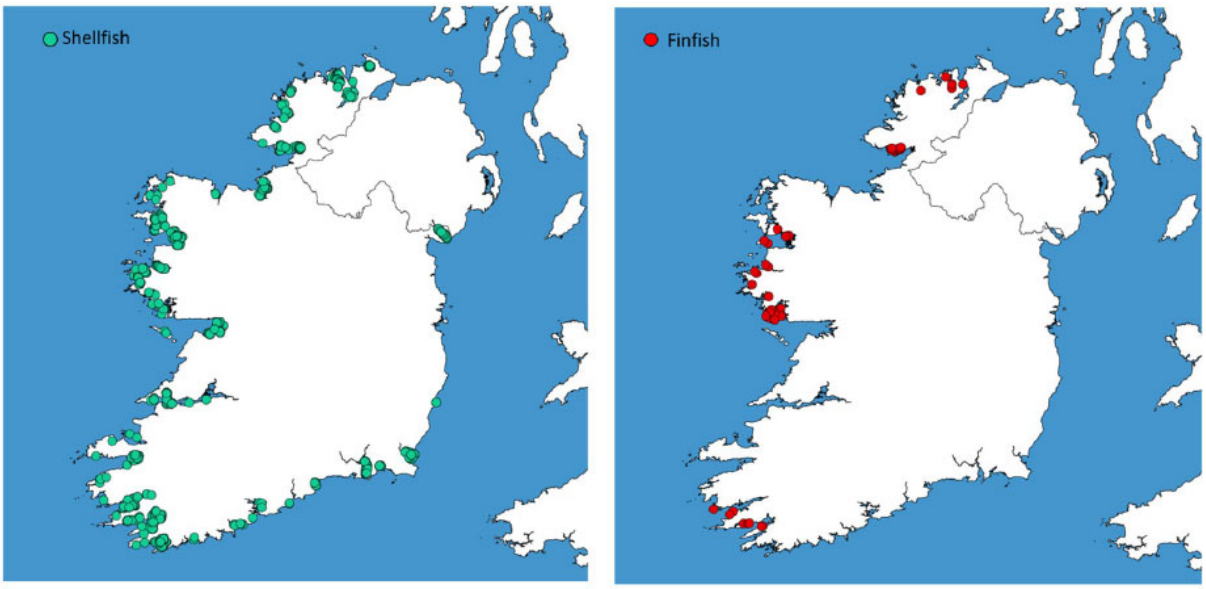


Figure 2 Shellfish and finfish aquaculture sites around the coast of Ireland.

https://doi.org/10.17895/ices.advice.21252294.v1

MARINE INSTITUTE AT-SEA SAMPLING 2021 – INCLUDING COVID-19 RESPONSE

From March 2020 the Marine Institute (MI) at sea sampling aboard commercial vessels was temporarily suspended in the interest of the health and safety of both samplers and the fishing crews due to the COVID-19 pandemic. This temporary suspension remained in place for 2021 and therefore the MI have not had samplers at sea on commercial trips >18 hours during much of 2022 although normal sampling has resumed in the latter half of 2022. The MI were able to sample at sea on inshore vessels where overnight accommodation is not a requirement and sampling occurs outside on deck resulting in a number of at-sea trips. In 2022 the availability of vessels was reduced with a significant number availing of the tie-up schemes introduced after Brexit.

To mitigate for the loss of at sea sampler coverage the Marine Institute (MI) has worked with the industry and continued the at-sea self-sampling programme developed in 2020 where the skippers/crews collect data and samples from a subset of the hauls, bring the material ashore where MI staff measure and work up under COVID-19 guidelines. Each vessel is contacted individually by the Fisheries Liaison Team Leader (TL) following "4s sampling"[1] guidelines selection in advance of a possible trip. On agreeing to participate the skipper is trained via remote training and supplied with a sampling pack pre sailing. Participating skippers record data on haul start & stop positions, date and time, estimate the bulk catch, record observations on bird, mammal, reptile interaction record by kg /species what catch is wanted and take one random box of unwanted catch for measurement ashore by our staff. On sailing the participating skipper maintains contact with the Fisheries Liaison (TL) and quality assurance checks are performed regularly during the trip via WhatsApp. The extra samples coming ashore has resulted in an increased resource requirement ashore which is offset by the pandemic imposed lack of sea time. This mitigation measure has ensured that MI kept catch data flowing to our process systems and more importantly ensured that the dialogue between the MI and the industry is maintained and developed. This has resulted in over sixty demersal trips, 13 pelagic trips and 212 inshore/shellfish trips (inshore/shellfish is a combination of at sea sampler and self-sampling) sampled in 2021.

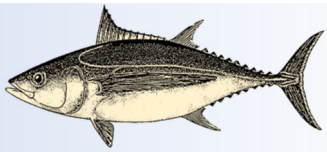
In 2020 the Marine Institute established up a self-sampling project with the Irish Tuna Fishery Improvement Project FIP (http://www.irishtunafip.ie/) where the Irish tuna fleet employed a crew member to self-sample data during the albacore fishery working to MI standard operating procedures. The crew member was trained by the MI and delivered the data to MI for entry/analysis. This program was continued in 2021 – 3 trips were sampled in in the Bay of Biscay during the season. The MI FU16 at-sea self-sampling programme to sample Porcupine *Nephrops* was continued and expanded in 2021 yielding 10 trips and associated samples.

The at-sea self-sampling programme was assessed and has resulted in several positive benefits; close collaboration and frequent communication with active fishermen, developing new self-sampling protocols, recruiting new vessels to the programme (including vessels with limited accommodation), increased understanding of the importance of scientific data collection and specific standards/SOPs. The MI aims to build on the partnerships developed with the industry through the at-sea self-sampling programme. In the future it is expected that the at-sea programme will take the form of dual streams for the collection of fisheries dependant data 1) from self-sampling and 2) from scientific samplers aboard vessels.

[1] 4s sampling is a statistical sounds sampling procedure implement by Ireland see: https://www.dcmap-ireland.ie/sites/default/files/DCF_Files/docs/TripSelectionForTheDemersalObserverProgramme.pdf

ALBACORE TUNA

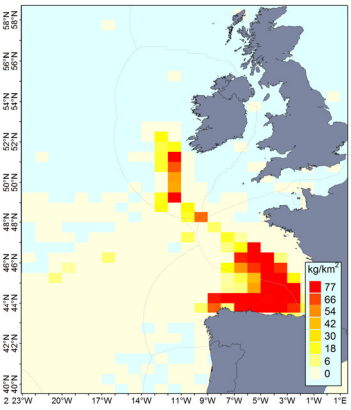
(*THUNNUS ALALUNGA*)



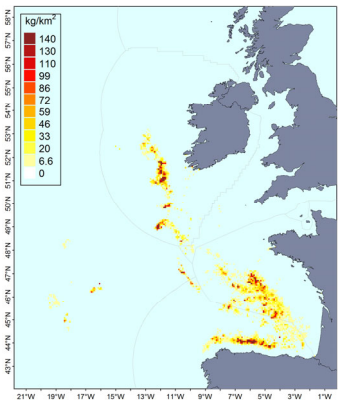
BIOLOGY – SPECIES

Albacore tuna is a medium sized, pelagic fish found offshore, in surface and mid-waters between 14° and 21° Celsius. It is found from the Azores and Canaries north to Ireland, and westwards to the central USA. Separate stocks occur in the south Atlantic and the Mediterranean. It is fast growing and recruits to the fishery by age 1, with maximum age of 15 years. Maturation occurs at 5 years, corresponding to fork length of approximately 90 cm, and maximum size is 128 cm. Juveniles migrate north to SW Ireland in summer, to feed in surface waters. Adults migrate, at depths from 50-150 m, to spawn off Venezuela, in the Gulf of Mexico and Sargasso Sea. Spawning ensues from April to September.

LANDINGS DISTRIBUTION



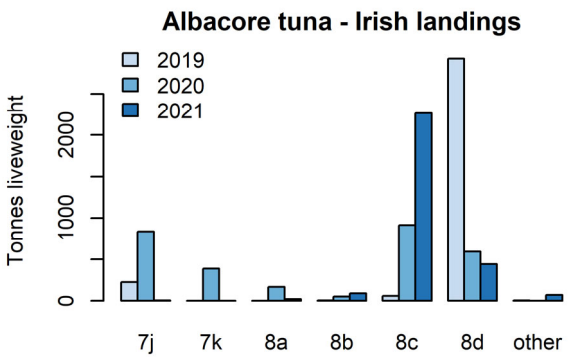
◀ The distribution of international landings of albacore tuna between 2016-2020. Within the Irish EEZ, most albacore tuna were taken in the southern part of Division 7.j.

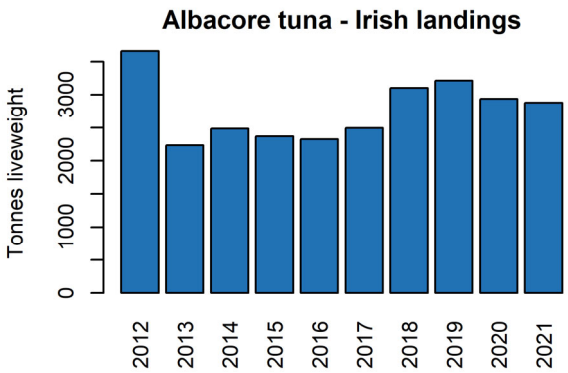


◀ The distribution of albacore tuna landings by Irish vessels (mainly pelagic otter trawls) between 2016-2020. Albacore tuna were mostly caught in Divisions 7.j and Sub-areas 8.

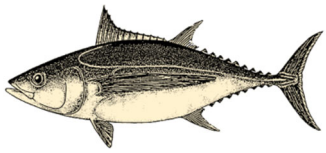
IRISH LANDINGS AND VALUE OF TAC

Irish catches of Albacore tuna in recent years been around 3,000 t (average 2019-2021). The majority of catches was taken by pelagic pair trawl. Since 2017, the bulk of catches have been from ICES division 8 (Bay of Biscay) and landed into France and Spain. Previous to this, the majority of catch was taken in the Celtic Sea. In 2021, Irish landings were worth approximately €7 million.





North Atlantic Albacore Tuna



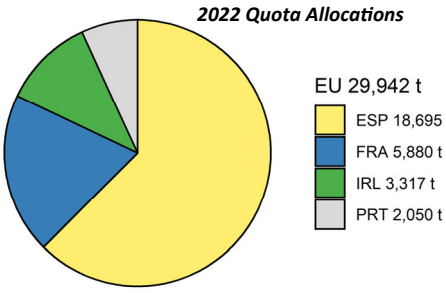
North Atlantic

Advice for 2023

The interim harvest control rule (HCR) was adopted by the Commission in 2017 (Rec. 17-04). Based on the 2020 assessment, application of the HCR gives a TAC of 37,801 t for 2021-2023.

Key Points

ICCAT advice basis	Quantitative assessment and HCR (from MSE framework)	
Management Plan	ICCAT management plan Catch=37,801 t	
Ranges	F_{MSY} Range Lower	Catch=35,761 t
	F_{MSY}	Catch=36,816 t
	F_{MSY} Range Upper	Catch=38,039 t
Landing Obligation	From 2015	Area and gear specific *de minimis* exemption of 5%



* Commission delegated regulation EC 2020/2015

Management in 2022

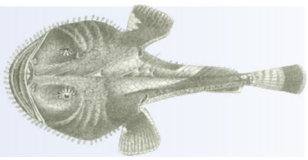
- The stock assessment and management area for North Atlantic albacore tuna covers the Atlantic, north of 5°N line, and excluding the Mediterranean Sea.
- ICCAT recommendation 98-08 limiting fishing capacity to the average of 1993-1995, remains in force. This limits the number of Irish vessels that may fish for tuna to a maximum of 50 vessels.
- ICCAT recommendation 16-06 sets the objective of maintaining the fishing pressure below F_{MSY} and stock biomass state above B_{MSY}, while maximizing average catch and minimizing inter-annual fluctuations in TAC levels.
- The maximum allowed carryover is 25% of the initial quota. ICCAT undertakes to implement additional measures if carried over quota leads to a TAC in excess of 33,600 t.

Key Stock Considerations

- The stock was last assessed in 2020, following the same approach as the previous assessment in 2016. The 2020 assessment uses data up to, and including 2018. ICCAT usually set a 3-year constant annual TAC. The next stock assessment is planned for 2023.
- In 2021 Irish vessels had a total catch of 2,879 t and landed mainly into France and Spain.
- The primary Irish fishery is with pair pelagic trawlers in the Bay of Biscay, there can be some late season catches to the south west of Ireland.
- Irish observer and self-sampling data suggest that bycatch of sharks, seabirds, turtles and mammals are near zero. Bluefin tuna and swordfish are potential choke species for the fishery and the Irish fleet are known to avoid such catches.

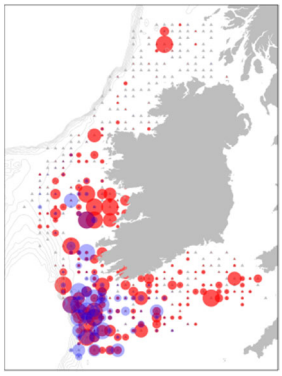
ANGLERFISH

(*LOPHIUS SPP*)



BIOLOGY – SPECIES

White anglerfish (*Lophius piscatorius*) and black anglerfish (*L. budegassa*) are two closely related species. White anglerfish occur throughout the north-east Atlantic. They are most abundant at depths of 200-800m but also occur in coastal waters. Black anglerfish occur from the north of Scotland to the west of Africa and are mainly found offshore between 200 and 500m depth. White anglerfish are relatively more abundant in northern areas while black anglerfish are relatively more abundant in Biscay and further south as well as an area in the western Celtic Sea. Recent research suggests that the two species occasionally inter-breed to form hybrids.

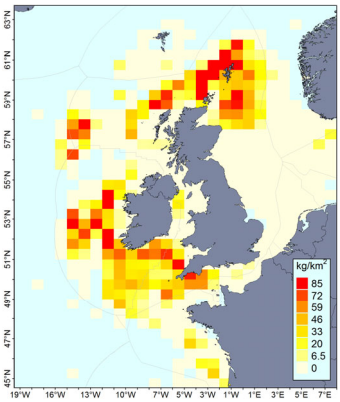


Survey catches of juvenile since 2005 L. piscatorius (red) and L. budegassa (blue)

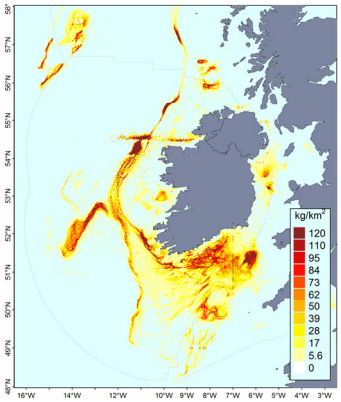
Anglerfish are difficult to age but are known to be relatively fast-growing. White anglerfish grow around 15cm per year and black anglerfish around 12cm per year. Females grow larger than males and mature at larger sizes. There is no minimum landing size but EC 2406/96 established a minimum marketing size of 500g gutted weight or 200g tailed.

The population structure of anglerfish is poorly understood but genetic diversity within the species appears to be limited. Anglerfish can migrate hundreds of kilometres and the eggs and larvae are pelagic for up to 4 months, allowing them to be dispersed over large areas. Recruitment success varies strongly between years.

LANDINGS DISTRIBUTION

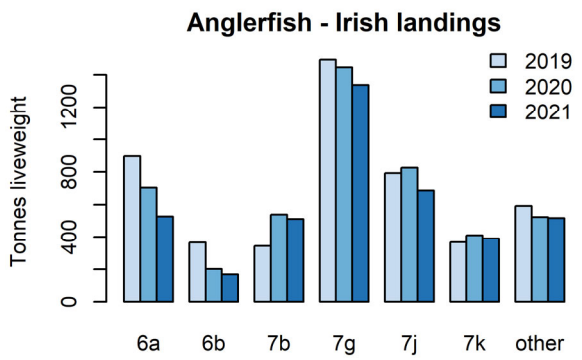


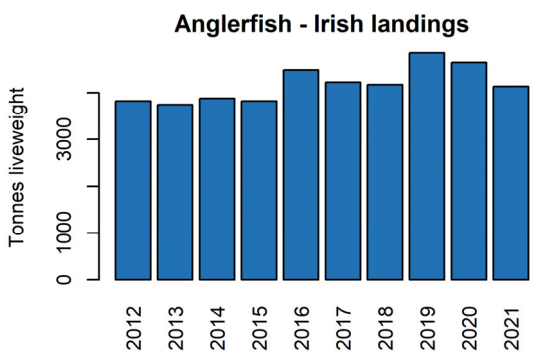
◀ The distribution of EU landings of anglerfish between 2016-2020 (both species combined). Highest catches were taken in the northern North Sea, Rockall, Porcupine and Celtic Sea.



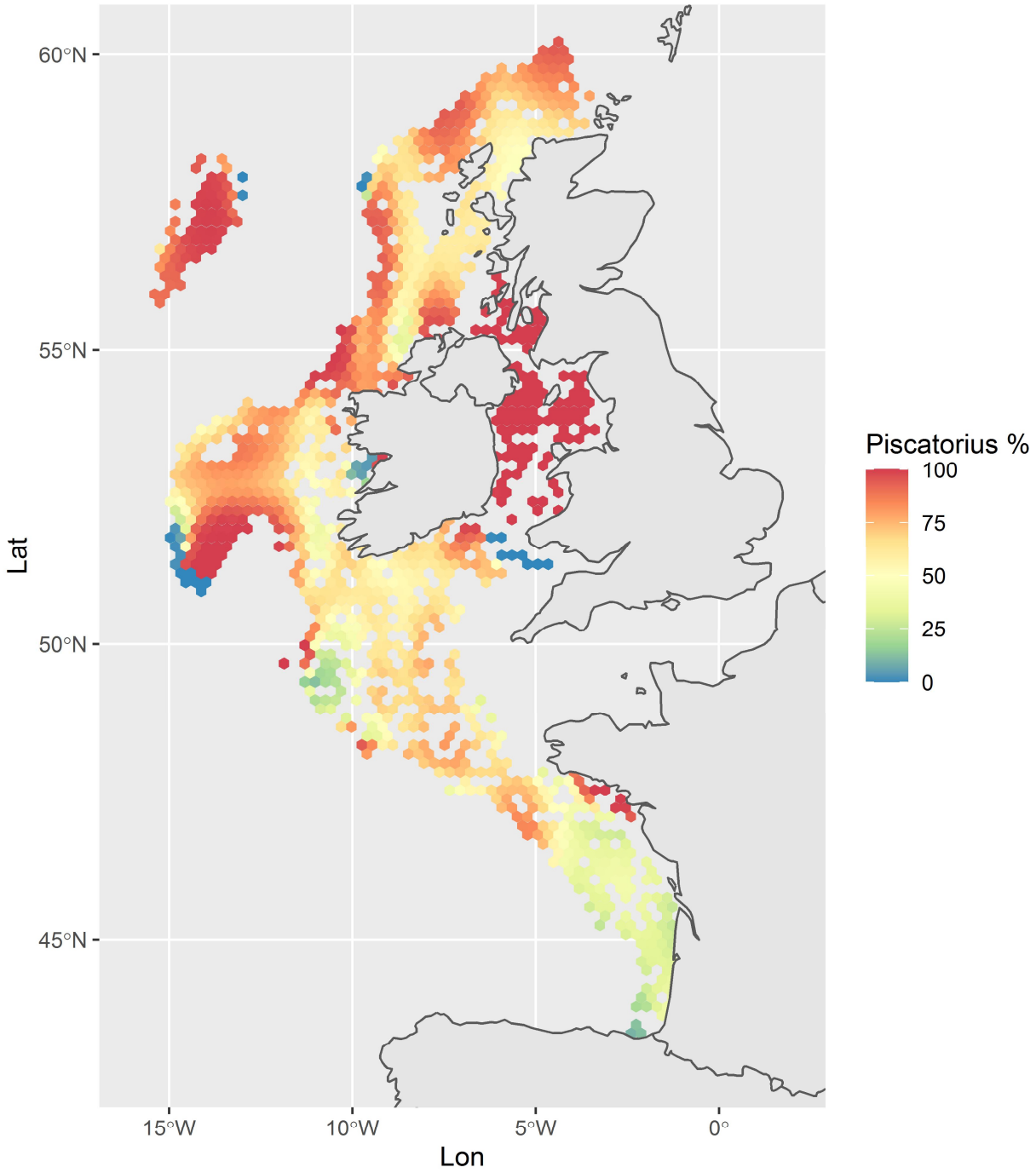
◀ The distribution of Irish anglerfish landings between 2016-2020 (both species combined). Catches were highest along the shelf edge and in the Celtic Sea.

IRISH LANDINGS AND VALUE OF TAC



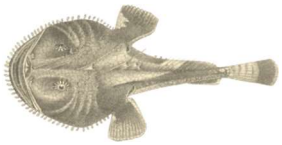


The annual landings of anglerfish by Irish vessels were approximately 4,500 tonnes in the last 3 years, mostly from 7.g and 7.j. Anglerfish are the most valuable demersal fish species: the landings in 2021 were worth around €16 million.



Ratio of survey catch weights of white (*Lophius piscatorius*) and black (*Lophius budegassa*) anglerfish. Red indicates 100% white anglerfish, blue indicates 100% black anglerfish. Survey data from ICES DATRAS database; all available bottom trawl surveys in ICES areas 6,7,8 during the years 2003-2019 were included. Proportions were smoothed spatially using a generalised additive model.

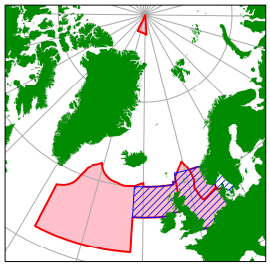
West of Scotland, Rockall and North Sea Anglerfish



Sub-areas 4 and 6 and Division 3.a

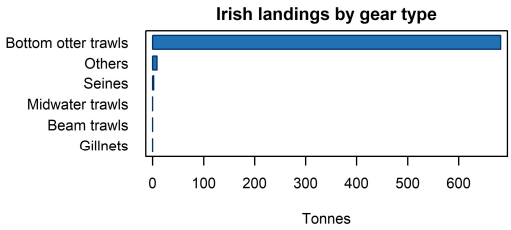
ADVICE FOR 2023

ICES advises that when the MSY approach is applied, catches should be no more than 9,881 t in each of the years 2023 and 2024.



KEY POINTS

ICES Assessment Category	3 (rfb rule)	
Management Plan	NSMAP (target species)	
Advice Basis	ICES MSY approach	Catch=9,881 t
Ranges	F_{MSY} Range Lower	Not available
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not available
Landing Obligation	From 2019	No derogations or exemptions apply

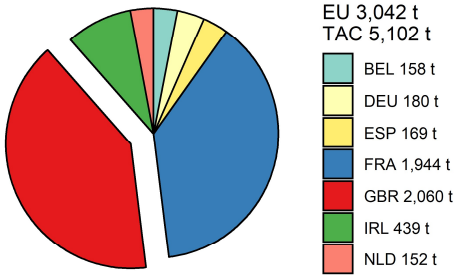


MANAGEMENT IN 2022

- Two species of *Lophius* occur in this area. Black anglerfish (*Lophius budegassa)* usually make up around 10% of the international landings but in some years this may be as much as 30%. The two species are assessed and managed as a single stock.
- There are three TAC areas that cover anglerfish in this area:
  - Union and UK waters of areas 2.a and 4
  - Norwegian waters of area 4
  - Union, UK and international waters of areas 6, 5.b,12,14.

  Ireland only has a quota for the 6, 5.b,12,14 area and generally relies on swaps to land its catches. France has the largest EU quota but usually takes less than a third of this. The UK has full quota uptake and is responsible for the vast majority of the international landings.
- There is a special condition that states that up to 20% of the area 6, 5b, 12, 14 quota may be fished in UK and Union waters of 2a and 4.

2022 Quota Allocations for area 6, 5.b, 12 and 14



KEY STOCK CONSIDERATIONS

- The advice is based on a survey index trend (decreasing) together with a fishing pressure proxy (F is above the reference point), a biomass safeguard (biomass is above the reference point) and precautionary multiplier. This would result in a reduction in catch advice of 36% but a stability clause limits the reduction in advice to 30%.
- Irish vessels mainly catch anglerfish in mixed fisheries with various gadoids and megrim near the Stanton Banks; with hake and other gadoids along the continental slope; and with megrim to the south of Rockall.
- Discard levels in this stock are estimated to be low (1.2% in 2021).

Published 28 October 2022

Anglerfish (*Lophius budegassa, Lophius piscatorius*) in subareas 4 and 6 and Division 3.a (North Sea, Rockall and West of Scotland, Skagerrak and Kattegat)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches should be no more than 9 881 tonnes in each of the years 2023 and 2024.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Management should be implemented at the stock level.

Stock development over time

The fishing pressure proxy on the stock is above $F_{MSY\ proxy}$ (Figure 2), and the stock-size index is above MSY Btrigger proxy (Itrigger).

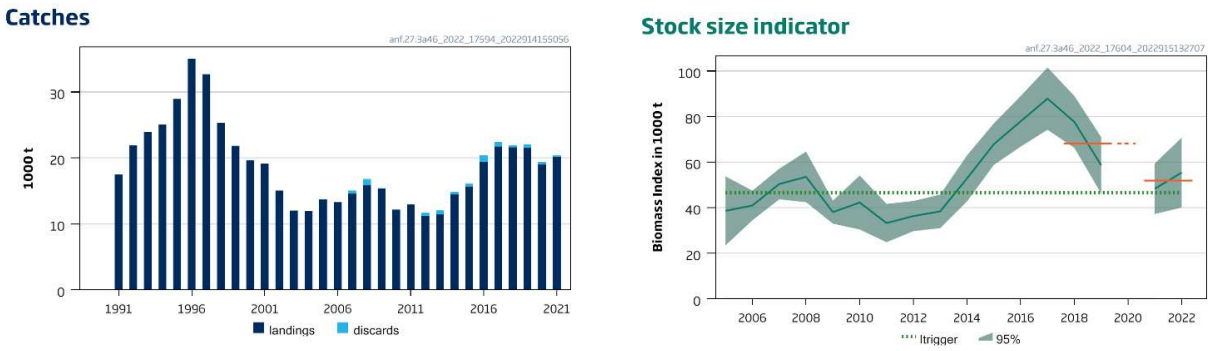


Figure 1 Anglerfish in subareas 4 and 6, and in Division 3.a. Summary of the stock assessment. ICES landings and discards (estimates available since 2007). Stock biomass from the SIAMISS-Q2 survey. The horizontal orange lines indicate the average of the most recent two years, and the previous three years (with 2020 not available and therefore excluded from the average).

Catch scenarios

ICES framework for category 3 stocks was applied (rfb rule, method 2.1; ICES, 2022a). A survey biomass index was used as an indicator of stock development. The advice is based on the recent advised catches (2022), multiplied by the ratio of the mean of the last two index values (index A) and the mean of the three preceding values (index B), a ratio of observed mean length in the catch relative to the target mean length, a biomass safeguard, and a precautionary multiplier. The stability clause was considered and applied to limit the reduction in catch advice to 30%. The discard rate (average 2007–2021) was 2.9%.

Table 1 Anglerfish in subareas 4 and 6, and in Division 3.a. The basis for the catch scenarios. All weights are in tonnes. *
* The figures in the table are rounded. Calculations were made with unrounded inputs, and computed values may not match

Division 3a46 Anglerfish stock		
Previous catch advice A_y (advised catch for 2022)		14 116 tonnes
Stock biomass trend		
Index A (2021, 2022)		53 222 tonnes
Index B (2018, 2019; 2020 not available)		68 118 tonnes
r: stock biomass trend (index ratio A/B)		0.78
Fishing pressure proxy		
Mean catch length ($L_{mean} = L_{2021}$)		53 cm
MSY proxy length ($L_{F=M}$)		61 cm
f: Fishing pressure proxy relative to MSY proxy ($L_{2021}/L_{F=M}$)		0.87
Biomass safeguard		
Last index value (I_{2021})		55 423
Index trigger value ($I_{trigger} = I_{loss} \times 1.4$)		46 554
b: Index relative to trigger value, min $\{I_{2021}/I_{trigger}, 1\}$		1
Precautionary multiplier to maintain biomass above B_{lim} with 95% probability		
m: multiplier (generic multiplier based on life history)		0.95
RFB calculation **		9 100 tonnes
Stability clause (+20%/−30% compared to A_y, only applied if b = 1)	Applied	0.70
Discard rate		1.2%
Catch advice for 2023 (A_y × stability clause)		9 881 tonnes
Projected landings corresponding to advice ***		9 610 tonnes
% advice change ^		−30%

exactly when calculated using the rounded figures in the table.
**$Ay+1 = Ay \times r \times f \times b \times m$.
*** [Advised catch for 2023] × [1 – discard rate].
^ Advice value for 2023 relative to the advice value for 2022 (14 116 tonnes).

The current advice has decreased by 30% compared to last year's advice because of a change in the advice method and a declining trend in the recent stock biomass.

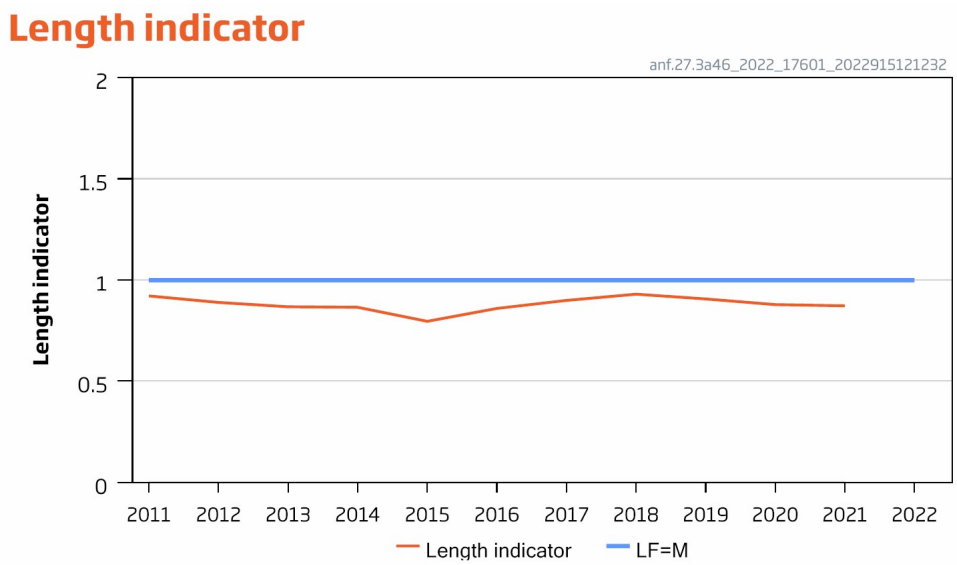


Figure 2 Anglerfish in subareas 4 and 6 and in Division 3.a. Length indicator (mean length of fish in the catch above the estimated length of first capture (Lc) normalised to the MSY proxy reference length $L_{F=M}$.). The exploitation status is below $F_{MSY\ proxy}$ when the indicator ratio value is higher than 1 (shown by a blue line).

Basis of the advice

Table 2 Anglerfish in subareas 4 and 6 and in Division 3.a. The basis of the advice.

Advice basis	MSY approach
Management plan	An EU multiannual management plan (MAP) has been agreed by the EU for this stock (EU, 2018). The MAP stipulates that when the F_{MSY} ranges are not available, fishing opportunities should be based on the best available scientific advice. There is no agreed shared management plan with the UK or Norway for this stock, and ICES provides advice according to ICES MSY approach.

Quality of the assessment

The SIAMISS-Q2 survey was not completed in 2020 due to the COVID-19 pandemic; the stock-size indicator is therefore unknown for 2020. The use of two values (2018, 2019; no data for 2020) for index B in the category 3 approach adds a degree of uncertainty. Furthermore, in 2022 the SIAMISS-Q2 survey did not include Division 6.b (Rockall) which in 2021 accounted for 7.9% of landings. The survey estimate for 2021 was used in place of the missing 2022 estimate for Division 6.b. This adds a further degree of uncertainty to the assessment, but does not affect the advice as the reduction is capped.

The SIAMISS-Q2 survey does not cover divisions 3.a, 4.b, or 4.c, which collectively accounted for 10.2% of the landings in 2021. It is uncertain to what extent the lack of coverage of these areas affects the quality of the assessment.

Discard data are available for most of the fleets except the gillnet fishery, which is not adequately sampled and which accounted for 13% of the landings in 2021.

Issues relevant to the advice

Previously, advice for this stock was given following ICES precautionary approach; the new method gives advice following ICES MSY approach (ICES, 2022a).

The basis for the advice (rfb rule) has a biennial advice interval and so advice is provided for 2 years (ICES, 2022a).

There is a mismatch between management and assessment area, and as a result there is a potential for catches to exceed advice.

Reference points

Table 3 Anglerfish in subareas 4 and 6 and in Division 3.a. Reference points, relative values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger\ proxy}$	46 554	Biomass index trigger value ($I_{trigger}$), defined as $I_{trigger} = I_{loss} \times 1.4$, where I_{loss} is the lowest observed historical biomass index value (from 2011) from 2005–2022. Value in tonnes.	ICES (2022a, 2022b)
	$F_{MSY\ proxy}$	1	$L_{mean}/L_{F=M}$; Mean catch length divided by MSY proxy reference length ($L_{F=M}$ = 61 cm).	ICES (2022a, 2022b)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 4 Anglerfish in subareas 4 and 6 and in Division 3.a. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2022c)
Assessment type	Survey biomass trend applying the rfb rule for advice (ICES, 2022a).
Input data	Commercial catch (international landings and discards, length frequencies from catch sampling), and a dedicated Scottish–Irish Anglerfish and Megrim Industry–Science Survey in Subarea 6 and Division 4.a (G3745 - Anglerfish surveys II-III [SIAMISS-Q2])
Discards and bycatch	Discard estimates are available from 2007 onwards for the majority of the fleets included in the model and in the advice.
Indicators	Length distribution from the SIAMISS–Q2 survey
Other information	Last benchmarked in 2018 (WKANGLER; ICES, 2018a).
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 5 Anglerfish in subareas 4 and 6, and in Division 3.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice		Landings corresponding to advice	Agreed TAC *	Official landings	ICES landings #	ICES discards
		Division 3.a and Subarea 4	Subarea 6					
1990	Not assessed	-	-	-	8 600	17 605	-	-
1991	Not assessed	-	-	-	8 600	18 369	17 441	-
1992	Not assessed	-	-	-	8 600	20 807	21 872	-
1993	No long-term gain in increased F **	-	-	-	8 600	22 596	23 971	-
1994	No long-term gain in increased F **	-	-	-	8 600	25 155	25 057	-
1995	A precautionary TAC not exceeding recent catch levels**	-	-	-	8 600	29 055	28 913	-
1996	A precautionary TAC not exceeding recent catch levels**	-	-	-	8 600	35 039	35 100	-
1997	Reduction in fishing effort**	-	-	-	8 600	32 853	32 728	-
1998	Reduction in fishing effort**	-	-	-	30 700	25 471	25 293	-
1999	Reduce fishing effort, effective implementation of the TAC**	-	-	-	30 700	21 230	21 854	-
2000	40% reduction in catches	< 9700	< 7400	-	25 700	18 973	19 682	-
2001	2/3 of the catches in 1973–1990	5700	4300	-	20 500	19 304	19 157	-
2002	2/3 of the catches in 1973–1990	5700	4300	-	15 300	15 978	15 067	-
2003	Reduce F below F_{pa}	-	-	< 6700***	10 200	13 004	12 008	-
2004	Reduce F below F_{pa}	-	-	< 8800	10 200	13 496	11 976	-
2005	No effort increase	-	-	-	15 000	13 557	13 728	-
2006	No effort increase	-	-	-	15 000	15 152	13 292	-
2007	No effort increase	-	-	-	16 500	16 430	14 564	490
2008	No effort increase	-	-	-	16 500	16 918	15 878	903
2009	Same advice as last year	-	-	-	16 900	16 008	15 372	38
2010	No effort increase	-	-	-	16 900	13 898	12 136	69
2011	Decrease effort	-	-	-	15 100^	13 679	12 902	95
2012	Reduce catch	-	-	-	14 344^	12 266	11 143	590
2013	Decrease catches by 20%	-	-	-	13 627^	12 141	11 375	687
2014	Decrease catches by 20%	-	-	10231	12 265^	13 286	14 406	448
2015	Increase landings by 20%	-	-	14 702	16 203^	16 182	15 663	395
2016	Precautionary approach (increase recent advised catch by no more than 20%)	≤ 18 435		17 642	19 142^	19 533	19 412	981
2017	Precautionary approach	≤ 22 007		21 171	21 171^	22 023	21 719	756
2018	Precautionary approach	≤ 26 408		≤ 25 563	25 405^^	21 487	21 572	326

Year	ICES advice	Catch corresponding to advice		Landings corresponding to advice	Agreed TAC *	Official landings	ICES landings #	ICES discards
		Division 3.a and Subarea 4	Subarea 6					
2019	Precautionary approach	≤ 31 690			31 690^^	21 192	21 179	513
2020	Precautionary approach	≤ 22 056			22 056^^	19 063##	19 072	316
2021	Precautionary approach	≤ 17 645			18 349^^^	20 066##	20 143	249
2022	Precautionary approach	≤ 14 116			14 116^^^			
2023	MSY approach	≤ 9 881						
2024	MSY approach	≤ 9 881						

* TAC for Subarea 4 and Division 2.a (EC until 2020; UK thereafter) plus TAC for Division 5.b (EC) and subareas 6, 12, and 14. Prior to 1998, TAC covered only Division 5.b (EC) and subareas 6, 12, and 14.
** For Subarea 6.
*** Advice for Division 3.a, Subarea 4, and Division 6.a.
^ An additional quota of 1500 tonnes is also available for EU vessels fishing in the Norwegian zone of Subarea 4.
^^ An additional quota of 1700 tonnes is also available for EU vessels fishing in the Norwegian zone of Subarea 4.
^^^ An additional quota of 1000 tonnes is also available for EU vessels fishing in the Norwegian zone of Subarea 4.
# Includes Division 3.a official landings when ICES estimates are not available.
Preliminary.

History of the catch and landings

Table 6 Anglerfish in subareas 4 and 6 and in Division 3.a. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings								Discards
	Division 3.a and Subarea 4				Subarea 6				
20 392 tonnes	Demersal trawls 68%	Gillnets 21%	Norway lobster trawls 6%	Other 5%	Demersal trawls 87%	Gillnets 1%	Norway lobster trawls 11%	Other 1%	249 tonnes
	20 143 tonnes								

Table 7 Anglerfish in subareas 4 and 6 and in Division 3.a. Official landings by ICES area, and ICES estimates of landings and discards. All weights are in tonnes.

Year	3.a	4.a	4.b	4.c	6.a	6.b	4	6	Total (3.a, 4, and 6)	ICES landings**	ICES discards
1973	140	2 085	575	41	9 221	127	2 701	9 348	12 189	-	-
1974	202	2 737	1 171	39	3 217	435	3 947	3 652	7 801	-	-
1975	291	2 887	1 864	59	3 122	76	4 810	3 198	8 299	-	-
1976	641	3 624	1 252	49	3 383	72	4 925	3 455	9 021	-	-
1977	643	3 264	1 278	54	3 457	78	4 596	3 535	8 774	-	-
1978	509	3 111	1 260	72	3 117	103	4 443	3 220	8 172	-	-
1979	687	2 972	1 578	112	2 745	29	4 662	2 774	8 123	-	-
1980	652	3 450	1 374	175	2 634	200	4 999	2 834	8 485	-	-
1981	549	2 472	752	132	1 387	331	3 356	1 718	5 623	-	-
1982	529	2 214	654	99	3 154	454	2 967	3 608	7 104	-	-
1983	506	2 465	1 540	181	3 417	433	4 186	3 850	8 542	-	-
1984	568	3 874	1 803	188	3 935	707	5 865	4 642	11 075	-	-
1985	578	4 569	1 798	77	4 043	1 013	6 444	5 056	12 078	-	-
1986	524	5 594	1 762	47	3 090	1 326	7 403	4 416	12 343	-	-
1987	589	7 705	1 768	66	3 955	1 294	9 539	5 249	15 377	-	-
1988	347	7 737	2 061	95	6 003	1 730	9 893	7 733	17 973	-	-
1989	334	7 868	2 121	86	5 729	313	10 075	6 042	16 451	-	-
1990	570	8 387	2 177	34	5 615	822	10 598	6 437	17 605	-	-
1991	595	9 235	2 522	26	5 061	923	11 790	5 984	18 369	17 441	-
1992	938	10 209	3 053	39	5 479	1 089	13 301	6 568	20 807	21 872	-
1993	843	12 309	3 143	66	5 553	681	15 519	6 234	22 596	23 971	-
1994	811	14 505	3 445	210	5 273	909	18 162	6 182	25 155	25 057	-
1995	823	17 891	2 627	402	6 354	958	20 920	7 312	29 055	28 913	-
1996	702	25 176	1 847	304	6 408	602	27 327	7 010	35 039	35 100	-

Year	3.a	4.a	4.b	4.c	6.a	6.b	4	6	Total (3.a, 4, and 6)	ICES landings**	ICES discards
1997	776	23 425	2 172	160	5 330	990	25 757	6 320	32 853	32 728	-
1998	626	16 859	2 088	78	4 506	1 313	19 026	5 819	25 471	25 293	-
1999	660	13 344	1 517	24	4 284	1 401	14 885	5 685	21 230	21 854	-
2000	602	12 338	1 617	31	3 311	1 074	13 986	4 385	18 973	19 682	-
2001	621	12 861	1 832	21	2 660	1 309	14 714	3 969	19 304	19 157	-
2002	667	11 048	1 244	21	2 280	718	12 313	2 998	15 978	15 067	-
2003	478	8 523	847	20	2 493	643	9 390	3 136	13 004	12 008	-
2004	519	8 987	851	15	2 453	671	9 853	3 124	13 496	11 976	-
2005	458	8 424	688	5	3 019	958	9 117	3 982	13 557	13 728	-
2006	426	10 340	683	3	2 785	915	11 026	3 700	15 152	13 292	-
2007	433	10 632	749	4	3 353	1 261	11 384	4 613	16 430	14 564	490
2008	486	11 038	769	5	3 373	1 246	11 813	4 619	16 918	15 878	903
2009	478	10 067	651	8	2 984	1 820	10 726	4 804	16 008	15 372	38
2010	433	8 190	615	11	3 040	1 606	8 815	4 645	13 893	12 136	69
2011	405	7 760	764	8	2 871	1 871	8 532	4 742	13 679	12 902	95
2012	423	6 459	714	5	2 835	1 831	7 177	4 666	12 266	11 143	590
2013	407	6 393	546	5	2 667	2 123	6 944	4 790	12 141	11 375	687
2014	440	7 633	820	27	2 610	1 754	8 481	4 365	13 286	14 406	448
2015	478	9 690	985	16	3 290	1 723	10 691	5 013	16 182	15 663	395
2016	586	11 690	1 196	11	4 638	1 423	12 887	6 080	19 553	19 412	981
2017	742	13 620	1 107	7	5 024	1 504	14 753	6 528	22 023	21 719	756
2018	914	13 391	823	11	4 292	1 918	14 225	6 210	21 349	21 572	326
2019	1 029	11 155	1 303	28	5 030	2 647	12 486	7 677	21192	21 179	513
2020*	866	10 674	1 066	24	4 749	1 685	11 763	6 434	19 063	19 072	316
2021*	912	11 959	1 184	19	4 455	1 537	13 162	5 992	20 066	20 143	249

* Preliminary official landings.

** Revised values to include Division 3.a official landings when ICES estimates are not available (ICES, 2022b).

Table 8 Anglerfish in subareas 4 and 6 and in Division 3.a. Official landings by country and ICES estimated landings in Subarea 6. All weights are in tonnes.

Year	Belgium	Denmark	Faroe Is.	France	Germany	Ireland	Netherlands	Norway	Portugal	Russia	Spain	UK (E,W,&NI)	UK (Scotland)	UK (total)	Total	Unallocated	ICES landings
1991	3	1	-	1 910	1	522	-	24	-	-	340	369	2 814	-	5 984	296	6 280
1992	2	3	2	2 308	2	820	-	24	-	-	274	524	2 609	-	6 568	2 638	9 206
1993	9	4	-	2 496	163	524	-	25	-	-	186	299	2 528	-	6 234	3 816	10 050
1994	6	5	-	2 382	140	438	-	30	132	-	215	420	2 414	-	6 182	2 634	8 816
1995	5	1	-	2 648	160	853	-	18	128	-	333	425	2 732	-	7 312	4 984	12 296
1996	-	4	1	2 899	113	807	-	15	-	-	229	345	2 583	-	7 010	11 148	18 158
1997	5	1	4	2 059	249	764	27	5	91	-	234	403	2 478	-	6 320	7 415	13 735
1998	2	2	2	1 635	269	879	1	9	413	-	338	307	1 962	-	5 819	4 821	10 640
1999	-	1	2	1 814	194	692	-	6	429	-	344	171	2 032	-	5 685	3 790	9 475
2000	-	<	-	1 180	158	596	-	14	20	-	231	316	1 870	-	4 385	3 131	7 516
2001	<1	<	1	1 135	78	609	-	7	18	1	397	237	1 486	-	3 969	1 890	5 859
2002	<1	-	-	782	38	355	-	4	8	-	229	165	1 417	-	2 998	−22	2 976
2003	-	<	-	1 403	91	348	-	6	4	-	255	164	865	-	3 136	−68	3 068
2004	<1	<	2	1 366	105	232	-	5	19	2	153	84	1 156	-	3 124	6	3 130
2005	-	-	2	1 689	116	391	-	5	63	4	117	113	1 482	-	3 982	−235	3 747
2006	-	-	3	1 537	73	445	-	7	-	1	112	70	1 451	-	3 700	−209	3 491

Year	Belgium	Denmark	Faroe Is.	France	Germany	Ireland	Netherlands	Norway	Portugal	Russia	Spain	UK (E,W,&NI)	UK (Scotland)	UK (total)	Total	Unallocated	ICES landings
2007	-	-	2	2 090	222	540	-	8	-	1	15	188	1 546	-	4 613	−137	4 476
2008	-	-	2	2 073	146	371	-	7	-	35	259	6	1 720	-	4 619	228	4 847
2009	-	-	6	1 852	211	419	-	9	-	-	242	60	2 005	-	4 804	388	5 192
2010	-	-	1	1 374	166	617	-	14	-	-	229	-	-	2234	4 645	−733	3 912
2011	-	-	1	1 676	149	596	-	7	-	-	167	-	-	2145	4 742	−49	4 693
2012	-	-	5	1 622	142	581	-	6	-	-	105	132	2 073	2205	4 666	−294	4 372
2013	-	-	-	1 777	136	572	-	10	-	-	123	401	1 770	2171	4 790	−63	4 727
2014	-	-	1	1 246	151	572	-	4	-	1	81	-	-	2310	4 365	1 515	5 880
2015	-	-	<	1 326	201	602	-	8	-	2	149	-	-	2724	5 013	−5	5 008
2016	-	-	1	1 734	258	741	-	12	-	-	234	-	-	3080	6 060	−94	5 966
2017	-	-	<	1 882	246	793	-	5		2	290	-	-	3310	6 528	−68	6 460
2018	-	-	-	1 287	394	878	-	4	-	-	261	-	-	3387	6 211	145	6 356
2019	-	-	-	1 293	434	126	-	2	-	1	358	-	-	4322	7 652	160	7 812
2020	-	-	-	1 304	229	900	-	1	-	3	264	-	-	3731	6 432	169	6 601
2021	-	1	-	1 326	157	684	-	-	-	-	282	-	-	3539	5 992	40	6 032

* Preliminary official landings.

Table 9 Anglerfish in subareas 4 and 6 and in Division 3.a. Official landings by country and ICES estimated landings in Subarea 4. All weights are in tonnes.

Year	Belgium	Denmark	Faroes	France	Germany	Ireland	Netherlands	Norway	Sweden	UK (E,W,&NI)	UK (Scotland)	UK (Total)	Total	Unallocated	ICES landings
1991	372	1 599	1	124	75	-	313	604	14	804	7 884	-	11 790	−1 224	10 566
1992	559	1 686	-	152	70	-	410	639	7	1 158	8 620	-	13 301	−1 573	11 728
1993	595	1 293	12	69	113	-	559	1 227	7	1 463	10	-	15 519	−2 441	13 078
1994	753	1 509	18	30	99	-	568	1 329	10	1 582	12	-	18 162	−2 732	15 430
1995	607	1 027	20	18	623	-	363	672	4	1 456	16	-	20 920	−5 126	15 794
1996	323	1 464	-	7	301	-	201	850	2	1 357	22	-	27 327	−11 087	16 240
1997	357	1 489	15	7	619	-	260	678	5	2 969	19	-	25 757	−7 540	18 217
1998	389	1 456	10	13	892	-	238	967	11	1 307	13	-	19 026	−4 999	14 027
1999	286	1 496	6	18	463	-	166	1 236	12	1 148	10	-	14 885	−3 166	11 719
2000	476	1 347	-	8	196	-	168	1 191	81	642	9 877	-	13 986	−2 422	11 564
2001	594	1 540	2	9	104	-	132	1 227	46	658	10	-	14 714	−2 037	12 677
2002	459	1 563	10	8	112	-	75	938	65	334	8 749	-	12 313	−600	11 713
2003	190	1 714	3	8	76	1	52	781	10	281	6 274	-	9 390	−676	8 714
2004	265	1 812	11	8	31	-	63	1 021	7	206	6 429	-	9 853	−1 330	8 523
2005	211	1 616	22	4	93	-	45	896	9	130	6 091	-	9 117	579	9 696
2006	141	1 587	2	7	187	-	47	1 018	10	207	7 820	-	11 026	−1 462	9 564
2007	181	1 134	-	14	198	-	76	855	26	425	8 476	-	11 384	−1 561	9 823
2008	185	1 308	-	13	367	-	71	875	76	118	8 800	-	11 813	−1 081	10 732
2009	140	1 382	4	23	233	-	41	881	-	406	7 617	-	10 726	−945	9 781
2010	131	1 337	-	30	145	-	56	802	-	460	5 855	-	8 815	−915	7 900
2011	116	1 127	-	24	63	-	59	505	-	-	-	6	8 532	−612	7 920
2012	133	1 122	-	15	275	-	67	496	-	333	4 736	5	7 177	−765	6 412
2013	137	1 046	-	15	284	-	42	572	-	621	4 226	4	6 944	−638	6 306
2014	217	1 135	-	30	339	-	108	533	-	-	-	6	8 481	−316	8 165
2015	200	1 331	-	26	309	-	98	415	10	-	-	8	10 691	−448	10 243
2016	253	2 090	-	36	226	-	148	626	11	-	-	9	12 887	−33	12 854
2017	169	2 567	-	91	537	-	199	881	18	-	-	10	14 733	−225	14 508
2018	156	2 201	-	142	536	-	187	1 267	25	-	-	9	14 225	55	14 280
2019	249	2 202	-	186	574	-	405	1 289	36	-	-	7	12 486	176	12 662
2020	243	1 398	-	127	361	-	285	997	72	-	-	8	11 765	−181	11 582
2021	290	1462	-	108	228	-	376	982	11	-	-	960	13162	6	13168

* Preliminary official landings.

Table 10 Anglerfish in subareas 4 and 6 and in Division 3.a. Official landings by country in Division 3.a. All weights are in tonnes.

Year	Belgium	Denmark	France	Germany	Netherlands	Norway	Sweden	UK (Total)	Total	Unallocated	ICES landings
1991	15	493	-	-	-	64	23	-	595	-	-
1992	48	658	-	-	-	170	62	-	938	-	-
1993	34	565	-	1	-	154	89	-	843	-	-
1994	21	459	-	<1	-	263	68	-	811	-	-
1995	35	312	-	-	-	440	36	-	823	-	-
1996	-	367	-	1	-	309	25	-	702	-	-
1997	-	550	-	1	-	186	39	-	776	-	-
1998	-	415	-	1	-	177	33	-	626	-	-
1999	-	362	-	2	-	260	36	-	660	-	-
2000	-	377	-	1	-	197	27	-	602	-	-
2001	-	375	-	-	-	200	46	-	621	-	-
2002	-	369	-	1	-	242	55	-	667	288	379
2003	-	215	-	-	3	189	71	-	478	252	226
2004	-	311	-	1	4	130	73	-	519	197	322
2005	-	274	-	1	4	100	79	-	458	174	284
2006	-	227	-	2	3	139	54	-	426	189	237
2007	-	255	-	1	1	132	44	-	433	168	265
2008	-	287	-	1	3	144	51	-	486	187	299
2009	-	344	-	1	-	134	-	-	478	79	399
2010	-	270	-	1	5	158	-	-	433	109	324
2011	-	251	-	2	-	153	-	-	405	116	289
2012	-	307	<1	1	-	115	-	-	423	63	360
2013	-	298	<1	1	-	108	-	-	407	65	342
2014	-	309	-	-	4	127	-	-	440	78	362
2015	-	336	-	1	9	90	42	-	478	66	412
2016	-	389	<1	2	17	124	53	<1	586	−5	591
2017	-	526	1	1	16	118	81	-	742	−9	751
2018	-	597	-	2	16	204	95	-	914	−22	936
2019	-	692	-	1	46	189	100	-	1028	−35	1 063
2020*	-	600	-	1	66	129	71	0	866	−22	888
2021*	-	678	-	1	46	116	71	-	912	−30	942

* Preliminary official landings.

Summary of the assessment

Table 11 Anglerfish in subareas 4 and 6, and in Division 3.a. Assessment summary. Weights are in tonnes. High and low refer to 95% confidence intervals.

Year	Stock-size indicator			ICES landings *	ICES discards	Length indicator **
	Low	Value	High			
1991				17 441		
1992				21 872		
1993				23 971		
1994				25 057		
1995				28 913		
1996				35 100		
1997				32 728		
1998				25 293		
1999				21 854		
2000				19 682		
2001				19 157		
2002				15 067		
2003				12 008		
2004				11 976		
2005	23 479	38 617	53 755	13 728		
2006	34 478	40 985	47 492	13 292		

Year	Stock-size indicator			ICES landings *	ICES discards	Length indicator **
	Low	Value	High			
2007	43 676	50 392	57 108	14 564	490	
2008	42 421	53 546	64 671	15 878	903	
2009	32 987	38 060	43 133	15 372	38	
2010	30 429	42 279	54 129	12 136	69	0.840
2011	24 846	33 254	41 662	12 902	95	0.918
2012	29 704	36 325	42 946	11 143	590	0.886
2013	31 020	38 395	45 770	11 375	687	0.865
2014	42 769	52 884	62 999	14 406	448	0.862
2015	58 782	67 915	77 047	15 663	395	0.793
2016	66 831	77 946	89 060	19 412	981	0.856
2017	74 222	87 896	101 569	21 719	756	0.896
2018	66 258	77 661	89 064	21 572	326	0.926
2019	46 189	58 575	70 962	21 551	513	0.903
2020				19 072	316	0.875
2021	37 233	48 354	59 476	20 143	249	0.869
2022	40 068	55 423	70 779			

* Includes Division 3.a official landings when ICES estimates are not available.

** Mean length of fish in the catch above the estimated length of first capture (Lc) normalised to the MSY proxy reference length $L_{F=M}$.

*** Stock abundance is not available, because the survey was not conducted due to the COVID-19 pandemic.

Sources and references

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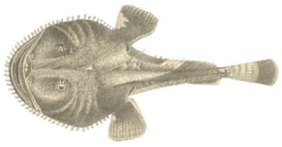
Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Anglerfish (*Lophius budegassa*, *Lophius piscatorius*) in Subareas 4 and 6, and Division 3.a (North Sea, Rockall and West of Scotland, Skagerrak and Kattegat). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, anf.27.3a46. https://doi.org/10.17895/ices.advice.19772359

Celtic Sea and Bay of Biscay Anglerfish



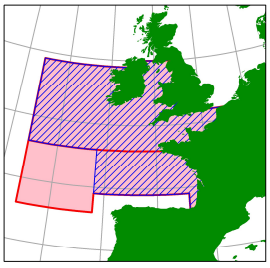
Sub-area 7 and Divisions 8.a,b,d

ADVICE FOR 2023

Black anglerfish (*Lophius budegassa*): ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 23,436 t.

White anglerfish (*Lophius piscatorius*): ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 34,540 t.

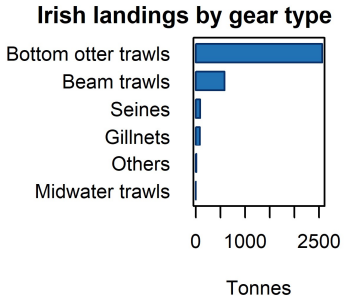
ICES also advises that management of black and white anglerfish under a combined-species TAC, prevents effective control of the single-species exploitation rates and could lead to the overexploitation of either species.



KEY POINTS

	Black anglerfish	White anglerfish
Assessment Cat	1 (Quantitative Assessment)	1 (Quantitative Assessment)
Management Plan	WWMAP (target species)	WWMAP (target species)
Advice Basis	MSY approach, Catch=23,436 t	MSY approach, Catch=34,540 t
F_{MSY} ranges	F_{lower} Catch=16,483 t	F_{lower} Catch=24,306 t
	F_{MSY} Catch=23,436 t	F_{MSY} Catch=34,540 t
	F_{upper} Catch=33,948 t	F_{upper} Catch=37,757 t
Landing Obligation	From 2019; Area and gear specific derogation*	From 2019; Area and gear specific derogation*

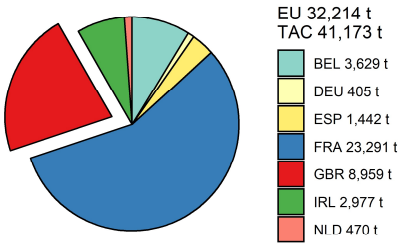
*EC 2020/2015



MANAGEMENT IN 2022

- The TAC applies to combined species of anglerfish because black and white anglerfish are often not separated in the landings. This can potentially lead to over-exploitation of one of the two species. However, both species are currently assessed to be well within safe biological limits.
- There are two TAC areas that cover these stocks: area 7 and area 8.a,b,d,e. Up to 10% of the Sub-area 7 TAC may be fished in Divisions 8.a,b,d,e, but there currently is no flexibility from 8.a,b,d,e to 7.

2022 Quota Allocation Area 7



KEY STOCK CONSIDERATIONS

- The advice for the combined species in the two TAC areas is 57,976 t. This implies a TAC for Sub-area 7 of 45,724 t with an Irish quota of 3,306 t – assuming the same allocation between the TAC areas as last year.
- The assessment for black anglerfish indicates that the stock is increasing and is fished below F_{MSY}. The stock was benchmarked in 2022 and this is the first time ICES has provided MSY advice for this stock (the advice was previously based on the precautionary approach). The catch advice for 2023 is 28% higher than the advice for 2022; this is due to an increasing stock size and the change in basis of the advice.
- The assessment for white anglerfish indicates that the stock is fished below F_{MSY}, the stock size peaked in 2020 and is now decreasing. The stock was benchmarked in 2022 and the perception of the stock size is unchanged but the estimated levels of fishing mortality and recruitment have changed. The catch advice is very similar to the advice for the previous year.
- Much of the Irish anglerfish landings come from highly mixed fisheries. They are caught together with megrim, *Nephrops*, haddock, hake and other species. In some areas anglerfish are specifically targeted, mainly along the edge of the continental shelf.

Published 25 October 2022

Black-bellied anglerfish (*Lophius budegassa*) in Subarea 7 and divisions 8.a–b, and 8.d (Celtic Seas, Bay of Biscay)

ICES advice on fishing opportunities

Please note: the present advice replaces the advice given in June 2022.

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 23 436 tonnes.

ICES notes the existence of a precautionary management plan developed and adopted by one of the relevant management authorities for this stock.

Management of catches of the two anglerfish species—black-bellied anglerfish (*Lophius budegassa*) and white anglerfish (*Lophius piscatorius*)—under a combined species total allowable catch (TAC) prevents effective control of the single-species exploitation rates and could lead to the overexploitation of either species.

Stock development over time

Fishing pressure on the stock is below F_{MSY} and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

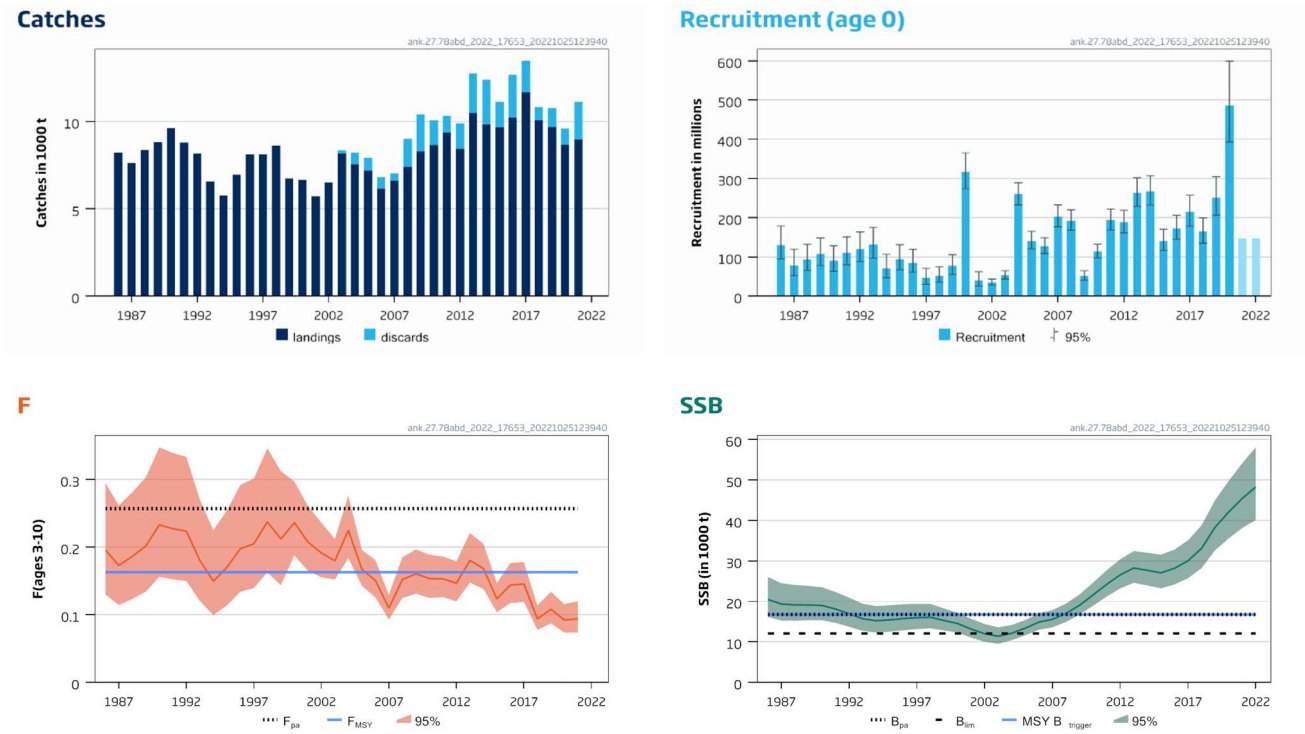


Figure 1 Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d. Summary of the stock assessment. Discard observations are available since 2003. The assumed recruitment values for 2021 and 2022 are shaded in a lighter colour.

Catch scenarios

Table 1 Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d. The basis of the catch scenarios.

Variable	Value	Notes
$F_{ages\ 3–10}$ (2022)	0.098	*Status quo* $F_{ages\ 3–10}$ (average 2019–2021).
SSB (2023)	49454	Short-term forecast (STF); in tonnes.
$R_{age\ 0}$ (2022)	146922	Predicted from stock–recruitment relationship; in thousands.
$R_{age\ 0}$ (2023)	147092	Predicted from stock–recruitment relationship; in thousands.
Catch (2022)	147437	STF; in tonnes.
Projected landings (2022)	10458	STF assuming average landings ratio by age (2019–2021); in tonnes.
Projected discards (2022)	4148	STF assuming average discards ratio by age (2019–2021); in tonnes.

Table 2 Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d. Annual catch scenarios. All weights are in tonnes. Note: the % change in TAC is not computed because the TAC is for both species of anglerfish.

Basis	Total catch (2023)	Projected landings* (2023)	Projected discards **(2023)	$F_{ages\ 3–10}$ Total (2023)	$F_{ages\ 3–10}$ Projected landings (2023)	$F_{ages\ 3–10}$ Projected discards (2023)	SSB (2024)	% SSB change ***	% advice change ^
ICES advice basis									
MSY approach = F_{MSY}	23436	18793	4643	0.163	0.156	0.0069	50314	1.74	+26
Other options									
$F_{MSY\ lower}$	16483	13220	3263	0.112	0.107	0.0048	52946	7.1	−11.7
$F_{MSY\ upper}$	33948	27211	6737	0.24	0.23	0.0104	46353	−6.3	+82
F = 0	0	0	0	0	0	0	59220	19.8	−100
F_{pa}	35420	28390	7030	0.26	0.25	0.0109	45800	−7.4	+90
$SSB_{2024} = B_{lim}$	129513	103228	26285	1.59	1.52	0.067	12073	−76	+594
$SSB_{2024} = B_{pa} = MSY\ B_{trigger}$	115519	92189	23330	1.26	1.21	0.054	16776	−66	+519
$SSB_{2024} = SSB_{2023}$	25712	20616	5096	0.180	0.173	0.0076	49454	0	+38
$F = F_{2022}$	14536	11660	2876	0.098	0.094	0.0042	53685	8.6	−22

* Marketable landings, assuming recent discard rate.
** Including BMS landings (EU stocks), assuming recent discard rate.
*** SSB 2024 relative to SSB 2023.
^ Advice value for 2023 relative to advice value for 2022 (18 661 tonnes).

The advice for 2023 is 26% higher because the advice is now based on the MSY approach using a category 1 assessment method and forecast after being benchmarked (ICES, 2022a).

Basis of the advice

Table 3 Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (EU MAP) which was adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to the ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

The stock was benchmarked in 2022 (ICES, 2022a). The broad perception of the stock is unchanged ($F < F_{MSY}$ and increasing stock size).

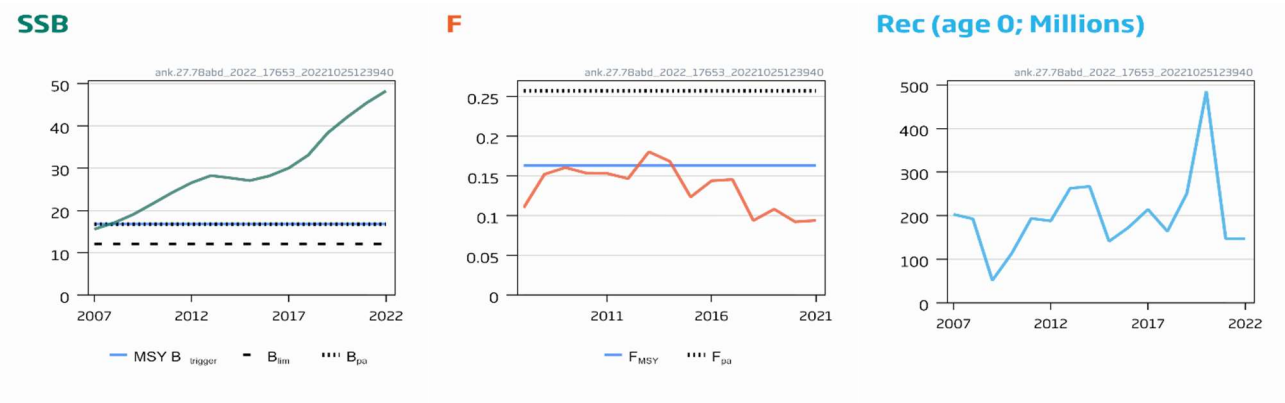


Figure 2 Black-bellied anglerfish in Subarea 7 and divisions 8.a–8.b and 8.d. Historical assessment results. The basis for the advice has changed from a trends-based analysis (category 3) to an analytical assessment (category 1) in 2022, and there are no previous estimates of SSB, F, or R.

Issues relevant for the advice

The two anglerfish species are not separated in the landings statistics. The TACs are set separately for Subarea 7 and divisions 8.a, 8.b, 8.d, and 8.e with each TAC covering catches of both species. Species-specific landings are estimated by ICES. ICES considers that management of the catches of these two species under a combined TAC prevents effective control of single-species exploitation rates and could lead to overexploitation of either species.

Reference points

Table 4 Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	16776	B_{pa}; in tonnes.	ICES (2022a)
	F_{MSY}	0.163	Stochastic simulations (EqSim) with Beverton-Holt stock-recruitment relationship estimated by the assessment model.	ICES (2022a)
Precautionary approach	B_{lim}	12073	SSB_{2004}; lowest observed SSB with high recruitment; in tonnes.	ICES (2022a)
	B_{pa}	16776	$B_{lim} \times \exp(\sigma \times 1.645)$, where $\sigma = 0.2$; in tonnes.	ICES (2022a)
	F_{lim}	Undefined	Inconsistent with F_{pa}.	ICES (2022a)
	F_{pa}	0.257	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability.	ICES (2022a)
Management plan	MAP MSY $B_{trigger}$	16776	MSY $B_{trigger}$; in tonnes.	ICES (2022a)
	MAP B_{lim}	12073	B_{lim}; in tonnes.	ICES (2022a)
	MAP F_{MSY}	0.163	F_{MSY}	ICES (2022a)
	MAP range F_{lower}	0.122	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with F_{MSY}.	ICES (2022a)
	MAP range F_{upper}	0.245	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with F_{MSY}.	ICES (2022a)

Basis of the assessment

Table 5 Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d. The basis of the assessment.

ICES stock data category	1 (ICES, 2022b).
Assessment type	Length-based age-structured Stock Synthesis model that uses catches in the model and forecast (ICES, 2022a; 2022c).
Input data	Commercial landings and discards and three surveys: IAMS [G3098]; IE-IGFS [G7212], and EVHOE [G9527]; the latter two surveys are combined into a single index.
Discards and bycatch	Discard estimates are available since 2003 and used in the assessment.
Indicators	None.
Other information	Last benchmarked in 2022 (ICES, 2022a).
Working group report	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE).

History of the advice, catch, and management

Table 6 Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d. History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in tonnes.

Year	*L. budegassa*	*L. budegassa*	Combined *L. budegassa* + *piscatorius*			*L. budegassa*	
	ICES advice	Catch/landings corresponding to advice*,**	Catch/landings corresponding to advice*,**	Agreed TAC ***	ICES landings^	ICES landings^	ICES catches^
1986	Not assessed	-	-		33198	8218	
1987	Not assessed	-	-	39080	30710	7620	
1988	Not assessed	-	-	42990	29696	8382	
1989	Not assessed	-	-	42990	32835	8820	
1990	Not assessed	-	-	42990	30615	9632	
1991	No advice	-	-	42990	25543	8780	
1992	No advice	-	-	42990	21793	8176	
1993	SSB is decreasing	-	-	25100	21461	6566	
1994	SSB is decreasing	-	-	23900	22945	5744	
1995	No increase in F	-	20000	23200	27987	6955	
1996	No increase in F	-	30300	30400	31426	8093	
1997	No increase in F	-	34300	34300	31097	8115	
1998	No increase in F	-	33000	34300	29073	8600	
1999	No increase in F	-	32900	34300	25531	6739	
2000	≥ 20% decrease in F	-	< 22300	29600	21096	6644	
2001	Reduce F below F_{pa}	-	< 27600	27600	23021	5729	
2002	Reduce F below F_{pa}	-	< 19900	23700	28588	6505	
2003	≥ 30% decrease in F	-	< 16400	21000	36104	8171	8350
2004	≥ 10% decrease in F	-	< 26700	26700	36565	7538	8214
2005	Maintain F < F_{pa}	-	< 37800	31200	35056	7187	7914
2006	Maintain F < F_{pa}	-	< 33900	34000	33783	6130	6834
2007	Maintain F < F_{pa}	-	< 36000	36000	37821	6608	7021
2008	< average landings	-	< 33000	36000	34452	7398	8983
2009	Same advice as 2008	-	< 33000	36000	30122	8287	10400
2010	No increase in effort	-	-	41400	30841	8627	10063
2011	No increase in effort	-	-	40900	34005	9348	10319
2012	Reduce catch	-	-	38897	36617	8429	9888
2013	Reduce catch *pro rata* biomass decrease	< 6900	< 24800	36953	41086	10475	12760
2014	Increase landings *pro rata* biomass increase	< 10757	< 37448	42496	38306	9832	12402
2015	Same advice as 2014	< 10757	< 37448	42496	37508	9651	11111
2016	PA; same as 2015	≤ 10757	≤ 37448	42496	39303	10220	12661
2017	PA; same as 2016	≤ 10757	≤ 37448	42496	37324	11689	13459
2018	PA; same as 2017	≤ 10757	≤ 37448	42496	32421	10077	10804
2019	PA (catch advice)	≤ 10799	≤ 41841	41370	30512	9679	10763
2020	PA (catch advice)	≤ 12959	≤ 44757	44307	28713	8676	9602
2021	PA (catch advice)	≤ 15551	≤ 50130	48338	31005	8965	11107

Year	*L. budegassa*	*L. budegassa*	Combined *L. budegassa* + *piscatorius*			*L. budegassa*	
	ICES advice	Catch/landings corresponding to advice*,**	Catch/landings corresponding to advice*,**	Agreed TAC ***	ICES landings^	ICES landings^	ICES catches^
2022	PA (catch advice)	≤ 18661	≤ 52936	52205			
2023	MSY approach	≤ 23436	≤ 57976				

* Includes Division 7.a since the 2018 benchmark (ICES, 2018).
** PA and MSY advice refer to landings up to 2018 and catches since 2019.
*** Combined TACs for subareas 7 and 8 (which includes Division 8.e).
^ Revised at the 2022 benchmark (ICES, 2022a).

History of catch and landings

Table 7 Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d. Catch distribution by fleet in 2021 as estimated by ICES. All weights are in tonnes.

Catch	Landings					Discards
11107	82% otter trawl demersal fish	2% otter trawl *Nephrops*	7% beam trawl	6% gillnets	4% others	2141
	8965					

Table 8 Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d. History of the ICES estimates of the catch and landings by area and by country. All weights are in tonnes.

Year	ICES estimated landings from Subarea 7						ICES estimated landings from divisions 8.a, 8.b, 8.d				ICES estimated; Subarea 7 and divisions 8.a, 8.b, 8.d		
	ESP	FRA	GBR	IRL	OTH	Total 7	ESP	FRA	OTH	Total 8.a, 8.b, 8.d	Landings	Discards	Catch
1986	2816	2251	949	262	165	6443	485	1289	0	1775	8217		
1987	2174	1868	805	241	28	5116	953	1551	0	2504	7620		
1988	2316	2572	1160	234	65	6347	695	1341	0	2035	8382		
1989	2445	2932	472	310	275	6434	602	1785	0	2387	8820		
1990	2393	2914	1030	614	109	7061	571	2000	0	2571	9632		
1991	2180	2390	809	858	17	6254	799	1727	0	2526	8780		
1992	1763	2440	1002	774	28	6008	536	1632	0	2168	8176		
1993	1304	1941	727	607	68	4646	589	1331	0	1919	6566		
1994	1374	1820	378	290	86	3948	624	1172	0	1796	5744		
1995	1668	2448	389	630	69	5204	463	1287	0	1750	6954		
1996	1909	2763	576	641	90	5979	525	1589	0	2114	8093		
1997	2143	2804	644	557	38	6185	366	1563	0	1929	8114		
1998	2042	2419	763	1234	53	6510	441	1648	0	2089	8599		
1999	2434	1771	193	529	141	5068	458	1212	0	1670	6739		
2000	2051	1961	167	873	169	5220	445	980	0	1424	6645		
2001	2083	1516	131	580	168	4478	333	918	0	1251	5728		
2002	2451	1710	146	309	119	4734	463	1309	0	1771	6505		
2003	3600	2175	181	180	119	6256	396	1520	0	1916	8171	179	8351
2004	2875	1845	256	224	157	5358	471	1708	0	2178	7537	676	8213
2005	2902	1530	248	365	167	5214	415	1559	0	1974	7187	727	7914
2006	2737	1536	131	200	71	4675	282	1171	2	1456	6131	704	6835
2007	2451	1747	150	348	162	4857	316	1434	1	1751	6608	413	7021
2008	3017	2030	279	508	205	6039	265	1095	1	1360	7399	1585	8985
2009	3498	1635	304	797	244	6478	293	1515	2	1809	8287	2113	10400
2010	2866	2179	469	981	316	6812	317	1490	8	1815	8626	1436	10062
2011	3812	1863	418	941	382	7416	503	1423	8	1933	9348	971	10319
2012	2888	2032	365	621	53	5959	692	1612	167	2471	8429	1459	9888
2013	3896	2211	484	615	68	7274	790	2032	379	3200	10475	2285	12760
2014	1629	2829	862	720	74	6114	945	2526	246	3718	9832	2570	12402
2015	1384	2945	1046	839	69	6284	749	2480	136	3365	9649	1460	11109
2016	1118	2881	1063	970	94	6127	918	2968	206	4093	10220	2441	12660
2017	1287	4255	1183	793	0	7518	941	3000	231	4172	11690	1770	13460
2018	890	3443	898	1110	0	6341	766	2807	161	3734	10076	727	10803
2019	1366	3500	993	940	0	6800	645	2156	79	2880	9680	1084	10764
2020	1538	2575	757	1445	187	6502	611	1547	16	2174	8676	926	9601
2021	1548	3790	1309	721	78	7445	422	1085	13	1520	8965	2141	11107

Summary of the assessment

Table 9 Black-bellied anglerfish in Subarea 7 and divisions 8.a–b and 8.d. Assessment summary. 'High' and 'Low' refer to 95% confidence intervals. Weights are in tonnes and recruitment is in thousands. Discard observations are available since 2003.

Year	Recruitment (age 0)			Stock size			Landings (tonnes)	Discards (tonnes)	F ages 3–10		
	R	High	Low	SSB	High	Low			F	High	Low
1986	130138	178763	94740	20510	26072	16135	8217		0.196	0.30	0.130
1987	78878	119913	51885	19353	24509	15281	7620		0.173	0.26	0.114
1988	92875	132061	65316	19154	24073	15240	8382		0.186	0.28	0.124
1989	107480	148279	77907	19125	23823	15353	8820		0.20	0.30	0.134
1990	90320	128901	63287	19008	23513	15366	9632		0.23	0.35	0.156
1991	110098	151448	80038	18124	22344	14702	8780		0.23	0.34	0.152
1992	120102	163586	88177	16973	20942	13756	8176		0.22	0.33	0.150
1993	130768	175502	97436	15720	19435	12715	6566		0.181	0.27	0.120
1994	70720	106993	46745	15233	18843	12314	5744		0.150	0.23	0.099
1995	93995	131409	67234	15454	19056	12533	6954		0.170	0.25	0.114
1996	85624	119608	61296	15755	19302	12860	8093		0.198	0.29	0.134
1997	46250	71007	30125	15986	19421	13159	8114		0.21	0.30	0.139
1998	51746	75008	35698	16090	19390	13352	8599		0.24	0.35	0.163
1999	76442	105463	55407	15305	18273	12818	6739		0.21	0.31	0.144
2000	316721	365778	274244	14552	17193	12316	6645		0.24	0.30	0.188
2001	39897	62506	25466	13175	15712	11047	5728		0.21	0.26	0.165
2002	35233	43857	28304	12026	14437	10017	6505		0.192	0.24	0.155
2003	53176	64765	43661	11401	13620	9544	8171	179	0.180	0.21	0.152
2004	259446	289442	232559	12148	14177	10409	7537	676	0.23	0.28	0.184
2005	141191	165227	120652	13393	15413	11638	7187	727	0.167	0.196	0.143
2006	127334	149025	108800	14894	17052	13009	6131	704	0.151	0.181	0.126
2007	202972	232714	177031	15582	17867	13589	6608	413	0.110	0.130	0.093
2008	192670	220453	168388	17049	19468	14929	7399	1585	0.152	0.185	0.125
2009	51394	64881	40710	19055	21723	16715	8287	2113	0.161	0.197	0.131
2010	113789	132654	97607	21601	24651	18928	8626	1436	0.154	0.189	0.125
2011	193717	222015	169026	24221	27692	21185	9348	971	0.153	0.186	0.126
2012	187939	218938	161329	26565	30404	23210	8429	1459	0.147	0.179	0.120
2013	262877	301875	228917	28254	32444	24604	10475	2285	0.180	0.22	0.147
2014	267119	307371	232138	27695	32043	23937	9832	2570	0.168	0.21	0.138
2015	141082	170719	116590	27072	31545	23232	9649	1460	0.124	0.147	0.104
2016	172973	206478	144905	28169	32818	24178	10220	2441	0.144	0.177	0.117
2017	214456	257467	178630	30032	35071	25717	11690	1770	0.146	0.178	0.119
2018	164120	199904	134741	33086	38802	28212	10076	727	0.094	0.114	0.078
2019	250884	304808	206500	38325	45019	32626	9680	1084	0.108	0.134	0.087
2020	485415	599461	393066	42068	49764	35562	8676	926	0.092	0.116	0.074
2021	146922*			45430	54131	38128	8965	2141	0.094	0.120	0.074
2022	147092*			48272	58079	40121					

* Assumed recruitment based on stock–recruit relationship.

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Download the stock assessment data and figures.

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White anglerfish (*Lophius piscatorius*) in Subarea 7 and divisions 8.a–b, and 8.d (Celtic Seas, Bay of Biscay)

ICES advice on fishing opportunities

Please note: the present advice replaces the advice given in June 2022.

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 34 540 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Management of catches of the two anglerfish species—black-bellied anglerfish (*Lophius budegassa*) and white anglerfish (*Lophius piscatorius*)—under a combined species total allowable catch (TAC) prevents effective control of the single-species exploitation rates and could lead to the overexploitation of either species.

Stock development over time

Fishing pressure on the stock is below F_{MSY}; spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

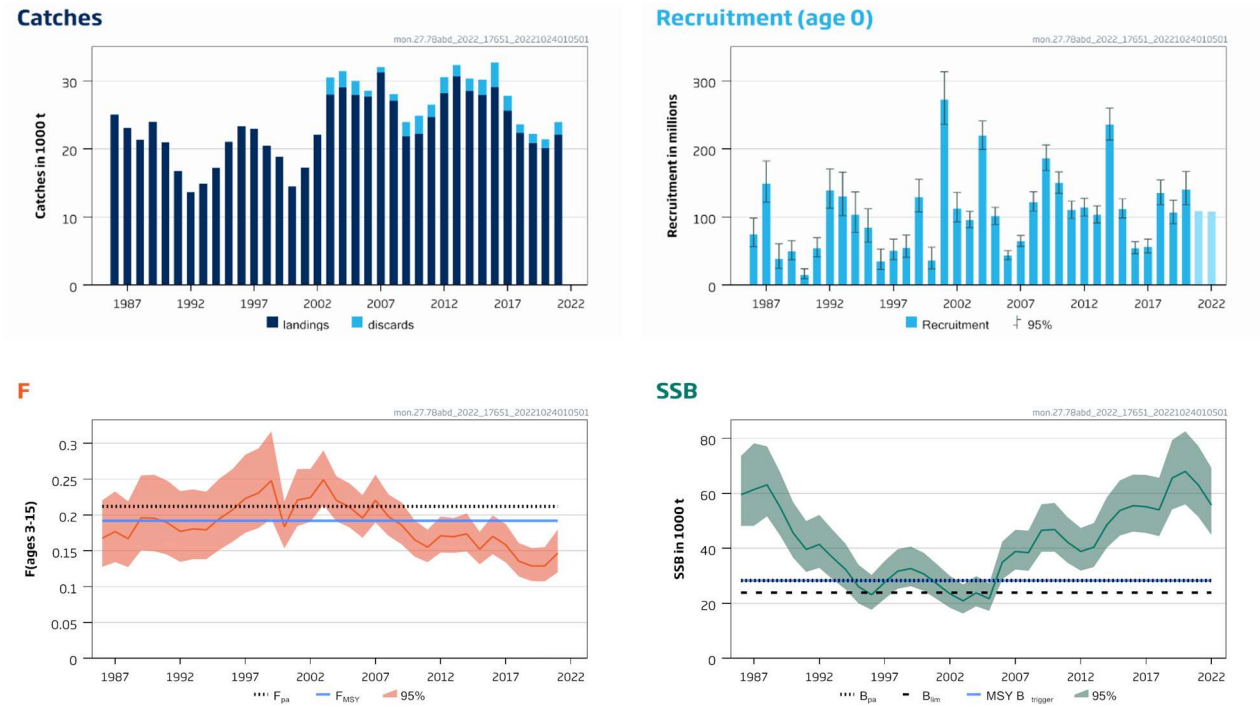

Figure 1 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. Summary of the stock assessment. Discard observations are available only since 2003. The assumed recruitment values for 2021 and 2022 are shaded in a lighter colour.

Catch scenarios

Table 1 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. The basis of the catch scenarios.

Variable	Value	Notes
$F_{ages\ 3–15}$ (2022)	0.135	$F_{ages\ 3–15}$, average F (2019–2021).
SSB (2023)	56201	Short-term forecast (STF); in tonnes.
$R_{age\ 0}$ (2022)	107677	Predicted from stock-recruitment relationship; in thousands.
$R_{age\ 0}$ (2023)	107829	Predicted from stock-recruitment relationship; in thousands.
Catch (2022)	24770	STF; in tonnes.
Projected landings (2022)	21440	STF assuming mean landings ratio-at-age, last three years, 2019–2021; in tonnes.
Projected discards (2022)	3330	STF assuming mean discards ratio-at-age, last three years, 2019–2021; in tonnes.

Table 2 White anglerfish in Subarea 7 and divisions 8.a–b and 8.d. Annual catch scenarios. All weights are in tonnes. Note: the % change in TAC is not computed because the TAC is for both species of anglerfish.

Basis	Total catch (2023)	Projected landings* (2023)	Projected discards** (2023)	$F_{ages\ 3–15}$ Total (2023)	$F_{ages\ 3–15}$ Projected landings (2023)	$F_{ages\ 3–15}$ Projected discards (2023)	SSB (2024)	% SSB change ***	% advice change^
ICES advice basis									
MSY approach = F_{MSY}	34540	30103	4437	0.192	0.19	0.00176	53140	−5.5	0.77
Other scenarios									
$F_{MSY\ lower}$	24306	21188	3118	0.131	0.13	0.0012	56606	0.72	4.9^^
$F_{MSY\ upper}$	37757	32904	4853	0.21	0	0.00194	52051	−7.38	−17.0^^
F = 0	0	0	0	0	0.21	0	64838	15.4	−100
F_{pa}	37757	32904	4853	0.135	0.134	0.00194	52051	−7.4	10.2
$SSB_{2024} = B_{lim}$	121549	105607	15942	0.97	0.96	0.0089	23868	−58	255
$SSB_{2024} = B_{pa}$ = MSY $B_{trigger}$	108298	94163	14135	0.8	0.8	0.0073	28275	−50	216
$SSB_{2024} = SSB_{2023}$	25502	22230	3272	0.138	0.137	0.00126	56201	0	−26
$F = F_{2022}$	24971	21767	3204	0.135	0.134	0.00123	56381	0.32	−27

* Marketable landings, assuming recent discard rate.
** Including BMS landings (EU stocks), assuming recent discard rate.
*** SSB 2024 relative to SSB 2023 (56 201 tonnes).
^ Advice value for 2023 relative to advice value for 2022 (34 275 tonnes).
^^ Advice value for 2023 relative to the advice value for 2022 for the $F_{MSY\ lower}$ (23 162 tonnes) and $F_{MSY\ upper}$ (45 491 tonnes).

Basis of the advice

Table 3 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. The basis of the advice.

Advice basis	MSY approach.
Management plan	ICES is aware of the multiannual management plan (EU MAP) which was adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

The stock was benchmarked in 2022 (ICES, 2022a). The estimated fishing mortality and recruitment have changed considerably due to the new methodology. Perception of stock size relative to MSY $B_{trigger}$ remains unchanged.

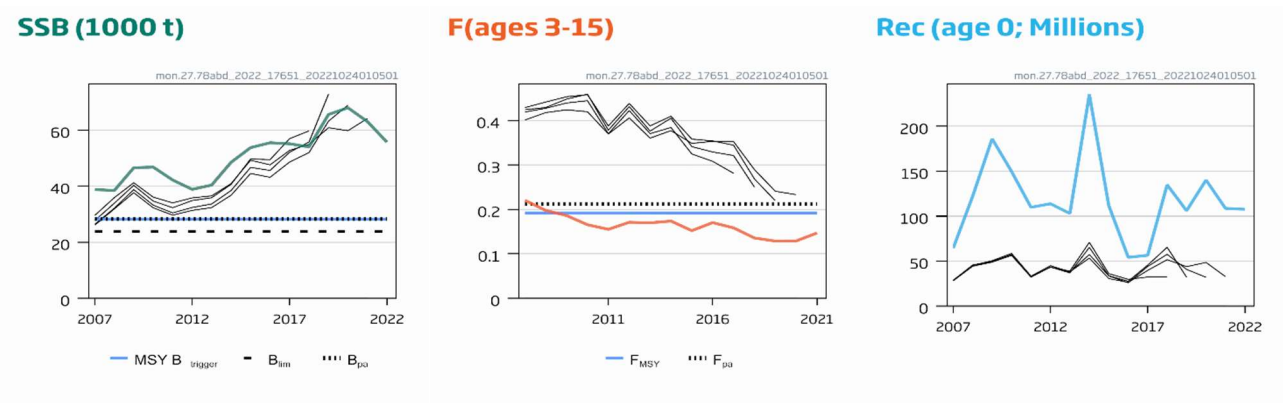

Figure 2 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. Historical assessment results. The reference points and assessment results were revised following a benchmark in 2022. Thus the 2022 estimates are not comparable to the previous assessments. The final two years of recruitment values are assumptions.

The final year of recruitment is estimated with high uncertainty and is therefore replaced by the expected recruitment estimated from the stock–recruit relationship.

Issues relevant for the advice

The two anglerfish species are not separated in the landings statistics. The TACs are set separately for subarea 7 and divisions 8.a, 8.b, 8.d, and 8.e with each TAC covering catches of both species. Species specific landings are estimated by ICES. ICES considers that management of the catches of these two species under a combined TAC prevents effective control of single-species exploitation rates and could lead to overexploitation of either species.

Reference points

Table 4 White anglerfish in Subarea 7 and divisions 8.a–b and 8.d. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	28275	B_{pa}; in tonnes.	ICES (2022a)
	F_{MSY}	0.192	Stochastic simulations (EqSim) with Beverton–Holt stock-recruitment relationship estimated by the assessment model.	ICES (2022a)
Precautionary approach	B_{lim}	23868	SSB_{2004}; lowest observed SSB with high recruitment; in tonnes.	ICES (2022a)
	B_{pa}	28275	$B_{lim} \times \exp(\sigma \times 1.645)$, where $\sigma = 0.103$; in tonnes.	ICES (2022a)
	F_{lim}	Undefined	Inconsistent with F_{pa}.	ICES (2022a)
	F_{pa}	0.212	F_{P05} with advice rule (AR): the F that provides a 95% probability for SSB to be above B_{lim}.	ICES (2022a)
Management plan	MAP MSY $B_{trigger}$	28275	MSY $B_{trigger}$; in tonnes.	ICES (2022a)
	MAP B_{lim}	23868	B_{lim}; in tonnes.	ICES (2022a)
	MAP F_{MSY}	0.192	F_{MSY}	ICES (2022a)
	MAP range F_{lower}	0.131	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with F_{MSY}.	ICES (2022a)
	MAP range F_{upper}	0.212	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with F_{MSY}.	ICES (2022a)

Basis of the assessment

Table 5 White anglerfish in Subarea 7 and divisions 8.a–b and 8.d. The basis of the assessment.

ICES stock data category	1 (ICES, 2022b).
Assessment type	Length-based age-structured Stock Synthesis model that uses catches in the model and forecast (ICES, 2022c).
Input data	Commercial landings and discards; three survey indices consisting of a combined French Southern Atlantic Bottom trawl survey (EVHOE-WIBTS-Q4 [G9527])/Irish Groundfish Survey (IGFS-WIBTS-Q4 [G7212]) index, the Spanish Porcupine Bottom Trawl Survey (SpPGFS -WIBTS-Q3 [G5768]), and the Irish Anglerfish and Megrim Survey (IE-IAMS [G3098]).
Discards and bycatch	Discards are available since 2003 and included in the assessment and forecast.
Indicators	None.
Other information	Last benchmarked in 2022 (ICES, 2022a).
Working group report	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE).

History of the advice, catch, and management

Table 6 White anglerfish in Subarea 7 and divisions 8.a–b and 8.d. History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in tonnes.

Year	ICES advice***, #	Catch corresponding to advice ***, #	Landings corresponding to advice (both *Lophius* species) ***, #	Agreed TAC *, **	ICES landings (both *Lophius* species)***	Landings *L. piscatorius*	Catches *L. piscatorius*
1987	Not assessed	-	< 27600	39080	3071009	23090	-
1988	Not assessed	-	< 19900	42990	29696	21314	-
1989	Not assessed	-	< 16400	42990	32835	24015	-
1990	Not assessed	-	< 26700	42990	30615	20983	-
1991	No advice	-	< 37800	42990	25543	16763	-
1992	No advice	-	< 33900	42990	21793	13617	-
1993	Concern about *L. pisc.* SSB decrease	-	< 36000	25100	21461	14895	-
1994	SSB decreasing, still inside safe biological limits	-	< 33000	23900	22945	17201	-
1995	No increase in F	-	< 33000	23200	27987	21033	-
1996	No increase in F	-	-	30400	31426	23333	-
1997	No increase in F	-	-	34300	31097	22983	-
1998	No increase in F	-	-	34300	29073	20474	-
1999	No increase in F	-	< 24800	34300	25531	18792	-
2000	At least 20% decrease in F	-	< 37448	29600	21096	14451	-
2001	Reduce F below F_{pa}	-	< 37448	27600	23021	17293	-
2002	Reduce F below F_{pa}	-	< 37448	23700	28588	22083	-
2003	At least 30% decrease in F	-	< 37448	21000	36104	27933	30444
2004	At least 10% decrease in F	-	< 37448	26700	36565	29028	31439
2005	Maintain F below F_{pa}	-	< 27600	31200	35056	27869	29980
2006	Maintain F below F_{pa}	-	< 19900	34000	33783	27652	28545
2007	Maintain F below F_{pa}	-	< 16400	36000	37821	31213	32029
2008	Less than average landings	-	< 26700	36000	34452	27053	28046
2009	Same advice as last year	-	< 37800	36000	30122	21835	23913
2010	No increase in effort	-	< 33900	41400	30841	22215	24886
2011	No increase in effort	-	< 36000	40900	34005	24657	26489
2012	Reduce catch	-	< 33000	38900	36617	28188	30519
2013	Reduce catch by the rate of biomass decrease (14% for *L. piscatorius* and 20% for *L. budegassa*)	17900		36953	41086	30611	32295
2014	Increase landings by the rate of biomass increase (20% for *L. piscatorius* and 20% for *L. budegassa*)	< 26691	< 37448	42496	38306	28474	30333
2015	Same landings advice for *L. piscatorius* as in 2014	< 26691	< 37448	42496	37508	27859	30183
2016	Precautionary approach (same landings value as advised for 2014)	≤ 26691	≤ 37448	42496	39303	29083	32668
2017	Precautionary approach (same landings value as advised for 2016)	≤ 26691	≤ 37448	42496	37324	25634	27808
2018	Precautionary approach (same landings value as advised for 2016)	≤ 26691	≤ 37448	42496	32421	22345	23595
2019	MSY approach	≤ 31042	≤ 41841	41370	30512	20832	22196
2020	Management plan	31798 (range 21248–42331) ##	≤ 44757	44307	28713	20037	21387

Year	ICES advice***, #	Catch corresponding to advice ***, #	Landings corresponding to advice (both *Lophius* species) ***, #	Agreed TAC *, **	ICES landings (both *Lophius* species)***	Landings *L. piscatorius*	Catches *L. piscatorius*
2021	Management plan	34579 (range 23320–45996) ##	≤ 50130	38123	31005	22040	23878
2022	MSY approach	≤ 34275	≤ 52936	52205			
2023	MSY approach	≤ 34540	≤ 57976				

* Applies to the combined *Lophius* species.
** Includes Division 8.e.
*** Includes Division 7.a since 2018 (ICES, 2018).
# Advice refers to landings up to 2017 and to catches since 2018.
Catches corresponding to F_{MSY}, EU MAP range in brackets.

History of catch and landings

Table 7 White anglerfish in Subarea 7 and divisions 8.a–b and 8.d. Catch distribution by fleet in 2021 as estimated by ICES.

Total catch	Landings					Discards
23878	64% otter trawl demersal fish	2.9% otter trawl *Nephrops*	13.5% beam trawl	16.8% gillnet	2.8% other	1839
	22040					

Table 8a White anglerfish in Subarea 7 and divisions 8.a–b and 8.d. History of commercial catch and landings; ICES estimated values are presented for Subarea 7 for each country participating in the fishery. All weights are in tonnes.

Year	Official landings					ICES estimates		
	France	Ireland	Spain	UK	Others	Unallocated	Landings in Subarea 7	Discards in Subarea 7
1986*	9180	950	5831	3145	1753	0	20859	-
1987*	7998	868	5059	3164	1272	0	18361	-
1988*	7677	608	4291	3415	1375	0	17366	-
1989*	8233	1482	4253	3746	3411	0	21126	-
1990*	8161	1371	3985	2647	1440	0	17603	-
1991*	6930	1012	3554	2454	655	0	14604	-
1992*	5206	1050	2484	2570	946	0	12255	-
1993*	5611	1147	2543	2346	1660	0	13308	-
1994*	6834	1891	2652	2117	1663	0	15156	-
1995*	8867	1541	3004	2374	2134	0	17921	-
1996*	9237	1289	3849	2999	1971	0	19345	-
1997*	8895	1855	3302	3143	1871	0	19066	-
1998*	8052	1896	3403	3049	1287	0	17688	-
1999*	7623	3076	2954	2812	853	0	17318	-
2000*	6167	1660	2187	2574	831	0	13420	-
2001*	7780	1535	2395	2903	1057	0	15669	-
2002	9195	1884	3084	2985	1397	0	18546	-
2003	12081	1456	4662	2850	1569	0	22619	2077
2004	12281	1646	4507	2906	1743	0	23083	1968
2005	11137	2071	4663	3032	1469	0	22371	1779
2006	10607	2656	4589	3137	1375	0	22366	674
2007	12253	2902	5065	4036	1596	0	25852	620
2008	10871	2419	4107	2928	1062	0	21387	743
2009	8691	2048	2754	3013	857	0	17363	1509
2010	8188	2523	2353	3675	993	0	17732	2038
2011	9546	2304	920	4287	1174	1313	19544	1443
2012	12225	2648	1398	4028	1835	1167	23302	1833
2013	12775	2557	3316	4629	1625	1148	26051	1405
2014	11410	2707	1892	6129	1055	337	23529	1443
2015	11721	2582	1693	5644	1284	414	23338	1796

Year	Official landings					ICES estimates		
	France	Ireland	Spain	UK	Others	Unallocated	Landings in Subarea 7	Discards in Subarea 7
2016	12667	2761	1754	6052	1578	351	25164	3056
2017	11473	2543	1744	5222	1498	0	22479	1912
2018	10360	2148	1810	4156	770	85	19327	1192
2019	9379	2285	1473	4553	858	0	18651	1314
2020*, ^	9372	2388	1477	4171	994	0	18185	804
2021^	9673	2696	1567	4778	1173	0	19887	1132

* ICES landings data revised (ICES, 2022a).
^ Preliminary official landings data

Table 8b White anglerfish in Subarea 7 and divisions 8.a–b and 8.d. History of commercial catch and landings. For divisions 8.a, 8.b, and 8.d both the official and ICES estimated values are presented by country participating in the fishery. The final column shows the total for divisions 8.a–b and 8.d. All weights are in tonnes.

Year	Official landings			ICES estimates		
	France	Spain	Others	Unallocated	Total landings in divisions 8.a–b and 8.d	Total discards in divisions 8.a–b and 8.d
1986	3265	858	0	0	4122	-
1987	3955	774	0	0	4729	-
1988	3129	819	0	0	3948	-
1989	2264	625	0	0	2889	-
1990	2580	800	0	0	3379	-
1991	1657	502	0	0	2158	-
1992	1066	296	0	0	1362	-
1993	1314	274	0	0	1587	-
1994	1564	481	0	0	2045	-
1995	2402	482	0	228	3113	-
1996	2216	834	0	938	3988	-
1997	2143	707	0	1068	3917	-
1998	1534	711	0	542	2787	-
1999	924	549	0	0	1473	-
2000	690	341	0	0	1032	-
2001	1240	384	0	0	1624	-
2002	3023	514	0	0	3537	-
2003	4806	508	0	0	5315	434
2004	5227	718	0	0	5945	443
2005	4927	571	0	0	5498	332
2006	4819	420	48	0	5287	219
2007	4935	401	25	0	5361	197
2008	5132	527	7	0	5666	250
2009	4065	374	33	0	4472	569
2010	4043	367	73	0	4483	634
2011	4569	422	93	30	5114	388
2012	4221	430	194	41	4887	497
2013	4105	318	137	0	4560	279
2014	4279	408	174	84	4945	416
2015	4153	293	65	10	4521	528
2016	3561	283	69	5	3919	529
2017	2886	203	66	0	3154	263
2018	2844	156	15	3	3018	58
2019	1987	130	64	0	2181	50
2020^	1666	129	57	0	1852	545
2021^	1973	151	42	0	2166	706

^ Preliminary official landings data.

Summary of the assessment

Table 9 White anglerfish in Subarea 7 and divisions 8.a–b and 8.d. Assessment summary. Weights are in tonnes and recruitment in thousands. 'High' and 'Low' refer to 95% confidence intervals.

	Recruitment			Stock size			Catch		Fishing pressure		
Year	$R_{age\ 0}$	High	Low	SSB	High	Low	Landings	Discards	F ages 3–15	High	Low
1986	74533	98314	56504	59516	73575	48144	24981		0.168	0.22	0.127
1987	148992	182369	121724	61389	78222	48179	23090		0.177	0.23	0.134
1988	38655	60688	24621	63112	77130	51642	21314		0.167	0.22	0.127
1989	49226	65288	37115	55014	67754	44669	24015		0.196	0.26	0.151
1990	14907	23896	9300	45575	56814	36559	20983		0.196	0.26	0.149
1991	53682	69554	41432	39604	49946	31404	16763		0.189	0.25	0.145
1992	138846	170608	112997	41428	52194	32882	13617		0.177	0.23	0.135
1993	129977	165932	101813	36721	46853	28779	14895		0.181	0.24	0.138
1994	103059	136731	77679	32376	41762	25100	17201		0.179	0.23	0.138
1995	84111	111992	63172	26063	34048	19950	21033		0.195	0.25	0.151
1996	34884	53102	22916	23132	30334	17639	23333		0.21	0.26	0.162
1997	50196	67402	37382	27651	35397	21600	22983		0.22	0.28	0.175
1998	54803	73473	40878	31692	39707	25295	20474		0.23	0.29	0.182
1999	129316	155341	107651	32644	40672	26200	18792		0.25	0.32	0.194
2000	36294	55777	23616	30676	38372	24525	14451		0.183	0.22	0.153
2001	271932	313462	235904	27091	34228	21442	17293		0.22	0.26	0.185
2002	112468	136212	92863	23446	29962	18347	22083		0.22	0.26	0.191
2003	95532	108272	84290	20914	26868	16279	27933	2511	0.25	0.29	0.21
2004	219114	241044	199179	23780	29904	18910	29028	2411	0.22	0.25	0.191
2005	100800	114181	88987	21693	27266	17259	27869	2110	0.21	0.24	0.183
2006	43502	50820	37237	34932	42455	28741	27652	892	0.196	0.23	0.168
2007	64448	73132	56795	38838	46750	32266	31213	816	0.22	0.26	0.190
2008	122125	137100	108786	38451	46457	31824	27053	993	0.198	0.23	0.171
2009	186167	205853	168364	46589	56060	38718	21835	2078	0.186	0.22	0.159
2010	149709	166197	134856	46828	56526	38794	22215	2672	0.165	0.193	0.142
2011	109902	123366	97907	42212	51322	34719	24657	1832	0.155	0.180	0.134
2012	113820	127590	101536	38879	47424	31874	28188	2330	0.171	0.198	0.148
2013	103001	116462	91096	40412	49198	33195	30611	1684	0.170	0.196	0.147
2014	235353	260001	213041	48547	58591	40224	28474	1859	0.174	0.20	0.149
2015	111783	126669	98646	53775	64755	44657	27859	2324	0.152	0.177	0.131
2016	54186	63810	46013	55502	66854	46077	29083	3585	0.170	0.200	0.145
2017	56474	67406	47314	55147	66718	45583	25634	2175	0.158	0.188	0.134
2018	134904	154367	117895	54015	65693	44413	22345	1250	0.136	0.161	0.114
2019	106086	124797	90181	65604	79443	54176	20832	1364	0.129	0.154	0.108
2020	140237	166822	117889	67993	82585	55978	20037	1350	0.129	0.155	
2021	108688*			63046	77238	51462	22040	1839	0.147	0.180	0.120
2022	107677*			55742	69307	44832					

* Assumed recruitment based on stock–recruit relationship

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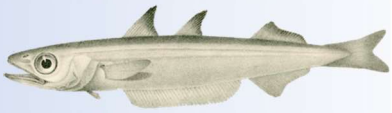
Download the stock assessment data and figures.

Recommended citation: ICES. 2022. White anglerfish (*Lophius piscatorius*) in Subarea 7 and divisions 8.a–b and 8.d (Celtic Seas, Bay of Biscay). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, mon.27.78abd, https://doi.org/10.17895/ices.advice.21394107

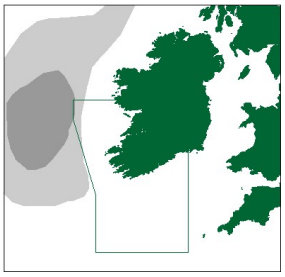
Blue Whiting

(*Micromesistius poutassou*)



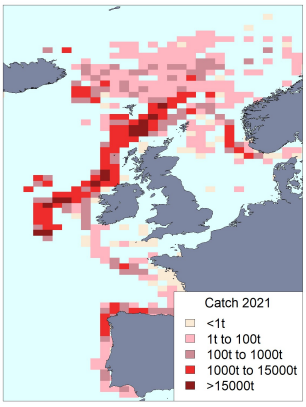
Biology – Species

Blue whiting is a small, pelagic, densely shoaling gadoid. It is widely distributed in the eastern north Atlantic from Norway to Portugal. They recruit to the fishery from one year of age, although the maximum age is about 15. The population is comprised of at least a northern and a southern component, both spawning mainly between 300 and 600 m depth along the continental margin off Ireland and Scotland. Juveniles are widely distributed, including in the Bay of Biscay and Iberian waters, with the main nursery area believed to be in the Norwegian Sea. Maturation occurs at 2.5 years, corresponding to a total length of approximately 23 cm. The maximum size of this species is about 38 cm. Blue whiting is an important prey species.

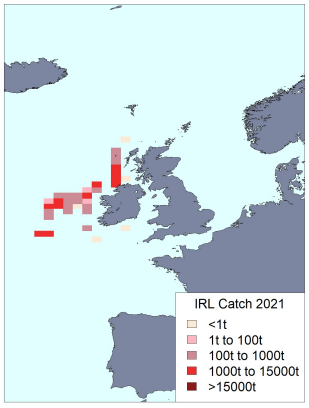


Blue Whiting Spawning Grounds

Landings Distribution



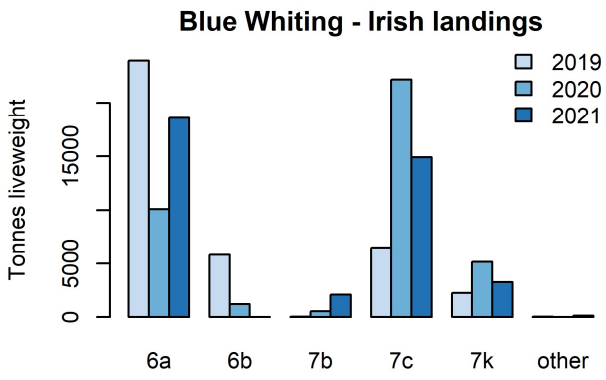
The distribution of international catches of blue whiting in 2021 (excluding Russia). Most were taken during the first half of the year from the slopes of the Western European shelf, the Rockall Trough and deep trenches around the Faroes.

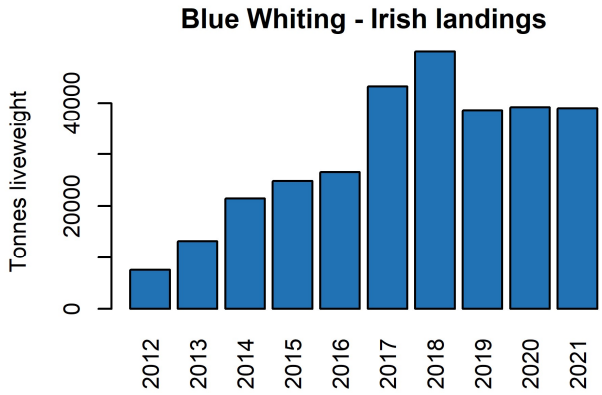


The distribution of blue whiting catches from Irish vessels (mainly pelagic otter trawls) during 2021. They were caught mostly to the west of Ireland in Division 7.c and Sub-area 6.

Irish Landings and Value of TAC

On average approximately 39,000 tonnes per year of blue whiting were caught and landed by Irish vessels using mainly pelagic trawls between 2019 and 2021, 47% of which were caught in sub-area 6.a in 2021. Norway and the Faroes dominate the international fishery, with Iceland and Russia also significant participants. In 2021 the landings were worth approximately €9.4 million to Irish vessels.



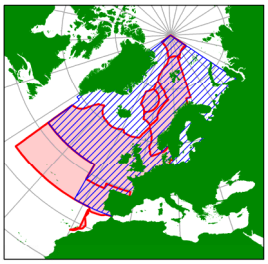


Blue Whiting

Subareas 1-9, 12 and 14 (Northeast Atlantic and adjacent waters)

Advice for 2023

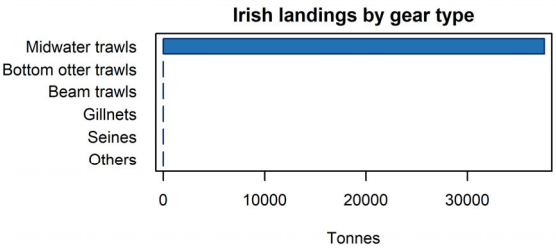
ICES advises that when the long-term management strategy agreed by the European Union, the Faroe Islands, Iceland, and Norway is applied, catches in 2023 should be no more than 1,359,629 t.



Key Points

ICES Assessment Category	1 (Quantitative Assessment)	
Management plan	Yes (European Union, the Faroe Islands, Iceland and Norway in 2016)	
Advice Basis	MSY	Catch=1,359,629 t
	F_{MSY} Range Lower	Not Available
Ranges	F_{MSY}	Catch=1,359,629 t
	F_{MSY} Range Upper	Not Available
Landing Obligation	From 2015	Fleet specific *de minimis* exemption for 2021-2023*

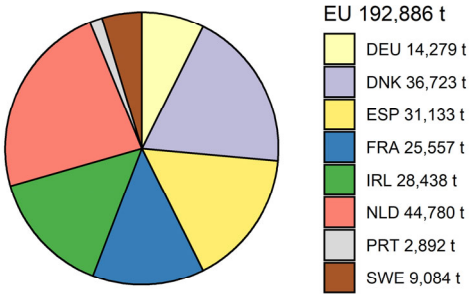
* Commission delegated regulation 2020/2015



Management in 2022

- A long-term management strategy was agreed by the European Union, the Faroe Islands, Iceland and Norway in 2016. ICES evaluated the strategy in 2016 and found it to be precautionary.
- Since 2014, no sharing agreement has been in place between the Coastal States for the blue whiting stock and total catches have exceeded advice.
- In 2022, the catch is estimated at 1,107,529 t (based on declared quotas and expected uptake), substantially in excess of the catch advice of 752,736 t.
- Ireland has a share of the EU quota, in Sub-areas 1-7, Divisions 8.a, 8.b, 8.d, 8.e and Sub-areas 12 and 14.
- A separate EU quota exists for 8.c, 9 and 10. There is no Irish quota in these areas.
- The EU TAC may be adjusted subject to transfers in the EU- Norway agreement.

2022 Quota Allocations for EU parties – Divisions 1 – 7, 8a, 8b, 8d, 8e, 12 and 14



Key Stock Considerations

- Following three consecutive years of below average recruitment, stock size declined between 2017 and 2021. However, recruitment in 2021 is strong and leads to an increase in stock size and consequently higher catch advice for 2023.
- The long-term management strategy was evaluated in 2016 and did not take into account consistent deviations from the management strategy catch advice, nor the suspension of TAC change limits when the change is greater than 40%. Therefore, the long-term management strategy may no longer be precautionary and the advice is given on the basis of the MSY approach.

Published 30 September 2022
Version 2: 02 November 2022

Blue whiting (*Micromesistius poutassou*) in Subareas 1–9, 12, and 14 (Northeast Atlantic and adjacent water)

ICES advice on fishing opportunities[†]

ICES advises that when the long-term management strategy agreed by the European Union, the Faroe Islands, Iceland, and Norway is applied, catches in 2023 should be no more than 1 359 629 tonnes.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and F_{pa} but below F_{lim}; spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

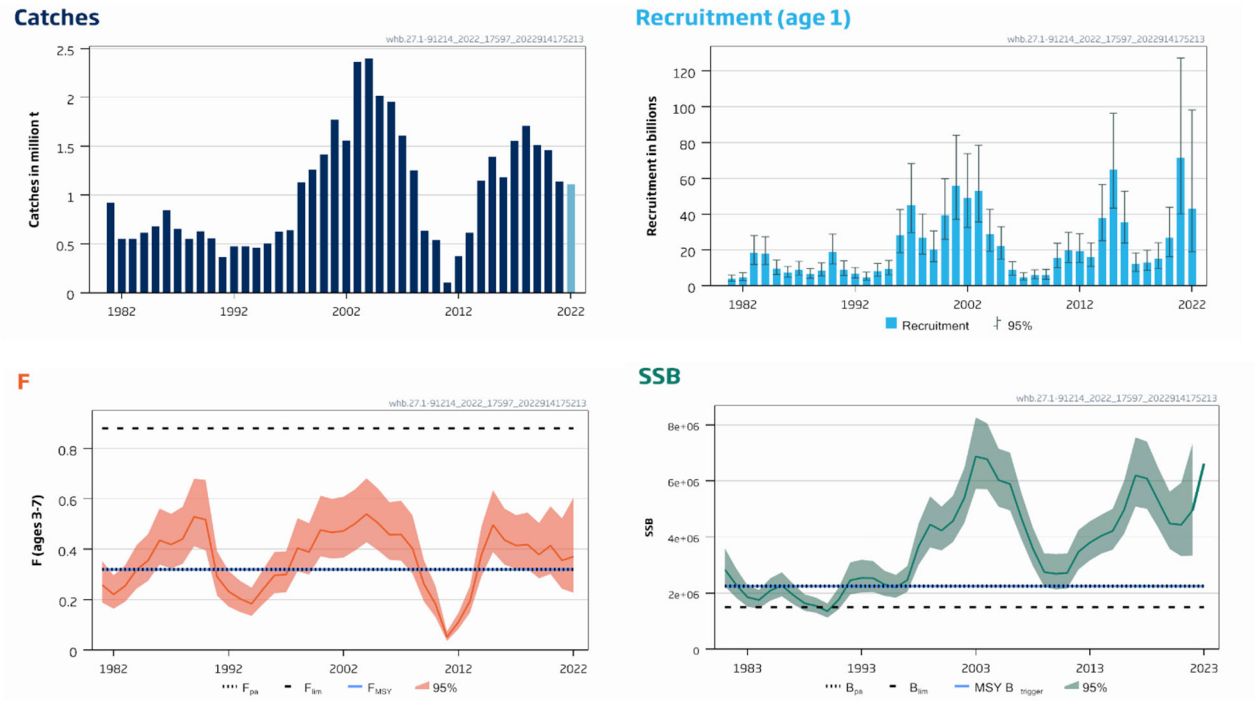


Figure 1 Blue whiting in subareas 1–9, 12, and 14. Summary of the stock assessment. The catch estimate for 2022 is preliminary. The assumed recruitment value for 2023 is shaded in a lighter colour.

Catch scenarios

Table 1 Blue whiting in subareas 1–9, 12, and 14. Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 3–7}$ (2022)	0.37	From the assessment (based on assumed 2022 catches)
SSB (2023)	6 621 207	From the assessment; in tonnes
$R_{age\ 1}$ (2022)	43 220 294	From the assessment; in thousands
$R_{age\ 1}$ (2023–2024)	22 537 250	Geometric mean (1996–2021); in thousands
Total catch (2022)	1 107 529	As estimated by ICES, based on declared national quotas and expected uptake; in tonnes

[†] Version 2: Basis for the advice has changed. Text and tables throughout the advice sheet have been updated to reflect this.

Table 2 Blue whiting in subareas 1–9, 12, and 14. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	F (2023)	SSB (2024)	% SSB change*	% catch change**	% advice change***
ICES advice basis						
Long-term management strategy: $F = F_{mgt}$	1359629	0.32	7781444	17.5	23	81
Other scenarios						
MSY approach: F_{MSY}	1359629	0.32	7781444	17.5	23	81
F = 0	0	0	9039585	37	−100	−100
F_{pa}	1359629	0.32	7781444	17.5	23	81
F_{lim}	3146002	0.88	6157129	−7	184	318
$SSB_{2024} = B_{lim}$^	8696303	6.503	1499996	−77	685	1055
$SSB_{2024} = B_{pa}$^	7715688	4.401	2249993	−66	597	925
SSB_{2024} = MSY $B_{trigger}$^	7715688	4.401	2249993	−66	597	925
$F = F_{2022}$	1550784	0.371	7605942	14.9	40	106
$SSB_{2024} = SSB_{2023}$	2631402	0.698	6621196	0	138	250
$Catch_{2023} = catch_{2022}$ ^	1107553	0.255	8013430	21	0	47
$Catch_{2023} = catch_{2022}$ −20%	886105	0.2	8217731	24	−20	17.7
$Catch_{2023} = catch_{2022}$ +25%	1384385	0.327	7758694	17.2	25	84
$Catch_{2023} = advice_{2022}$ −20%	602183	0.133	8480325	28	−46	−20
$Catch_{2023} = advice_{2022}$ +25%	940871	0.214	8167163	23	−15.0	25

* SSB 2024 relative to SSB 2023.
** Catch 2023 relative to expected catch in 2022 (1 107 529 tonnes).
*** Catch 2023 relative to advice for 2022 (752 736 tonnes).
^ SSB_{2024} and $Catch_{2023}$ values are the closest available approximation to either B_{lim}, B_{pa} and $B_{trigger}$ or target catches.

The advice for 2023 is 81 % higher than that for 2022 because of a large upward revision of estimated recruitment in 2021 (age 1).

Basis of the advice

Table 3 Blue whiting in subareas 1–9, 12, and 14. The basis of the advice.

Advice basis	Long-term management strategy
Management plan	A long-term management strategy was agreed by the European Union, the Faroe Islands, Iceland, and Norway (Anon., 2016) and subsequently by UK in 2021 (Anon., 2021). ICES has evaluated the strategy, including clause 6.b, and found it to be precautionary (ICES, 2016a, 2017).

Quality of the assessment

This year's assessment shows a substantial revision of the historical values of F, SSB and recruitment for 2021. The 2020 year class (recruitment at age 1 in 2021) is now estimated to be at a historical high (71.6 billion), while last year's estimate was 22.8 billion. Fishing mortality (F) in 2021 is revised downward by 29%, and SSB in 2021 upward by 46%. The revision of the 2020 year class is due to a historically high survey index value in 2022 and is corroborated by high commercial catch-at-age of the same year class in 2021 and 2022. The catch for 2021 was 9.1% lower than the preliminary value used last year, which contributes to the revision of F and SSB in this year's assessment.

Other surveys, which are not presently used in the assessment, confirm a very large 2020 year class.

Preliminary catch data from Russian Federation for 2021 were used in the assessment, together with Russian catch samples that were available for the first half year. Historically, preliminary catches are comparable to ICES final estimated catch. Russian data on age composition of the catch in 2022 are not available. ICES used the historical (2019–2021) Russian proportion (13%) of total international catch weight to estimate the total catches for 2022. It was assumed that the age distribution of Russian catches is similar to the-catch-at age distribution available from other nations.

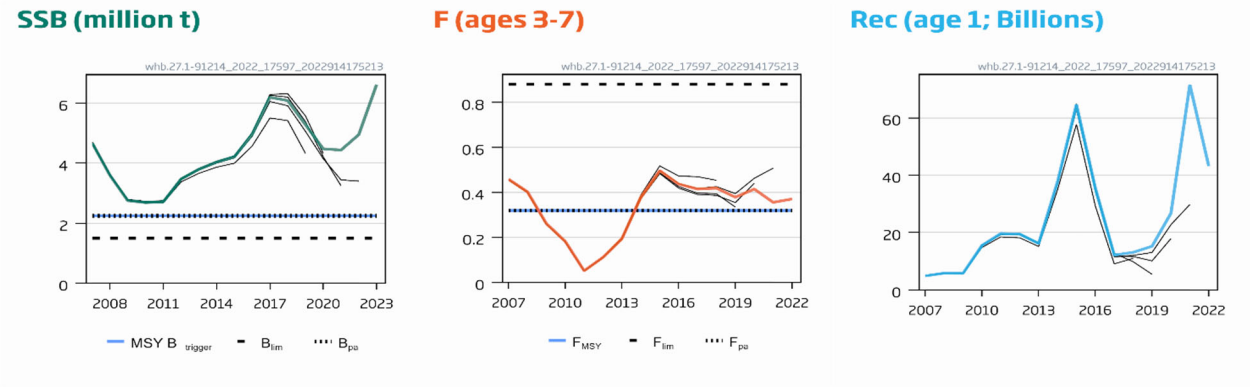


Figure 2 Blue whiting in subareas 1–9, 12, and 14. Historical assessment results.

Issues relevant for the advice

In the application of the long term management strategy, the 25% restriction in the increase of catch advice is not applied this year because clause 6.b states that a constraint on annual TAC variation shall not be applied when the catch advice deviates more than 40% from the catch advice of the preceding year. This clause was evaluated by ICES and found precautionary in 2017 (ICES, 2017).

There have been consistent deviations from the long-term management strategy since 2018 as evident from the sum of unilateral quotas. During the evaluation of the management strategy (ICES, 2016a), the implementation error in the form of a consistent overshoot of the TAC was not included. Therefore, failing to adhere to the advised catches as derived from the application of the MSY approach or the long-term management strategy may not be precautionary. Specifically, this may result in an increased risk for the stock to fall below B_{lim}, loss of catch in the long term and unsustainable utilization of the resource.

The 2020 year class is estimated to be historically high and will be fully recruited to the fishery in 2023.

F has exceeded F_{pa} since 2014. This does not adhere to the precautionary approach and in the long term could result in increased risk of SSB to fall below B_{lim} and loss of yields.

Reference points

Table 4 Blue whiting in subareas 1–9, 12, and 14. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	2250000 t	B_{pa}	ICES (2013a, 2013b, 2016a)
	F_{MSY}	0.32	Stochastic simulations with segmented regression stock–recruitment relationship capped to F_{P05}	ICES (2016a)
Precautionary approach	B_{lim}	1500000 t	Approximately B_{loss}	ICES (2013a, 2013b, 2016a)
	B_{pa}	2250000 t	B_{lim} exp(1.645 × σ), with σ = 0.246	ICES (2013a, 2013b, 2016a)
	F_{lim}	0.88	Equilibrium scenarios with stochastic recruitment: F value corresponding to 50% probability of (SSB < B_{lim})	ICES (2016a)
	F_{pa}	0.32	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability	ICES(2016a, 2021a)
EU–Faroes–Iceland–Norway long-term management strategy	SSB_{mgt_lower}	1500000 t	B_{lim}	Anon (2016)
	SSB_{mgt}	2250000 t	B_{pa}	
	F_{mgt_lower}	0.05	Arbitrary low F	
	F_{mgt}	0.32	F_{MSY}	

Basis of the assessment

Table 5 Blue whiting in subareas 1–9, 12, and 14. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical assessment (SAM; ICES, 2021a) that uses catches in the model and the forecast
Input data	Commercial catches, preliminary estimate of catch-at-age in the year (Q1–Q2) in which the assessment is carried out. One survey index (International Blue Whiting Spawning Stock Survey [IBWSS; A1142] ages 1–8, 2004–2022, excluding 2010 and 2020). Time invariant maturity at age was estimated in 1994 by combining maturity ogives from the southern and northern areas. Time invariant natural mortality fixed at 0.2 for all ages, derived in the 1980s from age compositions before the targeted fishery started.
Discards and bycatch	Discard data since 2014 have been included in the assessment
Indicators	Estimates of recruitment from surveys: Joint Norwegian-Russian survey Barents Sea (G5348), International Ecosystem Survey in the Nordic Seas in May (A3675, [IESNS]), the Faroese bottom-trawl surveys (G1264 [FO-GFS-Q1], G3284 [FO-GFS-Q3]) and the Icelandic bottom-trawl survey in spring (G3239 [IS-SMB]).
Other information	The stock was benchmarked in 2012 (WKPELA; ICES, 2012). An interbenchmark protocol was conducted in the spring of 2016 (ICES, 2016b).
Working group	Working Group on Widely Distributed Stocks (WGWIDE; ICES 2022b)

History of the advice, catch, and management

Table 6 Blue whiting in subareas 1–9, 12, and 14. ICES advice and catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	TAC	ICES estimated landings	ICES estimated discards§	ICES catch
1987	TAC for northern areas; no advice for southern areas	950000	-			655000
1988	TAC for northern areas; no advice for southern areas	832000	-			557847
1989	TAC for northern areas; no advice for southern areas	630000	-			627447
1990	TAC for northern areas; no advice for southern areas	600000	-			561610
1991	TAC for northern areas; no advice for southern areas	670000	-			369524
1992	No advice	-	-			475026
1993	Catch at *status quo* F (northern areas); no assessment for southern areas	490000	-			480679
1994	Precautionary TAC (northern areas); no assessment for southern areas	485000	650000*			459414
1995	Precautionary TAC for combined stock	518000	650000*			578905
1996	Precautionary TAC for combined stock	500000	650000*			645982
1997	Precautionary TAC for combined stock	540000	-			672437
1998	Precautionary TAC for combined stock	650000	-			1128969
1999	Catches above 650 000 t may not be sustainable in the long run	650000	-			1256228
2000	F should not exceed the proposed F_{pa}	800000	-			1412927
2001	F should not exceed the proposed F_{pa}	628000	-			1780170
2002	Rebuilding plan	0	-			1556792
2003	F should be less than the proposed F_{pa}	600000	-			2321406
2004	Achieve 50% probability that F will be less than F_{pa}	925000	-			2380161
2005	Achieve 50% probability that F will be less than F_{pa}	1075000	-			2034309
2006	F old management plan	1500000	2100000**			1976176
2007	F should be less than the proposed F_{pa}	980000	1847000***			1625255
2008	F should be less than F_{pa}	835000	1250000^			1260615
2009	Maintain stock above B_{pa}	384000	606000^^			641818
2010	Follow the agreed management plan	540000	548000			526357
2011	See scenarios	40100–223000	40000			103620
2012	Follow the agreed management plan	391000	391000			384021
2013	Follow the agreed management plan	643000	643000			628169
2014	Follow the agreed management plan	948950	1200000			1155279
2015	Follow the agreed management plan	839886	1260000^^^	1389953	6291	1396244
2016	MSY approach	≤ 76391	1147000^^^	1178180	5007	1183187
2017	MSY approach	≤ 1342330	1675400^^^	1556030	2030	1558061

Year	ICES advice	Catch corresponding to advice	TAC	ICES estimated landings	ICES estimated discards§	ICES catch
2018	Long-term management strategy	≤ 1387872	1727964^^^	1707152	4325	1711477
2019	Long-term management strategy	≤ 1143629	1483208^^^	1512922	2604	1515527
2020	Long-term management strategy	≤ 1161615	1478358^^^	1492420	2828	1495248
2021	Long-term management strategy	929292	1157604^^^	1139514	3936	1143450
2022	Long-term management strategy	≤ 752736	752736 §§§			1107529§§
2023	Long-term management strategy	≤ 1359629				

* NEAFC proposal for NEAFC regions 1 and 2.

** Agreed TAC from the four Coastal States of 2 million tonnes and an additional allocation of 100 000 tonnes to Russian Federation in the international zone.

*** Agreed TAC from the four Coastal States of 1.7 million tonnes and an additional allocation of 147 000 tonnes to Russian Federation and Greenland.

^ Agreed TAC from the four Coastal States of 1.1 million tonnes and an additional allocation to Russian Federation and Greenland.

^^ Agreed TAC from the four Coastal States of 0.59 million tonnes and an additional allocation of 16 000 tonnes to Russian Federation.

^^^ Sum of unilateral quotas (Note: the Coastal States agree a TAC of 1 161 615 tonnes for 2020 and 929 292 tonnes for 2021).

§ Discards estimates include BMS landings.

§§ Preliminary.

§§§ Official TAC agreed between the coastal states who have signed up to the MP.

History of the catch and landings

Table 7 Blue whiting in subareas 1–9, 12, and 14. Catch distribution by fleet in 2021, as estimated by ICES.

Total catch (2021)	Landings		Discards
1143450 tonnes	96% pelagic trawl	4% other gears	3936 tonnes
	1139514 tonnes		

Table 8 Blue whiting in subareas 1–9, 12, and 14. History of commercial catch; ICES estimated values are presented for each country participating in the fishery. Discard data are included since 2014. All weights are in tonnes.

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Denmark	48659	18134	248	140	165	340	2167	35256	45178	39395	60868	87348	68716	58997	40321
Estonia													0		
Faroe Islands	317859	225003	58354	49979	16405	43290	85768	224700	282502	282416	356501	349838	336569	343372	202415
France	16638	11723	8831	7839	4337	9799	8978	10410	9659	10345	13369	16784	16095	13769	14612
Germany	34404	25259	5044	9108	278	6239	11418	24487	24107	20025	45555	47708	38244	42362	35327
Iceland	236538	159307	120202	87942	5887	63056	104918	182879	214870	186914	228934	292944	268356	243725	190146
Ireland	31132	22852	8776	8324	1195	7557	13205	21466	24785	27657	43238	49903	38836	40135	39514
Lithuania	9812	5338						4717		1129	5300			9543	21183
Netherlands	79875	78684	35686	33762	4595	26526	51635	38524	56397	58148	81156	121864	75020	62309	62017
Norway	539587	418289	225995	194317	20539	118832	196246	399520	489439	310412	399363	438426	351429	354033	233968
Poland											15889	12152	27185	47616	26077
Portugal	3897	4220	2043	1482	603	1955	2056	2150	2547	2586	2046	2497	3481	2819	2522
Spain	13557	14342	20637	12891	2416	6726	15274	32065	29206	31952	28920	24718	22782	23676	25509
Sweden	464	4	3	50	1	4	199	2	32	42	90	16**	54	25	40
UK (England + Wales)	12926	14147	6176	2475	27	1590	4100	11	131	1374+	3447	1864	4062	7458	8783
UK (Northern Ireland)							1232	2205	1119			4508	2899	2958	
UK (Scotland)	43540	38150	173	5496	1331	6305	8166	24630	30508	37173	64724	66682	54040	41344	65085
Russia	236369	225163	149650	112553	45841	88303	120674	152256	185763	173655	188449	170892	188006	181496	133605^
Greenland							2133				20212	23333	19753	19611	20190
Unallocated						3499									22137
Total	1625255	1260615	641818	526357	103620	384021	628169	1155279	1396244	1181850	1558061	1711461	1515527	1495248	1143450

* Only landings.

^ Russia 2021 preliminary data (Q1+Q2) submitted to WGWIDE 2021.

Table 9 Blue whiting in subareas 1–9, 12, and 14. ICES estimated catches by main fishing areas. All weights are in tonnes.

Area	Norwegian Sea fishery (subareas 1 and 2; divisions 5.a, 14.a–b)	Fishery in the spawning area (Subarea 12; divisions 5.b, 6.a–b, 7.a–c)	Directed- and mixed fisheries in the North Sea (Subarea 4; Division 3.a)	Total northern areas	Total southern areas (subareas 8, 9; divisions 7.d–k)	Total
1988	55829	426037	45143	527009	30838	557847
1989	42615	475179	75958	593752	33695	627447
1990	2106	463495	63192	528793	32817	561610
1991	78703	218946	39872	337521	32003	369524
1992	62312	318018	65974	446367	28722	475026
1993	43240	347101	58082	448423	32256	480679
1994	22674	378704	28563	429941	29473	459414
1995	23733	423504	104004	551241	27664	578905
1996	23447	478077	119359	620883	25099	645982
1997	62570	514654	65091	642315	30122	672437
1998	177494	827194	94881	1099569	29400	1128969
1999	179639	943578	106609	1229826	26402	1256228
2000	284666	989131	114477	1388274	24654	1412928
2001	591583	1045100	118523	1755206	24964	1780170
2002	541467	846602	145652	1533721	23071	1556792
2003	931508	1211621	158180	2301309	20097	2321406
2004	921349	1232534	138593	2292476	85093	2377569
2005	405577	1465735	128033	1999345	27608	2026953
2006	404362	1428208	105239	1937809	28331	1966140
2007	172709	1360882	61105	1594695	17634	1612330
2008	68352	1111292	36061	1215704	30761	1246465
2009	46629	533996	22387	603012	32627	635639
2010	36214	441521	17545	495280	28552	523832
2011	20599	72279	7524	100401	3191	103592
2012	24391	324545	5678	354614	29402	384016*
2013	31759	481356	8749	521864	103973	625837**
2014	45580	885483	28596	959659	195620	1155279
2015	150828	895684	44661	1091173	305071	1396244
2016	59744	905087	55774	1020604	162583	1183187***
2017	136565	1284105	45474	1466144	91917	1558061
2018	143204	1445957	43484	1632646	78831	1711477
2019	68593	1271883	44856	1385333	130194	1515527
2020	92084	1059197	64327	1215608	279640	1495248
2021	112082	801768	39509	953359	190091	1143450

* Official catches by area from Sweden are not included (2012).
** Official catches by area from Sweden and Greenland are not included (2013).
*** The total includes only 1336 tonnes from UK (England + Wales; 2016 total catch from UK [England + Wales] = 1374 tonnes).

Table 10 Blue whiting in subareas 1–9, 12, and 14. Landings inside and outside the NEAFC Regulatory Area (RA), as estimated by ICES, as well as total landings. Weights are in tonnes.

Year	Inside the NEAFC RA	Outside the NEAFC RA	Total catches	Percentage inside the NEAFC RA
2017	263019	1295042	1558061	17
2018	176399	1535078	1711477	10
2019	340062	1175465	1515527	22
2020	246412	1248836	1495248	16
2021	154661	833047	987708*	16

* Without the Russian 2021 preliminary catch data (quarter 1 and 2) submitted to WGWIDE 2021 and the unallocated catch data.

Summary of the assessment

Table 11 Blue whiting in subareas 1–9, 12, and 14. Assessment summary.

Year	Recruitment age 1 (thousands)			SSB (tonnes)			Catches (tonnes)*	F ages 3–7		
	Low	Value	High	Low	Value	High		Low	Value	High
1981	2549746	3948198	6113656	2245456	2846036	3607250	922980	0.189	0.259	0.354
1982	3001694	4696698	7348843	1835126	2299742	2881988	550643	0.164	0.221	0.297
1983	11937083	18293953	28036056	1512075	1854216	2273776	553344	0.192	0.255	0.337
1984	11900836	18077398	27459608	1454927	1756125	2119676	615569	0.244	0.319	0.417
1985	6312234	9550303	14449447	1732609	2095632	2534718	678214	0.275	0.356	0.461
1986	4792760	7206799	10836753	1884455	2274475	2745217	847145	0.339	0.436	0.562
1987	6047121	9113538	13734894	1603976	1933155	2329890	654718	0.324	0.419	0.541
1988	4251396	6409993	9664593	1370653	1638205	1957983	552264	0.342	0.441	0.569
1989	5609692	8492388	12856438	1297863	1546404	1842541	630316	0.412	0.529	0.680
1990	12270809	18840757	28928337	1128145	1356528	1631147	558128	0.396	0.518	0.676
1991	5826489	9049081	14054068	1429325	1777830	2211309	364008	0.216	0.291	0.393
1992	4365051	6698667	10279865	1951887	2460102	3100643	474592	0.173	0.233	0.315
1993	3184796	4942776	7671146	2027313	2543671	3191545	475198	0.151	0.204	0.275
1994	5277115	8113390	12474069	2042807	2535468	3146943	457696	0.136	0.184	0.248
1995	6125353	9322644	14188844	1901995	2308211	2801183	505176	0.183	0.242	0.320
1996	18496998	28090039	42658289	1836837	2207682	2653398	621104	0.226	0.297	0.390
1997	29748090	45080996	68316864	2048273	2467358	2972189	639681	0.229	0.300	0.392
1998	17717886	26696161	40224044	3017327	3685247	4501018	1131955	0.313	0.405	0.524
1999	13419599	20303064	30717343	3630259	4449851	5454480	1261033	0.300	0.389	0.504
2000	26002313	39448363	59847495	3521792	4233012	5087862	1412449	0.372	0.477	0.613
2001	37187292	55947436	84171646	3821738	4575712	5478433	1771805	0.363	0.467	0.600
2002	32631938	49106855	73899478	4504809	5401566	6476838	1556955	0.367	0.473	0.609
2003	35655989	52947963	78625974	5716742	6875173	8268346	2365319	0.395	0.502	0.638
2004	19302031	28714768	42717673	5701925	6778079	8057341	2400795	0.428	0.540	0.682
2005	14998683	22271163	33069881	5083744	6031586	7156150	2018344	0.396	0.504	0.641
2006	6005043	9009113	13515995	4948048	5891687	7015288	1956239	0.358	0.458	0.587
2007	3264414	4913368	7395256	3915203	4673775	5579322	1612269	0.355	0.459	0.593
2008	3862867	5883847	8962167	2971047	3593824	4347144	1251851	0.303	0.403	0.535
2009	3702391	5813482	9128311	2222003	2754203	3413874	634978	0.192	0.262	0.357
2010	10141289	15534228	23795027	2129607	2690487	3399087	539539	0.131	0.183	0.255
2011	12986631	19713440	29924598	2166277	2717639	3409333	103771	0.036	0.052	0.075
2012	13074672	19509226	29110475	2840438	3476370	4254677	375692	0.084	0.112	0.149
2013	10896851	16196200	24072726	3168694	3803134	4564602	613863	0.149	0.195	0.255
2014	25189811	37769539	56631551	3409524	4045006	4798933	1147650	0.292	0.379	0.492
2015	43428474	64728113	96474232	3548784	4218197	5013883	1390656	0.389	0.497	0.635
2016	23913789	35567778	52901145	4114630	4974200	6013339	1180786	0.339	0.437	0.562
2017	8062125	12172965	18379902	5085700	6199504	7557239	1555069	0.322	0.415	0.536
2018	8655930	13119298	19884169	5006887	6090429	7408460	1709856	0.322	0.419	0.546
2019	9638265	15254049	24141898	4319920	5284355	6464102	1512026	0.285	0.379	0.505
2020	16299607	26772174	43973408	3571612	4480563	5620836	1460507	0.302	0.415	0.571
2021	40213851	71562826	127350103	3320100	4440379	5938666	1139531	0.243	0.356	0.523
2022	19011128	43220294	98257917	3341999	4955777	7348815	1107529***	0.228	0.371	0.605
2023		22537250**			6621207^					

* Catches presented are the sum of product (SOP) values from catch- and weight-at-age used in the assessment model.
** Geometric mean (1996–2021).
*** Preliminary catches.
^ SSB calculated from the assessment and assumed recruitment for 2023.

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Download the stock assessment data and figures.

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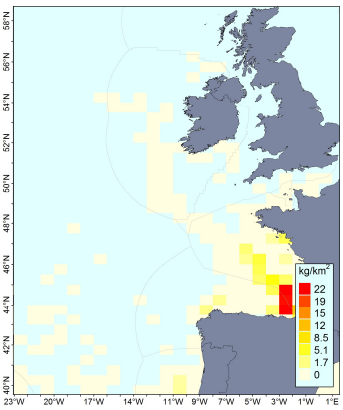
Bluefin Tuna

(*Thunnus thynnus*)

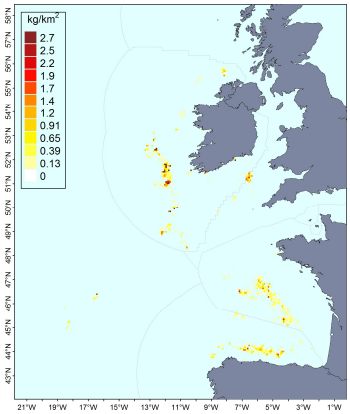
Biology – Species

Bluefin tuna is the largest tuna, and one of the largest fish of all. It is a pelagic, fish-eating species, found from the surface to depths of up to 1,000 m, and in temperatures from 3° to 30° Celsius. It is found throughout the Mediterranean and north Atlantic extending to the very cold waters off Norway. A separate stock occurs in the western north Atlantic. It is fast growing and recruits to the fishery by age 1, with maximum age of at least 20 years. Maturation occurs at 4 years, corresponding to fork length of approximately 115 cm, and maximum size is 400 cm. Juveniles migrate north to SW Ireland in summer, to feed in surface waters. Adults migrate, at depths from 50-150 m, to spawn off Venezuela, in the Gulf of Mexico and Sargasso Sea, and in the Mediterranean Sea. Spawning occurs from May to June, but individuals may only spawn every 2-3 years. Bluefin tuna are highly opportunistic predators that feed primarily on schooling fish. While they do eat pelagic shoaling fish such as herring and mackerel, there is no evidence that they specifically target them.

Landings Distribution



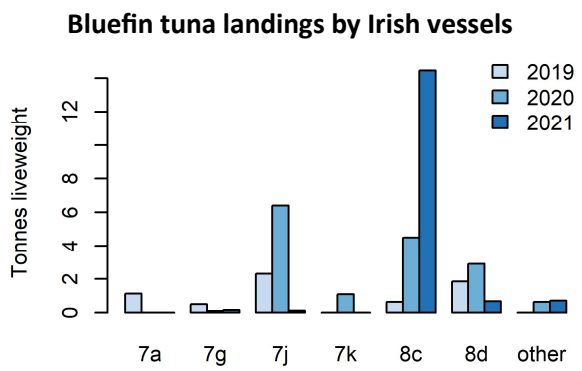
◀ The distribution of international landings of bluefin tuna between 2016-2020. Within the Irish EEZ, most bluefin tuna are taken in 7.j and 7.k as bycatch in the albacore tuna fishery.

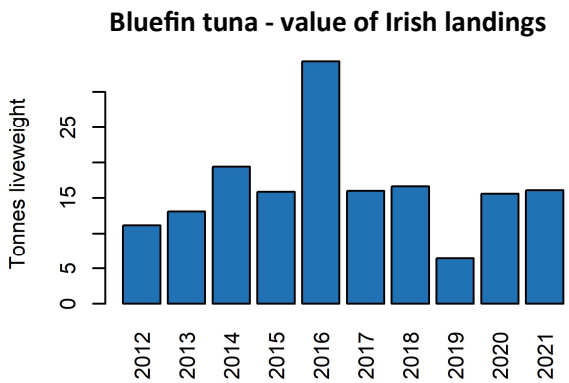


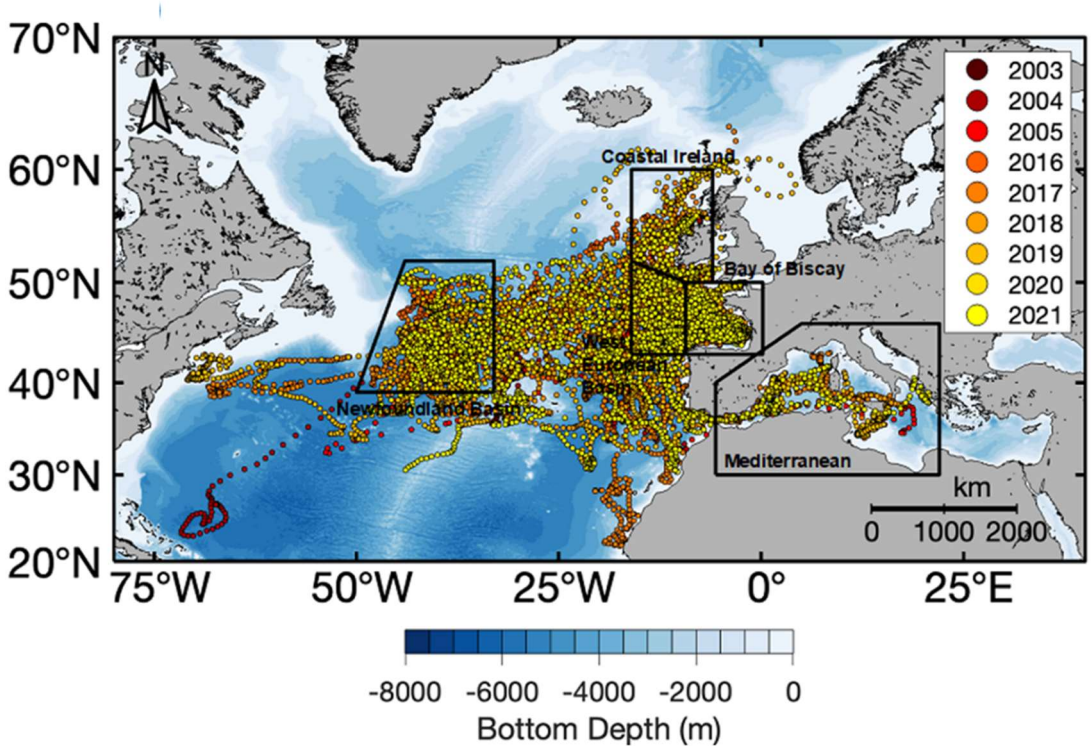
◀ Distribution of bluefin tuna bycatches by Irish commercial vessels (mainly pelagic otter trawls), between 2016-2020.

Irish Landings and Value of TAC

Ireland has no directed fishery for bluefin tuna. In 2021, 16.1 t of bluefin tuna were caught and landed by Irish vessels as bycatch (mainly in the albacore fishery) for which there is a minor quota. In 2021 the value of the catch of bluefin tuna was worth approximately €54,000.







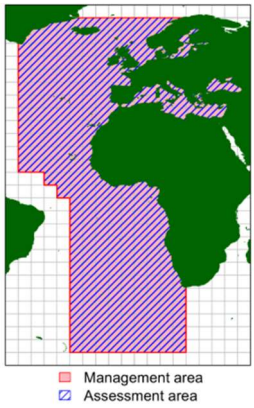
Satellite tracking of Bluefin tunas (n=81) tagged in Irish waters from 2003 to 2005 and 2016 to 2021. Information from satellite tags can indicate migration routes, timing, behaviour and location of spawning grounds as well as biological hotspots.

East Atlantic & Mediterranean Bluefin Tuna

East Atlantic and Mediterranean Sea

Advice for 2023

ICCAT has carried out a new assessment and management strategy evaluation (MSE) for this stock. A new management procedure will be selected in December 2022, therefore, no new advice was available at the time of publication.



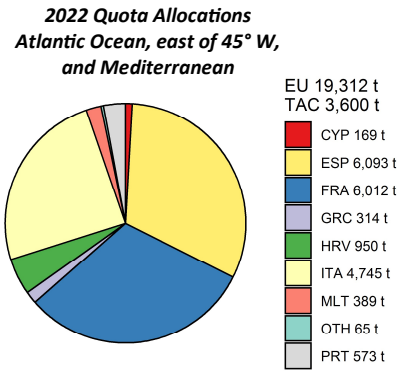
Key Points

ICCAT advice basis	Previous advice and indicators	
Management Plan	ICCAT Management Strategy Evaluation (Rec. 18-02*) Catch = 36,000 t	
ICCAT MSY	MSY lower	Not available
	MSY	Not available
	MSY upper	Not available
Landing Obligation	From 2015	No derogations or exemptions

* Recommendation by ICCAT Establishing a Multi-Annual Management Plan for Bluefin Tuna in the Eastern Atlantic and the Mediterranean Sea 18-02. A new MSE has been now carried out and will form the basis of management in the future.

Management in 2022

- The TAC covers the entire North Atlantic Ocean east of 45°W and the also the Mediterranean Sea.
- Ireland has no target fisheries. Bycatches in any fishery are subject to an unallocated bycatch quota for EU vessels (65t in 2022). This restrictive bycatch allowance may make blue fin a potential choke species in other pelagic fisheries especially as the stock rebuilds.
- In 2022, 22 charter angling vessels have been authorised to participate in the Irish catch, tag and release programme.
- EU member states' retained recreational catches must be deducted from available quotas. The quota that Ireland has access to is designated for bycatch only, and not for target fisheries.



Key Stock Considerations

- A new assessment and MSE was carried out in 2022 by ICCAT the results of that are being used to define a new management procedure and 2023 TAC for this stock.
- Previously, the ICCAT recommendation 09-06 sets the objective of achieving F_{MSY} and B_{MSY} by 2022 with at least a 60% probability and fishery indicators did not provide a reason to alter current management advice (36,000 t).
- The Marine Institute commenced a research programme on bluefin tuna in 2016 in partnership with Stanford University USA, University of Acadia Canada, Trinity College Dublin and ICCAT. A total of 120 Bluefin Tuna were tagged with pop off satellite tags (109) and accelerometer tags (11) from the Donegal and south coast during years 2016-2022. Results suggest a very high survival rate of tagged fish. Tags recovered to date show that fish tend to migrate to the mid-Atlantic for overwintering with some passing through the Bay of Biscay. Several fish have been observed in the Mediterranean at spawning time before subsequently returning to Irish waters a year later. The Marine Institute and partners plan to continue the research programme in 2023.

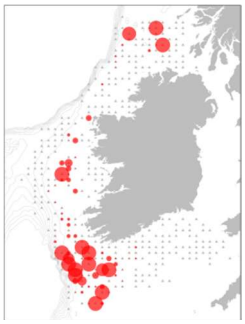
- A management plan for Bluefin tuna in the Mediterranean and East Atlantic, proposed by the ICCAT in 2018 allows for countries with no assigned quota to set up a recreational /sport catch/conventional tag/release fishery. This allows member states to collect scientific data regarding the numbers of BFT in particular areas and their migratory habits. Specifically:
    - Vessels would require specific authorisations
    - Vessels must be operating in the context of a scientific project of a research institute integrated in a scientific research programme.
    - Results would also need to be communicated to the Standing Committee on Research and Science (SCRS of ICCAT) on a yearly basis.
    - Tagging must be performed by trained personnel.
- Since 2019 Inland Fisheries Ireland, the Sea Fisheries Protection Authority and the Marine Institute have been running the Irish catch and release programme for bluefin tuna caught on charter angling vessels in Irish waters. To date approximately 1,300 bluefin tuna have been tagged using conventional floy tags.

BOARFISH

(CAPROS APER)

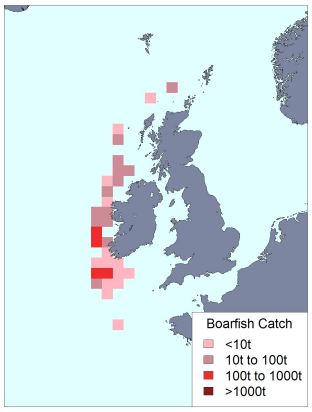
BIOLOGY – SPECIES

Boarfish is a small, pelagic, plankton eating, shoaling species, found at depths of up to 600 m. The species is widely distributed from Norway to Senegal, including the Mediterranean and oceanic island waters, but mostly south of Ireland to north Spain. Boarfish recruit to the fishery around three to four years of age, although the maximum age of boarfish is about 30. Spawning occurs on the Celtic Sea shelf edge during June and July. Under optimal conditions, boarfish are capable of spawning over an extended period of time. Maturation occurs at 3.5 years, corresponding to a total length of approximately 10 cm. The maximum size of this species is about 18 cm. Boarfish does not appear to be an important prey species in the Celtic Sea area.

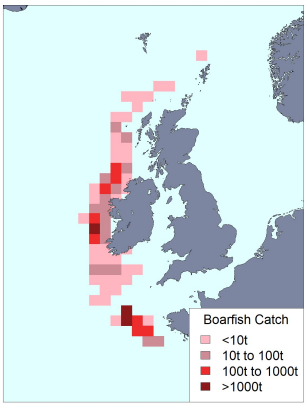


Survey catches of juveniles since 2005

LANDINGS DISTRIBUTION



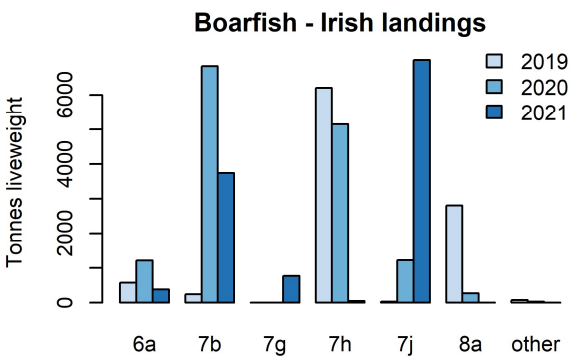
The distribution of Irish boarfish landings in 2021. The majority of landings were taken west of Ireland.

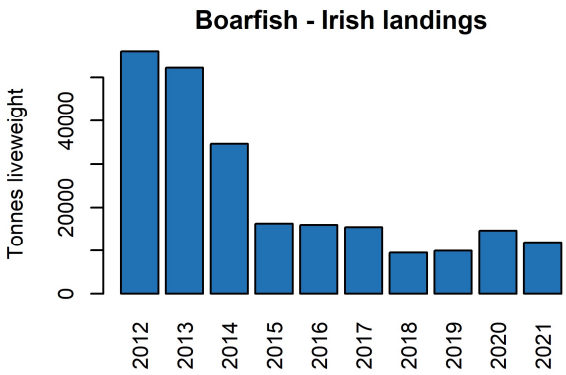


The distribution of Irish boarfish landings between 2019-2021. In recent years the fishery has taken place further south than during the earlier years of the fishery.

IRISH LANDINGS AND VALUE OF TAC

On average approximately 12,135 tonnes of boarfish were caught and landed by Irish vessels each year using mainly pelagic trawls between 2019 and 2021, most of which were caught in 7.h, 7.j and 7.b. Ireland dominates the international fishery, with Denmark being the only other significant participant. In 2021 landings were worth approximately €2.7 million for Irish vessels.



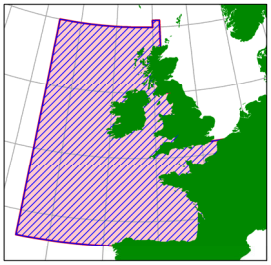


Boarfish in the Northeast Atlantic

Subareas 6, 7 and 8

Advice for 2023

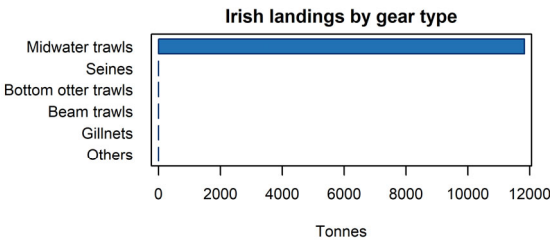
ICES advises that when the precautionary approach is applied, catches should be more than 22,791 t in each of the years 2022 and 2023.



Key Points

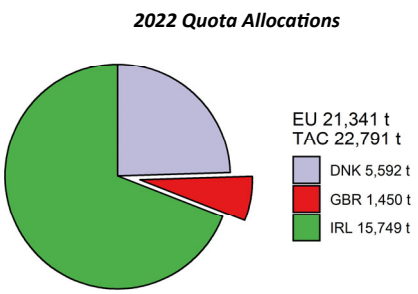
ICES Assessment Category	3 (Survey Based Assessment)	
Management Plan	No	
Advice basis	ICES PA Approach	Catch = 22,791 t Index ratio applied
Ranges	F_{MSY} Range Lower	Not available
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not available
Landing Obligation	From 2015	Area and gear specific *de minimis* exemption applies in 2021-23*

* Commission delegated regulation (EU) 2020/2015



Management in 2022

- The stock assessment and management units are ICES Sub-areas 6, 7 and 8.
- A long term management plan was proposed by the Pelagic Advisory Council in 2015 and evaluated by ICES as precautionary. The plan follows the rationale for the TAC setting within the ICES advice framework, but with some additional caution at low stock size.
- The plan includes closures from the 31st March – 31st August in all areas and also inside the Irish 12-mile limit, south of 52°30 from 12th February – 31st October to prevent catches of Celtic Sea herring and mackerel.



Key Stock Considerations

- Discard rates have been variable with up to 10% of the international catch discarded. Most of this is from demersal fisheries.
- In 2021, 85% of the TAC was taken, with Ireland and Denmark catching 90% and 92% of their total quotas respectively.

Further information on this stock can be found in the 2021 Stock Book.

Table 1: Landings of boarfish by country.

Year	Denmark	Germany	Ireland	Netherlands	England	Poland	Scotland	Spain	Total landings	Discards	Total	TAC
2001			120						120		120	
2002			91						91		91	
2003			458						458	10929	11387	
2004			675						675	4476	5151	
2005			165						165	5795	5959	
2006			2772						2772	4365	7137	
2007			17615				772		18387	3189	21576	
2008	3098		21585				0.45		24683	10068	34751	
2009	15059		68629						83688	6682	90370	
2010	39805		88457				9241		137503	6544	144047	
2011	7797		20685				2813		31295	5802	37097	33000
2012	19888		55949				4884		80721	6634	87355	82000
2013	13182		52250				4380		69812	5598	75410	82000
2014	8758		34622				38		43418	1813	45231	133957
2015	29	4	16325	375	104				16837	929	17766	53296
2016	337	7	17496	171	21				18032	1283	19315	47637
2017	548		15485	182	0.13				16215	1173	17388	27288
2018	94		9513	172	0.08		0.23	148	9927	1359	11286	21830
2019	757		9910	318	19			2.5	11006	306	11312	21830
2020	196		14666	416	62	109		1	15451	198	15649	19152
2021	4322		11830	781	45	45	9	11	17042	651	17693	19152

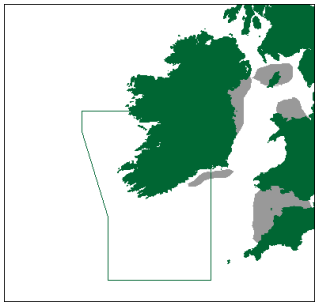
Cod

(Gadus morhua)

Biology – Species

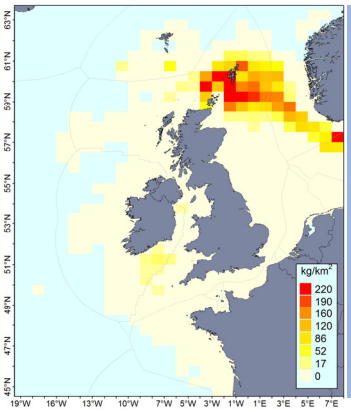
Atlantic cod (*Gadus morhua*) are widely distributed on both sides of the north Atlantic. In the North East Atlantic they occur from Norway to the Bay of Biscay.

Cod around Ireland are very fast growing and attain lengths in excess of 35cm in the first year and over 90cm as adults. About 50% of individuals are mature at 2 years and virtually 100% are mature by 3 years of age. Juveniles are more commonly found from 30 to 80m, mainly on rocky bottoms. Their diet consists of benthic animals, crustaceans and small fish. Fish become more prevalent in the diet in older cod. Once mature an adult female can produce over 2 million eggs.

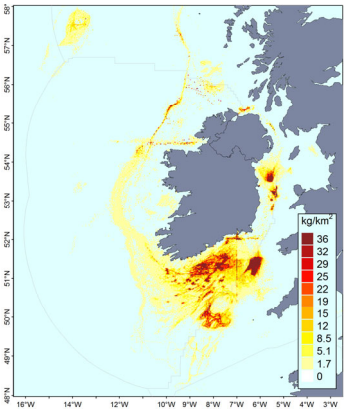


Cod Spawning Grounds

Landings Distribution



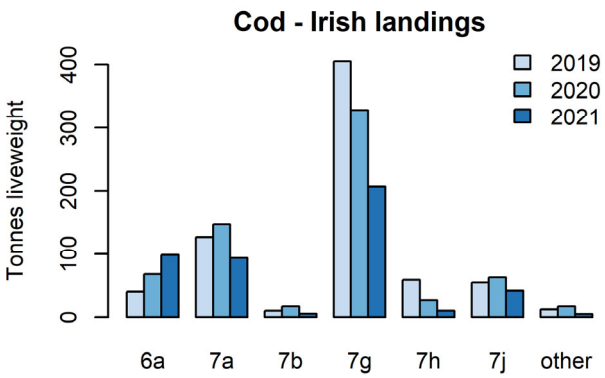
◀ The distribution of international landings of cod during 2016-2020. The vast majority of cod landings were taken from the northern North Sea.

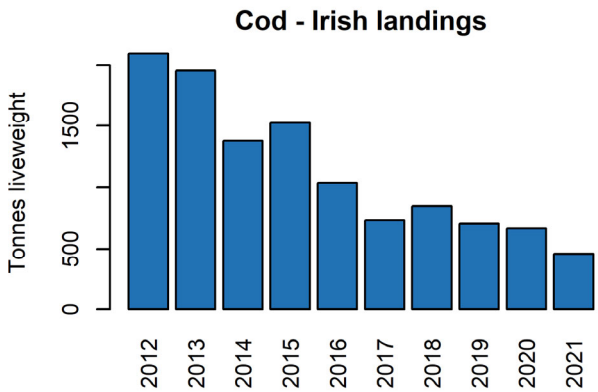


◀ The distribution of cod landings by Irish vessels between 2016-2020. The majority of the landings were from the Celtic Sea.

Irish Landings and Value of TAC

On average 611 tonnes of cod were caught and landed annually in mixed demersal fisheries by Irish vessels between 2019 and 2021, 45% of which were caught in 7.g. In 2021 landings were worth approximately €1.6 million for Irish vessels.



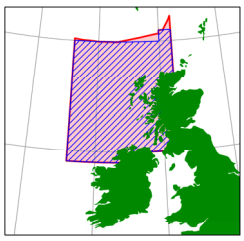


West of Scotland Cod

Division 6.a

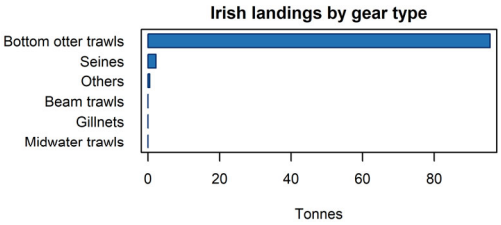
Advice for 2023

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in each of the years 2023 and 2024.



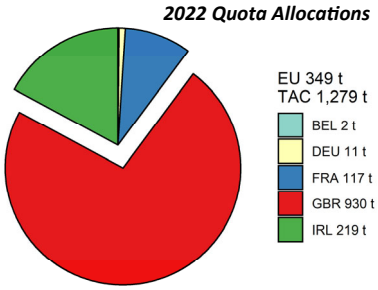
Key Points

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (bycatch)	
Advice Basis	ICES MSY approach	Catch=0 t
Ranges	F_{MSY} Range Lower	Not Appropriate (bycatch)
	F_{MSY}	Catch=809 t
	F_{MSY} Range Upper	Not Appropriate (bycatch)
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

- Quota is exclusively for bycatch in fisheries for other species.
- Division 6.a cod falls under a quota exchange mechanism related to the Landing Obligation, through which up to 6% of national quota is made available to other Member States who lack quota.
- The TAC Area covers Division 6.a, EU and international waters of 5.b east of 12° 00′ W. The assessment covers Division 6.a only and landings in the past have been adjusted to include substantial area misreporting estimates for landings reported in 4 but thought to be taken in 6.a.



Key Stock Considerations

- The 2022 ICES advice for this stock is biennial and is relevant for 2023 and 2024.
- The stock collapsed in the early 1980s, with SSB dropping from 40,000 t to below 3,100 t in 2006, with no indications of recovery despite significant management measures.
- There is no targeted fishery for cod in Division 6a. Landings are from bycatch in the mixed bottom trawl fishery targeting haddock, saithe, hake, anglerfish and megrim. ICES has provided a technical service for cod in Division 6.a which states that: "For cod in Division 6.a, catches in 2023 are estimated to be between 1,642 t and 2,562 t, assuming fishing mortality on cod does not change or increases by the same proportion as the change advised for haddock. Under the scenario resulting in lower catch, spawning-stock biomass (SSB) in 2024 is expected to decrease by 5.6% while the higher catch option is expected to result in a decrease in SSB of 44%."
- There is increasing evidence that cod in the north of 6.a are in fact part of the North Sea population. This will be investigated in the near future, ICES is identifying research needs and developing a roadmap for further research on cod in the northern shelf seas (including cod in the Celtic Seas).

Published 30 June 202

Cod (*Gadus morhua*) in Division 6.a (West of Scotland)

ICES advice on fishing opportunities

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in each of the years 2023 and 2024.

Stock development over time

Fishing pressure on the stock is above F_{MSY}, F_{pa} and F_{lim}; spawning-stock size is below MSY $B_{trigger}$, B_{pa}, and B_{lim}.

Figure 1 Cod in Division 6.a. Summary of the stock assessment. . Reported landings and estimated discards shown in the upper left panel (catches from 1995–2005 (pale blue) are excluded from the assessment. The assumed recruitment value for 2022 is shaded in a lighter colour.

Catch scenarios

Table 1 Cod in Division 6.a. Assumptions made for the interim year and forecast.

Variable	Value	Notes
$F_{ages\ 2–5}$ (2022)	0.74	F_{sq}= $F_{average\ (2019–2021)}$
SSB (2023)	2 923	Short-term forecast; in tonnes
$R_{age\ 1}$ (2022, 2023 and 2024)	2 226	Median recruitment resampled from the years 2016–2021; in thousands
Total catch (2022)	1 873	Short-term forecast; in tonnes
Projected landings (2022)	1 333	Short-term forecast assuming average landing pattern (2019–2021)^; in tonnes
Projected discards (2022)	540	Short-term forecast assuming average discard pattern (2019–2021)^; in tonnes

^ Because of inadequate discard sampling coverage of the fishery in 2021, average landings and discards proportions from 2019–2020 are used for ages 1 and 2.

Table 2 Cod in Division 6.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	F_{total} (2023)	$F_{projected\ landings}$ (2023)	$F_{projected\ discards}$ (2023)	SSB (2024)	% SSB change*	% TAC change^
ICES advice basis									
MSY approach: F = 0	0	0	0	0	0	0	4728	62	−100
Other scenarios									
F_{MSY} × SSB (2023)/MSY $B_{trigger}$	133	99	34	0.043	0.033	0.01	4569	56	−90
$F_{MSY\ lower}$ × SSB (2023)/MSY $B_{trigger}$	80	60	20	0.026	0.02	0.006	4632	58	−94
$F_{MSY\ upper}$ × SSB (2023)/MSY $B_{trigger}$	214	159	55	0.071	0.055	0.016	4472	53	−83
F = $F_{MSY\ lower}$	514	380	134	0.18	0.139	0.041	4113	41	−60
F = F_{MSY}	809	594	215	0.3	0.23	0.069	3757	29	−37
F = F_{pa}	1359	985	374	0.57	0.44	0.13	3099	6.0	6.3
F = $F_{MSY\ upper}$	1210	881	329	0.49	0.38	0.112	3278	12.1	−5.4
F = F_{2022}	1642	1181	461	0.74	0.57	0.17	2760	−5.6	28
F = F_{lim}	1625	1169	456	0.73	0.56	0.167	2781	−4.9	27
TAC(2022)	1279	929	350	0.53	0.41	0.12	3196	9.3	0.0
TAC(2022) – 25%	959	703	256	0.37	0.28	0.084	3577	22	−25
SSB(2024) = SSB(2023)	1507	1088	419	0.66	0.51	0.15	2923	0.0	17.8
SSB(2024) = 1.2 × SSB(2023)	1017	744	273	0.39	0.3	0.09	3510	20	−20
SSB (2024) = B_{lim}**									
SSB(2024) = B_{pa} = MSY $B_{trigger}$**									

* SSB 2024 relative to SSB 2023.
** The B_{lim}, B_{pa}, and MSY $B_{trigger}$ options were left blank because none of the three can be achieved in 2024, even with zero catches.
^ Total catch in 2023 relative to the TAC in 2022 (1279 tonnes).

The stock is estimated to be below B_{lim}. There are no catch scenarios that will rebuild the stock above B_{lim} in the short term. ICES continues to advise zero catch.

Basis of the advice

Table 3 Cod in Division 6.a. The basis of the advice.

Advice basis	MSY approach
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent waters (EU, 2019) takes bycatch of this species into account. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach and precautionary considerations.

Quality of the assessment

As a result of vessel breakdown, the UK-SCOGFS-Q1 survey was not carried out in 2022. In addition, a lack of discard sampling from the Nephrops trawl fleet (due to COVID-19 disruption) means that total discards were not adequately sampled for ages 1 and 2 in 2021, therefore catch numbers for ages 1 and 2 for 2021 were estimated by the model. Sensitivity analyses indicate that these issues are likely to have minimal impact on the assessment.

Stock structure remains an issue for cod in Division 6.a. The issues of multiple stocks in Division 6.a and connectivity with the North Sea stock remain sources of uncertainty.

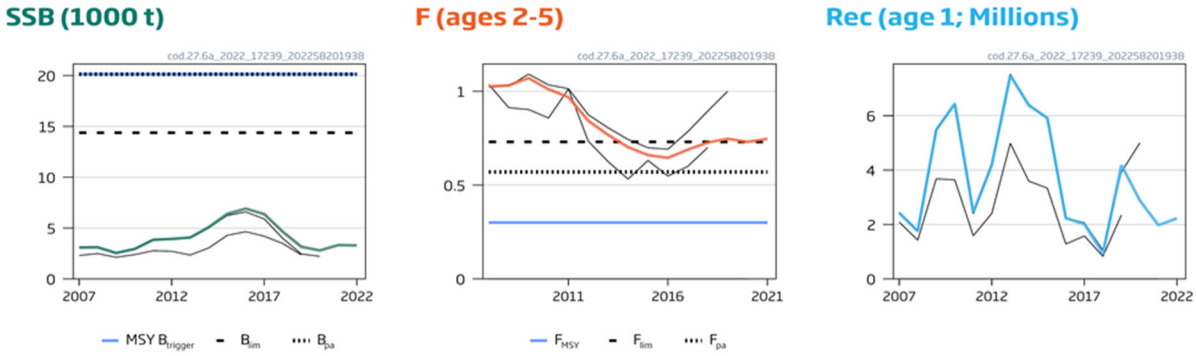


Figure 2 Cod in Division 6.a. Historical assessment results. Final-year recruitment and SSB estimates are included. The assessment was benchmarked in 2020.

Issues relevant for the advice

Management measures taken so far have not resulted in a recovery of the stock. Even though fishing mortality declined between 2009 and 2016, it has remained stable at above F_{lim} since then.

Cod are known to form aggregations; hence, it is still possible to find areas of high cod density at low stock abundance. This can lead to high catches in localized areas, generating high fishing mortality even with low fishing effort. The impact of this could be reduced by temporary spatial measures (e.g. real-time closures).

From 2019, cod is fully under the EU landing obligation in Division 6.a. The below minimum size (BMS) landings of cod reported to ICES are currently negligible, and they are much lower than ICES estimates of catches below the minimum conservation reference size (MCRS).

Cod to the west of Scotland (Division 6.a) are believed to comprise at least two subpopulations and potentially linked to cod in the North Sea (Division 4.a). The current assessment and management does not capture this dynamic as they are treated independently.

Estimated area-misreported landings (catches taken in Division 6.a, but reported elsewhere) have declined from 40% (average percentage 2017–2019) to around 20% (2019–2021) of the total landings.

Grey seal abundance is significant to the west of Scotland, and grey seals are known to feed on cod among other species. Cook *et al*. (2015) suggest that seal predation may be impairing the recovery of this stock.

Reference points

Table 4 Cod in Division 6.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	20 126	B_{pa}; in tonnes	ICES (2020)
	F_{MSY}	0.30	Based on simulation using a segmented regression stock–recruitment relationship (EqSim).	ICES (2020)
	$F_{MSY\ lower}$	0.18	F at 95% MSY (below F_{MSY}), based on simulation using a segmented regression stock–recruitment relationship (EqSim)	ICES (2020)
	$F_{MSY\ upper}$	0.49	F at 95 % MSY (above F_{MSY}), based on simulation using a segmented regression stock–recruitment relationship (EqSim)	ICES (2020)
Precautionary approach	B_{lim}	14 376	SSB consistent with high probability of above-average recruitment (SSB in 1992 as estimated by WKDEM); in tonnes	ICES (2020)
	B_{pa}	20 126	$B_{lim} \times 1.4$; in tonnes	ICES (2020)
	F_{lim}	0.73	The F with 50% probability of SSB < B_{lim}	ICES (2020)
	F_{pa}	0.57	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability	ICES (2020)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 5 Cod in Division 6.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Analytical age-based assessment (SAM) that uses catches in the model and in the forecast (ICES, 2022b)
Input data	Commercial catches (international landings, ages compositions from catch sampling); five survey indexes (ScoGFS-WIBTS-Q1 [G1179]; UK-SCOWCGFS-Q1 [G4748]; ScoGFS-WIBTS-Q4 [G4299]; UK-SCOWCGFS-Q4 [G4815]; IGFS-WIBTS-Q4 [G7212]); maturity data from surveys; time-varying natural mortalities (M) based on a mean weight model (Lorenzen, 1996), using mean weight data from market sampling and discard observations
Discards and bycatch	Because of a lack of discard sampling from the *Nephrops* fleet in 2021 (due to COVID-19 disruption), total discards were underestimated for 2021. Catch numbers at age 1 and 2 for 2021 were estimated by the assessment model.
Indicators	-
Other information	The stock was last benchmarked in 2020 (WKDEM; ICES, 2020)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Cod in Division 6.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC*	Agreed TAC**	Official landings	ICES estimates of reported landings	Misreporting adjustment	ICES discards^^^	ICES catch
1987	Reduce F towards F_{max}	18000	22000		19199	18970		2388	21358
1988	No increase in F; TAC	16000	18430		19182	20413		368	20781
1989	80% of F (87); TAC	16000	18430		15426	17170		2076	19246
1990	80% of F (88); TAC	15000	16000		11777	12175		571	12746
1991	70% of effort (89)	-	16000		10634	10927		622	11549
1992	70% of effort (89)	-	13500		9017	9086 ^		1779	10865
1993	70% of effort (89)	-	14000		10475	10314 ^		139	10453
1994	30% reduction in effort	-	13000		9131	8927 ^		661	9588
1995	Significant reduction in effort	-	13000		9660	9439 ^		141	9580
1996	Significant reduction in effort	-	13000		9580	9426		63	9489
1997	Significant reduction in effort	-	14000		6992	7034		499	7533
1998	20% reduction in F	9500^^	11000		5671	5714		538	6252
1999	F reduced to below F_{pa}	< 9700^^	11800		4289	4201		69	4270
2000	Recovery plan, 60% reduction in F	< 4200	7480		3064	2977		821	3798
2001	Lowest possible F, recovery plan	-	3700		2439	2347		92	2439
2002	Recovery plan or lowest possible F	-	4600		2231	2242		480	2722
2003	Closure	-	1808		1298	1292		60	1353
2004	Zero catch +	0	848		596	573		78	651
2005	Zero catch +	0	721		420	516		54	570
2006	Zero catch +	0	613		484	470	34	461	965
2007	Zero catch +	0	490		487	485	30	1651	2166
2008	Zero catch +	0	402		445	460	102	1037	1598
2009	Zero catch +	0	302	240	234	231	54	1287	1572
2010	Zero catch +	0		240	249	239	119	1575	1933

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC*	Agreed TAC**	Official landings	ICES estimates of reported landings	Misreporting adjustment	ICES discards^^^	ICES catch
2011	Zero catch +	0		182	206	211	130	3867	4208
2012	Zero catch +	0		0[++]	216	162	65	1914	2141
2013	No directed fisheries, minimize bycatch and discards	0		0[++]	172	172	93	1870	2136
2014	No directed fisheries, minimize bycatch and discards	0		0[++]	161	161	234	3369	3764
2015	No directed fisheries, minimize bycatch and discards	0		0[++]	256	258	270	2498	3026
2016	MSY approach (minimize all catches)	0		0[++]	346	336	272	1499	2108
2017	MSY approach (same advised catch value as provided for 2016)	0		0 [++]	351	355	320	3519	4195
2018	MSY approach	0		0[++]	367	378	613	2429	3419
2019	MSY approach (same advised catch value as provided for 2018)	0		1735[+++]	1443[##]	1489	571	204	2264
2020	MSY approach	0		1279[+++]	983***	941	332	309	1583
2021	MSY approach	0		1279[+++]	1209***	1215	49	642[#]	1906[#]
2022	MSY approach (same advised catch value as provided for 2021)	0		1279[+++]					
2023	MSY approach	0							
2024	MSY approach (same advised catch value as provided for 2023)	0							

* TAC is for the whole of Subdivision 5.b1 and subareas 6, 12, and 14.
** TAC is for Subdivision 5.b1 and Division 6.a.
*** Preliminary.
^ Including ICES estimates of misreporting.
^^ For Division 6.a only.
^^^ Including BMS landings from 2018 onwards.
[+] Single-stock boundaries and the exploitation of this stock should be conducted in the context of mixed fisheries, protecting stocks outside safe biological limits.
[++] Bycatch of cod in the area covered by this TAC may be landed, provided this bycatch does not exceed 1.5% of the live weight of the total catch retained on board per fishing trip.
[+++] Bycatch TAC.
[#] Underestimate due to lack of discard samples from the *Nephrops* fleet.
[##] Incomplete/missing, as part of the data is unavailable under data confidentiality clauses .

History of the catch and landings

Table 7 Cod in Division 6.a. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings			Discards		
1906# tonnes	Demersal finfish trawl 96%	*Nephrops* fleet < 1%	Other 4%	Demersal finfish trawl 99%	*Nephrops* fleet# < 1%	Other < 1%
	1264 tonnes			642# tonnes		

Underestimate because of lack of discard samples from *Nephrops* fleet which accounted for 45% of the discards in 2021.

Table 8 Cod in Division 6.a. History of commercial landings; official values are presented by country. All weights are in tonnes.

Year	Belgium	Denmark	Faroe Islands	France	Germany	Greenland	Ireland	Netherlands	Norway	Spain	UK (E, W, N.I.)	UK (Scotland)	UK	Official BMS landings	Total
1985	48	-	-	7411	66	-	2564	-	204	28	260	8032	-		18613
1986	88	-	-	5096	53	-	1704	-	174	-	160	4251	-		11526
1987	33	4	-	5044	12	-	2442	-	77	-	444	11143	-		19199
1988	44	1	11	7669	25	-	2551	-	186	-	230	8465	-		19182
1989	28	3	26	3640	281	-	1642	-	207	85	278	9236	-		15426
1990	-	2	-	2220	586	-	1200	-	150	-	230	7389	-		11777
1991	6	2	-	2503	60	-	761	-	40	-	511	6751	-		10634
1992	-	3	-	1957	5	-	761	-	171	-	577	5543	-		9017
1993	22	2	-	3047	94	-	645	-	72	-	524	6069	-		10475
1994	1	+	-	2488	100	-	825	-	51	-	419	5247	-		9131
1995	2	4	-	2533	18	-	1054	-	61	16	450	5522	-		9660
1996	+	2	-	2253	63	-	1286	-	137	+	457	5382	-		9580
1997	11	-	-	956	5	-	708	2	36	6	779	4489	-		6992
1998	1	-	-	714	6	-	478	1	36	42	474	3919	-		5671
1999	+	+	-	842	8	-	223	-	79	45	381	2711	-		4289
2000	+	-	-	236	6	-	357	-	114	14	280	2057	-		3064
2001	2	-	-	391	4	-	319	-	39	3	138	1544	-		2440
2002	+	-	-	208	+	-	210	-	88	11	195	1519	-		2231
2003	-	-	-	172	+	-	120	-	45	3	79	879	-		1298
2004	-	-	2	91	-	-	34	-	10	-	46	413	-		596
2005	-	-	-	107	-	-	28	-	17	-	25	243	-		420
2006	-	-	1	108	2	-	18	-	30	-	14	318	-		491
2007	-	-	12	92	2	-	70	-	30	-	21	260	-		487
2008	-	-	1	82	1	-	58	-	65	-	6	232	-		445
2009	-	-		74	-	-	24	-	18	-	14	104	-		234
2010	-	-	-	60	-	-	49	-	21	-	4	115	-		249
2011	-	-	-	49	-	-	41	-	8	-	3	107	-		208
2012	-	-	-	4	-	-	18	-	2	-	2	135	-		161
2013	-	-	-	3	-	-	14	-	24	-	1	130	-		172
2014	-	-	-	5	-	-	12	-	13	-	9	121	-		160
2015	-	-	-	11	-	-	17	-	59	-	-	-	168		256
2016	-	11	-	86	-	1	28	-	39	-	-	-	183		348
2017	-	1	-	119	-	-	19	-	14	-	-	-	200		352
2018	-	+	+	101	-	-	12	-	37	-	-	-	217		367
2019	-	-	-	142	-	-	^	-	47	31	-	-	1224	+	1443^
2020*	-	-	-	139	-	3	65	-	4	32	-	-	738	2	983
2021*	-	-	-	162	-	-	98	-	-	27	-	-	923	+	1209

* Preliminary.
+ Landings < 0.5 tonnes.
^Incomplete/missing part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

Table 9 Cod in Division 6.a. Assessment summary. Weights are in tonnes and recruitment in thousands. 'High' and 'Low' refer to 95% confidence intervals. Total landings and discards from 1995–2006 are not included as input to the assessment.

Year	Recruitment age 1			SSB			Catches ^^	Landings^	Discards^,*	Fishing mortality ages 2–5		
	Value	High	Low	Value	High	Low				Value	High	Low
1981	10776	14874	7807	43252	49703	37639		23865	303	0.68	0.79	0.58
1982	24158	32385	18021	42471	48273	37367		21511	571	0.72	0.81	0.64
1983	14133	18900	10568	35762	40320	31720		21305	197	0.78	0.88	0.70
1984	24070	32119	18038	30414	34196	27051		21272	329	0.86	0.96	0.77
1985	10610	14131	7966	25388	28505	22611		18607	963	0.92	1.02	0.82
1986	21633	29608	15806	22021	24899	19475		11820	263	0.88	0.98	0.79
1987	42929	59470	30989	24089	27161	21365		18971	2388	0.91	1.01	0.81
1988	7360	9974	5432	26656	30811	23062		20413	368	0.91	1.01	0.82
1989	21585	29143	15987	25011	28826	21701		17169	2076	0.93	1.03	0.83
1990	7974	10959	5803	19427	22020	17139		12175	571	0.87	0.97	0.78
1991	11762	15821	8745	16219	18356	14331		10927	622	0.89	1.00	0.80
1992	21848	29386	16244	14351	16120	12777		9086	1779	0.89	1.00	0.80
1993	7886	10879	5717	14335	16522	12438		10314	139	0.89	1.01	0.79
1994	13771	19640	9656	14118	16916	11784		8928	661	0.89	1.02	0.78
1995	10200	14828	7016	13032	16629	10213	9419		141	0.91	1.04	0.79
1996	4222	6265	2845	10962	14540	8264	8359		63	0.94	1.08	0.82
1997	17062	25460	11434	9311	12567	6899	7087		499	0.97	1.11	0.84
1998	5413	8172	3586	9098	12560	6591	6095		538	0.97	1.11	0.84
1999	4314	6539	2846	7685	10687	5527	5285		69	0.97	1.11	0.85
2000	14621	22205	9627	6650	9228	4792	4822		821	0.97	1.11	0.85
2001	4137	6313	2711	6966	9763	4971	5057		92	0.99	1.13	0.86
2002	6975	10613	4583	6387	8885	4591	4756		480	1.00	1.15	0.87
2003	2303	3466	1531	5208	7115	3811	3649		57	1.03	1.19	0.90
2004	3243	4777	2202	3632	4839	2726	2570		75	1.06	1.22	0.92
2005	2204	3284	1480	2609	3382	2012	1870		41	1.07	1.23	0.92
2006	7212	10572	4920	2476	3095	1981	1856		456	1.05	1.21	0.91
2007	2419	3617	1617	3083	3909	2431		515	1648	1.03	1.18	0.89
2008	1751	2573	1192	3091	3946	2422		561	1037	1.03	1.19	0.90
2009	5474	7799	3843	2534	3080	2084		293	1285	1.07	1.24	0.92
2010	6453	9064	4594	2940	3549	2435		353	1558	1.01	1.17	0.87
2011	2450	3515	1708	3838	4664	3159		344	3805	0.97	1.13	0.83
2012	4188	5873	2986	3931	4759	3248		238	1916	0.84	0.98	0.72
2013	7473	10512	5312	4074	4824	3441		270	1784	0.77	0.90	0.65
2014	6372	8932	4546	5094	6061	4281		397	3367	0.70	0.83	0.60
2015	5925	8356	4201	6395	7652	5343		565	2501	0.66	0.79	0.55
2016	2226	3117	1590	6902	8255	5770		650	1499	0.65	0.77	0.54
2017	2012	2817	1437	6366	7671	5284		687	3500	0.69	0.81	0.59
2018	924	1338	638	4634	5613	3825		994	2426	0.73	0.86	0.62
2019	4183	5902	2964	3158	3820	2611		2077	203	0.75	0.89	0.63
2020	2876	4705	1758	2795	3378	2313		1176	309	0.73	0.89	0.60
2021	1974	4198	928	3326	4255	2600		1241	642#	0.75	0.95	0.58
2022	2226**	4183	924	3288	4558	2376						

* BMS landings are included with discards from 2018 onwards.

** Median resampled recruitment (2016–2020).

^ Calculated using sum of products from the landings and discards numbers-at-age and mean weights-at-age.

^^ Catches estimated by the model.

Underestimate because of lack of discard samples from the *Nephrops* fleet.

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Download the stock assessment data and figures.

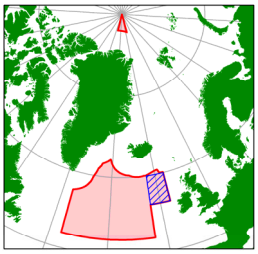
Recommended citation: ICES. 2022. Cod (*Gadus morhua*) in Division 6.a (West of Scotland). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, cod.27.6a. https://doi.org/10.17895/ices.advice.19447889.

Rockall Cod

Division 6.b

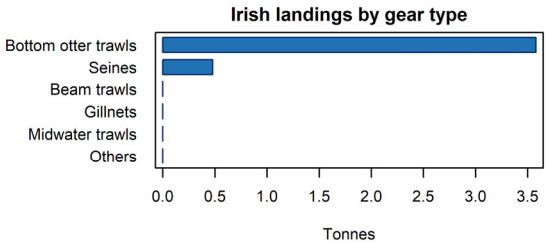
Advice for 2023

ICES advises that when the precautionary approach is applied, catches should be no more than 14 t in each of the years 2021, 2022, and 2023.



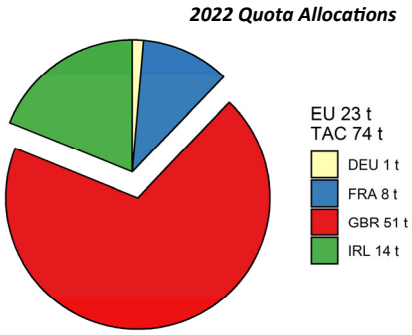
Key Points

ICES Assessment Category	6 (Bycatch only)	
Management Plan	WWMAP (bycatch)	
Advice Basis	ICES PA approach	Catch=14 t
Ranges	F_{MSY} Range Lower	Not available
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not available
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

- The TAC area covers Sub-areas 6.b, EU and international waters of 5.b west of 12°00' W and to 12 and 14. The TAC applies to EU vessels only and not the international fishery at Rockall.



Key Stock Considerations

- The ICES advice issued in 2020 is relevant for 2021, 2022 and 2023.
- Total landings for 2021 were estimated to be 25 t, the majority is taken by Scottish vessels.
- Irish landings of Rockall cod are taken as a minor bycatch in the fishery targeting haddock; they are also landed with megrim, saithe and anglerfish.
- Irish LPUE showed large reductions from the 1990s to historic lows in recent years. Scottish LPUE and survey data shows some increase in abundance in the last 3-4 years but the stock is likely to be significantly lower than was observed in the 1990s.

Further information on this stock can be found in the 2020 Stock Book.

Cod in Division 6.b Landings by country 1992-2021 (* Preliminary, + Landings < 0.5 tonnes)

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Faroe Is.	-	1	-	-	-	-	-	-	-	-
France	-	-	-	-	-	-	-	-	+	-
Germany	2	-	-	-	10	22	3	11	1	-
Ireland	235	472	280	477	436	153	227	148	119	40
Norway	199	199	120	92	91	55	51	85	152	89
Portugal	-	-	-	-	-	5	-	-	-	-
Russia	-	-	-	-	-	-	-	-	7	26
Spain	-	-	-	2	5	1	6	4	3	1
UK (E, W, N.I.)	26	103	25	90	23	20	32	22	4	2
UK (Scotland)	714	322	236	370	210	706	341	389	286	176
UK	-	-	-	-	-	-	-	-	-	-
Total	1176	1097	661	1031	775	962	660	659	572	334

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Faroe Is.	-	-	-	-	-	-	-	3	5	+
France	+	+	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-
Ireland	18	11	7	12	23	24	41	20	6	12
Norway	28	25	23	7	7	12	12	25	27	49
Portugal	-	-	-	-	-	-	-	-	-	-
Russia	-	-	-	-	-	-	-	1	-	-
Spain	-	6	-	-	-	-	-	-	-	-
UK (E, W, N.I.)	2	3	-	-	-	-	-	-	-	-
UK (Scotland)	67	57	45	43	29	26	41	48	23	37
UK	-	-	-	-	-	-	-	-	-	-
Total	115	102	75	62	58	62	94	97	61	98

Country	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021*
Faroe Is.	-	-	-	-	-	-	-	-	-	-
France	-	-	-	-	-	-	-	-	0	-
Germany	-	-	-	-	-	-	-	-	-	-
Ireland	1	2	6	5	15	17	14	10	14	4
Norway	11	3	+	18	11	3	1	5	1	-
Portugal	-	-	-	-	-	-	-	-	-	-
Russia	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	0	0	-
UK (E, W, N.I.)	-	-	-	-	-	-	-	-	-	-
UK (Scotland)	11	9	-	-	-	-	-	-	-	-
UK	-	-	10	18	37	38	49	51	27	21
Total	23	14	15	41	63	57	64	66	42	25

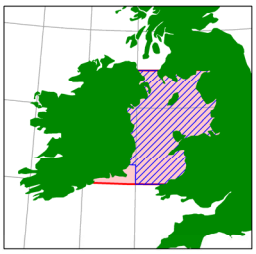
Irish Sea Cod

Division 7.a

Advice for 2023

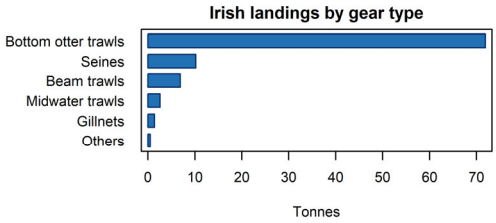
ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in 2023.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.



Key Points

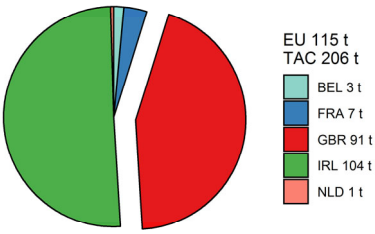
ICES Assessment Category	I (Quantitative Assessment)	
Management Plan	WWMAP (target)	
Advice Basis	MSY approach	Catch=0 t
Ranges	F_{MSY} Range Lower	Catch=704 t
	F_{MSY}	Catch=908 t
	F_{MSY} Range Upper	Catch=1,093 t
Landing Obligation	From 2019	No derogations or exemptions.



Management in 2022

- The TAC Area covers Division 7.a, which corresponds to the assessment area, however Irish landings taken or reported from 33E2 and 33E3 (off Waterford & Wexford), are transferred into the Celtic Sea assessment (Division 7.e-k).
- The 2021 reallocation of 52 t accounted for 28% of Irish Sea (Division 7.a) landings and 8% of Celtic Sea (Divisions 7.b-k) landings. The TAC management area covers all of ICES Division 7.a.
- The TAC is exclusively for by-catches. No directed fisheries are permitted under this quota.
- This stock is considered to be a target stock in the Western Waters MAP regulation ((EU) 2019/472) but given the state of the stock no directed fisheries are permitted.
- All Irish TR2 vessels targeting *Nephrops* in 7.a must use highly selective gears i.e. SELTRA trawl, large mesh (300mm) square mesh panels or sorting grid as a condition of national license obligations.

2022 Quota Allocations



Key Stock Considerations

- This stock was benchmarked in 2022 and the new assessment carried out this year showed that stock biomass in 2022 is the lowest recorded since 2011.
- In the past cod were mainly taken as a bycatch in the *Nephrops* fisheries. In 2021, 37% of landings are from vessels targeting demersal fish and 33% are from vessels targeting *Nephrops*.
- An EU funded tagging study which concluded in 2019, has indicated some outward migration of mature cod into the Celtic Sea. This needs to be further investigated to determine stock assessment implications.
- ICES has provided catch scenarios which take into account ecosystem considerations (F_{eco}) for the first time this year. Irish Sea cod are suffering from reduced productivity according to the ecosystem indicator (based on sea surface temperature).

Published 30 June 2022

Version 2: 10 October 2022

Cod (*Gadus morhua*) in Division 7.a (Irish Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in 2023.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and spawning-stock size is below MSY $B_{trigger}$, B_{pa}, and B_{lim}.

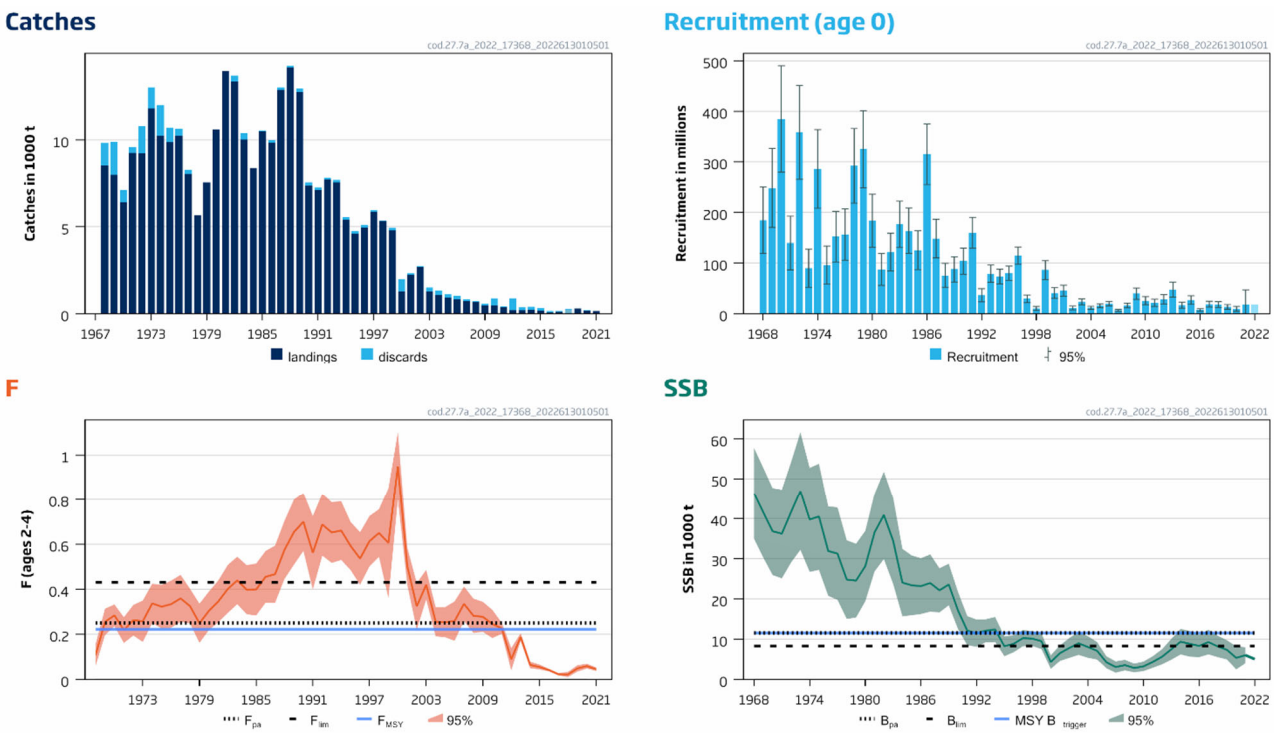


Figure 1 Cod in Division 7.a. Summary of the stock. The assumed recruitment value for 2022 is shaded in a lighter colour. The SSB in 2022 is forecasted.

Catch scenarios

Table 1 Cod in Division 7.a. Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 2–4}$ (2022)	0.038	$F_{sq} = F_{average(2018,2019,2021)}$*
SSB (2023)	4 842	Short-term forecast fishing at F_{sq}; in tonnes
$R_{age\ 0}$ (2022 and 2023)	17 989	Geometric mean (2002–2019); in thousands
Total catch (2022)	165	Fishing at F_{sq}; in tonnes
Projected landings (2022)	159	Short-term forecast assuming average landing pattern (2019–2021); in tonnes
Projected discards (2022)	6	Short-term forecast assuming average discard pattern (2019–2021); in tonnes

* F in 2020 was assumed to be unrepresentative because of the COVID-19 disruption and hence F_{sq} was calculated as $F_{average\ (2018,2019,2021)}$.

Table 2[1] Cod in Division 7.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	F_{total} (2023)	$F_{projected\ landings}$ (2023)	$F_{projected\ discards}$ (2023)	SSB (2024)	% SSB change*	% TAC change^	% advice change^^
ICES advice basis										
MSY approach: F = 0	0	0	0	0	0	0	5930	9.8	−100	−100
Other scenarios										
F = 0	0	0	0	0	0	0	5930	9.8	−100	−100
F_{MSY} × SSB (2023)/MSY $B_{trigger}$	448	424	23	0.104	0.099	0.0040	5410	0.19	117	510
EU MAP**: $F_{MSY\ lower}$ × SSB (2023)/MSY $B_{trigger}$	343	325	18	0.079	0.076	0.0030	5532	2.44	66	364
EU MAP**: $F_{MSY\ lower}$	704	667	37	0.168	0.162	0.0065	5116	−5.3	242	850
F = F_{MSY}	908	861	48	0.22	0.21	0.0086	4882	−9.6	340	1130
F = F_{pa}	1011	958	53	0.25	0.24	0.0097	4766	−11.7	390	1270
F = $F_{MSY\ upper}$	1093	1035	58	0.27	0.26	0.0106	4673	−13.5	430	1380
F = F_{2022}	170	161	9	0.038	0.037	0.00148	5732	6.1	−17.5	130
F = F_{lim}	1612	1526	86	0.43	0.41	0.0166	4092	−24	680	2100
F=F_{eco}	788	747	41	0.19	0.183	0.0074	5019	−7.1	280	960
F_{eco} × SSB (2023)/MSY $B_{trigger}$	386	366	20	0.089	0.085	0.0034	5482	1.52	87	423
SSB (2024) = SSB (2023)	457	433	24	0.106	0.102	0.0041	5400	0	122	520
SSB (2024) = B_{lim} ***										
SSB(2024)=B_{pa} = MSY $B_{trigger}$ ***										

* SSB 2024 relative to SSB 2023.

** EU multiannual plan (MAP) for the Western Waters (EU, 2019).

*** The B_{lim}, B_{pa}, and MSY $B_{trigger}$ options were left blank because none of them can be achieved in 2024, even with zero catches.

^ Total TAC in 2023 relative to the TAC in 2022 (206 tonnes).

^^ Total advice in 2023 relative to advice in 2022 (74 tonnes).

The stock is estimated to be below B_{lim}. There are no catch scenarios that will rebuild the stock above B_{lim} by 2024 and therefore ICES advises zero catch.

[1] Version 2: Correction to the + group weights which affects slightly the values in table 2 but does not affect the advice.

Basis of the advice

Table 3 Cod in Division 7.a. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

The assessment was benchmarked in 2022 and changed from category 3 to category 1 (ICES, 2022a); therefore, historical assessments are not comparable.

Recreational removals were not included in the 2022 assessment owing to uncertainty around their calculations and selectivity patterns. This exclusion makes minor changes to the perception of the stock.

Issues relevant for the advice

The advice is for Division 7.a, excluding the rectangles 33E2 and 33E3 in the Irish Sea.

Landings have been adjusted since 2003 to exclude those taken from the southern rectangles (33E2 and 33E3) in the Irish Sea; these landings are not believed to be part of this stock (Table 8) but rather of the stock in divisions 7.e–k (western English Channel and southern Celtic Seas). The advice thus excludes these two southern rectangles for cod in Division 7.a but includes them in the assessment and advice for cod in divisions 7.e–k. This should be considered when setting TACs for the two management areas for cod in both 7.a and 7.e–k. In total, 38.8% of total Irish Sea ICES landings are reallocated, accounting for 8.2% of ICES landings in divisions 7.e–k.

During the benchmark the existence of recreational fishery for cod was noted. The relative contribution of the recreational fishery to the total catch may have increased.

A new reference point, F_{eco}, was introduced during the benchmark (ICES, 2022a). F_{eco} falls in the pre-defined F_{MSY} range and it should provide in the long-term better yield and lower risk. For Irish Sea cod, F_{eco} was derived from the inverse of sea surface temperature. This indicator is updated annually (ICES, 2019, 2020).

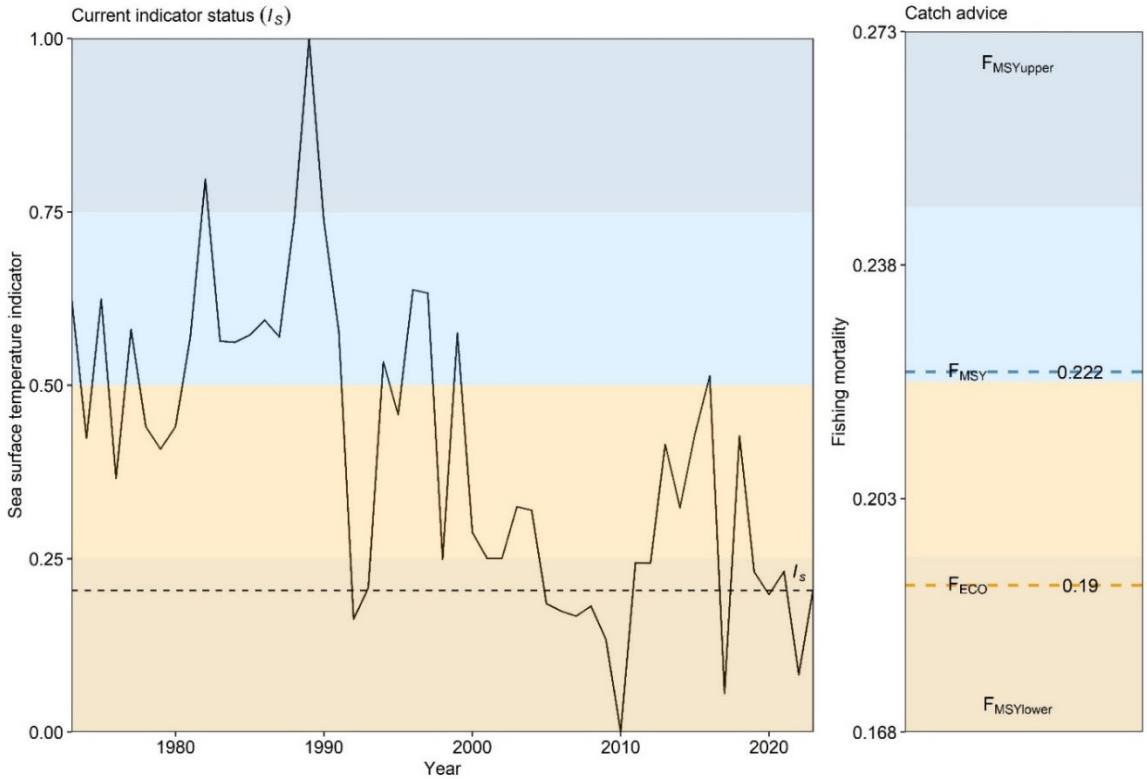


Figure 2 Derivation of F_{eco} for Irish Sea cod. Left: time-series of inverted SST (three-year lag) *I* rescaled between zero and one which informs the status of the indicator (I_s) in 2023 compared with previous years. Right: the status of the indicator determines the placement of the F_{eco} reference point within F_{MSY} ranges (ICES, 2019,2020).

Reference points

Table 4 Cod in Division 7.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	11 538	B_{pa}	ICES (2022a)
	F_{MSY}	0.222	Based on a simulation using model averaged combined stock–recruitment relationship (EqSim)	ICES (2022a)
	F_{eco}	0.19	Ecosystem indicator (I_s); F_{eco} = $F_{MSY\ lower}$ + ([$F_{MSY\ upper}$ − $F_{MSY\ lower}$]*I_s)	ICES (2022a)
Precautionary approach	B_{lim}	8 303	Lowest SSB with above-average recruitment	ICES (2022a)
	B_{pa}	11 538	$B_{lim} \times \exp(1.645 \times \sigma)$, $\sigma = 0.20$; in tonnes	ICES (2022a)
	F_{lim}	0.43	F with 50% probability of SSB > B_{lim}	ICES (2022a)
	F_{pa}	0.25	F_{P05}; the F that leads to SSB > B_{lim} with 95% probability	ICES (2022a)
EU Management Plan (MAP)*	MAP MSY $B_{trigger}$	11 538	MSY $B_{trigger}$; in tonnes	ICES (2022a)
	MAP B_{lim}	8 303	B_{lim}; in tonnes	ICES (2022a)
	MAP F_{MSY}	0.222	F_{MSY}	ICES (2022a)
	MAP range F_{lower}	0.168	F at 95% MSY (below F_{MSY}), based on simulation using a model average combined stock–recruitment relationship (EqSim)	ICES (2022a)
	MAP range F_{upper}	0.273	F at 95 % MSY (above F_{MSY}), based on simulation using model averaged combined stock–recruitment relationship (EqSim)	ICES (2022a)

* EU multiannual plan (MAP) for the Western Waters (EU, 2019).

Basis of the assessment

Table 5 Cod in Division 7.a. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2022b)
Assessment type	Age-based stochastic analytical assessment (SS3; ICES, 2022a, 2022c)
Input data	Northern Ireland Groundfish Survey quarter 1 (G7144; 1995–2021) ages 1–4, and quarter 4 (G7655; 1995–2021) age 0 recruitment index, Fishery science partnership survey UKFSP (B7897; ages 2–6, 2004–2021, excluding 2014), commercial catches (age composition of landings and discards), annual maturity from the G7144 survey and commercial landings, natural mortality estimated from tagging data (ICES, 2022a)
Discards and bycatch	Discards available since 2007, prior to 2007 are reconstructed (ICES, 2017)
Indicators	Sea surface temperature (Rayner, 2003)
Other information	This stock was benchmarked in 2022 (ICES, 2022a)
Working group	Working Group for the Celtic Seas Ecoregion

History of the advice, catch, and management

Table 6 Cod in Division 7.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice, with single-stock exploitation boundaries since 2004	Catch corresponding to advice	Agreed TAC	Official landings	ICES landings ***	ICES discards
1987	No increase in F; interaction with *Nephrops*	10300	15000	13200	12900	
1988	No increase in F; interaction with *Nephrops*	10100	15000	15800	14200	
1989	No increase in F	13400	15000	11300	12800	
1990	F at F_{med}; TAC	15300	15300	9900	7400	
1991	Stop SSB decline; TAC	6000	10000	7000	7100**	
1992	20% of F(90) ~ 10 000 tonnes	10000	10000	7400	7700**	
1993	F_{med} ~ 10 200 tonnes	10200	11000	5900	7600**	
1994	60% reduction in F	3700	6200	4500	5400**	
1995	50% reduction in F	3900	5800	4500	4600**	
1996	30% reduction in F	5400	6200	5303	4964**	
1997	30% reduction in F	5900	6200	4441	5859**	
1998	No increase in F	6200	7100	4962	5318**	
1999	Reduce F below F_{pa}	4900	5500	2875	4784**	
2000	Lowest possible F	0	2100	1417	1274	
2001	Lowest possible F	0	2100	2026	2252	
2002	Establish recovery plan	-	3200	2715	2695	
2003	Closure of all fisheries for cod	-	1950	1477	1285	
2004	Zero catch	0	2150	1179	1072	
2005	Zero catch	0	2150	967	910	
2006	Zero catch	0	1828	948	840	
2007	Zero catch	0	1462	1117	702	148
2008	Zero catch	0	1199	1224	661	62
2009	Zero catch	0	899	765	468	60
2010	Zero catch	0	674	594	464	377
2011	Zero catch	0	506	485	368	43
2012	Zero catch	0	380	326	198	658
2013	No directed fisheries, minimize bycatch and discards	0	285	281	206	118
2014	No directed fisheries, minimize bycatch and discards	0	228	236	213	149
2015	No directed fisheries, minimize bycatch and discards	0	182	199	161	224
2016	No directed fisheries, minimize bycatch and discards	0	146	122	82	60
2017	MSY approach	0	146	103	84	59
2018	MSY approach	≤ 1073	695	235	215	42
2019	MSY approach	≤ 807	807	205†	295	7

Year	ICES advice, with single-stock exploitation boundaries since 2004	Catch corresponding to advice	Agreed TAC	Official landings	ICES landings ***	ICES discards
2020	Precautionary approach	≤ 116	257	252*	181	25
2021	Precautionary approach	≤ 93	206	184*	133	4
2022	Precautionary approach	≤ 74	206			
2023	MSY approach and precautionary considerations	0				

* Preliminary.
** Includes sample-based estimates of landings into three ports.
*** Excludes landings reported from rectangles 33E2 and 33E3 since 2004.
† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

History of the catch and landings

Table 7 Cod in Division 7.a. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings				
137 tonnes	Otter trawls		Midwater trawl	Beam trawls	Other gear types
	Nephrops directed 33%	Demersal fish directed 37%	18.7%	9.4%	1%
	133 tonnes				
	Discards				
	Otter trawls		Midwater trawl	Beam trawls	Other gear types
	Nephrops directed 77%	Demersal fish directed < 1%	< 1%	22%	1%
	4 tonnes				

Table 8 Cod in Division 7.a. History of commercial catches; official landings by country and ICES estimates of total landings and discards. All weights are in tonnes, minor differences in total value are due to rounding.

Year	Belgium	France	Ireland	Netherlands	Spain	UK (England Wales, & NI)	UK (Isle of Man)	UK (Scotland)	Total	Landings in rectangles 33E2 & 33E3***	ICES Landings	ICES discards
1996	142	148	2476	25	-	2359	27	126	5303		4964**	
1997	183	268	1492	29	-	2370	19	80	4441		5859**	
1998	316	269	1739	20	-	2517	34	67	4962		5318**	
1999	150	n/a	966	5	-	1665	9	80	2875		4784**	
2000	60	53	455	1	-	799	11	38	1417		1274	
2001	283	74	751	-	-	885	1	32	2026		2252	
2002	318	116	1111	-	-	1134	7	29	2715		2695	
2003	183	151	594	-	14	505	7	23	1477		1285	
2004	104	29	380	-	-	646	5	15	1179	108	1072	
2005	115	35	220	-	-	594	n/a	3	967	54	910	
2006	60	18**	275	-	-	589	n/a	6	948	103	840	
2007	67	17**	608	-	-	423	n/a	2	1117	527	702	148
2008	26	3	618**	-	-	543	22	12	1224	558	661	62
2009	19	12	323**	-	-	387	12	12	765	193	468	60
2010	21	1	289	-	-	282	1	-	594	143	464	377
2011	36	3	275	-	-	169	1	-	485	147	368	43
2012	23	1	193	-	-	109	< 1	-	326	85	198	658
2013	13	< 1	160			107	< 1	-	281	76	206	118
2014	9	< 1	148	-	-	79	< 1	-	236	24	213	149
2015	12	< 1	137	-	-	50	< 1	-	199	39	161	224

Year	Belgium	France	Ireland	Netherlands	Spain	UK (England Wales, & NI)	UK (Isle of Man)	UK (Scotland)	Total	Landings in rectangles 33E2 & 33E3***	ICES Landings	ICES discards
2016	3	< 1	84	-	-	35	< 1	-	122	40	82	60
2017	5	< 1	57	-	-	41	< 1	< 1	103	19	84	59
2018	2	< 1	105	-	-	128	< 1	< 1	235	20	215	42
2019	10	< 1	†	-	-	195	< 1	< 1	205†	37	295	7
2020*	10	0	76	-	-	95	< 1	< 1	252	71	181	25
2021*	3	0	93	-	-	89	<1	<1	184	52	133	4

* Preliminary official landings.
** Includes sample-based estimates of landings into ports.
*** Landings in the southern part of Division 7.a (rectangles 33E2 and 33E3) are not included in the assessment and are considered to be part of the cod stock in divisions 7.e–k.
† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

Table 9 Cod in Division 7.a. Assessment summary. All weights are in tonnes, recruitment (age 0) in thousands. 'Low' and 'High' refer to 95% confidence intervals.

Year	Recruitment age 0			SSB			Landings	Discards	Fishing mortality ages 2–4		
	Low	Value	High	Low	Value	High			Low	Value	High
1968	146962	212818	278674	34934	46341	57748	8541	1285	0.059	0.108	0.156
1969	134614	212818	291022	30242	41512	52782	7991	1898	0.196	0.26	0.31
1970	79297	184549	289801	25921	36819	47717	6426	708	0.24	0.28	0.33
1971	195211	248327	301443	25101	36214	47328	9246	363	0.162	0.22	0.28
1972	292036	384744	477452	29061	41664	54267	9234	1546	0.194	0.26	0.33
1973	102005	139637	177269	32188	46927	61667	11819	1222	0.166	0.26	0.35
1974	280484	358296	436108	26715	39749	52783	10251	1749	0.25	0.34	0.42
1975	51901	89533	127165	27201	40510	53818	9863	857	0.23	0.32	0.42
1976	235851	286027	336203	20762	31895	43028	10247	381	0.23	0.33	0.44
1977	45127	95891	146655	19752	31257	42762	8054	201	0.25	0.36	0.46
1978	78345	152041	225737	15019	24799	34579	5662	0	0.25	0.33	0.4
1979	80263	156311	232359	15368	24541	33713	7548	0	0.162	0.25	0.34
1980	239567	292095	344623	19393	28154	36916	10599	0	0.22	0.3	0.39
1981	293444	325000	356556	26816	36538	46259	13958	0	0.25	0.35	0.44
1982	146139	183575	221011	29889	40865	51841	13381	313	0.29	0.4	0.51
1983	41580	87444	133308	23719	34460	45201	10015	372	0.33	0.44	0.54
1984	77218	121906	166594	15660	24049	32437	8383	2	0.29	0.4	0.51
1985	138125	176541	214957	15943	23371	30800	10483	61	0.28	0.4	0.51
1986	103594	163766	223938	16236	23174	30112	9852	154	0.34	0.45	0.57
1987	87022	125242	163462	16830	23944	31059	12894	128	0.34	0.47	0.59
1988	291263	314979	338695	16638	22126	27614	14168	109	0.45	0.57	0.7
1989	123188	148276	173364	18403	23577	28751	12751	202	0.51	0.65	0.8
1990	49786	75658	101530	12468	17093	21719	7379	159	0.57	0.7	0.83
1991	57023	87599	118175	8473	12099	15725	7095	163	0.4	0.56	0.73
1992	90849	103824	116799	8115	11486	14857	7735	98	0.55	0.69	0.83
1993	142592	159860	177128	9225	12087	14948	7555	155	0.52	0.65	0.79
1994	21708	36349	50990	9303	12400	15497	5402	142	0.53	0.66	0.79
1995	64909	79041	93172	5765	8234	10704	4587	166	0.48	0.59	0.7
1996	56511	73406	90302	6747	8845	10942	4964	140	0.42	0.54	0.65
1997	72462	79988	87515	8237	10256	12274	5859	120	0.5	0.61	0.73
1998	110742	114682	118622	8309	10136	11963	5318	29	0.54	0.65	0.76
1999	10399	29215	48031	7531	9471	11412	4784	159	0.36	0.61	0.85
2000	0	10300	20943	2628	4321	6015	1274	699	0.8	0.95	1.1
2001	75200	85980	96760	4576	6527	8477	2252	64	0.42	0.5	0.58
2002	36988	40830	44672	5337	7807	10276	2695	46	0.22	0.32	0.43
2003	39805	45489	51173	6084	8965	11846	1285	215	0.35	0.42	0.49

Year	Recruitment age 0			SSB			Landings	Discards	Fishing mortality ages 2–4		
	Low	Value	High	Low	Value	High			Low	Value	High
2004	8044	11180	14316	5367	8052	10737	1072	254	0.191	0.26	0.32
2005	19426	23209	26992	4919	7094	9270	910	204	0.187	0.25	0.32
2006	6928	11475	16022	2764	4255	5747	840	185	0.171	0.26	0.35
2007	13523	15620	17718	1671	3072	4473	702	145	0.26	0.34	0.41
2008	15086	19634	24181	2236	3544	4851	662	61	0.21	0.28	0.36
2009	0	6406	17461	1764	2840	3916	466	88	0.21	0.28	0.34
2010	8238	16137	24036	2064	3242	4420	464	386	0.183	0.25	0.31
2011	32304	39400	46495	2888	4322	5757	365	48	0.2	0.23	0.25
2012	16258	25608	34957	3736	5617	7499	198	678	0.039	0.089	0.139
2013	6289	21342	36395	4879	7466	10053	206	152	0.171	0.188	0.21
2014	22163	28200	34236	6188	9363	12538	213	184	0.05	0.064	0.079
2015	38890	47279	55668	5646	8841	12036	161	147	0.044	0.055	0.066
2016	13938	16662	19387	5511	8313	11116	82	60	0.036	0.041	0.047
2017	20971	26831	32692	6213	9270	12328	84	59	0.0175	0.023	0.028
2018	1441	7164	12887	5531	8196	10862	215	42	0.01	0.022	0.033
2019	14158	18842	23527	4945	7336	9727	295	7	0.035	0.049	0.063
2020	12947	17867	22787	2483	5345	8206	181	25	0.048	0.059	0.07
2021	0	13315	42715	4034	6014	7994	133	4	0.037	0.045	0.053
2022		17989*			5029						

*Geometric mean 2002–2019.

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Download the stock assessment data and figures.

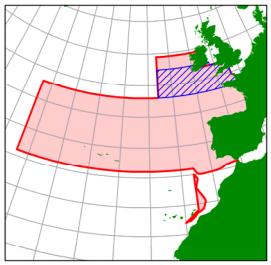
Recommended citation: ICES. 2022. Cod (*Gadus morhua*) in Division 7.a (Irish Sea). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, cod.27.7a. https://doi.org/10.17895/ices.advice.19447895.

Celtic Sea and Western Channel Cod

Divisions 7.e-k & 7.b,c

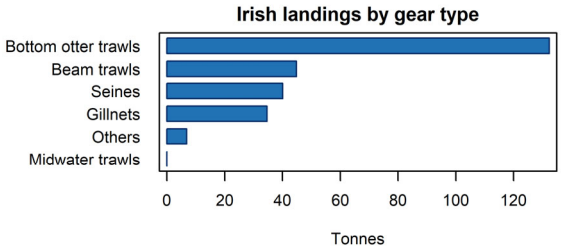
Advice for 2023

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in 2023. ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.



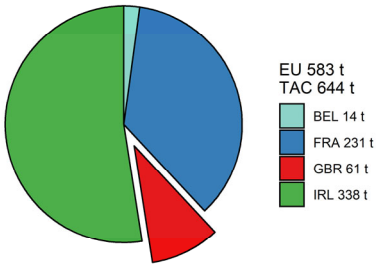
Key Points

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target)	
Advice Basis	Management Plan	Catch=0 t
Ranges	F_{MSY} Range Lower	Catch=262 t
	F_{MSY}	Catch=424 t
	F_{MSY} Range Upper	Not applicable
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

2022 Quota Allocations



- The assessment area covers 7.e-k, with inclusion of catch from the south Irish Sea (7.a; ICES rectangles 33E2 and 33E3). This does not correspond to the TAC management area of 7.b-c, 7.e-k, 8, 9 and 10; Union waters of CECAF 34.1.1.
- The 2021 reallocation of 52 t accounted for 28% of Irish Sea (Division 7.a) landings and 8% of Celtic Sea (Divisions 7.b-k) landings.
- Since 2005, ICES rectangles 30E4, 31E4, and 32E3 have been closed during the first quarter as part of the Celtic Sea Conservation area (Appendix VII).
- Since June 2020, a number of additional technical measures were introduced in parts of the Celtic Sea, including raised footropes and changes to mesh sizes, with the aim of reducing by-catch of cod in fisheries targeting other species.
- The TAC is exclusively for bycatches of cod in fisheries for other species. No directed fisheries for cod are permitted under this quota.

Key Stock Considerations

- Because of the very low stock size and continued high mortality the short-term stock development is very sensitive to incoming recruitment. The assumed recruitment in 2022 and 2023 used in the forecast constitutes a significant part (70%) of the projected SSB in 2024.
- There was an observed change in fishing behaviour in 2021 with increased levels of discarding of fish above MCRS which may be due to restrictive TACs and delay in total TAC attribution. The discard rate in 2021 was 54% compared to an average of 20% for the previous 3 years.
- The estimate of fishing mortality is highly sensitive to the additional annual data; this is due to the low stock size.
- Most Irish catch is taken as a minor bycatch throughout the Celtic Sea. This makes it difficult to control the fishing mortality on the stock in mixed fisheries.
- In recent years ICES has provided a technical service on "unavoidable bycatches" of cod in the Celtic Sea based on a mixed fisheries analysis. It is likely that cod will continue to be the primary "choke" species for most Celtic Sea fleets in 2023.

Published 30 June 2022

Version 2: 14 October 2022

Cod (*Gadus morhua*) in divisions 7.e–k (western English Channel and southern Celtic Seas)

ICES advice on fishing opportunities

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in 2023.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and between F_{pa}, and F_{lim}, and spawning-stock size is below MSY $B_{trigger}$, B_{pa}, and B_{lim}.

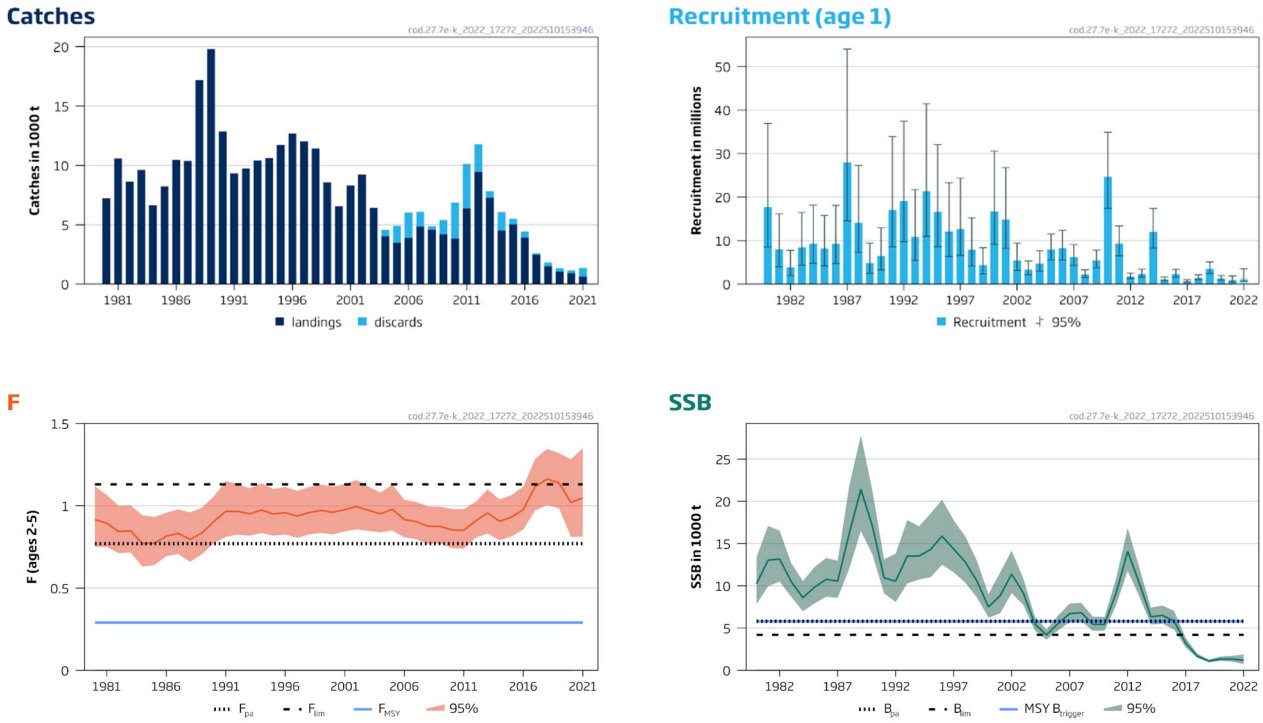


Figure 1 Cod in divisions 7.e–k. Summary of the stock assessment. Discard estimates are available from 2004. The assumed recruitment value for 2022 is shaded in a lighter colour.

Catch scenarios

Table 1 Cod in divisions 7.e–k. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 2–5}$ (2022)	1.069	$F_{sq} = F_{average\ (2019–2021)}$.
SSB (2023)	1053	Short-term forecast; in tonnes
Recruitment $_{age\ 1}$ (2022–2023)	1305	Median from resampled (2015–2021); in thousands
Total catch (2022)	1174	Short-term forecast, in tonnes

Table 2[2] Cod in divisions 7.e–k. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	F_{total} (2023)	SSB (2024)	% SSB change*
ICES advice basis				
MSY approach: F = 0	0	0	2754	162
Other scenarios				
$F_{MSY} \times SSB_{2023}$/MSY $B_{trigger}$	80	0.050	2632	150
EU MAP**: $F_{MSY\ lower} \times SSB_{2023}$/MSY $B_{trigger}$	48	0.029	2682	155
EU MAP**: $F_{MSY\ upper} \times SSB_{2023}$/MSY $B_{trigger}$	113	0.070	2583	145
$F=F_{MSY}$	424	0.29	2120	101
F = 0	0	0	2754	162
$F=F_{lim}$	1194	1.13	1014	−3.7
$F = F_{pa}$	928	0.77	1385	32
$SSB_{2024} = B_{lim}$***				
SSB_{2024} = Bpa = MSY $B_{trigger}$***				
$F = F_{2022}$	1154	1.069	1069	1.5
$SSB_{2024}=SSB_{2023}$	1210	1.156	992	−5.7
$F=F_{MSY\ upper}$	933	0.410	1904	81
$F=F_{MSY\ lower}$	262	0.170	2360	124

* SSB_{2024} relative to SSB_{2023}.
** EU multiannual plan (MAP) for the Western Waters (EU, 2019).
***The B_{lim}, B_{pa}, and MSY $B_{trigger}$ options were left blank because none of them can be achieved in 2024, even with zero catch in 2023.

The advice for 2023 is the same as the previous advice because there is no change in the perception of the stock.

Basis of the advice

Table 3 Cod in divisions 7.e–k. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

[2] Version 2: $F_{MSY\ lower}$ and $F_{MSY\ upper}$ options added to table 2.

Quality of the assessment

The estimate of fishing mortality is highly sensitive to the additional annual data; this is due to the low stock size.

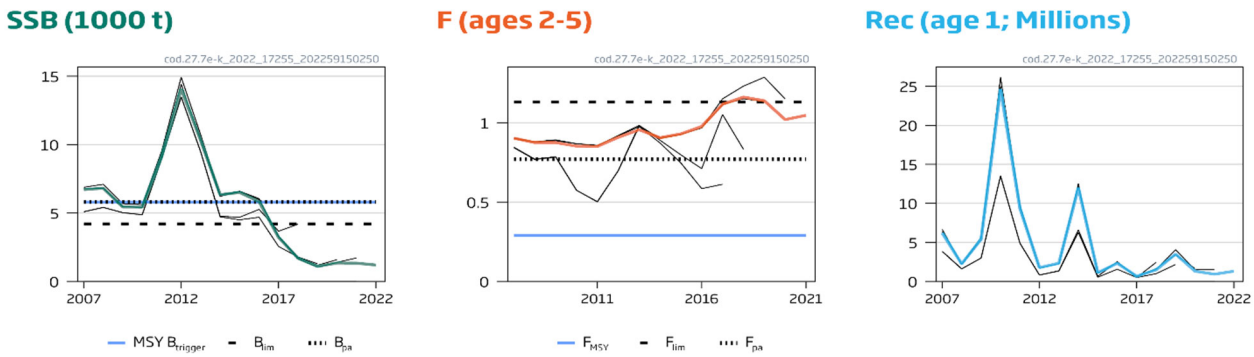


Figure 2 Cod in divisions 7.e–k. Historical assessment results (final-year SSB estimate and recruitment assumption included). The assessment was benchmarked in 2020 (ICES, 2020). The reference points were revised in 2020 (following a benchmark), and only assessment results from the last three years should be compared to the reference points indicated.

Issues relevant for the advice

ICES provides zero-catch advice for this stock in 2023 because the median SSB remains below B_{lim} by 2024 under all catch scenarios.

The assumed recruitment in 2022 and 2023 used in the forecast constitutes a significant part (70%) of the projected SSB in 2024 (45% and 25%, respectively).

There was an observed change in fishing behaviour in 2021 with increased levels of discarding of fish above MCRS which may be due to restrictive TACs and delay in total TAC attribution. The discard rate in 2021 was 54% compared to an average of 20% for the previous 3 years. As a result of this large change, recent discard ratio is not considered a plausible assumption to split the catch forecast. Therefore, ICES does not provide separate landings and discards estimates for 2023.

Landings are adjusted to include those reported from rectangles 33E2 and 33E3 in Division 7.a because they are considered part of this stock. The 2021 reallocation (52 tonnes) accounts for 8.3% of ICES estimated division 7.b–k landings and 28% of the Irish Sea (Division 7.a) landings. This should be taken into consideration when setting TACs for the two management areas (divisions 7.a and 7.e–k) as a portion of the catch taken under the Division 7.a TAC is considered to be part of the divisions 7.e–k stock.

Mixed-fisheries considerations
Cod in divisions 7.e–k is caught as part of a mixed fishery and almost all fisheries operating with demersal gears catch cod (ICES, 2021).

Reference points

Table 4 Cod in divisions 7.e–k. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	5800	B_{pa}; in tonnes	ICES (2020)
	F_{MSY}	0.29	Segmented regression with B_{lim} (EqSim).	ICES (2020)
Precautionary approach	B_{lim}	4200	B_{loss}, lowest observed SSB from which there has been some recovery (2005) rounded value; in	ICES (2020)
	B_{pa}	5800	$B_{lim} \times 1.4$; in tonnes	ICES (2020)
	F_{lim}	1.13	Segmented regression with B_{lim} (EqSim)	ICES (2020)
	F_{pa}	0.77	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability	ICES (2020)
Management plan (MAP)*	MAP MSY $B_{trigger}$	5800	MSY $B_{trigger}$; in tonnes	EU (2019), ICES (2020)
	MAP B_{lim}	4200	B_{lim}; in tonnes	EU (2019), ICES (2020)
	MAP F_{MSY}	0.29	F_{MSY}	EU (2019), ICES (2020)
	MAP range F_{lower}	0.17	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2020)
	MAP range F_{upper}	0.41	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2020)

* EU multiannual plan (MAP) for the Western Waters (EU, 2019).

Basis of the assessment

Table 5 Cod in divisions 7.e–k. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based stochastic analytical assessment (SAM; ICES, 2022b)
Input data	Commercial landings, ages, and length frequencies from sampling by métier; one combined VAST-modelled survey index (combined IGFS-WIBTS-Q4 [G7212] and EVHOE-WIBTS-Q4 [G9527]); one commercial index (FR-OTDEF Q2+3+4 trawlers in divisions 7.e–k); fixed maturity ogive derived from UK-WCGFS survey Q1 data; age-dependent natural mortalities (Lorenzen, 1996)
Discards and bycatch	Included in the assessment. Observer-based estimates from 2004; discards and bycatch prior to that (between 1980 and 2003) are model estimated. No discards proportion was provide in the 2022 advice.
Indicators	None
Other information	Benchmarked at WKCELTIC 2020 (ICES, 2020)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Cod in divisions 7.e–k. ICES advice and official landings and ICES catch estimates. All weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC*	ICES landings ^^^	ICES discards
1987	Reduce F	< 6400**			10390	
1988	No increase in F; TAC	7000**			17196	
1989	No increase in F; TAC	8600**			19804	
1990	No increase in F; TAC	9200**			12878	
1991	TAC; SSB mean	4500**			9336	
1992	Appropriate to reduce F	-			9747	
1993	20% reduction in F	6500**		17500	10416	
1994	20% reduction in F	5600**		17000	10620	
1995	20% reduction in F	4700***		17000	11710	
1996	20% reduction in F	4700***		20000	12681	
1997	20% reduction in F	7400***		20000	12028	
1998	10% reduction in F	8800^		20000	11418	
1999	Reduce F below F_{pa}	9200^		19000	8580	
2000	Reduce F below F_{pa}	< 7600^^		16000	6539	
2001	40% reduction in F	< 4300^^		10500	8316	

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC*	ICES landings ^^^	ICES discards
2002	45% reduction in F	< 5300^^		8700	9239	
2003	60% reduction in F	< 3800^^		n/a	6425	
2004	90% reduction in F or management plan	< 700		n/a	4027	543
2005	17% reduction in F	< 5200		6200	3478	1426
2006	No increase in effort (should have been "reduce effort")	Cannot be estimated		5580	3902	2118
2007	Zero catch	0		4743	4842	1248
2008	Zero catch	0		4316	4577	306
2009	50% reduction in F	< 2600		4023	4187	1229
2010	Substantial catch reduction	-		4023	3831	3040
2011	Catch and effort reduction	-		5379	6376	3749
2012	MSY framework	< 10000		10059	9443	2341
2013	MSY framework	< 10200		10200	7273	562
2014	MSY approach	< 6848		6848	4512	1569
2015	MSY approach	< 4024		5072	5028	483
2016	MSY approach	≤ 3569		4565	3924	525
2017	MSY approach	≤ 1447		2830	2471	134
2018	MSY approach	≤ 3076	≤ 3428	3076	1496	316
2019	MSY approach		0	1610	1051	300
2020	MSY approach		0	805	922	231
2021	MSY approach and precautionary considerations		0	805	627	733
2022	MSY approach and precautionary considerations		0	644		
2023	MSY approach and precautionary considerations		0			

* TAC covers subareas 7 (except Division 7.a) and 8. From 2009 onwards, the TAC covers divisions 7.b–c and 7.e–k, subareas 8–10, and EU waters of CECAF Division 34.1.1 (with a separate TAC established for Division 7.d).
** For the division 7.f–g stock component.
*** For the division 7.f–h stock component.
^ For the division 7.e–h stock component.
^^ For the division 7.e–k stock component.
^^^ Landings have been adjusted to include those taken or reported in rectangles 33E2 and 33E3 since 2004.

History of the catch and landings

Table 7 Cod in divisions 7.e–k. Catch distribution by fleet in 2021, as estimated by ICES.

Catch	Landings				Discards			
1360 tonnes	Otter trawls	Seine nets	Beam trawls	Other gears	Otter trawls	Seine nets	Beam trawls	Other gears
	70%	8%	11%	11%	90%	1%	2%	7%
	627 tonnes				733 tonnes			

Table 8 Cod in divisions 7.e–k. History of official commercial landings, presented by country and discard estimates. All weights are in tonnes.

Year	Belgium	France	Ireland	UK	Others	Total	Discard estimates	Landings taken or reported in rectangles 33E2 and 33E3*
1971	n/a	n/a	n/a	n/a	n/a	5782	n/a	n/a
1972	n/a	n/a	n/a	n/a	n/a	4737	n/a	n/a
1973	n/a	n/a	n/a	n/a	n/a	4015	n/a	n/a
1974	n/a	n/a	n/a	n/a	n/a	2898	n/a	n/a
1975	n/a	n/a	n/a	n/a	n/a	3993	n/a	n/a
1976	n/a	n/a	n/a	n/a	n/a	4818	n/a	n/a
1977	n/a	n/a	n/a	n/a	n/a	3059	n/a	n/a
1978	n/a	n/a	n/a	n/a	n/a	3647	n/a	n/a
1979	n/a	n/a	n/a	n/a	n/a	4650	n/a	n/a
1980	n/a	n/a	n/a	n/a	n/a	7243	n/a	n/a
1981	n/a	n/a	n/a	n/a	n/a	10597	n/a	n/a
1982	n/a	n/a	n/a	n/a	n/a	8766	n/a	n/a
1983	n/a	n/a	n/a	n/a	n/a	9641	n/a	n/a
1984	n/a	n/a	n/a	n/a	n/a	6631	n/a	n/a
1985	n/a	n/a	n/a	n/a	n/a	8317	n/a	n/a
1986	n/a	n/a	n/a	n/a	n/a	10475	n/a	n/a
1987	n/a	n/a	n/a	n/a	n/a	10228	n/a	n/a
1988	554	13863	1480	1292	2	17191	n/a	n/a
1989	910	15801	1860	1223	15	19809	n/a	n/a
1990	621	9383	1241	1346	158	12749	n/a	n/a
1991	303	6260	1659	1094	20	9336	n/a	n/a
1992	195	7120	1212	1207	13	9747	n/a	n/a
1993	391	8317	766	945	6	10425	n/a	n/a
1994	398	7692	1616	906	8	10620	n/a	n/a
1995	400	8321	1946	1034	8	11709	n/a	n/a
1996	552	8981	1982	1166	0	12681	n/a	n/a
1997	694	8662	1513	1166	0	12035	n/a	n/a
1998	528	8096	1718	1089	0	11431	n/a	n/a
1999	326	5488	1883	897	0	8594	n/a	n/a
2000	208	4281	1302	744	0	6535	n/a	n/a
2001	347	6033	1091	838	0	8309	n/a	n/a
2002	555	7368	694	618	0	9235	n/a	n/a
2003	136	5222	517	346	0	6221	n/a	n/a
2004	153	2934	657	281	1	4027	543	108
2005	186	2127	855	309	1	3478	1426	54
2006	101	2431	995	371	3	3902	2118	103
2007	107	3113	1208	411	3	4842	1248	527
2008	65	2994	1222	295	1	4577	306	558
2009	48	3020	847	267	5	4187	1229	193
2010	52	2449	1030	296	3	3831	3040	143
2011	123	4808	1010	427	7	6376	3749	147
2012	290	6900	1539	706	8	9443	2341	85
2013	202	5051	1470	548	3	7273	562	76
2014	141	2715	1189	466	0	4512	1569	24
2015	121	3373	1109	422	3	5028	483	39
2016	97	2579	881	365	1	3924	525	40
2017	82	1578	623	188	0	2471	134	19
2018	49	611	706 †	130	0	1496†	316	20
2019	43	369	554 †	84	n/a	1051†	300	37
2020**	18	371	487	44	2	922	231	71
2021**	11	261	309	46	0	627	733	52

* Included in Ireland landings estimates. Landings in the southern part of Division 7.a (rectangles 33E2 and 33E3) are included in the assessment and are considered to be part of the stock.

** Preliminary official landings.

n/a = not available.

† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

Table 9 Cod in divisions 7.e–k. Assessment summary. Recruitments are in thousands, weights in tonnes.

Year	Recruitment age 1			SSB			Landings	Discards	F ages 2–5		
	Low	Value	High	Low	Value	High			Low	Value	High
1980	8502	17720	36932	7843	10247	13387	7241		0.75	0.92	1.12
1981	3988	8019	16127	9933	13034	17105	10595		0.75	0.89	1.07
1982	1949	3889	7760	10494	13167	16521	8639		0.71	0.84	1.00
1983	4312	8433	16495	8677	10489	12681	9635		0.72	0.85	1.00
1984	4767	9296	18131	6982	8588	10565	6642		0.63	0.77	0.94
1985	4205	8141	15762	7912	9830	12213	8241		0.64	0.77	0.93
1986	4695	9219	18101	8700	10758	13301	10475		0.69	0.82	0.96
1987	14496	27983	54019	8582	10551	12972	10390		0.71	0.83	0.98
1988	7264	14070	27253	12026	16219	21873	17196		0.66	0.80	0.96
1989	2454	4807	9419	16488	21417	27820	19804		0.71	0.84	0.99
1990	3257	6490	12932	13673	17023	21193	12878		0.77	0.90	1.06
1991	8528	17005	33908	9097	10934	13143	9336		0.81	0.97	1.15
1992	9725	19077	37422	8075	10555	13797	9747		0.82	0.97	1.13
1993	5449	10876	21710	10277	13519	17783	10416		0.82	0.95	1.11
1994	10979	21331	41447	10730	13521	17038	10620		0.83	0.97	1.14
1995	8616	16618	32050	11018	14295	18546	11710		0.82	0.95	1.10
1996	6327	12144	23307	12485	15874	20184	12681		0.83	0.96	1.11
1997	6588	12659	24326	11592	14352	17770	12028		0.81	0.94	1.09
1998	4120	7921	15232	10363	12818	15855	11418		0.83	0.96	1.11
1999	2287	4374	8365	8628	10582	12978	8580		0.84	0.97	1.13
2000	9099	16676	30560	6228	7486	8999	6539		0.83	0.96	1.12
2001	8194	14810	26768	6725	8824	11577	8316		0.84	0.98	1.13
2002	3108	5412	9426	9147	11384	14167	9239		0.86	1.00	1.16
2003	2123	3354	5296	7727	9163	10867	6425		0.85	0.97	1.12
2004	2937	4741	7653	4694	5463	6358	4027	543	0.84	0.95	1.08
2005	5530	7966	11477	3640	4190	4823	3478	1426	0.85	0.98	1.13
2006	5536	8275	12371	4708	5522	6477	3902	2118	0.81	0.92	1.04
2007	4238	6203	9079	5695	6708	7900	4842	1248	0.80	0.90	1.02
2008	1541	2242	3262	5818	6814	7981	4577	306	0.77	0.88	1.00
2009	3739	5403	7808	4656	5438	6350	4187	1229	0.77	0.88	0.99
2010	17401	24640	34892	4675	5431	6310	3831	3040	0.74	0.85	0.98
2011	6505	9323	13361	7692	9140	10861	6376	3749	0.74	0.85	0.98
2012	1229	1771	2551	11764	14076	16842	9443	2341	0.81	0.91	1.02
2013	1599	2337	3414	8747	10315	12165	7273	562	0.83	0.96	1.10
2014	8271	11992	17387	5420	6343	7423	4512	1569	0.79	0.91	1.04
2015	759	1111	1627	5510	6499	7666	5028	483	0.81	0.93	1.06
2016	1586	2320	3394	4832	5834	7043	3924	525	0.86	0.98	1.12
2017	447	666	992	2705	3224	3843	2471	134	0.97	1.12	1.28
2018	1000	1472	2168	1450	1689	1966	1496	316	1.00	1.16	1.35
2019	2423	3502	5062	940	1097	1279	1051	300	0.98	1.14	1.32
2020	856	1305	1990	1105	1346	1640	922	231	0.81	1.02	1.28
2021	464	923	1837	1036	1334	1716	627	733	0.81	1.05	1.35
2022	666	1305*	3502	732	1196	1879					

*Median resampled (2015–2021).

Sources and references

EU. 2019. Regulation (EU) 2019/472 of the European Parliament and of the Council of 19 March 2019 establishing a multiannual plan for stocks fished in the Western Waters and adjacent waters, and for fisheries exploiting those stocks, amending Regulations (EU) 2016/1139 and (EU) 2018/973, and repealing Council Regulations (EC) No 811/2004, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007 and (EC) No 1300/2008. Official Journal of the European Union, L 83: 1–17. http://data.europa.eu/eli/reg/2019/472/oj.

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Cod (*Gadus morhua*) in divisions 7.e-k (eastern English Channel and southern Celtic Seas). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, cod.27.7e–k. https://doi.org/10.17895/ices.advice.19447898.

DEEPWATER STOCKS SOUTH OF 63°N

Management advice on deepwater species is mainly biennial and was last given in 2020, 2021 or 2022, depending on stocks. EU quotas for deepwater species are also biennial except for tusk, ling, greater silver smelt and blue ling in ICES Areas 5, 6 and 7, which are managed by annual TACs. The full ICES advice for deepwater species is not included in the stock book it is available from the ICES website: https://www.ices.dk/advice/Pages/Latest-Advice.aspx.

Table 1 Stock Status and 2021 and 2022 EU TACs for deep water stocks with Irish quota

Species	Stock area	Most recent International landings, tonnes	Most recent Irish landings, tonnes	ICES Stock Status 2020 / 2021		2021 TAC, tonnes	2021 Irish quota, tonnes	2022 TAC, tonnes	2022 Irish quota, tonnes
				F_{MSY}	SSB Btrig				
Deep sea sharks	5, 6, 7, 8, 9	0	0	?	?	0	0	0	0
Deep sea sharks	12	0	0	?	?	0	0	0	0
Black scabbardfish	5.b, 6, 7, 12.b	907	0	?	?	1,929	55	1,929	55
Alfonsinos	1 - 10, 12, 14	205	0	?	?	224	7	224	7
Roundnose grenadier	5.b, 6, 7, 12.b	141	0	?	?	2,317	150	2,317	150
Roundnose grenadier	8, 9, 10, 12, 14	240	0	?	?	1545*	2	1545*	2
Orange roughy	NEA	60	0	?	?	0	0	0	0
Red seabream	6, 7, 8	99	0	?	?	105	3	105	3
Greater forkbeard	NEA	1,644	12	?	?	*		*	
Tusk	4, 7, 8, 9, 3.a, 5.b, 6.a, 12.b	4,065	16	?	?	4,545	238	4,522	238
Greater silver smelt	1, 2, 4, 3.a	15,920	0	✓	?	868	5	868	5
Greater silver smelt	7 - 10, 12, 6.b	76	0	?	?	3,729	262	11,626	821
Blue ling	5.b, 6, 7	5,285	0	✓	✓	11,522	32	10,859	30
Blue ling	3.a, 4.a, 1, 2, 8, 9, 12	348	0	?	✗	127	2	108	2

* A TAC for roundnose grenadier in ICES subareas 1, 2 and 4, and greater forkbeard in ICES subareas 7 – 10, 12 and 14 should no longer be set. The ICES advice establishes that the absence of a TAC would result in no or a low risk of unsustainable exploitation.

Table 2 ICES Advice

Species	Stock area	ICES Advice
Deep sea sharks	5, 6, 7, 8, 9	No catches of Portuguese dogfish, leafscale gulper shark and no targeted fishery for kitefin shark
Deep sea sharks	12	No catches of Portuguese dogfish, leafscale gulper shark and no targeted fishery for kitefin shark
Black scabbardfish **	1, 2, 4-8, 10, 14, 3a, 9a, 12b	Catches should be no more than 4,214 t in each of the years 2023 and 2024
Alfonsinos	1 - 10, 12, 14	Landings should be no more than 179 t in each of the years 2023 and 2024
Roundnose grenadier	5.b, 6, 7, 12.b	Catches should be no more than 3,177 t in each of the years 2023 and 2024
Roundnose grenadier	10.b, 12.c, 5.a.1, 12.a.1, 14.b.1	Landings should be no more than 574 t in each of the years from 2020 to 2023
Roundnose grenadier	1, 2, 4, 8, 9, 14.a, 5.a.2, 14.b.2	Landings should be no more than 131 t in each of the years from 2020 to 2023
Orange roughy	NEA	There should be zero catches in each of the years 2021 - 2024
Red seabream	6, 7, 8	There should be zero catch in each of the years 2023 and 2024
Greater forkbeard	NEA	Landings should be no more than 818 t in each of the years 2023 and 2024
Tusk	4, 7, 8, 9, 3.a, 5.b, 6.a, 12.b	Catches should be no more than 7,821 t in each of the years 2022 and 2023
Greater silver smelt	1, 2, 4, 3.a	Catches should be no more than 10,271 t in each of the years 2022 and 2023
Greater silver smelt	7 - 10, 12, 6.b	Catches should be no more than 124 t in each of the years 2022 and 2023
Blue ling	5.b, 6, 7	Catches should be no more than 10,952 t in 2023 and no more than 10,972 t in 2024
Blue ling	3.a, 4.a, 1, 2, 8, 9, 12	There should be zero catch in each of the years from 2020 to 2023

** ICES advice is for the whole stock, it no longer broken into components. ICES do not consider the catch proportions necessarily represent sustainable harvest rates for the different components of the stock, and therefore the advice for 2023 and 2024 is not split by area.

Northeast Atlantic Demersal Dogfish

ICES provides advice on the status of demersal dogfish species on 2-year cycles. Advice for these stocks was last provided in 2021 for 2022 and 2023.

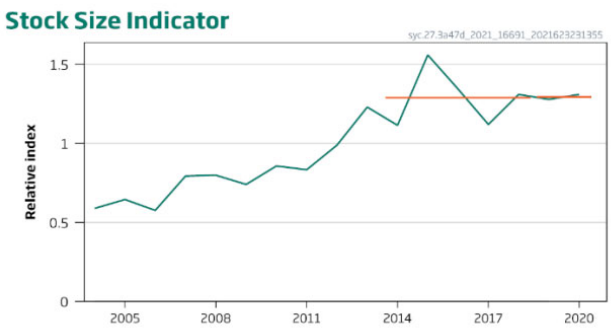
Lesser spotted Dogfish in in Sub-area 6 and divisions 7.a–c and 7.e–j

Advice for 2023

ICES advises that when the precautionary approach is applied, landings should be no more than 3,596 tonnes in each of the years 2022 and 2023. ICES cannot quantify the corresponding catches.

Key Points

ICES Assessment Category	3 (Trends-based assessment)	
Management Plan	WWMAP (Bycatch)	
Advice Basis	ICES PA approach	Landings = 3,596 t
MSY Range	F_{MSY} Range Lower	Not Available
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Available
Landing Obligation	Not applicable (non TAC species)	



Lesser spotted dogfish (*Scyliorhinus canicula*) stock size indicator based on groundfish surveys.

Management in 2022

- There is no TAC for lesser-spotted dogfish in this or any other area.

Key Stock Considerations

- The most recent ICES assessment (2021) showed the stock size indicator has in increasing trend since 2004 but has been stable in recent years.
- The most recent advice from ICES was issued in 2021 and applies for two years (2022-2023).
- By-catches of lesser spotted dogfish occurs in most demersal fisheries.

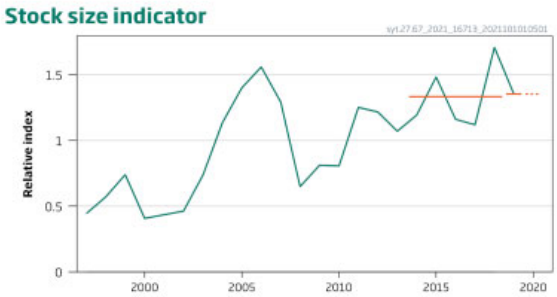
Greater spotted Dogfish in the North Atlantic

Advice for 2023

ICES advises that when the precautionary approach is applied, catches in each of the years 2022 and 2023 should be decreased by no less than 18% compared to the average catches in 2018–2020. ICES cannot quantify the corresponding catches or landings.

Key Points

ICES Assessment Category	3 (Trends-based assessment)	
Management Plan	WWMAP (Bycatch)	
Advice Basis	ICES PA approach	Decrease catch by >18%
MSY Range	F_{MSY} Range Lower	Not Available
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Available
Landing Obligation	Not applicable (non TAC species)	



Stock-size indicator for greater spotted dogfish in sub-areas 6 and 7 based on groundfish surveys.

Management in 2022

- There is no TAC for this greater spotted dogfish in this area.

Key Stock Considerations

- There is a single stock of greater spotted dogfish in this area, mainly found in the Irish Sea.
- Greater spotted dogfish are bycaught in several demersal fisheries in this area.
- The most recent advice from ICES was issued in 2021 and applies for two years (2022-2023).
- The advice decreased by 18% because the stock size indicator ratio increased by 2% and the precautionary buffer was applied.

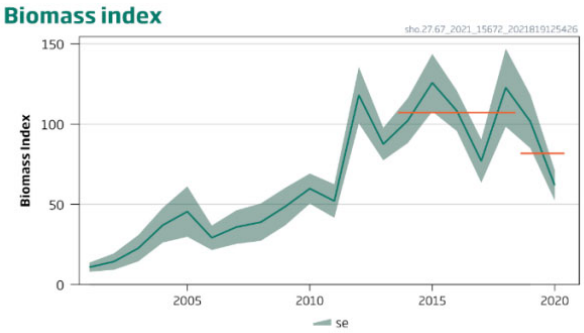
BLACKMOUTH DOGFISH IN SUB-AREAS 6 AND 7

ADVICE FOR 2023

ICES advises that when the precautionary approach is applied, catches in each of the years 2022 and 2023 should be decreased by no less than 36% compared to the average catches in 2018–2020. ICES cannot quantify the corresponding catches or landings.

KEY POINTS

ICES Assessment Category	3 (Trends-based assessment)	
Management Plan	WWMAP (Bycatch)	
Advice Basis	ICES PA approach	Reduce catches by >36%
MSY Range	F_{MSY} Range Lower	Not Available
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Available
Landing Obligation	Not applicable (non TAC species)	



Biomass indicator for blackmouth dogfish from the Spanish porcupine groundfish surveys.

MANAGEMENT IN 2022

- There is no TAC for blackmouth dogfish in this area.

KEY STOCK CONSIDERATIONS

- There is a single stock of blackmouth dogfish in this area, mainly found in deeper waters of the Celtic Seas.
- Blackmouth dogfish are bycaught in several demersal fisheries in this area.
- The most recent advice from ICES was issued in 2021 and applies for two years (2022-2023).
- Stock trends were evaluated using the Spanish survey on the Porcupine Bank. Whilst this survey only covers a small area of the stock range, the survey area is an important fishing ground where the species is abundant.
- Blackmouth dogfish was removed from the EU list of deepwater species in 2013, and so deepwater fishing regulations no longer apply to this species.
- A blackmouth dogfish spawning area was recently discovered in Irish waters.

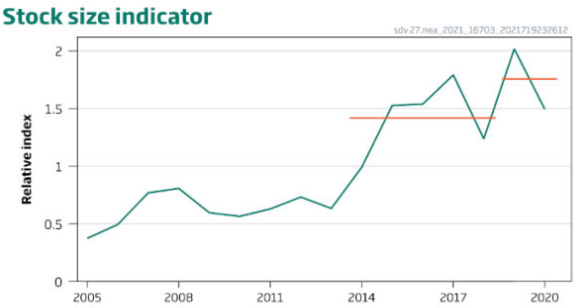
SMOOTH-HOUND (*MUSTELUS* SPP.) IN SUB-AREAS 1–10, 12, 14

ADVICE FOR 2023

ICES advises that when the precautionary approach is applied, landings should be no more than 4,441 tonnes in each of the years 2022 and 2023. ICES cannot quantify the corresponding catches.

KEY POINTS

ICES Assessment Category	3 (Trends-based assessment)	
Management Plan	WWMAP (Bycatch)	
Advice Basis	Precautionary approach	Landings = 4,441 t
MSY Range	F_{MSY} Range Lower	Not Available
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Available
Landing Obligation	Not applicable (non TAC species)	



Stock size indicator for starry smooth-hound from international groundfish surveys.

MANAGEMENT IN 2022

- There is no TAC for Smooth-hound (*Mustelus* spp.) in this area.

KEY STOCK CONSIDERATIONS

- The assessment was based on survey trends for starry smooth-hound (*Mustelus asterias*) and landings data for the smoothhound genus from the overall Northeast Atlantic.
- Three species of smooth-hound occur in the Northeast Atlantic, mainly in sub-areas 4 and 6–9. Starry smooth-hound is the main species occurring in sub-areas 4 and 6–8, and this is the species assessed.
- The most recent advice from ICES was issued in 2021 and applies for two years (2022-2023).
- Reported landings of smooth-hound by Irish vessels is very low or zero.

HADDOCK

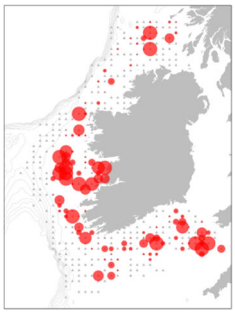
(MELANOGRAMMUS AEGLEFINUS)

BIOLOGY – SPECIES

Haddock live near the bottom on gravel, clay, or smooth, hard sand and are widespread in the northern Atlantic. They occur mostly at bottom depths between 10 and 200m. Haddock are moderately large gadoids with a diet consisting largely of benthic molluscs, crustaceans, worms and small fish. Small haddock are important prey for saithe and large cod.

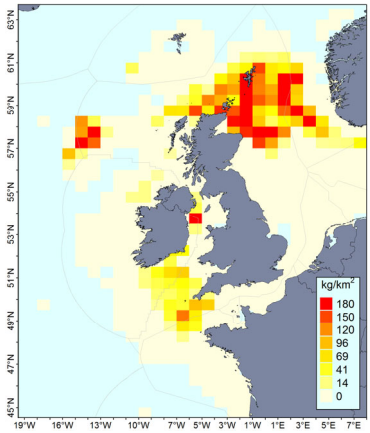
The waters around Ireland provide important spawning and nursery areas for haddock. Irish waters are at the southerly end of the distribution of haddock, allowing them to grow fast and mature early. They reach a length of around 27cm after two years of growth and most haddock are mature at age two.

All haddock stocks occasionally produce extremely large numbers of recruits, which can increase the stock size dramatically.

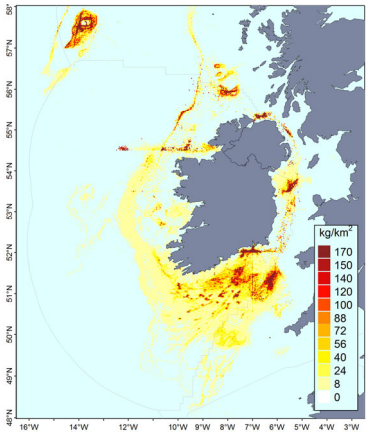


Survey catches of juveniles since 2005

LANDINGS DISTRIBUTION



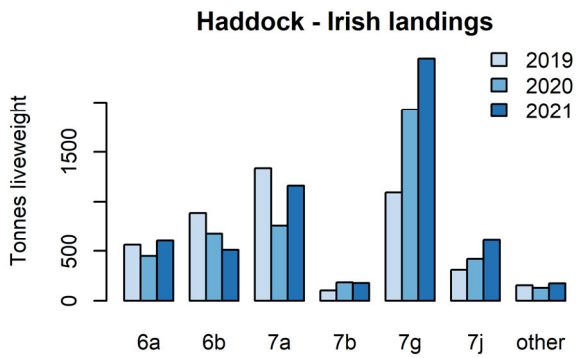
◀ The distribution of international landings of haddock between 2016-2020. Most haddock landings were taken from the northern North Sea, Irish Sea, Rockall and from the Celtic Sea.

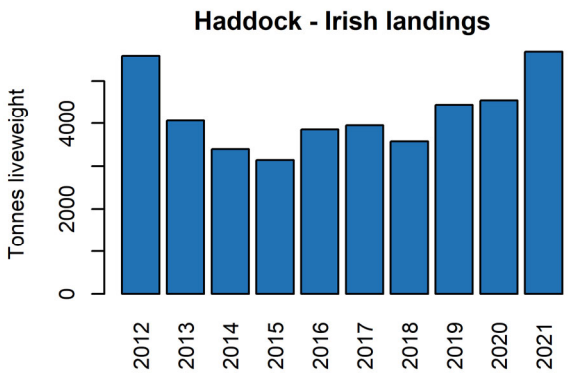


◀ The distribution of haddock landings by Irish vessels between 2016-2020. Haddock are caught in most areas between 50 and 200 metres depth.

IRISH LANDINGS AND VALUE OF TAC

The annual landings of haddock by Irish vessels were approximately 4,900 t in the last 3 years, 22% of which was caught in 7.a and 37% of which was caught in 7.g. In 2021 landings were worth around €10.1 million for Irish vessels.





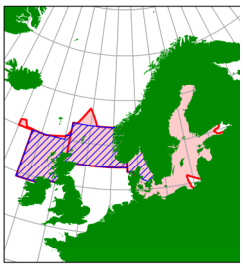
West of Scotland, North Sea and Skagerrak Haddock

Division 6.a, Sub-area 4 and Sub-division 20

ADVICE FOR 2023

ICES advises that when the MSY approach is applied, total catches in 2023 should be no more than 137,058 t.

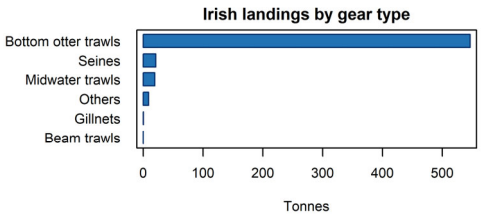
ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.



Key Points

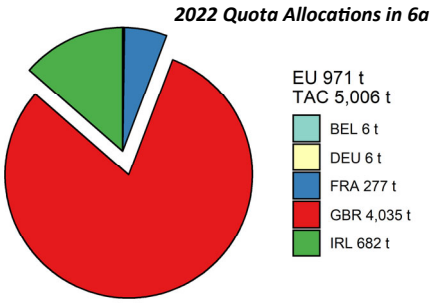
ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	NSMAP (target); Not agreed between EU, UK & Norway	
Advice Basis	ICES MSY approach	Catch=137,058 t
Ranges	F_{MSY} Range Lower	Catch=109,157 t
	F_{MSY}	Catch=137,058 t
	F_{MSY} Range Upper	Catch=137,058 t
Landing Obligation	From 2016	Below MCRS *De minimis* up to 3%*

* Maximum of annual catch by bottom trawls with mesh size up to 119 mm and requiring reporting (EU 2020/2015).



Management in 2022

- ICES advice was split across three TAC areas. The Irish quota is from the TAC covering 6a and United Kingdom and international waters of 5b. The 2022 TAC was set at 5,006 t with an Irish quota of 682 t.
- From 2015 to 2019 the Irish fleet caught its full quota, this was not the case in 2020 or 2021.



Key Stock Considerations

- Most of the Irish landings of haddock in Division 6.a come from trips that target haddock. The remainder are taken from a more mixed fishery and are mainly landed with megrim, anglerfish and other gadoid species.
- The TAC for this stock is linked to the North Sea and is negotiated as part of an EU, UK and Norway agreement.
- Advice has increased notably for the last three years owing to incoming recruitment in 2019 and 2020 that were above the preceding low levels since the early 2000s. Irregular strong recruitment events have been a feature of the stock dynamics in the past, resulting in a saw tooth SSB time profile. Decreased fishing pressure has also contributed to an increase in the stock size.

Published 30 June 2022

Haddock (*Melanogrammus aeglefinus*) in Subarea 4, Division 6.a, and Subdivision 20 (North Sea, West of Scotland, Skagerrak)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, total catches in 2023 should be no more than 137 058 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is below F_{MSY} and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

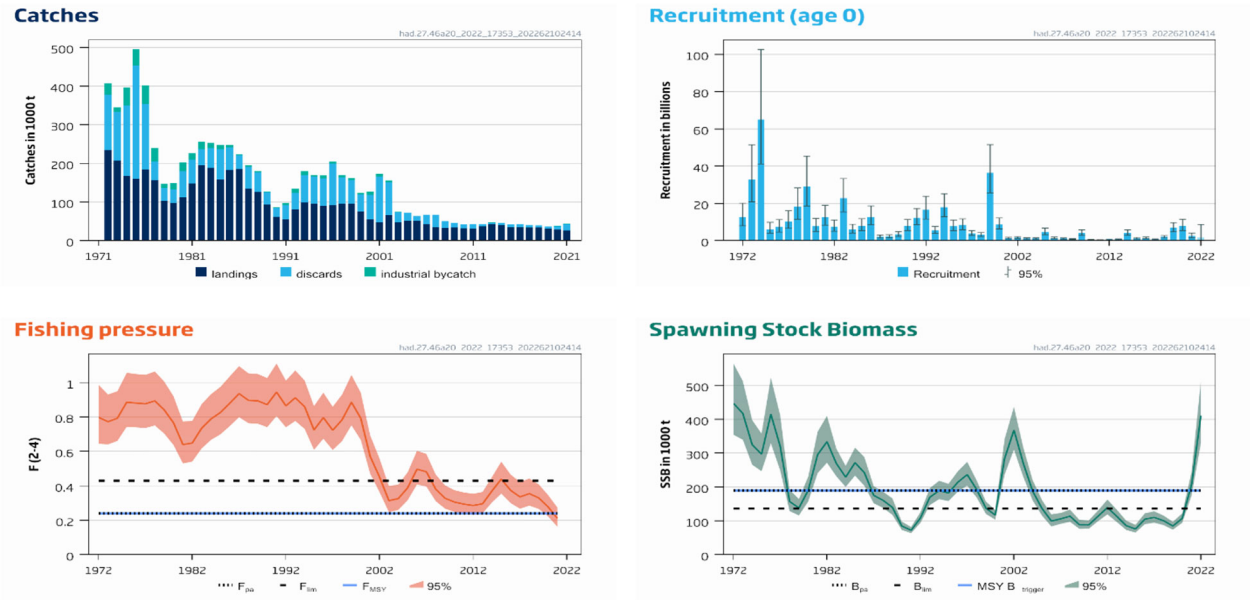


Figure 1 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour. Discards include BMS landings.

Catch scenarios

Table 1 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 2–4}$ (2022)	0.111	Based on a catch constraint for 2022. Average exploitation pattern (2019–2021)
SSB (2023)	494 778	Short-term forecast (STF); tonnes
$R_{age\ 0}$ (2022, 2023)	1 623 040	Geometric mean of recruitment resampled from the years 2000–2021; thousands
Total catch (2022)	52 692	TAC for 2022; tonnes
Projected landings (2022)	40 425	STF; assuming average landings ratio by age 2019–2021; tonnes
Projected discards and IBC (2022)	12 267	STF; assuming average discards (including IBC) ratio by age 2019–2021; tonnes

Table 2 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Annual catch scenarios. All weights are in tonnes (t).

Basis	Total catch (2023)	Projected landings (2023)	Projected discards and IBC* (2023)	F_{total} (ages 2–4) (2023)	$F_{projected\ landings}$ (ages 2–4) (2023)	$F_{projected\ discards\ and\ IBC}$ (ages 2–4) (2023)	SSB (2024)	% SSB change ^	% TAC change ^^	% advice change ^^^
ICES advice basis										
MSY approach: F_{MSY}	137 058	118 373	18 685	0.24	0.19	0.05	438 042	−11.50	160	6.50
Other scenarios										
$F = F_{MSY\ lower}$	109 157	94 391	14 766	0.19	0.15	0.04	461 609	−6.70	107	−15.20
$F = F_{MSY\ upper}$[#]	137 058	118 373	18 685	0.24	0.19	0.05	438 042	−11.50	160	6.50
F = 0	0	0	0	0	0	0	556 373	12.40	−100	−100
F_{pa}	137 058	118 373	18 685	0.24	0.19	0.05	438 042	−11.50	160	6.50
F_{lim}	223 464	192 501	30 963	0.43	0.35	0.09	363 491	−27	324	74
SSB (2024) = B_{lim}	496 564	419 677	76 887	1.54	1.24	0.31	136 540	−72	842	286
SSB (2024) = B_{pa} = MSY $B_{trigger}$	429 169	363 631	65 538	1.13	0.91	0.22	189 733	−62	715	233
$F = F_{2022}$	67 653	58 557	9096	0.11	0.09	0.02	498 369	0.73	28	−47
Rollover TAC	52 690	45 652	7038	0.09	0.07	0.02	511 261	3.30	0	−59

* Including below minimum size (BMS) landings, assuming recent discard rate.

^ SSB 2024 relative to SSB 2023.

^^ Human consumption fishery (HCF) catch in 2023 relative to TAC in 2022: Subdivision 20 (2761 t) + Subarea 4 (44 924 t) + Division 6.a (5006 t) = 52 691 t.

^^^ Total catch 2023 relative to the advice value 2022 (128 708 t).

[#] For this stock, $F_{MSY\ upper} = F_{MSY}$.

Basis of the advice

Table 3 Haddock in Subarea 4, Division 6.a, and Subdivision 20. The basis of the advice.

Advice basis	MSY approach
Management plan	An EU multiannual management plan (MAP) has been agreed by the EU for this stock (EU, 2018). There is no agreement with Norway and UK regarding this plan, and it is not used as the basis of the advice for this shared stock. ICES was requested by the EC and UK to provide advice based on the MSY approach, and to include F_{MSY} ranges in the catch scenarios.

Quality of the assessment

A benchmark was conducted for Northern Shelf haddock in 2022 (WKNSCS; ICES, 2022a). The primary changes consist of a change to a new assessment model (SAM) and the re-estimation of the reference points. Several input datasets were also updated, the most significant being changes to the maturity ogives and survey indices. These changes does not affect the perception of the stock but largely revised the estimates.

Scottish observer sampling was not possible during Q1 of 2021 because of the COVID-19 disruption. Sampling proceeded at a reduced level for the rest of 2021, but this reduced coverage is not thought to have had a significant impact on the quality of catch data for Scotland, which has the main fleets catching haddock.

A combination of several major storms and mechanical issues with some vessels resulted in a reduction in the sampling coverage across the NS-IBTS and SCOWCGFS Q1 surveys in 2022. This increased the uncertainty on the Q1 survey indices, which is now accounted for in the assessment model.

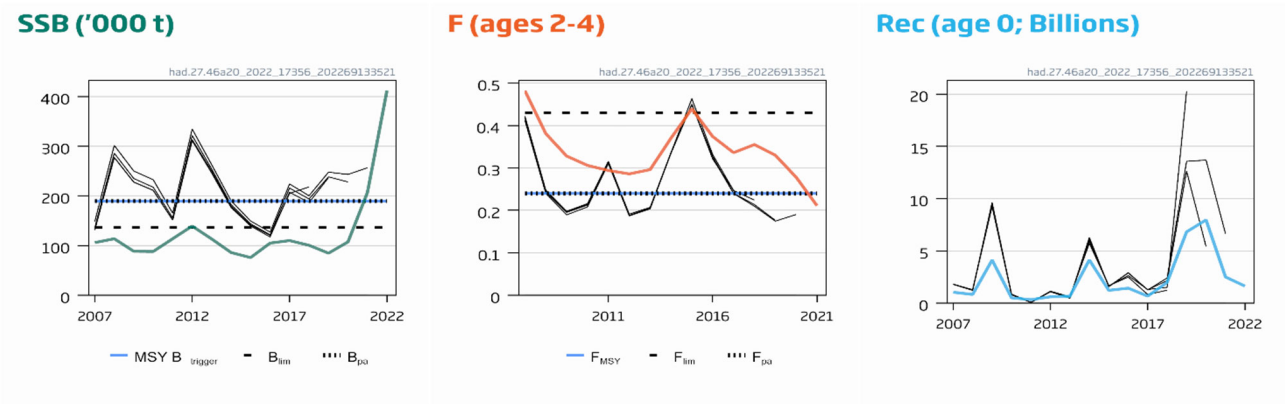


Figure 2 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Historical assessment results (final-year SSB and recruitment included for each line, corresponding respectively to the estimated survivors at the start of the interim year, and the forecast recruitment in the interim year). The reference points were revised in 2022 following a benchmark, and only assessment results from the final year should be compared to the reference points indicated.

Issues relevant to the advice

The new benchmark assessment has resulted in substantial revisions to the absolute levels of historic stock development, fishing mortality and recruitment as well as the reference points. However, all the differences together lead to a catch advice that is only 6.4% different to that given last year for 2022.

More abundant year classes were produced prior to 2000; recruitment since then has tended to be consistently lower. However, the 2019 and 2020 year classes are estimated to be the largest since 2000, which produced a sharp increase in SSB and continues to impact the catch advice.

Haddock on the Northern Shelf is under EU landing obligation and Norway and UK national legislation regulating discards. Landings of fish below the minimum size (BMS) reported to ICES are very low and discarding still takes place. The estimated discards in 2021 were 37% of the total catch by weight, based on observer data.

Reference points

Table 4 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	189 734	B_{pa}; in tonnes.	ICES (2022a)
	F_{MSY}	0.24	Stochastic simulations (EqSim) based on the recruitment period 2000–2020 with segmented regression fixed at B_{lim}.	ICES (2022a)
Precautionary approach	B_{lim}	136 541	Lowest estimated SSB that resulted in high recruitment (1999); in tonnes.	ICES (2022a)
	B_{pa}	189 734	$B_{lim} \times \exp(1.645 \times \sigma)$, $\sigma = 0.20$; in tonnes.	ICES (2022a)
	F_{lim}	0.43	The F that on average leads to B_{lim} from EqSim.	ICES (2022a)
	F_{pa}	0.24	$F_{P.05}$; the F that leads to SSB ≥ B_{lim} with 95% probability.	ICES (2022a)
EU Management Plan (MAP)*	MAP MSY $B_{trigger}$	189 734	MSY $B_{trigger}$; in tonnes.	ICES (2022a)
	MAP B_{lim}	136 541	B_{lim}; in tonnes.	ICES (2022a)
	MAP F_{MSY}	0.24	F_{MSY}	ICES (2022a)
	MAP range F_{lower}	0.186–0.24	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2022a)
	MAP range F_{upper}**	0.24–0.24	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2022a)

* EU multiannual plan (MAP) for the North Sea (EU, 2018).

** For this stock, $F_{MSY\ upper} = F_{MSY}$.

Basis of the assessment

Table 5 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022b)
Assessment type	Age-based analytical assessment (SAM; Nielsen and Berg, 2014; ICES, 2022c) that uses catches and surveys in the model and in the forecast
Input data	Commercial catches (international catches, ages from catch sampling), two survey indices derived through a delta-GAM approach: "Q1" (combining NS-IBTS [G1022], SWC-IBTS [G1179], SCOWCGFS [G4748]), "Q3+Q4" (combining NS-IBTS Q3 [G2829], Q4 SWC-IBTS [G4299], Q4 SCOWCGFS [G4815], and Q4 IGFS [G7212]). Annually varying maturity data from Q1 NS-IBTS [G1022], Q1 SWC-IBTS [G1179], and Q1 SCOWCGFS [G4748] (1991–2022). Annually varying natural mortalities from the North Sea multispecies model (1974–2020)(ICES, 2021b).
Discards, BMS landings and bycatch	Included in the assessment, data from the main fleets (covering around 86% of the landings in 2021). BMS landings, where reported, are included with discards and industrial bycatch in the assessment from 2016 onwards.
Indicators	None
Other information	Last benchmarked in 2022 during ICES Benchmark Meeting on North Sea and Celtic Sea Stocks (WKNSCS; ICES, 2022a), where several updates were made to biological parameters and a new assessment model was selected.
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

History of the advice, catch, and management

Table 6a Haddock in Subarea 4, Division 6.a, and Subdivision 20. **North Sea (Subarea 4).** ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of landings, discards, and catches for the period 1987 to 2014 are presented to the nearest thousand tonnes.

Year	ICES advice	Landings corresp. to advice	Total catch corresp. to advice^	Agreed TAC	Official landings	ICES landings	ICES discards^^	ICES industrial bycatch	ICES total
1987	80% of F(85)	105 000		140 000	109 000	108 000	59 000	4000	172 000
1988	77% of F(86); TAC	185 000		185 000	105 000	105 000	62 000	4000	171 000
1989	Reduce decline in SSB; TAC; protect juveniles	68 000		68 000	64 000	76 000	26 000	2000	104 000
1990	80% of F (88); TAC	50 000		50 000	43 000	51 000	33 000	3000	87 000
1991	70% of effort (89)			50 000	45 000	45 000	40 000	5000	90 000
1992	70% of effort (89)			60 000	51 000	70 000	48 000	11 000	129 000
1993	70% of effort (89)			133 000	80 000	80 000	80 000	11 000	170 000
1994	Significant reduction in effort; mixed fishery			160 000	87 000	81 000	65 000	4000	150 000
1995	Significant reduction in effort; mixed fishery			120 000	75 000	75 000	57 000	8000	140 000
1996	Mixed fishery to be taken into account			120 000	75 000	76 000	73 000	5000	154 000
1997	Mixed fishery to be taken into account			114 000	73 000	79 000	52 000	7000	138 000
1998	No increase in F	100 300		115 000	72 000	77 000	45 000	5000	128 000
1999	Reduction of 10% F (95–97)	72 000		88 600	64 000	64 000	43 000	4000	111 000
2000	F less than F_{pa}	< 51 700		73 000	47 000	45 000	47 000	8000	100 000
2001	F less than F_{pa}	< 58 000		61 000	40 000	39 000	118 000	8000	165 000
2002	F less than F_{pa}	< 94 000		104 000	54 000	53 000	45 000	4000	101 000
2003	No cod catches	-		52 000	42 000	42 000	23 000	1000	76 000
2004	Mixed-fisheries considerations; F should be below F_{pa}	No forecast*		85 000	48 000	47 000	17 000	1000	65 000
2005	Mixed-fisheries considerations/F should be below F_{pa}	92 000*		66 000	31 000	48 000	10 000	0	57 000
2006	Mixed-fisheries considerations/F < 0.3	39 000*		52 000	36 000	36 000	17 000	0	55 000
2007	Mixed-fisheries considerations/F < 0.3	55 400*		55 000	31 000	31 000	30 000	0	61 000
2008	Mixed-fisheries considerations/15% TAC reduction	49 300*,**		46 000	30 000	29 000	15 000	0	45 000
2009	Mixed-fisheries considerations/apply management plan	44 700*,**		42 000	31 000	30 000	10 000	0	40 000
2010	Mixed-fisheries considerations/apply management plan	38 000*,**		36 000	28 000	28 000	7000	0	35 000
2011	See scenarios	-		34 000	26 000	27 000	10 000	0	37 000
2012	Apply management plan	41 575*,**		39 000	30 000	30 000	4000	0	34 000
2013	Apply management plan	47 811*,**		45 041	37 000***	39 000***	2000***	0	39 000***
2014	Apply management plan	38 201*		38 284	35 000	35 000	4000	65	39 000
2015	(November update) MSY approach		68 690	40 711	30 276	30 013	4676	18	34 707

Year	ICES advice	Landings corresp. to advice	Total catch corresp. to advice^	Agreed TAC	Official landings	ICES landings	ICES discards^^	ICES industrial bycatch	ICES total
2016	MSY approach		≤ 59 945	61 933	30 162	29 713	6106	29	35 848
2017	MSY approach		≤ 39 461	33 643	30 051	29 318	5322	8	34 648
2018	MSY approach		≤ 48 990	41 767	29 417	29 333	3767	30	33 130
2019	MSY approach		≤ 33 956	28 950	25 542	26 697	3570	184	30 451
2020	MSY approach		≤ 41 818	35 653	26 243	26 023	8106	930	35 060
2021	MSY approach		≤ 69 280	42 785	22 402	21 019	11 450	1266	33 735
2022	MSY approach		≤ 128	44 924					
2023	MSY approach		≤ 137						

* The exploitation of this stock should be conducted in the context of mixed fisheries, protecting stocks outside safe biological limits.
** Including industrial bycatch.
*** Subarea 4 and Subdivision 20 combined.
^ Catch advice since 2015 is provided for Subarea 4, Division 6.a, and Subdivision 20.
^^ Since 2016 discards estimated by ICES include BMS landings.
^^^ Due to an InterCatch issue when generating area-specific catch estimates, these values do not sum to the catch-component totals in tables 7, 8, and 9 when added across areas. The latter are used in the assessment.

Table 6b Haddock in Subarea 4, Division 6.a, and Subdivision 20. **Skagerrak (Subdivision 20).** ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of landings, discards, and catches for the period 1987 to 2014 are presented to the nearest hundred tonnes.

Year	ICES advice	Landings corresp. to advice	Catch corresp. to advice**	Agreed TAC	Official landings	ICES landings	ICES discards^	ICES industrial bycatch	ICES total catch
1987	Precautionary TAC	-		11 500		3800		1400	5300
1988	Precautionary TAC	-		10 000		2900		1500	4300
1989	Precautionary TAC	-		10 000		4100		400	4500
1990	Precautionary TAC	-		10 000		4100		2000	6100
1991	Precautionary TAC	4600		4600		4100		2600	6700
1992	TAC	4600		4600		4400		4600	9000
1993	Precautionary TAC	-		4600		2000		2400	4400
1994	Precautionary TAC	-		10 000		1800		2200	4000
1995	If required, precautionary TAC; link to North Sea	-		10 000		2200		2200	4400
1996	If required, precautionary TAC; link to North Sea	-		10 000		3100		2900	6100
1997	Combined advice with North Sea	-		7000		3400		600	4000
1998	Combined advice with North Sea	4700		7000		3800		300	4000
1999	Combined advice with North Sea	3400		5400		1400		300	1700
2000	Combined advice with North Sea	< 1800		4500		1500		600	2100
2001	Combined advice with North Sea	< 2000		4000		1900		200	2100
2002	Combined advice with North Sea	< 3000		6300		4100		60	4100
2003	Combined advice with North Sea	-		3200		1800	200	n/a	1800
2004	Combined advice with North Sea/ F should be below F_{pa}	No forecast		4900		1400	100	n/a	1400
2005	Combined advice with North Sea/F should be below F_{pa}	-		4000		800	200	0	800
2006	Combined advice with North Sea/F < 0.3	-		3200		1500	1000	0	1500
2007	Combined advice with North Sea/F < 0.3	-		3400		1600	800	0	2500
2008	Combined advice with North Sea/15% TAC reduction	2900		2900		1300	400	0	1800
2009	Combined advice with North Sea/apply management plan	-		2600		1500	400	0	1900
2010	Combined advice with North Sea/apply management plan	-		2200		1400	600	0	2000
2011	See scenarios	-		2100		2100	1300	0	3400
2012	Apply North Sea management plan	-		2095	2500	2600	800	0	3400

Year	ICES advice	Landings corresp. to advice	Catch corresp. to advice**	Agreed TAC	Official landings	ICES landings	ICES discards^	ICES industrial bycatch	ICES total catch
2013	Apply North Sea management plan	-		2770	2000	*	*	*	*
2014	Apply North Sea management plan	2438		2355	2200	2300	200	0	2400
2015	(November update) MSY approach		68 690	2504	1432	1421	163	3	1586
2016	MSY approach		≤ 59 945	3926	1215	1221	93	7	1321
2017	MSY approach		≤ 39 461	2069	1032	1111	134	0	1245
2018	(November update) MSY approach		≤ 48 990	2569	717	797	68	0	865
2019	MSY approach		≤ 33 956	1780	584	628	75	3	706
2020	MSY approach		≤ 41 818	2193	532	402	247	147	796
2021	MSY approach		≤ 69 280	2630	2005	1988	614	93	2695
2022	MSY approach		≤ 128 708	2761					
2023	MSY approach		≤ 137 058						

* Subarea 4 and Subdivision 20 combined (see Table 4a).

** Catch advice since 2015 is given for Subarea 4, Division 6.a, and Subdivision 20.

^ Since 2016, discards estimated by ICES include BMS landings.

^^^ Due to an InterCatch issue when generating area-specific catch estimates, these values do not sum to the catch-component totals in Tables 7, 8, and 9 when added across areas. The latter are used in the assessment.

Table 6c Haddock in Subarea 4, Division 6.a, and Subdivision 20. **West of Scotland (Division 6.a.).** ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values for the period from 1987 to 2014 are presented to the nearest thousand (official landings) or nearest hundred (ICES landings, discards, and total) tonnes.

Year	ICES advice/Single-stock exploitation boundaries from 2004 onwards *	Landings corresp. to advice	Catch corresp. to advice^^	Agreed TAC	Official landings	ICES landings	ICES discards#	ICES industrial bycatch	ICES total catch
1987	Reduce F towards F_{max}	20 000		32	27 000	27 000	16 200		43 200
1988	No increase in F; TAC	25 000		35	21 000	21 200	9500		30 700
1989	80% of F (87); TAC	15 000		35	24 000	16 700	3000		19 700
1990	80% of F (88); TAC	14 000		24	13 000	10 100	5400		15 500
1991	70% of effort (89)	-		15	10 000	10 600	8700		19 200
1992	70% of effort (89)	-		12	7000	11	9300**		20 500**
1993	70% of effort (89)	-		17	13 000	19	16 800**		35 900**
1994	30% reduction in effort	-		16	9000	14	11 100**		25 000**
1995	Significant reduction in effort	-		21 000	13 000	12 400	8600		20 900
1996	Significant reduction in effort	-		22 900	13 000	13 500	11 400		24 800
1997	Significant reduction in effort	-		20 000	13 000	12 900	6500		19 300
1998	No increase in F	20 800***		25 700	14 000	14 400	5500		19 900
1999	F reduced to F_{pa}	14 300***		19 000	11 000	10 500	4900		15 300
2000	Maintain F below F_{pa}	< 14 900***		19 000	7000	7000	7900		14 900
2001	Reduce F below F_{pa}	< 11 200***		13 900	7000	6870	6600		13 400
2002	Reduce F below F_{pa}	< 14 100***		14 100	7000	7100	8900		16 000
2003	No cod catches	-		8700	4900	5300	4100		9400
2004	F_{pa}*	12 200		6500	3000	3900	3700		7600
2005	$0.75 \times F_{pa}$*	7600		7600	3200	3800	2900		6700
2006	$0.7 \times F_{pa}$*	8000		7810	5700	6300	4600		10 900
2007	$0.87 \times F_{pa}$*	7200		7200	3700	3800	4000		7700
2008	SSB > B_{pa}*	4200		6120	2800	2800	1600		4400
2009	No fishing and recovery plan*	0		3520	2800	2800	1800		4600

Year	ICES advice/Single-stock exploitation boundaries from 2004 onwards *	Landings corresp. to advice	Catch corresp. to advice^^	Agreed TAC	Official landings	ICES landings	ICES discards#	ICES industrial bycatch	ICES total catch
2010	No fishing and recovery plan	0		2670	2900	2900	1600		4500
2011	See scenarios	0		2005	1700	1800	1300		3100
2012	MSY framework	5600		6015	5000	5100	500		5600
2013	MSY framework	3100		4211	4700	4800	1000		5800
2014	MSY approach	6432^		3988	4000	4100	800		4900
2015	(November update) MSY approach		68 690	4536	3889	39 625	1425		5387
2016	MSY approach		≤ 59 945	6462	4265	4346	1626		5972
2017	MSY approach		≤ 39 461	3697	3251	34 564	1615		5071
2018	(November update) MSY approach		≤ 48 990	4654	4318	4380	1391		5771
2019	MSY approach		≤ 33 956	3226	3511	3588	2090		5679
2020	MSY approach		≤ 41 818	3973	2653	2695	619		3314
2021	MSY approach		≤ 69 280	4767	3559	3660	4370		8030
2022	MSY approach		≤ 128	5006					
2023	MSY approach		≤ 137						

* Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries, protecting stocks outside safe biological limits.
** Adjusted for misreporting.
*** For Division 6.a only.
^ This value (6432 t) refers to total catch, including discards. Therefore, it is not directly comparable to the value advised for 2013 (3100 t), which referred only to landings.
^^ Catch advice since 2015 is given for Subarea 4, Division 6.a, and Subdivision 20.
^^^ Due to an InterCatch issue when generating area-specific catch estimates, these values do not sum to the catch-component totals in tables 7, 8, and 9 when added across areas. The latter are used in the assessment.
# Since 2016, discards estimated by ICES include BMS landings.

History of the catch and landings

Table 7 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Catch distribution by fleet in 2021 as used in the assessment model.

Catch	Landings*			Discards**	IBC
44 122 tonnes	Demersal trawl and seine > 100 mm 92%	Trawl 70–99 mm 1.38%	Others 6.8%	16 308 tonnes	1357 tonnes
	26 457 tonnes				

*Landings include the Norwegian component of BMS landings.
**Discards include BMS landings from EU and UK fleets.

Table 8 Haddock in Subarea 4, Division 6.a, and Subdivision 20. History of official commercial landings, along with ICES estimates for individual areas. All weights are in tonnes.

Subdivision 20														
Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*	2021*
Germany	87	105	65	102	120	90	114	103	125	56	31	30	12	21
Denmark	1052	1263	1139	1661	1916	1456	1764	1059	908	852	542	457	448	1841
Netherlands	0	0	1	0	0	5	6	4	2	20	4	4	1	11
Norway	170	121	81	125	303	223	86	63	70	0	0	0	0	8
Portugal	0	0	0	0	0	0	0	0	0	0	0	0	15	0
Sweden	276	166	126	198	210	217	219	203	110	104	140	93	56	124
UK	0	0	0	0	0	3	0	0	0	0	0	0	0	0
BMS landings										< 1	< 1	0	1	74
Subarea 4														
Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*	2021*
Belgium	112	108	78	106	78	78	98	47	53	30	29	29	40	150
Germany	393	657	634	575	548	677	677	599	554	609	348	313	331	369
Denmark	501	552	725	697	947	1283	1079	1442	1244	1185	1117	1174	1683	1892
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Faroes	3	32	5	0	0	0	0	0	0	0	0	1	2	0
France	448	135	276	320	175	177	209	100	121	140	201	188	144	219
Greenland	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	130	0
Netherlands	29	24	41	71	191	172	99	44	146	75	102	166	175	291
Norway	1482	1278	1126	1195	1006	1662	2743	2003	1499	2164	1428	1516	3171	2215
Poland	16	0	0	0	0	0	0	0	0	0	0	0	0	0
Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweden	83	141	90	128	103	113	154	136	118	181	100	111	114	142
UK	27 365	28 393	24 983	23 343	27 378	33 013	29 851	25 905	26 427	25 667	26 091	22 044	20 452	17 123
BMS landings										< 1	15	160	287	208
Division 6.a														
Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*	2021*
Germany	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Denmark	0	0	0	0	0	0	0	0	2	2	1	9	4	18
Spain	10	21	28	36	15	14	19	9	33	28	28	64	26	24
Faroes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	151	136	89	73	32	51	67	41	62	68	66	57	86	92
Ireland	879	297	396	290	845	746	667	768	1034	641	758	562	441	587
Netherlands	0	0	0	0	0	0	0	11	28	31	17	54	13	0
Norway	28	18	9	4	0	6	2	7	5	1	7	10	2	0
UK	1776	2380	2415	1364	4123	3878	3261	3052	3101	2480	3441	2755	2081	2838

BMS landings										0	2	15	26	30
Subarea 4, Division 6.a, and Subdivision 20														
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*	2021*
Official landings	34 862	35 831	32 308	30 288	37 990	43 864	41 115	35 596	35 642	34 334	34 451	29 637	29 427	27 965
ICES landings	32 692	34 361	31 926	30 273	37 839	43 230	40 589	35 215	35 111	33 799	34 441	30 747	28 942	26 457
ICES discards and IBC^	17 235	12 159	9417	12 609	5073	3473	5336	6262	7819	7061	5245	5702	9987	17 665
ICES total catch	49 927	46 519	41 344	42 882	42 912	46 703	45 926	41 477	42 930	40 860	39 687	36 449	38 928	44 122
TAC 4	46 444	42 110	35 794	34 057	39 000	45 041	38 284	40 711	61 933	33 643	41 767	28 950	35 653	44 924
TAC 3.a 20	2856	2590	2201	2100	2095	2770	2355	2504	3926	2069	2569	1780	2193	2630
TAC 6.a	6120	3520	2670	2005	6015	4211	3988	4536	6462	3697	4654	3226	3973	4767
Total TAC	55 420	48 220	40 665	38 162	47 110	52 022	44 627	47 751	72 321	39 409	48 990	33 956	41 819	50 182

* Preliminary.

^ ICES discards included since 2016 BMS landings from EU and UK fleets.

Summary of the assessment

Table 9 Haddock in Subarea 4, Division 6.a, and Subdivision 20. Assessment summary. Recruitment is in thousands, weights are in tonnes. High and low refers to 95% confidence intervals.

Year	Recruitment (Age 0)			Spawning stock biomass			Landings*	Discards ***	IBC	Fishing pressure (Ages 2–4)		
	R	High	Low	SSB	High	Low				F	High	Low
	thousands			tonnes			tonnes					
1972	12 649 827	20 113 092	7 955 919	447 664	565 255	354 535	234 019	144 366	29 585	0.80	0.99	0.65
1973	32 687 783	51 475 117	20 757 431	417 535	513 277	339 652	207 489	126 105	11 267	0.77	0.93	0.64
1974	64 979 645	102 606 259	41 151 040	325 315	398 085	265 847	167 528	181 802	47 505	0.79	0.95	0.66
1975	6 249 833	9 833 292	3 972 261	297 219	358 137	246 663	160 271	293 321	41 487	0.89	1.06	0.74
1976	7 216 914	11 340 999	4 592 527	415 182	523 568	329 234	184 421	169 776	48 163	0.88	1.05	0.74
1977	10 302 559	16 105 854	6 590 319	320 170	412 156	248 714	156 639	48 732	35 022	0.88	1.04	0.74
1978	18 077 321	28 282 709	11 554 393	157 491	192 402	128 915	102 970	32 860	10 903	0.89	1.06	0.75
1979	29 049 767	45 377 445	18 597 102	138 197	164 641	116 000	97 896	35 054	16 240	0.84	1.01	0.70
1980	7 730 850	11 952 788	5 000 176	190 866	231 481	157 376	111 371	68 831	22 472	0.77	0.92	0.64
1981	12 568 912	19 030 232	8 301 399	295 790	363 448	240 726	147 806	61 683	17 041	0.64	0.77	0.53
1982	7 520 588	11 110 874	5 090 440	334 187	410 793	271 866	195 456	41 297	19 383	0.65	0.78	0.54
1983	22 651 401	33 335 912	15 391 389	269 887	314 169	231 847	188 754	51 584	12 898	0.74	0.88	0.62
1984	5 967 728	8 788 517	4 052 308	229 279	262 782	200 048	158 205	79 012	10 080	0.79	0.93	0.67
1985	7 974 824	11 756 222	5 409 715	272 109	316 718	233 784	182 946	58 373	5998	0.83	0.98	0.70
1986	12 651 223	18 691 287	8 562 998	242 521	288 707	203 724	185 137	36 063	2643	0.88	1.04	0.75
1987	2 068 253	3 046 503	1 404 125	175 563	202 834	151 959	135 022	55 674	4410	0.94	1.10	0.80
1988	2 182 966	3 209 442	1 484 788	160 702	186 494	138 476	126 227	49 833	4002	0.90	1.05	0.76

Year	Recruitment (Age 0)			Spawning stock biomass			Landings*	Discards ***	IBC	Fishing pressure (Ages 2–4)		
	R	High	Low	SSB	High	Low				F	High	Low
	thousands			tonnes			tonnes					
1989	3 331 710	4 876 122	2 276 460	140 052	166 724	117 647	92 840	32 453	2410	0.89	1.05	0.76
1990	7 883 152	11 353 356	5 473 632	84 855	98 167	73 348	61 605	22 548	2589	0.87	1.03	0.74
1991	12 172 282	17 287 476	8 570 623	72 369	82 189	63 722	55 208	36 610	5386	0.95	1.11	0.81
1992	16 645 721	23 823 591	11 630 490	108 819	125 922	94 038	81 566	42 477	10 927	0.87	1.01	0.74
1993	5 458 651	7 632 031	3 904 186	169 965	196 921	146 699	98 631	70 748	10 766	0.91	1.07	0.78
1994	18 014 805	25 226 697	12 864 673	189 463	218 673	164 156	95 141	70 668	3576	0.86	1.01	0.73
1995	7 732 879	11 098 636	5 387 816	182 341	209 790	158 483	89 859	71 262	7695	0.73	0.86	0.61
1996	8 352 530	11 729 542	5 947 782	214 411	246 633	186 398	92 615	107 207	5000	0.80	0.94	0.67
1997	3 918 301	5 474 646	2 804 398	236 707	274 753	203 930	95 391	67 879	6684	0.72	0.86	0.61
1998	3 125 460	4 363 147	2 238 865	193 454	220 720	169 556	95 472	61 399	5101	0.78	0.93	0.66
1999	36 390 173	51 550 735	25 688 182	137 730	157 492	120 449	76 009	43 562	3835	0.89	1.04	0.75
2000	8 706 721	12 203 038	6 212 142	117 042	132 124	103 682	54 504	64 185	8134	0.79	0.94	0.67
2001	1 297 496	1 831 910	918 984	284 289	341 924	236 369	47 592	117 882	7879	0.57	0.69	0.47
2002	1 559 523	2 182 575	1 114 332	368 458	437 244	310 493	65 405	86 051	3717	0.45	0.56	0.36
2003	1 136 921	1 597 872	808 945	270 109	317 446	229 831	47 282	25 975	1150	0.31	0.40	0.25
2004	1 113 678	1 556 649	796 762	188 026	220 738	160 161	51 896	20 020	554	0.33	0.41	0.26
2005	4 611 225	6 667 834	3 188 951	136 860	161 868	115 716	51 528	12 389	168	0.39	0.48	0.32
2006	1 424 468	1 995 510	1 016 837	99 835	119 359	83 504	43 334	23 094	535	0.50	0.60	0.41
2007	1 038 390	1 458 304	739 388	106 115	123 465	91 202	34 672	32 651	48	0.48	0.59	0.40
2008	822 127	1 164 693	580 319	113 882	133 503	97 145	32 692	17 234	1	0.38	0.47	0.31
2009	4 116 082	5 888 324	2 877 242	88 656	103 020	76 294	34 361	12 159	-	0.33	0.40	0.27
2010	499 120	707 224	352 251	88 234	101 620	76 611	31 926	9417	-	0.31	0.38	0.25
2011	329 439	461 757	235 037	113 933	130 890	99 173	30 273	12 609	-	0.29	0.36	0.24
2012	600 032	843 918	426 627	139 435	163 163	119 157	37 839	5054	19	0.29	0.35	0.23
2013	657 116	918 034	470 354	113 522	133 414	96 595	43 230	3305	168	0.30	0.37	0.24
2014	4 126 647	5 877 875	2 897 172	86 111	101 084	73 355	40 589	5271	65	0.37	0.45	0.30
2015	1 214 108	1 696 366	868 951	75 981	88 345	65 347	35 215	6241	21	0.44	0.54	0.36
2016	1 426 828	1 997 470	1 019 209	105 109	122 449	90 223	35 111	7782	37	0.37	0.47	0.30
2017	662 496	926 763	473 585	110 232	128 495	94 565	33 799	7053	8	0.34	0.42	0.27
2018	1 980 231	2 777 843	1 411 641	100 671	115 781	87 532	34 441	5215	30	0.36	0.44	0.28
2019	6 810 487	9 689 090	4 787 109	84 858	97 448	73 895	30 747	5516	186	0.33	0.41	0.27
2020	7 955 652	11 520 390	5 493 946	107 457	122 494	94 265	28 942	8910	1077	0.28	0.35	0.22
2021	2 499 031	4 117 484	1 516 741	207 210	245 324	175 018	26 457	16 308	1357	0.21	0.27	0.162
2022	1 623 040	8 706 721	329 439	412 059	513 977	330 351						

* ICES estimates, presented as the sum of product (SOP) values from the catch and weight-at-age used in the assessment model.

** Discards include since 2016, BMS landings from EU and UK fleets.

*** Recruitment in 2022 is the geometric mean of resampled assessment recruitment estimates from 2000 to 2021.

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Haddock (*Melanogrammus aeglefinus*) in Subarea 4, Division 6.a, and Subdivision 20 (North Sea, West of Scotland, Skagerrak). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, had.27.46a20. https://doi.org/10.17895/ices.advice.19447943.

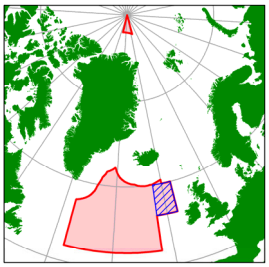
Rockall Haddock

Division 6.b

ADVICE FOR 2023

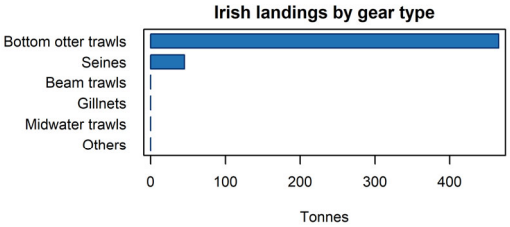
ICES advises that when the MSY approach is applied, catches should be no more than 4,078 t in each of the years 2023 and 2024.

ICES notes the existence of a precautionary management plan, developed and adopted by some of the relevant management authorities for this stock.



KEY POINTS

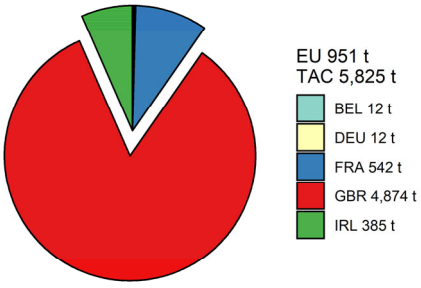
ICES Assessment Category	3 (Survey-Based Assessment)	
Management Plan	WWMAP (target); No management plan has been agreed between all the relevant management authorities.	
Advice Basis	ICES MSY approach	Catch=4,078 t
Ranges	F_{MSY} Range Lower	Not available
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not available
Landing Obligation	From 2016	No derogations or exemptions



MANAGEMENT IN 2022

- There is no internationally agreed TAC for haddock in Division 6.b. Since 2004 an autonomous TAC has been set for EU fleets (and UK fleets since 2021) operating in Division 6.b and Sub-areas 12 and 14.
- Part of Division 6.b falls (since 1999) within international waters fished by non EU vessels (mainly Russian).
- Following the NEAFC agreement in March 2001, NEAFC has maintained an area closure to all fishing except long-lining in the SW corner of the Rockall Bank, this continued in 2022. Data are inadequate to fully evaluate the impact of this measure on the stock status.
- The Irish fleet generally caught their full quota and in 2022 almost full uptake was achieved by October.

2022 Quota Allocations



KEY STOCK CONSIDERATIONS

- Most of the Irish landings of Rockall haddock come from trips where haddock was the dominant species. They are mainly landed with megrim, saithe and anglerfish.
- The main Irish fleet catching haddock from Division 6.b uses otter trawls although there have also been some landings from demersal seiners since 2014.
- Advice for 2023 is down by 30% on the 2022 advice owing to a change in assessment basis (from category 1 to category 3) and a decline in the survey biomass indices. The advice reduction is capped in the new category 3 rule which is applied this year.
- In the past the Irish haddock fishery operated on the bank both within and beyond 12 nautical miles of Rockall. Since 2021 Irish fishing vessels have been excluded from within 12 nm.

- In 2022 ICES assessed the efficacy of the Rockall haddock closure for the protection of juvenile haddock and concluded that the overall impact of the current closure area continues to be difficult to assess. The Rockall Haddock Box does coincide with areas of high juvenile and adult haddock densities, with high densities also observed outside the box to the northeast. For most years since the closure, haddock densities of age classes 1+ have been higher inside than outside the box.

Published 28 October 2022

Haddock (*Melanogrammus aeglefinus*) in Division 6.b (Rockall)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches should be no more than 4078 tonnes in each of the years 2023 and 2024.

ICES notes the existence of a precautionary management plan, developed and adopted by some of the relevant management authorities for this stock.

Stock development over time

The fishing pressure proxy on the stock is below $F_{MSY\ proxy}$ (Figure 2), and the stock-size index is above MSY $B_{trigger\ proxy}$ ($I_{trigger}$).

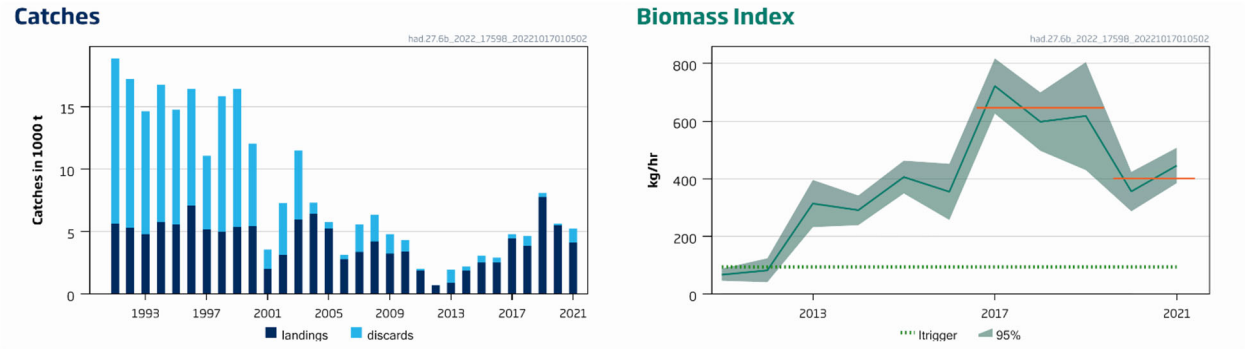


Figure 1 Haddock in Division 6.b. Summary of the stock assessment. ICES landings and discards, and stock biomass index from the Rock-WIBTS-Q3 survey. The horizontal orange lines indicate the average of the biomass index from 2017 to 2019 and from 2020 to 2021.

Catch scenarios

ICES framework for category 3 stocks was applied (rfb rule, method 2.1, ICES, 2022c). A survey biomass index was used as an indicator of stock development. The advice is based on the recent advised catches (2022), multiplied by the ratio of the mean of the last two index values (index A) and the mean of the three preceding values (index B), a ratio of observed mean length in the catch relative to the target mean length, a biomass safeguard, and a precautionary multiplier. The stability clause was considered and applied to limit the decrease in catch advice to 30%. The discard rate (mean 2019–2021) was 9.2%.

Table 1 Haddock in Division 6.b. The basis for the catch scenarios. Catches are in tonnes.*

Previous catch advice A_y (2022)		5825 tonnes
Stock biomass trend		
Index A (2020, 2021)		401 kg hr^{-1}
Index B (2017, 2018, 2019)		646 kg hr^{-1}
r: Index ratio (A/B)		0.62
Fishing pressure proxy		
Mean catch length ($L_{mean} = L_{2021}$)		39.0 cm
MSY proxy length ($L_{F=M}$)		37.4 cm
f: multiplier for relative mean length in catches ($L_{mean}/L_{F=M\ 2020}$)		1.04
Biomass safeguard		
Last index value (I_{2021})		446 kg hr^{-1}
Index trigger value ($I_{trigger} = I_{loss} \times 1.4$)		93.5 kg hr^{-1}
b: multiplier for index relative to trigger min{$I_{2021}/I_{trigger}$, 1}		1
Precautionary multiplier to maintain biomass above B_{lim} with 95% probability		
m: multiplier (generic multiplier based on life history)		0.90
RFB calculation**		3389 tonnes
Stability clause (+20%/−30% compared to A_y, only applied if b ≥ 1)	Applied	0.70
Discard rate		9.2%
Catch advice for 2023 and 2024 (A_y × stability clause)		4078 tonnes
Projected landings corresponding to advice***		3704 tonnes
% advice change^		−30 %

* The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.
**Ay+1 = $Ay \times r \times f \times b \times m$.
*** [Advised catch for 2023] × [1 – discard rate].
^ Advice value for 2023 and 2024 relative to the advice value for 2022 (5825 tonnes).

The current advice has decreased compared to last year's advice because of a change in the advice method and a declining trend in the recent stock biomass.

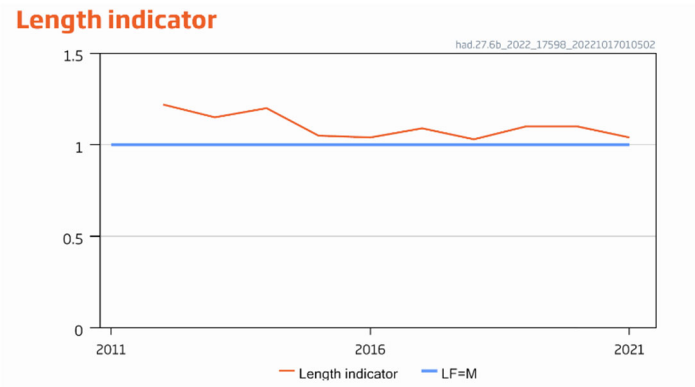


Figure 2 Haddock in Division 6.b. Length indicator: mean length of fish in the catch relative to MSY proxy reference length, $L_{F=M}$. The exploitation status is below $F_{MSY\ proxy}$ when the indicator ratio value is higher than 1 (shown by a blue line).

Basis of the advice

Table 2 Haddock in Division 6.b. The basis of the advice.

Advice basis	MSY approach
Management plan	There is no agreed management plan for haddock in this area. Two management strategies (NEAFC and EU MAP) have been assessed to be precautionary. NEAFC requested ICES to evaluate the harvest control rules (HCRs) that use F_{MSY} as a target. ICES concluded that the NEAFC HCRs in the long-term management strategy for Rockall haddock were consistent with the precautionary approach (ICES, 2019). ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach.

Quality of the assessment

In previous years an age-structured assessment model has been used to provide advice as a category 1 stock. This year, methods to update the previously utilised survey index were unavailable and the agreed assessment (and forecast) could not be carried out. Consequently the assessment this year is based on a new biomass index derived from the Rock-WIBTS-Q3 survey as an indicator of stock size and a mean catch length indicator as a proxy for fishing pressure (under a category 3 approach). This survey has good coverage of the stock area and it is considered representative of the stock trend.

While at-sea observer sampling for discards remains sparse for Rockall haddock, the estimated catch-at-length data are considered to be of sufficient quality for the calculation of length indicators.

Growth parameter estimates for this stock show significant variation between cohorts, and median values were used. An underestimate of the asymptotic length would lead to an underestimate of the MSY proxy reference length ($L_{F=M}$). The length indicator is estimated to be just above this reference point implying that the fishing pressure is just below the F_{MSY} proxy. This uncertainty in growth parameters has no effect on the advice as the reduction is capped.

Issues relevant for the advice

Advice for this stock was previously given following ICES MSY approach based on a Category 1 stock assessment; the applied method gives advice following ICES MSY approach for data limited stocks using the empirical rfb rule (Fischer *et al.*, 2021).

The basis for the advice (rfb rule) has a biennial advice interval and so advice is provided for 2 years (ICES, 2022c).

Reference points

Table 3 Haddock in Division 6.b. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger\ proxy}$	93.5	Biomass index trigger value ($I_{trigger}$), defined as $I_{trigger} = I_{loss} \times 1.4$, where I_{loss} (66.764 kg h^{-1}) is the lowest observed historical biomass index value from 2011. In kg per hour.	ICES (2022b, 2022c)
	$F_{MSY\ proxy}$	1	$L_{mean}/L_{F=M}$; Mean catch length divided by MSY proxy reference length ($L_{F=M}$ = 37.4 cm).	ICES (2022b, 2022c)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 4 Haddock in Division 6.b. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2022a)
Assessment type	Survey biomass trend applying the *rfb* rule for advice (ICES, 2022b).
Input data	Commercial catch (international landings and discards, length frequencies from catch sampling); one survey index (Rock-WIBTS-Q3 [G4436]); growth parameters estimated from survey data
Discards and bycatch	Discards are included in the assessment
Indicators	Length based indicator
Other information	This stock was benchmarked in 2019 (ICES, 2020). The stock changed from category 1 to category 3 in 2022 (ICES, 2022a).
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 5 Haddock in Division 6.b. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice, with single-stock exploitation boundaries from 2004 onwards	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC^^	Official landings	ICES landings	ICES discards+
1987	Precautionary TAC	10000			7995	8432	n/a
1988	Precautionary TAC	10000			7574	7929	n/a
1989	*Status quo* F; TAC	18000			6643	6728	n/a
1990	Precautionary TAC	5500			8213	3884	n/a
1991	Precautionary TAC	5500			5853	5656	13230
1992	Precautionary TAC	3800			4520	5321	11874
1993	80% of F (91)	3000			4113	4781	9854
1994	If required, precautionary TAC	-			3735	5732	11028
1995	No long-term gain in increasing F	5100			5491	5588	9170
1996	No long-term gains in increasing F	6900			6818	7072	9356
1997	No advice given	4900			5220	5167	5893
1998	No increase in F	4900			5098	4986	10863
1999	Reduce F below F_{pa}	3800			5990	5356	11065
2000	Reduce F below F_{pa}	< 3500			5688	5445	6611
2001	Reduce F below F_{pa}	< 2700			2315	2020	1536
2002	Reduce F below 0.2	< 1300			3037	3118	4154
2003	Lowest possible F	-			6148	5968	5520
2004	Lowest possible catch^			702	6306	6434	883
2005	Lowest possible catch^			702	5178	5239	505
2006	Lowest possible catch^			597	2765	2756	386
2007	Reduce F below F_{pa}^	< 7110		4615	3349	3347	2242
2008	Keep F below F_{pa}^	< 10600		6916	4222	4222	2104
2009	No long-term gains in increasing F^	-	< 4300	5879	3440	3241	1556
2010	No long-term gains in increasing F^	-	< 3300	4997	3405	3404	907
2011	See scenarios	-		3748	1897	1860	152
2012	MSY approach	-	< 3300	3300	710	686	26
2013	No directed fisheries, minimize bycatch and discards	0	0	990	826	889	1065
2014	MSY approach	< 1620	< 980	1210	1713	1845	332
2015	MSY approach	< 4310	< 2930	2580	2445	2510	554
2016	MSY approach	≤ 3932	≤ 3225	3225	2585	2504	401
2017	MSY approach	≤ 4690	≤ 4130	4690	4586	4430	379
2018	MSY approach	≤ 5163		5163	3865*	3850	788
2019	MSY approach	≤ 10469		10469	6807^^^*	7782^^^	303
2020	MSY approach	≤ 10472		10472	5401^^^#	5510^^^	130
2021	MSY approach	≤ 6239		8375	4088^^^#	4095^^^	1117
2022	MSY approach	≤ 5825		5825			
2023	MSY approach	≤ 4078					
2024	MSY approach	≤ 4078					

^ Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries, protecting stocks outside safe biological limits.
^^ Agreed EU and UK TAC for Division 6.b and subareas 12 and 14.
^^^ Including below minimum size (BMS) landings.
*Incomplete: part of the data being unavailable under data confidentiality clauses.
Preliminary.
+Updated in 2022.
n/a = Not available.

History of the catch and landings

Table 6 Haddock in Division 6.b. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings*		Discards
5212 tonnes	Otter trawl 99%	Longline 1%	1117 tonnes
	4095 tonnes		

*Including BMS landings.

Table 7 Haddock in Division 6.b. History of commercial catch and landings. All weights are in tonnes. Updated in 2022.

Year	Faroe Islands	France	Iceland	Ireland	Norway	Portugal	Russian Federation	Spain	UK (E,W, & NI)	UK (Scot.)	UK (total)	Total	Unallocated catch	Landings from NEAFC area**	ICES landings#
1996	-	-	-	747	24	-	-	1	293	5753		6818	254	n/a	7072
1997	-	-	+	895	24	-	-	22	165	4114		5220	−53	n/a	5167
1998	-	-	-	704	40	4	-	21	561	3768		5098	−112	n/a	4956
1999	-	-	167	1021	61	-	458	25	288	3970		5990	−634	n/a	5356
2000	-	5	-	824	152	-	2154	47	36	2470		5688	−243	n/a	5445^
2001	-	2	-	357	70	-	630	51	-	1205		2315	−295	n/a	2020^
2002	-	-	-	206	49	-	1630	7	+	1145		3037	81	n/a	3118^
2003	-	-	-	169	60	-	4237	19	56	1607		6148	−180	n/a	5968^
2004	-	-	-	19	32	-	5844	-	-	411		6306	128	n/a	6434
2005	-	-	-	105	33	-	4708	-	-	332		5178	61	n/a	5239
2006	2	+	-	41	123	-	2154	5	1	439		2765	−9	n/a	2756
2007	2	-	-	338	84	-	1282	+	8	1635		3349	−2	n/a	3347
2008	16	-	-	721	36	-	1669	1	-	1779		4222	0	n/a	4222
2009	10	1	-	352	71	-	55	+	-	2951		3440	−199	n/a	3241
2010	42	-	-	169	65	-	198	+	-	2931		3405	−1	n/a	3404
2011	2	+	-	123	40	-	-	-	-	1732		1897	−37	n/a	1860
2012	53	-	-	31	48	-	1	-	-	577		710	−24	33	686
2013	-	-	-	105	121	-	4	-	-	596		826	63	147	889
2014	24	2	-	94	55	-	388	-	-	1152		1713	132	423	1845
2015	1	-	-	190	66	-	136	-			2052	2445	65	241	2510
2016	+	-	-	362	63	-	-	-			2160	2585^^	−81	565	2504^^
2017	+	-	-	500	26	-	153	-			3907	4586	−156	715	4430
2018	-	-	-	431##	16	-	-	-			3418	3865##	−15	782##	3850
2019	-	8	-	4##	13	-	245	1			6536	6807##^^	975	809	7782^^
2020*	-	-	-	679	14	-	133	+			4575	5401^^	109	745	5510^^
2021*	+	+	-	510		-	20	-			3558	4088^^	7	1183	4095^^

* Preliminary official landings.
**Official landings except 2020 & 2021 which include ICES estimates.
^ Includes the total Russian catch.
^^ Including below minimum size (BMS) landings.
+ <0.5 tonnes.
# Updated in 2022.
Incomplete: part of the data being unavailable under data confidentiality clauses.
n/a = Not available.

Summary of the assessment

Table 8 Haddock in Division 6.b. Assessment summary. Weights are in tonnes. High and low refer to 95% confidence intervals.

Year	Biomass index (kg hr^{-1})			Landings	Discards	Length indicator
	Low	Value	High			
1991				5656	13231	
1992				5321	11874	
1993				4781	9854	
1994				5732	11028	
1995				5588	9170	
1996				7072	9356	
1997				5167	5893	
1998				4986	10863	
1999				5356	11065	
2000				5445	6611	
2001				2020	1536	
2002				3118	4154	
2003				5968	5520	
2004				6434	883	
2005				5239	505	
2006				2756	386	
2007				3347	2242	
2008				4222	2104	
2009				3241	1556	
2010				3404	907	
2011	46	67	88	1860	152	
2012	41	82	124	686	26	1.22
2013	232	314	396	889	1065	1.15
2014	239	291	342	1845	332	1.2
2015	349	406	463	2510	554	1.05
2016	257	355	452	2504	401	1.04
2017	626	722	818	4430	379	1.09
2018	497	598	700	3850	788	1.03
2019	430	618	805	7782*	303	1.1
2020	287	356	424	5510*	130	1.1
2021	385	446	508	4095*	1117	1.04

* Including below minimum size (BMS) landings.

Sources and references

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Haddock (*Melanogrammus aeglefinus*) in Division 6.b (Rockall). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, had.27.6b. https://doi.org/10.17895/ices.advice.19447952

IRISH SEA HADDOCK

Division 7.a

ADVICE FOR 2023

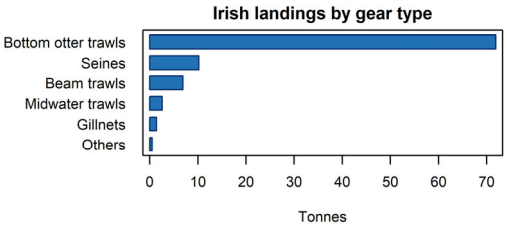
ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 2,648 t.

ICES notes the existence of a precautionary management plan, developed and adopted by some of the relevant management authorities for this stock.

KEY POINTS

ICES Assessment Category	I (Quantitative Assessment)	
Management Plan	WWMAP (target); No management plan has been agreed between all the relevant management authorities.	
Advice Basis	MSY approach	Catch=2,648 t
Ranges	F_{MSY} Range Lower	Catch=1,956 t
	F_{MSY}	Catch=2,648 t
	F_{MSY} Range Upper	Catch=3,216 t
Landing Obligation	From 2016	Specific technical measures in 7a under the landings obligation plan*

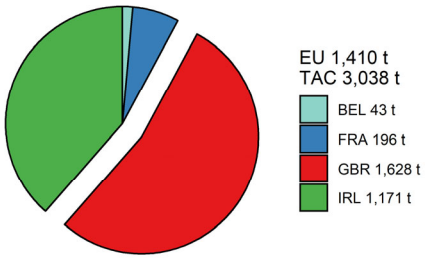
*EC 2020/2015.



MANAGEMENT IN 2022

- The assessment area of Division 7.a does not include Irish landings taken or reported in ICES rectangles 33E2 and 33E3, which are reallocated from Division 7.a to Division 7.g.
- This reallocation (from 2 rectangles from the Irish Sea to the Celtic Sea) has increased since first introduced in 2006, peaking in 2017.
- The 2021 reallocation of 827 t accounted for 68% of Irish Sea (Division 7.a) landings and contributed 9% of Celtic Sea (Divisions 7.b-k) landings. The TAC management area covers all of ICES Division 7.a.

2022 Quota Allocations



KEY STOCK CONSIDERATIONS

- The assessment shows stock size to be at a high level since the mid-2010s and fishing mortality to be low over the same period.
- Irish landings under the Irish Sea haddock quota are mostly taken in a targeted fishery, with approximately 74% of landings coming from trips where haddock was the dominant species landed. The majority of these trips are in the south of Division 7.a in ICES rectangles 33E2 and 33E3 which are not included in this stock assessment.
- The advice for 2023 is ~13% lower than that for 2022 because of poor recruitment in 2020 leading to a reduction in the forecast stock size and a downward revision of the spawning stock size.

Published 30 June 2022

Haddock (*Melanogrammus aeglefinus*) in Division 7.a (Irish Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 2648 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

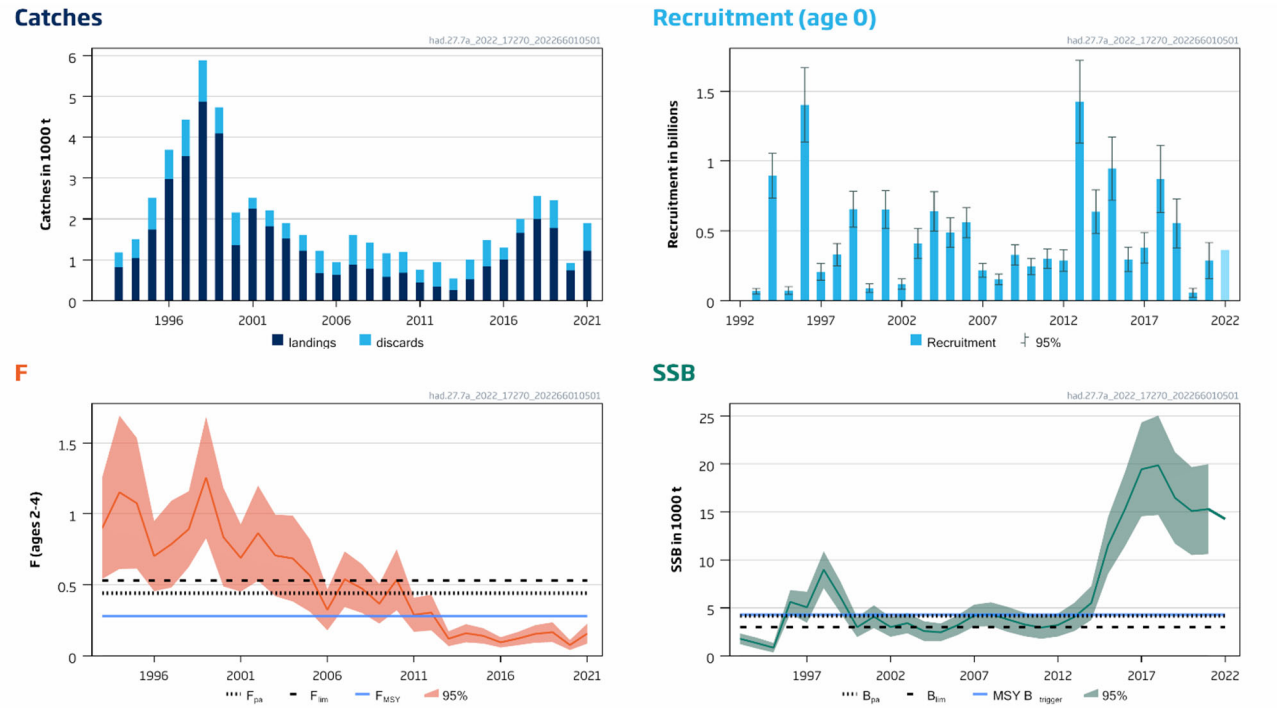


Figure 1 Haddock in Division 7.a. Summary of stock assessment. The assumed 2022 recruitment value is shaded in a light colour. The SSB in 2022 is forecasted.

Catch scenarios

Table 1 Haddock in Division 7.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 2–4}$ (2022)	0.159	$F_{sq} = F_{average(2018–2021)}$ *
SSB (2023)	11 817	Short-term forecast; fishing at F_{sq}, in tonnes
$R_{age\ 0}$ (2022-2023)	364 084	Geometric Mean (1993–2019), in thousands
Catch (2022)	1 846	Fishing at F_{sq}; in tonnes
Projected landings (2022)	1 545	Short-term forecast assuming average landing pattern (2019–2021); in tonnes
Projected discards (2022)	301	Short-term forecast assuming average discard pattern (2019–2021); in tonnes

* F in 2020 was assumed to be unrepresentatively low for the fishery due to the COVID-19 disruption and hence F_{sq} was assumed as $F_{average\ (}$2018–2021) excluding 2020.

Table 2 Haddock in Division 7.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	F_{total} (2023)	$F_{projected\ landings}$ (2023)	$F_{projected\ discards}$ (2023)	SSB (2024)	% SSB change*	% advice change**
ICES advice basis									
MSY approach: F_{MSY}	2648	2107	541	0.28	0.171	0.109	9321	−21	−12.8
Other scenarios									
EU MAP***: F_{MSY}	2648	2107	541	0.28	0.171	0.109	9321	−21	−12.8
EU MAP*** $F_{MSY\ lower}$	1956	1560	396	0.2	0.122	0.078	10044	−15	−36
EU MAP*** $F_{MSY\ upper}$	3216	2554	661	0.35	0.21	0.137	8732	−26	5.9
F = 0	0	0	0	0	0	0	12115	2.5	−100
$F = F_{pa}$	3676	2915	761	0.41	0.25	0.160	8258	−30	21
$F = F_{lim}$	4323	3421	903	0.5	0.3	0.195	7597	−36	42
$SSB_{2024} = B_{lim}$	9125	7029	2095	1.526	0.93	0.6	2994	−75	200
$SSB_{2024} = B_{pa}$	7834	6092	1742	1.158	0.71	0.45	4160	-65	158
$SSB_{2024} = SSB_{2023}$	280	224	56	0.027	0.0162	0.0104	11817	0	−91
SSB_{2024} = MSY $B_{trigger}$	7704	5997	1708	1.13	0.69	0.44	4281	−64	154
$F = F_{2022}$	1587	1267	320	0.159	0.097	0.062	10432	−11.7	−48

* SSB 2024 relative to SSB 2023.
** Advice value for 2023 relative to the F_{MSY} advice value for 2022 (3038 tonnes).
*** EU multiannual plan (MAP) for the Western Waters (EU, 2019).

The advice for 2023 is reduced from 2022 because of poor recruitment in 2020 leading to a reduction in the forecast stock size and a downward revision of the spawning stock size.

Basis of the advice

Table 3 Haddock in Division 7.a. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

Catch sampling in 2021 has increased compared to 2020 but has not returned to pre-covid levels, however it is considered sufficient to describe the current stock.

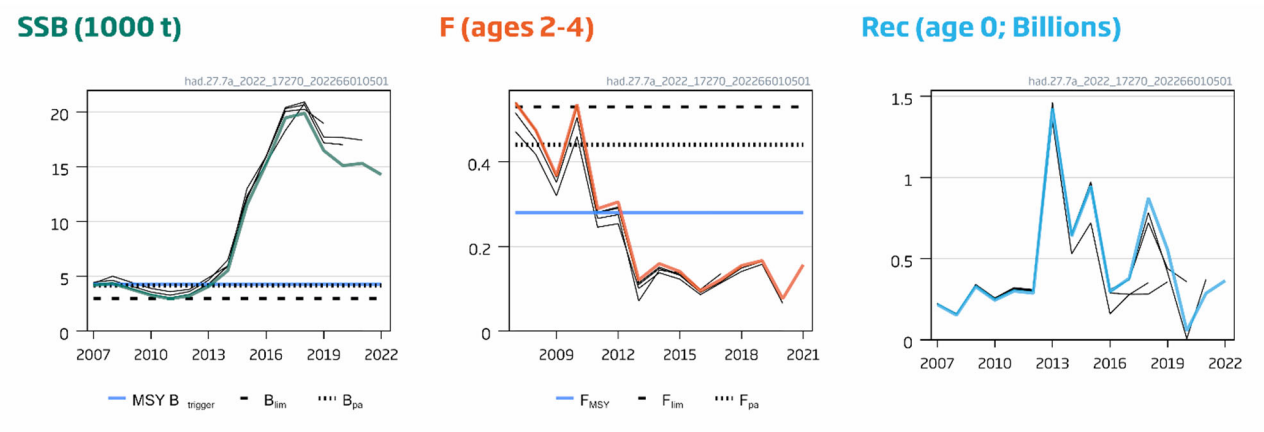


Figure 2 Haddock in Division 7.a. Historical assessment results (final-year SSB estimate and recruitment assumption included).

Issues relevant for the advice

The assessment and the advice are for Division 7.a, excluding the rectangles 33E2 and 33E3 in the Irish Sea. Landings are adjusted to exclude those reported from rectangles 33E2 and 33E3 in the Irish Sea, as they are not considered to be part of this stock (Table 8). The annual reallocation has increased since 2006, peaking in 2017. In 2021 the reallocation accounted for 68% of ICES landings in Division 7.a and contributed 9% of the estimated landings in divisons 7. b–k . This should be considered when setting TACs for the two management areas for haddock in divisions 7.a and 7.b–k. Changes in the TAC for the haddock stock in Division 7.a may have implications for the fishing pressure on haddock in divisions 7.b–k.

Mixed Fisheries considerations

Haddock in division 7.a is caught as part of a mixed fishery with cod and whiting.

Reference points

Table 4 Haddock in Division 7.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	4 281	The 5th percentile of B_{MSY}; Division 7.a haddock has been fished at or below F_{MSY} for more than five years; in	ICES (2018)
	F_{MSY}	0.28	Median point estimates of EqSim with a model averaged stock–recruitment relationship	ICES (2018)
Precautionary approach	B_{lim}	2 994	Tonnes; lowest observed SSB with > 75th percentile recruitment; in tonnes	ICES (2018)
	B_{pa}	4 160	B_{lim} combined with the assessment error; $B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.20$; in tonnes	ICES (2018)
	F_{lim}	0.50	F with 50% probability of SSB < B_{lim}	ICES (2018)
	F_{pa}	0.41	F_{P05}; the F that leads to SSB > B_{lim} with 95% probability	ICES (2018, 2021a)
Management plan	MAP MSY $B_{trigger}$	4 281	Tonnes; MSY $B_{trigger}$	ICES (2018), EU (2019)
	MAP B_{lim}	2 994	B_{lim}; in tonnes	ICES (2018), EU (2019)
	MAP F_{MSY}	0.28	F_{MSY}	ICES (2018), EU (2019)
	MAP range F_{lower}	0.20	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2018), EU (2019)
	MAP range F_{upper}	0.35	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2018), EU (2019)

Basis of the assessment

Table 5 Haddock in Division 7.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022)
Assessment type	ASAP (Age-Structured Assessment Programme; NOAA toolbox) that uses catches in the model and in the forecast (ICES, 2021a)
Input data	Four survey indices (NIGFS-WIBTS-Q1 [G7144], NIGFS-WIBTS-Q4 [G7655], NIMIK [I9826], UKFSPW [B7897]); annual maturity and growth data from the NIGFS-WIBTS-Q1 (G7144) survey and from commercial landings in quarter 1. Commercial catch-at-age.
Discards and bycatch	Included in the assessment for the full time-series
Indicators	None
Other information	This stock was benchmarked in 2017 (ICES, 2017); revision in reference points in 2018 (ICES, 2018)
Working group	Working Group for the Celtic Seas Ecoregion

History of the advice, catch, and management

Table 6 Haddock in Division 7.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	Official landings	ICES landings	ICES discards	ICES catches
1987	Not dealt with			6000	1287	1287		
1988	Not dealt with			6000	747	747		
1989	Not dealt with			6000	560	560		
1990	Not dealt with			6000	582	582		
1991	Not dealt with			6000	616	616		
1992	Not dealt with			6000	703	656		
1993	Not dealt with			6000	730	813		
1994	Not dealt with			6000	681	1042		
1995	Not dealt with			6000	841	1736	780	2516
1996	No advice			10000	1453	2981	709	3690
1997	Means of setting catch limits required			14000	1925	3547	895	4442
1998	Catch limit for Division 7.a		3000	20000	3015	4874	1015	5889
1999	No increase in F; catch limit for Division 7.a		7000	4990	2370	4095	634	4729
2000	Reduce F below F_{pa}		< 2800	3400	2447	1357	802	2159
2001	Reduce F below F_{pa}		< 1710	2700	2229	2246	269	2515
2002	Reduce F below F_{pa}		< 1200	1300	1115	1817	387	2204
2003	No cod catches		-	585	674	659**	-	-
2004	$F < F_{pa}$		< 1500	1500	761	1217	392	1609
2005	$F < F_{pa}$		< 1370	1500	547	666	551	1217
2006	Substantial reduction in fishing mortality	-		1275	655	633	306	939
2007	Substantial reduction in fishing mortality	-		1179	1078	886	722	1608
2008	No increase in effort	-		1238	879	786	643	1429
2009	No increase in effort	-		1424	846	581	579	1160
2010	No increase in effort	-		1424	939	679	508	1187
2011	See scenarios	-		1317	813	446	307	753
2012	Reduce catch and improved selectivity	-		1215	813	343	599	942
2013	Decrease catch by 18%	-	< 710	1189	656	254	283	537
2014	Increase catch by 17%	1120	< 572	1181	974	518	488	1006
2015	Increase catch by 20%	< 893	< 425	1181	1154	833	652	1485
2016	Precautionary approach (increase catch by 20%)	≤ 1072	≤ 481	1654	1477	1008	298	1306
2017	MSY approach	≤ 3061	≤ 2348	2615#	2379	1662	333	1995
2018	MSY approach	≤ 3444	≤ 2796	3207	2523	1993	568	2561
2019	MSY approach	≤ 3739	≤ 3334	3739	2553	1778	672	2450
2020	Management plan	3156 (range 2333–3830)		3156	1535^	742	234	976
2021	Management plan	3371 (range 2491–4092)		3371	2048^	1219	672	1891
2022	MSY approach	≤ 3038		3038				
2023	MSY approach	≤ 2648						

* Precautionary TAC for subareas 7–10 and CECAF Division 34.1.1 up to 1998. Since 1999, a special condition or separate TAC has been set for Division 7.a.

** Underestimate because of inadequate sampling.

Revised TAC in March 2017.

^ Preliminary.

History of the catch and landings

Table 7 Haddock in Division 7.a. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings					
1891 tonnes	Otter trawls		Scottish seines	Mid-water trawl	Beam trawl	Other gear types
	Nephrops directed fishery	Demersal fish directed fishery	3.6%	22%	< 1%	< 1%
	8.0%	66%				
	1219 tonnes					
	Discards					
	Otter trawls		Scottish seines	Mid-water trawl	Beam trawl	Other gear types
	Nephrops directed fishery	Demersal fish directed fishery	< 1%	< 1%	3.9%	1%
	85%	8.8%				
	672 tonnes					

Table 8 Haddock in Division 7.a. History of official landings and ICES estimates of landings (tonnes).

Year	Belgium	France	Ireland	Netherlands	UK (England & Wales)*	UK (Isle of Man)	UK (N. Ireland)*	UK (Scotland)* *	United Kingdom**	Total	ICES landings^	ICES discards	Reallocation ^^
1984	3	38	199	-	29	2	38	78		387	387		
1985	4	31	341	-	28	5	215	104		728	728		
1986	5	39	275	-	22	4	358	23		726	726		
1987	10	50	797	-	41	3	230	156		1287	1287		
1988	12	47	363	-	74	3	196	52		747	747		
1989	4	n/a	215	-	252	3		86		560	560		
1990	4	n/a	80	-	177	5		316		582	582		
1991	1	n/a	254	-	204	14		143		616	616		
1992	8	73	251	-	244	13		114		703	656		
1993	18	41	252	-	260	19		140		730	813		
1994	22	22	246	-	301	24		66		681	1042		
1995	32	58	320	-	294	27		110		841	1736	780	16
1996	34	105	798	1	463	38		14		1453	2981	709	33
1997	55	74	1005	14	717	9		51		1925	3547	895	36
1998	104	86	1699	10	1023	13		80		3015	4874	1015	28
1999	53	n/a	759	5	1479	7		67		2370	4095	634	34
2000	22	49	1238	2	1061	19		56		2447	1357	802	11
2001	68	184	652	-	1238	1		86		2229	2246	269	74
2002	44	72	401	-	551	-		47		1115	1817	387	82
2003^^^	20	146	229	-	248	-		31		674	n/a	-	64
2004	15	20	296	-	421	-		9		761	1217	392	53
2005	22	36	139	-	344	-		6		547	666	551	35
2006	23	20	184		419	-		9		655	633	306	26
2007	30	11	477	-	559	-		1		1078	886	722	222
2008	15	6	319	-	521	1		17		879	786	643	194
2009	7	3	388	-	446	1		1		846	581	579	285
2010	9	2	333	-	593	-		2		939	679	508	267
2011	16	8	434	-	355	-		-		813	446	307	374
2012	13	3	561	-		-			236	813	343	599	473
2013	6	1	492	-		< 1			155	656	254	283	410
2014	7	0	541	-		< 1			426	974	518	488	470
2015	7	7	507	-		< 1			634	1154	833	652	322
2016	5	1	646	-					825	1463	1008	298	455
2017	5	5	1114	-					1240	2363	1662	333	715
2018	4	0	949	-					1580	2532	1993	568	532
2019	9	0	1347	-					1197	2553	2537	672	764
2020***	3	0	759	-					539	1301	742	234	559
2021***	3	0	1162	-					884	2048	1219	674	827

* From 1989 to 2011, Northern Ireland is included with England and Wales.
** Since 2012, Northern Ireland, Scotland, England, and Wales have been combined to UK.
*** Preliminary official landings.
^ Landings in the southern part of Division 7.a (rectangles 33E2 and 33E3) are excluded.
^^ Landings taken or reported in rectangles 33E2 and 33E3(belonging to the 7.b–k stock)
^^^ Underestimate or low confidence due to inadequate sampling.

Summary of the assessment

Table 9 Haddock in Division 7.a. Assessment summary. All weights are in tonnes, recruitment (age 0) in thousands. Low and high refer to 95% confidence intervals.

Year	Recruitment			SSB			Landings	Discards *	F 2–4		
	Low	Value	High	Low	Value	High			Low	Value	High
1993	46607	66913	87219	1222	1782	2341	813	365	0.54	0.9	1.26
1994	735823	895924	1056025	766	1329	1891	1042	468	0.61	1.15	1.69
1995	45113	72493	99872	349	851	1353	1736	780	0.61	1.08	1.54
1996	1137229	1403632	1670035	4384	5624	6864	2981	709	0.46	0.7	0.95
1997	146594	206402	266209	3449	5064	6679	3547	895	0.48	0.79	1.09
1998	250080	329828	409576	7059	8987	10915	4874	1015	0.63	0.89	1.16
1999	526038	655112	784186	4492	6124	7756	4095	634	0.83	1.26	1.69
2000	58144	89531	120919	1957	2990	4022	1357	802	0.49	0.84	1.18
2001	517912	653512	789113	2897	4087	5276	2246	269	0.45	0.69	0.93
2002	81567	118762	155957	1984	3008	4031	1817	387	0.53	0.86	1.2
2003	301882	409766	517650	2353	3414	4475	1517	390	0.42	0.71	0.99
2004	497901	639366	780831	1554	2582	3610	1217	392	0.38	0.69	0.99
2005	381616	487460	593304	1527	2457	3387	666	551	0.31	0.57	0.82
2006	450949	558777	666604	2162	3193	4225	633	306	0.179	0.32	0.47
2007	166827	217242	267657	3053	4200	5348	886	722	0.34	0.54	0.74
2008	112833	151657	190481	3098	4341	5584	786	643	0.3	0.47	0.65
2009	255179	327164	399149	2494	3801	5107	581	579	0.23	0.37	0.51
2010	185913	243502	301091	2048	3276	4504	679	508	0.32	0.54	0.75
2011	230292	299962	369632	1778	2948	4119	446	307	0.169	0.29	0.41
2012	209462	286859	364255	2016	3216	4416	343	599	0.179	0.31	0.43
2013	1129076	1426173	1723270	2593	4070	5548	254	282	0.068	0.121	0.173
2014	481853	637664	793474	3747	5517	7286	518	488	0.095	0.159	0.22
2015	719551	946813	1174075	8547	11519	14491	833	652	0.087	0.141	0.195
2016	208578	295735	382892	11393	15252	19111	1008	298	0.059	0.095	0.132
2017	269515	378760	488004	14557	19453	24349	1662	333	0.075	0.122	0.169
2018	631559	872521	1113484	14684	19871	25058	1993	568	0.093	0.155	0.22
2019	378313	554048	729784	11698	16477	21255	1778	672	0.097	0.167	0.24
2020	22732	55311	87890	10509	15099	19689	742	177	0.041	0.076	0.112
2021	157020	286347	415674	10609	15301	19993	1219	672	0.086	0.157	0.23
2022		364 084**			14274					0.159	

* Discard estimates available from 2007; prior to 2007, discard estimates are based on limited sampling.
** Geometric mean (1993–2019).

Sources and references

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Haddock (*Melanogrammus aeglefinus*) in Division 7.a (Irish Sea). In Report of the ICES Advisory Committee, 2022. ICES Advice 2022, had.27.7a. https://doi.org/10.17895/ices.advice.19447958.

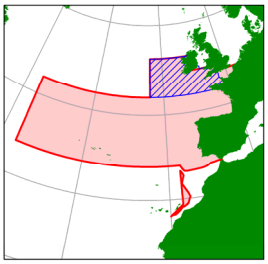
West of Ireland and Celtic Sea Haddock

Divisions 7.b-k

ADVICE FOR 2023

ICES advises that when the MSY approach is applied, catches in 2022 should be no more than 11,901 t.

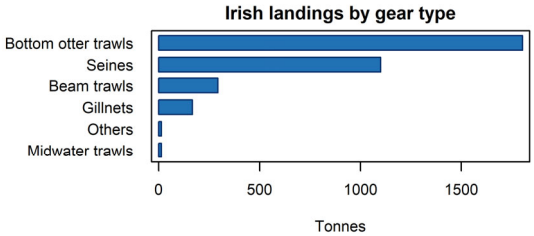
ICES notes the existence of a precautionary management plan, developed and adopted by some of the relevant management authorities for this stock.



KEY POINTS

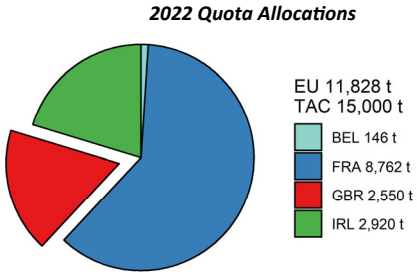
ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target); No management plan has been agreed between all the relevant management authorities.	
Advice Basis	ICES MSY approach	Catch=11,901 t
Ranges	F_{MSY} Range Lower	Catch=7,862 t
	F_{MSY}	Catch=11,901 t
	F_{MSY} Range Upper	Catch=16,424 t
Landing Obligation	From 2019	*De minimis* up to 5%*

* Caught using bottom trawls, seines and beam trawls with mesh ≥80mm, and requiring reporting (EU 2020/2015).



MANAGEMENT IN 2022

- The stock assessment area consists of 7.b-k and two rectangles in the south of the Irish Sea, (ICES Division 7.a, rectangles 33E2 and 33E3). This differs to the TAC area, 7.b-k, 8, 9 and 10.
- The reallocation of landings from 33E2 and 33E3 has generally increased since introduced in 2006. The 2021 reallocation of 827 t accounted for 9% of Division 7.b-k landings and 68% of Irish Sea landings (Division 7.a).
- The TAC has been very restrictive since 2010, resulting in high discarding. International discarding of catch has averaged 36% over the last 5 years (2017 to 2021).



KEY STOCK CONSIDERATIONS

- The advised catch for 2023 is 25% lower than that for 2022 as incoming recruitment is low and the assessment has also revised down estimates of stock size.
- Celtic Sea haddock are caught in mixed fisheries, primarily with whiting, megrim, anglerfish, *Nephrops* and other species. They are rarely specifically targeted but are widely distributed, making it difficult to control fishing mortality on the stock.
- Discarding of the stock has historically been high, and represented 20% of catch in 2021.
- The zero catch advised for Celtic sea cod and associated low quotas since 2019 will result in cod continuing to be a choke species for all demersal fleets.

Published 30 June 2022

Haddock (*Melanogrammus aeglefinus*) in divisions 7.b–k (southern Celtic Seas and English Channel)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 11 901 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and below F_{pa} and F_{lim}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

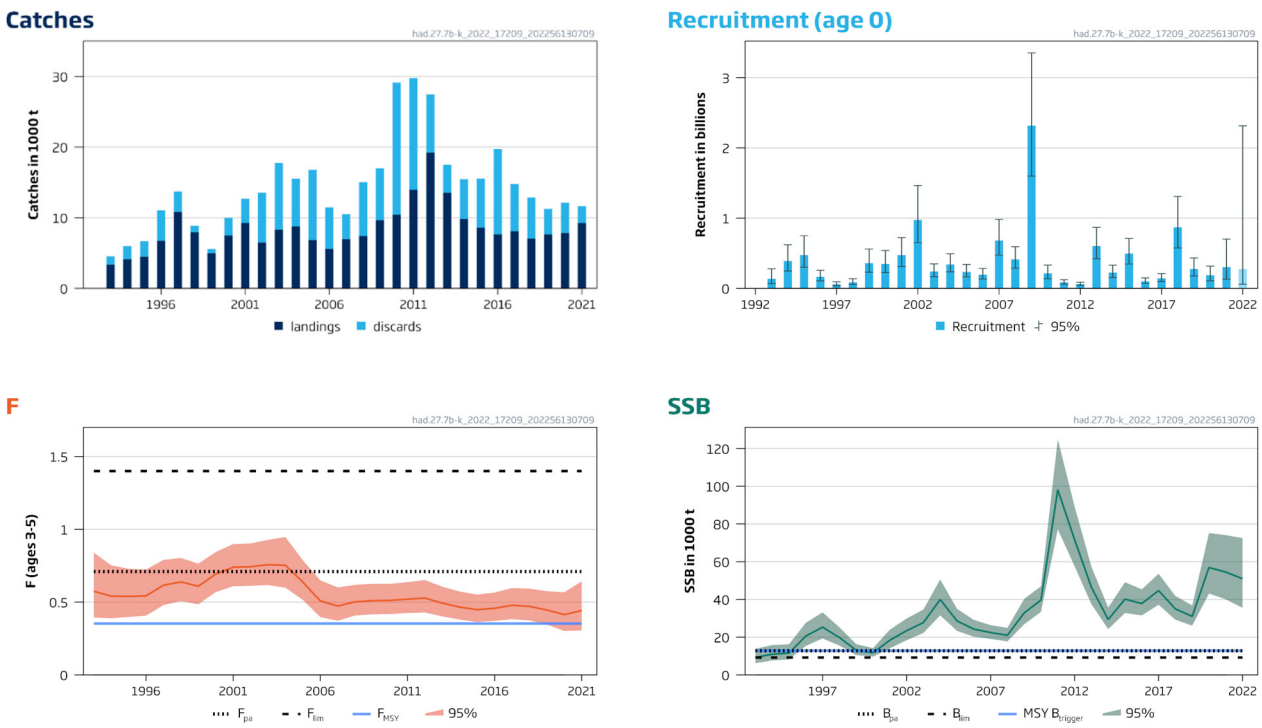


Figure 1 Haddock in divisions 7.b–k. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour.

Catch scenarios

Table 1 Haddock in divisions 7.b–k. Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 3–5}$ (2022)	0.443	$F = F_{Average\ (2019–2021)}$ rescaled to F_{2021}
SSB (2023)	47 157	Short-term forecast; in tonnes
$R_{age\ 0}$ (2022, 2023)	275 943	Median resampled (1993–2021); in thousands
Total catch (2022)	15 320	Short-term forecast; in tonnes
Projected landings (2022)	12 308	Short-term forecast, assuming average 2018–2021 landing pattern; in tonnes
Projected discards (2022)	3 012	Short-term forecast, assuming average 2018–2021 discard pattern; in tonnes

Table 2 Haddock in divisions 7.b–k. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	F_{total} (2023)	$F_{projected\ landings}$ (2023)	$F_{projected\ discards}$ (2023)	SSB (2024)	% SSB change*	% advice change^
ICES advice basis									
MSY approach: F_{MSY}	11901	9064	2837	0.353	0.31	0.044	48157	2.1	–25
Other scenarios									
EU MAP ^^: F_{MSY}	11901	9064	2837	0.353	0.31	0.044	48157	2.1	–25
EU MAP^^ $F_{MSY\ lower}$	7862	6030	1832	0.22	0.194	0.027	52430	11.2	–26
EU MAP^^ $F_{MSY\ upper}$	16424	12419	4005	0.52	0.46	0.064	43270	–8.2	–25
F = 0	0	0	0	0	0	0	61031	29.4	–100
F_{pa}	20787	15604	5183	0.71	0.62	0.088	38652	–18.0	30
F_{lim}	32583	23767	8816	1.400	1.23	0.170	26386	–44	104
$SSB_{2024} = B_{lim}$	50807	34676	16131	4.05	3.55	0.50	9227	–80	219
$SSB_{2024} = B_{pa} = MSY\ B_{trigger}$	46662	32469	14193	3.08	2.70	0.38	12822	–72.8	193
$F = F_{2022}$	14401	10923	3478	0.44	0.39	0.06	45431	–3.7	-9.7
$SSB_{2024} = SSB_{2023}$	12788	9731	3057	0.384	0.337	0.047	47157	0.00	–19.8

* SSB_{2024} forecast relative to SSB_{2023}.
^ Advice values for 2023 relative to the MSY value for 2022 (15 946 tonnes).
^^ EU multiannual plan (MAP) for the Western Waters (EU, 2019).

The reduction in catch advice is caused by a downward revision in estimated stock size and low recruitments.

Basis of the advice

Table 3 Haddock in divisions 7.b–k. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

Catch sampling in 2021 increased compared to 2020 when it was impacted owing to the COVID 19 pandemic and is considered sufficient to describe the stock.

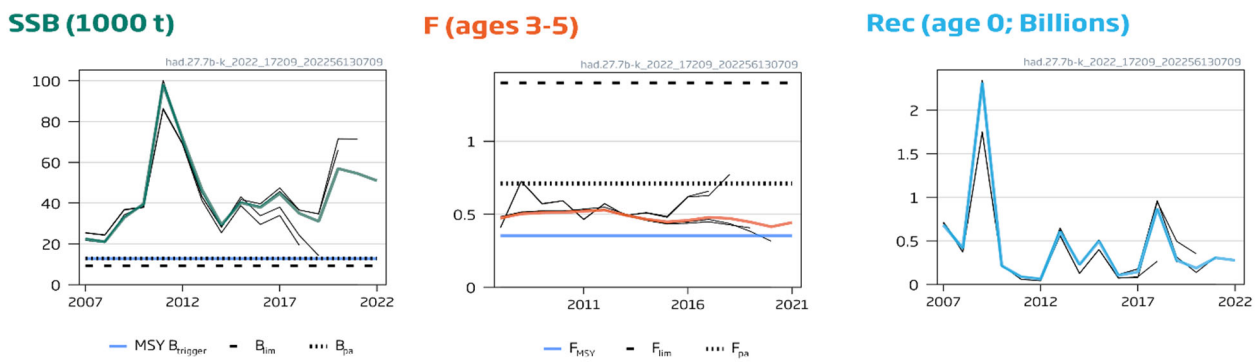


Figure 2 Haddock in divisions 7.b–k. Historical assessment results (final-year recruitment assumption and SSB estimate included). The assessment was benchmarked in 2020, prior to which a different method was applied. The reference points were revised in 2020 [following the benchmark], and only assessment results from the last three years should be compared to the reference points indicated.

Issues relevant for the advice

The assessment and advice are for divisions 7.b–k, including rectangles 33E2 and 33E3 in Division 7.a, as they are considered part of this stock. The 2021 reallocation (827 tonnes) from Division 7a accounts for 9% of ICES estimated division 7.b–k landings and 68% of the Irish Sea (Division 7.a) landings. This should be considered when setting TACs, as a portion of the catch taken under the Division 7.a TAC is considered to be part of the division 7.b–k stock.

The assumed recruitment in 2022 and 2023 used in the forecast would constitute a minor part of the projected catches in 2023 (8%) and approximately 31% of the SSB in 2024.

Mixed-fisheries considerations

Haddock in divisions 7.b–k is caught as part of a mixed fishery with cod and whiting.

Reference points

Table 4 Haddock in divisions 7.b–k. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	12822	B_{pa}; in tonnes	ICES (2020)
	F_{MSY}	0.353	Based on simulation using a segmented regression stock–recruitment relationship (EqSim)	ICES (2020)
Precautionary approach	B_{lim}	9227	Lowest observed SSB; in tonnes	ICES (2020)
	B_{pa}	12822	B_{lim} combined with the assessment error; $B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.20$ (default setting); in tonnes	ICES (2020)
	F_{lim}	1.40	F with 50% probability of SSB < B_{lim}	ICES (2020)
	F_{pa}	0.71	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability	ICES (2020)
EU MAP	MAP MSY $B_{trigger}$	12822	MSY B_{pa}; in tonnes	EU (2019), ICES (2020)
	MAP B_{lim}	9227	Lowest observed SSB; in tonnes	EU (2019), ICES (2020)
	MAP F_{MSY}	0.353	F_{MSY}	EU (2019), ICES (2020)
	MAP range F_{lower}	0.221	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2020)
	MAP range F_{upper}	0.521	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2020)

Basis of the assessment

Table 5 Haddock in divisions 7.b–k. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based stochastic analytical assessment (SAM; ICES, 2022b)
Input data	Commercial catches (age composition of landings and discards); vector autoregressive spatio-temporal (VAST) standardized survey index (combined IGFS-WIBTS-Q4 [G7212] and EVHOE-WIBTS-Q4 [G9527]); maturity data (surveys and observer data; constant for all years); age-dependent natural mortality (Lorenzen, 1996)
Discards and bycatch	Included in the assessment for the full time-series. Full observer-based estimates from 2005, partial observer-based estimates from 1993 to 2004.
Indicators	None
Other information	This stock was benchmarked in 2020 (ICES, 2020)
Working groups	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Haddock in divisions 7.b–k. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	ICES landings##	ICES discards ^^^	ICES catch
1987	Not dealt with				3000^^	2600^^	n/a	2600^^
1988	Not dealt with				4000^^	3600^^	n/a	3600^^
1989	Not dealt with				4200^^	3200^^	n/a	3200^^
1990	Not dealt with				2900^^	2000^^	n/a	2000^^
1991	Not dealt with				2900^^	2300^^	n/a	2300^^
1992	Not dealt with				2900^^	2700^^	n/a	2700^^
1993	Not dealt with				3400^^	3348	1208	4556
1994	Not dealt with				4076	4131	1886	6017
1995	Not dealt with			6000*	4468	4470	2218	6688
1996	Not dealt with			7000**	6653	6756	4309	11 065
1997	Not dealt with			14 000	10270	10827	2883	13 710
1998	Not dealt with			20 000	7361	7928	934	8862
1999	Not dealt with			22 000***	5247	4970	586	5556
2000	No expansion of catches			16 600***	6656	7499	2503	10 002
2001	No expansion of catches			12 000***	9702	9278	3418	12 696
2002	No expansion of catches		8000	9300***	7089	6488	7073	13 561
2003	No expansion of catches		7200	8185***	8241	8292	9456	17 748
2004	No increase in F			9600***	8453	8777	6750	15 527
2005	No increase in effort			11 520***	6859	6839	9953	16 792
2006	No increase in effort			11 520***	5647	5592	5899	11 491
2007	No increase in effort			11 520***	6629	6961	3552	10 513
2008	Same advice as last year			11 579***	6234	7392	7660	15 052
2009	Same advice as last year			11 579^	9307	9664	7322	16 986
2010	Same advice as last year			11 579^	9998	10 429	18 701	29 130
2011	See scenarios			13 316^	13 709	13 957	15 807	29 764
2012	No increase in catch and technical measures to reduce discard rates			16 645^	18 221	19 196	8285	27 481
2013	MSY transition		< 9500	14 148^	13099	13 538	3962	17 501
2014	MSY transition	< 5281	< 3602	9479^	9371	9846	5619	15 464
2015	MSY approach	< 10 434	< 5605	8342^	8229	8608	6941	15 549
2016	MSY approach	≤ 8590	≤ 6078	7258^	7024	7648	12 065	19 713
2017	MSY approach	≤ 12 444	≤ 7751	7751^	7374	8099	6691	14 789
2018	MSY approach	≤ 8358	≤ 5911	6910^	6595	7046	5798	12 844
2019	MSY approach	≤ 6317		8329^	8342	7656	3603	11 259
2020	Management plan	16 671 (range 11 418–23 262)		10 859^	6476#	7859	4260	12 119
2021	Management plan	18 382 (range 12 128–25 454)		15 000	8447#	9260	2385	11645
2022	MSY approach	≤15 946		15 000				
2023	MSY approach	≤11 901						

* Applies to subareas 7–10.
** Increased in-year to 14 000 tonnes.
*** Includes separate Division 7.a allocation.
^ Applies to divisions 7.b–k and subareas 8–10.
^^ Values presented to the nearest 100.
^^^ Discard estimates are available from 2005; prior to 2005, discard estimates are based on limited sampling.
# Preliminary.
Including landings from rectangles 33E2 and 33E3 since 2003.

History of the catch and landings

Table 7 Haddock in divisions 7.b–k. Catch distribution by fleet in 2021, as estimated by ICES.

Catch	Landings				Discards			
	Otter trawls	Beam trawls	Gillnets	Other	Otter trawls	Beam trawls	Gillnets	Other
11 645 tonnes	73%	6%	3%	18%	57%	22%	3%	18%
	9260 tonnes				2385 tonnes			

Table 8 Haddock in divisions 7.b–k. History of commercial catch and landings and ICES estimates. All weights are in tonnes.

Year	Official landings							ICES estimates		
	Belgium	France	Ireland	UK	Others	Total	Landings taken or reported in rectangles 33E2 and 33E3**	Landings	Discards ***	Catch
1993	51	1839	1262	256	0	3408		3348	1208	4556
1994	123	2788	908	240	17	4076		4131	1886	6017
1995	189	2964	966	266	83	4468		4470	2218	6688
1996	133	4527	1468	439	86	6653		6756	4309	11065
1997	246	6581	2789	569	85	10270		10827	2883	13710
1998	142	3674	2788	444	312	7360		7928	934	8862
1999	51	2725	2034	278	159	5247		4970	586	5556
2000	90	3088	3066	289	123	6656		7499	2503	10002
2001	165	4842	3608	422	665	9702		9278	3418	12696
2002	132	4348	2188	315	106	7089		6488	7073	13561
2003	118	5781	1867	393	82	8241	64	8292	9456	17748
2004	136	6130	1715	313	159	8453	53	8777	6750	15527
2005	167	4174	2037	292	197	6867	35	6839	9953	16792
2006	99	3191	1874	274	183	5621	26	5592	5899	11491
2007	119	4143	1931	385	50	6627	222	6961	3552	10513
2008	109	3638	1800	566	121	6234	194	7392	7660	15052
2009	131	5430	2983	716	48	9307	285	9664	7322	16986
2010	170	6240	2609	852	128	9998	267	10429	18701	29130
2011	211	8389	3323	1657	129	13709	374	13957	15807	29764
2012	232	11793	4129	1901	166	18221	473	19196	8285	27481
2013	174	8747	2699	1455	23	13099	410	13538	3962	17501
2014	99	6375	2092	785	21	9371	444	9846	5619	15464
2015	118	5679	1657	769	6	8229	322	8608	6941	15549
2016	88	4487	1730	692	27	7024	468	7648	12065	19713
2017	110	4885	1677	690	12	7374	715	8099	6691	14789
2018	89	4470	1444	583	9	6595	532	7046	5798	12844
2019	90	4259	1323	516	74	6262	760	7656	3603	11259
2020*	106	3522	2203	543	102	6475	554	7859	4260	12119
2021*	156	4249	3379	515	149	8447	827	9260	2385	11645

* Preliminary official landings.
** Landings in the southern part of Division 7.a (rectangles 33E2 and 33E3) are included in the assessment and are considered part of the stock.
*** Prior to 2005, discard estimates are based on limited sampling.

Summary of the assessment

Table 9 Haddock in divisions 7.b–k. Assessment summary. 'High' and 'Low' refer to 95% confidence intervals. All weights are in tonnes and recruitment in thousands.

Year	Recruitment (age 0)			SSB			Landings	Discards**	Fishing mortality ages 3–5		
	Low	Value	High	Low	Value	High			Low	Value	High
1993	67900	137524	278540	6188	9267	13880	3348	1208	0.39	0.57	0.84
1994	247144	392005	621773	7617	10974	15810	4131	1886	0.39	0.54	0.75
1995	300708	475242	751076	8259	11602	16297	4470	2218	0.40	0.54	0.73
1996	106170	165752	258771	15368	20604	27625	6756	4309	0.41	0.54	0.72
1997	38128	59509	92881	19321	25319	33177	10827	2883	0.48	0.62	0.79
1998	56018	87806	137632	15556	19822	25258	7928	934	0.51	0.64	0.80
1999	231157	359811	560067	10534	13115	16328	4970	586	0.49	0.61	0.76
2000	225057	348755	540440	9688	11742	14231	7499	2503	0.57	0.69	0.84
2001	312325	475463	723813	14106	18392	23980	9278	3418	0.61	0.74	0.90
2002	650852	976184	1464136	18383	23438	29883	6488	7073	0.61	0.74	0.90
2003	166214	241122	349789	22230	27763	34672	8292	9456	0.62	0.76	0.93
2004	235849	341271	493815	31562	39966	50608	8777	6750	0.60	0.75	0.95
2005	162874	236237	342644	23356	28620	35071	6839	9953	0.52	0.64	0.79
2006	133225	195043	285545	20233	24306	29198	5592	5899	0.40	0.51	0.65
2007	472854	681770	982989	19091	22460	26424	6961	3552	0.37	0.47	0.60
2z008	288369	414184	594892	17755	21044	24942	7392	7660	0.41	0.50	0.62
2009	1600195	2316405	3353174	26829	32887	40312	9664	7322	0.42	0.51	0.63
2010	138162	214532	333116	33456	39668	47033	10429	18701	0.42	0.51	0.63
2011	60654	86560	123532	77185	98217	124979	13957	15807	0.43	0.52	0.64
2012	41822	60869	88590	57593	71729	89335	19196	8285	0.43	0.53	0.65
2013	421428	604932	868340	37571	46457	57445	13538	3962	0.40	0.49	0.61
2014	154582	225966	330313	24229	29415	35711	9846	5619	0.38	0.47	0.57
2015	346622	496568	711378	32827	40176	49170	8608	6941	0.36	0.45	0.55
2016	70213	102096	148455	31556	37846	45390	7648	12065	0.37	0.46	0.57
2017	97262	143397	211414	37221	44690	53657	8099	6691	0.38	0.48	0.60
2018	576472	869056	1310138	29269	35005	41866	7046	5798	0.37	0.47	0.59
2019	176134	275943	432310	26143	31040	36854	7656	3603	0.35	0.45	0.57
2020	108999	186296	318408	43126	56954	75217	7859	4260	0.30	0.41	0.57
2021	132001	304566	702725	40077	54513	74148	9260	2385	0.31	0.44	0.64
2022	59509	275943*	2316405	35556	50999	72567					

* Median resampled (1993–2021), as estimated by stochastic projection.

** Discard estimates are available from 2005; prior to 2005, discard estimates are based on limited sampling.

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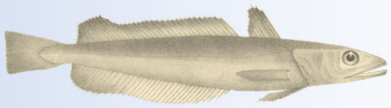
Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Haddock (Melanogrammus aeglefinus) in Divisions 7.b-k (southern Celtic Seas and English Channel). In Report of the ICES Advisory Committee, 2022. ICES Advice 2022, had.27.7b-k. https://doi.org/10.17895/ices.advice.19447961.

HAKE

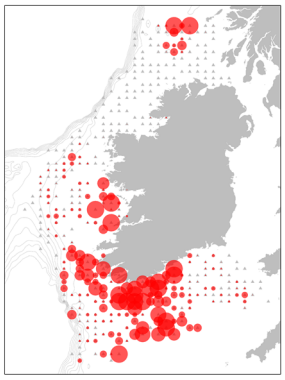
(MERLUCCIUS MERLUCCIUS)



BIOLOGY – SPECIES

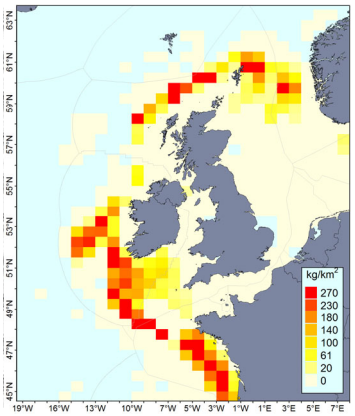
Hake are widely distributed throughout the north-east Atlantic, mostly between 50 and 700m depth. Adult hake mainly feed on fish and squid and can occur close to the bottom as well as off the bottom. Hake are relatively fast growing (around 15cm per year in the first few years of life). Males mature around 35cm and females around 50cm. The spawning period is long and occurs mostly in the first 6 months of the year.

There is some evidence for the existence of multiple populations of hake in the north-east Atlantic, but from a stock assessment point of view ICES consider the northern hake to be a single widely distributed stock.

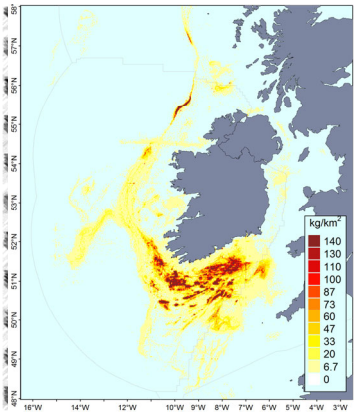


Survey catches of juveniles since 2005

LANDINGS DISTRIBUTION



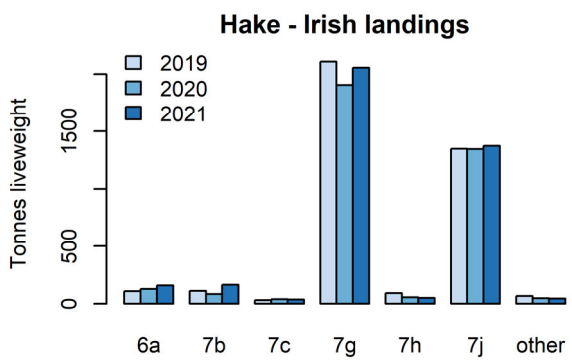
◀ The distribution of international landings of hake between 2016 and 2020. Most landings were taken along the edge of the continental shelf.

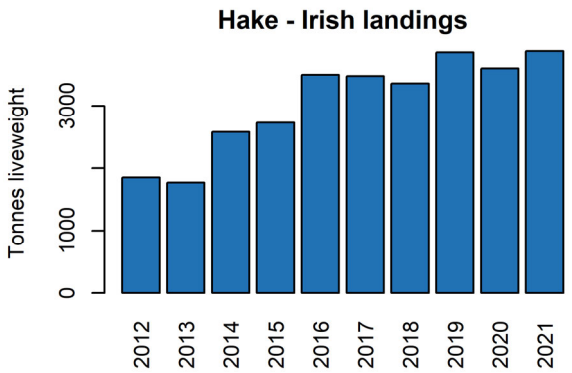


◀ The distribution of hake landings by Irish vessels between 2016 and 2020. Most Irish landings were taken in the Celtic Sea.

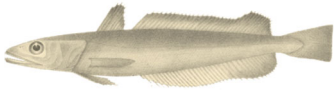
IRISH LANDINGS AND VALUE OF TAC

On average 3,782 tonnes of hake were landed annually by Irish vessels between 2019 and 2021, most of which were caught in 7.g (53%) and 7.j (35%). In 2021 landings were worth approximately €11.5 million for Irish vessels.





Northern Hake

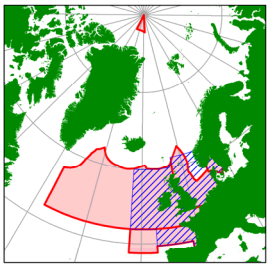


Sub-areas 4, 6, 7 and Divisions 3.a, 8.a–b, and 8.d

Advice for 2023

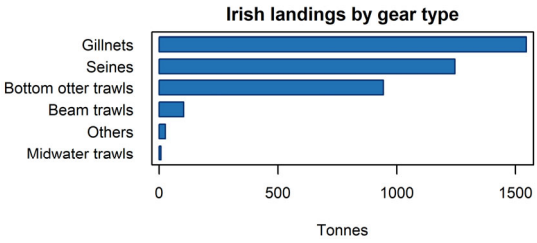
ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 83,130 t.

ICES notes the existence of a precautionary management plan developed and adopted by one of the relevant management authorities for this stock.



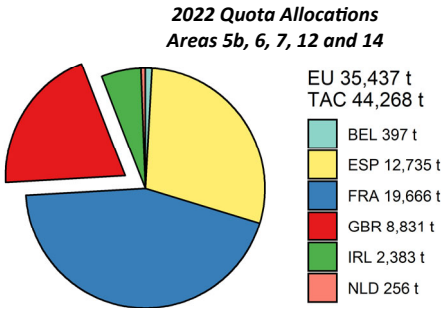
Key Points

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target)	
Advice Basis	ICES MSY Approach	
Ranges	F_{MSY} Range Lower	Catch=53,284 t
	F_{MSY}	Catch=83,130 t
	F_{MSY} Range Upper	Catch=117,526 t
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

- The assessment area overlaps with four TAC areas but Ireland only has quota for the 6, 7, 5.b, 12 and 14 TAC area (shown in the pie chart). Several inter-area flexibilities are allowed within the TAC areas.
- The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent has been agreed by the EU for this stock (EU, 2019). This plan is not adopted by Norway and UK; thus, it was not used as the basis of the advice for this shared stock.
- Norway takes around 4% of the landings from their own waters although they don't set a quota for their own waters or include hake in coastal states negotiations.



Key Stock Considerations

- The stock was benchmarked in 2022. The perception of the stock status in relation to reference points is similar. SSB remains well above the MSY $B_{trigger}$, while recent fishing mortalities are now estimated below F_{MSY}.
- Analyses show that the new assessment tends to revise historical SSB downwards and F upwards when a new year's data is added. If this pattern continues, this may result in an inflated advised catch.
- Most Irish trawlers do not seem to target hake but take them as a bycatch in mixed fisheries with anglerfish, megrim, haddock and whiting. There are targeted Irish gillnet and seine fisheries for hake in Sub-area 7.

Published 30 June 2021

Hake (*Merluccius merluccius*) in subareas 4, 6, and 7 and divisions 3.a, 8.a–b, and 8.d, Northern stock (Greater North Sea, Celtic Seas, and the northern Bay of Biscay)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 83 130 tonnes.

ICES notes the existence of a precautionary management plan developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

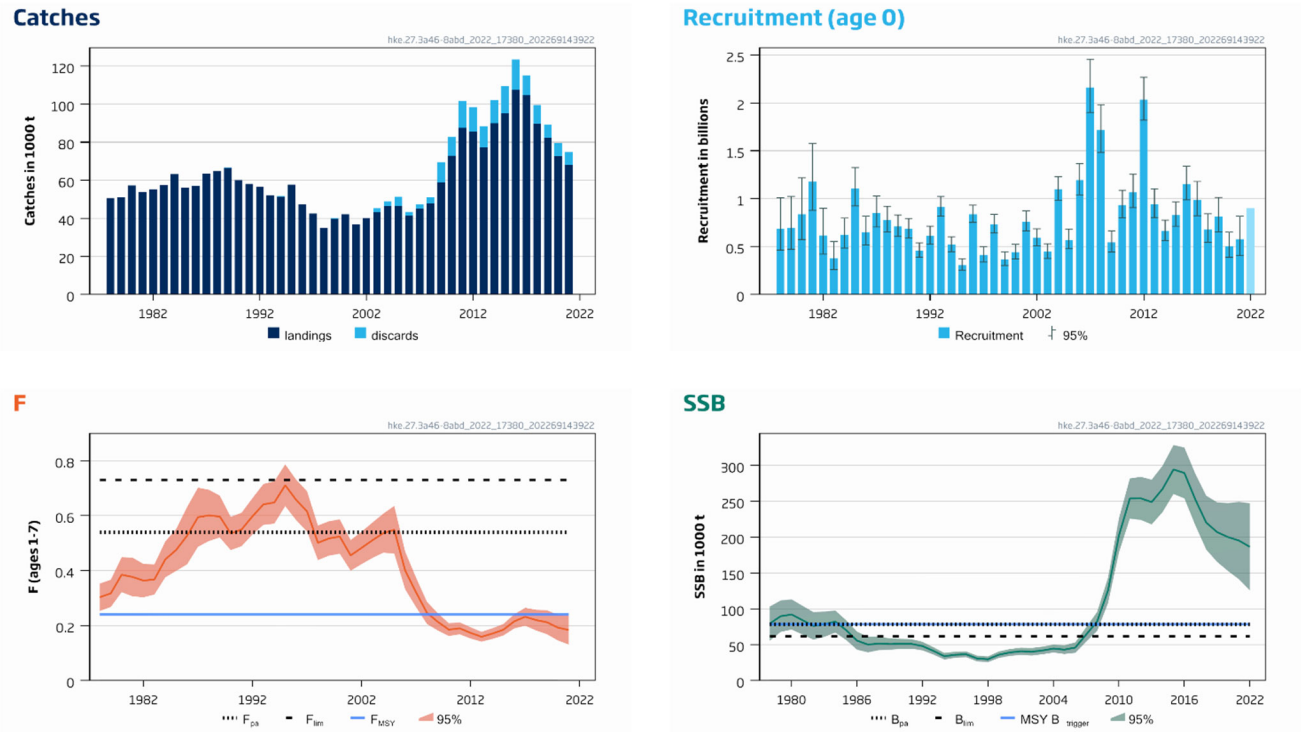


Figure 1 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Summary of the stock assessment. Discard estimates prior to 2003 are model estimates. Assumed recruitment values for 2022 are shaded in a lighter colour. Estimates for SSB are for females only and the 2022 value is a forecast.

Catch scenarios

Table 1 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. The basis of the catch scenarios.

Variable	Value	Notes
$F_{ages\ 1–7}$ (2022)	0.198	F_{sq} = average F (2019–2021); in tonnes.
SSB (2023)	168765	Short-term forecast (STF); females only, in tonnes.
$R_{age\ 0}$ (2022)	898602	Estimated by the model based on the stock–recruitment relationship; in thousands.
$R_{age\ 0}$ (2023)	891837	Estimated by the model based on the stock–recruitment relationship; in thousands.
Total catch (2022)	74935	STF; in tonnes.
Projected landings (2022)	69563	STF; assuming average landings ratio by length (2019–2021); in tonnes.
Projected discards (2022)	5371	STF; assuming average discards ratio by length (2019–2021); in tonnes.

Table 2 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Annual catch scenarios. All weights are in tonnes. Note: the % change in TAC is not presented because the stock area does not correspond to the area for the TAC.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	$F_{ages\ 1–7}$ total (2023)	$F_{ages\ 1–7}$ projected landings (2023)	$F_{ages\ 1–7}$ projected discards (2023)	SSB (2024)	% SSB change*	% advice change**
ICES advice basis									
MSY approach = F_{MSY}	83130	76360	6770	0.24	0.223	0.020	148841	−11.8	10.8
Other scenarios									
EU MAP***: F_{MSY}	83130	76360	6770	0.24	0.22	0	148841	−11.8	10.8
F = MAP***$F_{MSY\ lower}$	53284	49067	4218	0.147	0.135	0.0120	168127	−0.38	−29
F = MAP***$F_{MSY\ upper}$	117526	107599	9927	0.37	0.34	0.031	126984	−25	57
F = 0	0	0	0	0	0	0	203180	20	−100
F = F_{pa}	155336	141603	13733	0.54	0.49	0.047	103497	−39	107
SSB (2024) = B_{lim}	226111	203813	22298	0.98	0.89	0.097	61563	−64	201
SSB (2024) = B_{pa}	197045	178555	18491	0.77	0.70	0.072	78405	−54	163
SSB (2024) = MSY $B_{trigger}$	197045	178555	18491	0.71	0.70	0.072	78405	−54	163
SSB (2024) = SSB(2023)	52303	48167	4136	0.14	0.133	0.0110	168765	0.0	−30
F = F_{2022}	69596	64003	5593	0.198	0.182	0.0160	157552	−6.6	−7.3

* SSB 2024 relative to SSB 2023.
** Total catch advice in 2023 relative to the catch advice for 2022 (75 052 tonnes).
***The EU multiannual plan (MAP; EU, 2019).

The advice for 2023 is 10.8% higher than the advice for 2022 following the benchmark.

Basis of the advice

Table 3 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. The basis for the advice.

Advice basis	MSY approach
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent has been agreed by the EU for this stock (EU, 2019). This plan is not adopted by Norway and UK; thus, it was not used as the basis of the advice for this shared stock. ICES was requested to provide advice based on the MSY approach and to include the MAP as a catch option.

Quality of the assessment

The stock was benchmarked in 2022 (ICES, 2022a). An update of the Stock Synthesis framework was applied with the addition of commercial and survey data. The stock is now sex-separated with sex-dependent growth and natural mortality.

There is no full survey coverage of the entire stock distribution area, and changes in the spatial distribution of the stock are known to increase the uncertainty in the assessment.

On average the new assessment estimates a 71% larger stock size over time (ICES, 2022c). The SSB estimates made prior to 2022 include males and females while estimates in this assessment are female only. The perception of the stock status in relation to reference points is similar. SSB remains above the MSY $B_{trigger}$, while recent fishing mortalities are now estimated below F_{MSY} (Figure 2). On average the new assessment estimates a 70% larger stock size over time (Figure 3).

Analyses show that the new assessment tends to revise historical SSB downwards and F upwards when a new year's data is added. If this pattern continues, this may result in an inflated advised catch.

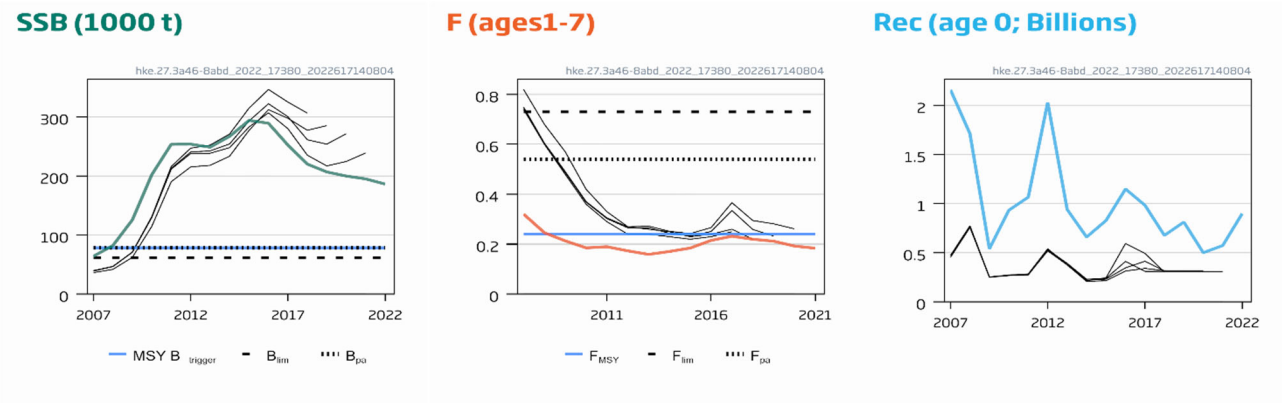


Figure 2 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Historical assessment results. The reference points and assessment results were revised following a benchmark in 2022. Thus the 2022 estimates are not comparable to the previous assessments. The final-year recruitment values are assumptions.

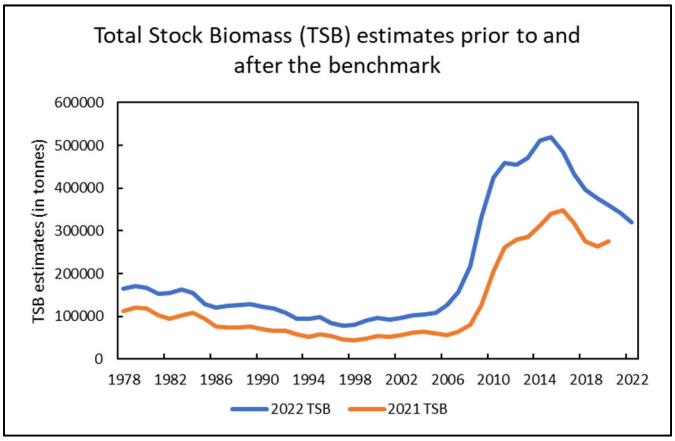


Figure 3 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Comparison of Total Stock Biomass from before the last benchmark (2021 assessment) and after the benchmark (current assessment).

Issues relevant for the advice

Analyses show that the new assessment tends to revise historical SSB downwards and F upwards when a new year of data is added. If this pattern continues, this may result in an inflated advised catch.

Reference points

Table 4 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	78405	B_{pa}; females only, in tonnes.	ICES (2022a)
	F_{MSY}	0.24	Stock Synthesis simulations.	ICES (2022a)
Precautionary approach	B_{lim}	61563	The breakpoint of the segmented regression stock–recruitment relationship; females only, in tonnes.	ICES (2022a)
	B_{pa}	78405	$\exp(1.654 \times \sigma) \times B_{lim}$, with $\sigma = 0.147$; females only, in tonnes.	ICES (2022a)
	F_{lim}	0.73	The F that provides a 50% probability for SSB to be above B_{lim}.	ICES (2022a)
	F_{pa}	0.54	F_{P05} with advice rule (AR): the F that provides a 95% probability for SSB to be above B_{lim}.	ICES(2022a)
Management plan	F_{mgt}	Not defined		
	SSB_{mgt}	Not defined		
	MAP MSY $B_{trigger}$	78405	MSY $B_{trigger}$; females only, in tonnes.	ICES (2022a), EU (2019)
	MAP B_{lim}	61563	B_{lim}; females only, in tonnes.	ICES (2022a), EU (2019)
	MAP F_{MSY}	0.24	F_{MSY}	ICES (2022a), EU (2019)
	MAP range F_{lower}	0.147	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2022a), EU (2019)
	MAP range F_{upper}	0.37	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2022a), EU (2019)

Basis of the assessment

Table 5 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022b).
Assessment type	Length-based and sex-disaggregated model (Stock Synthesis; ICES, 2022a, 2022c) that uses landings and discards in the assessment and forecast.
Input data	Commercial landings; four survey indices including the French Southern Atlantic Bottom trawl survey (EVHOE-WIBTS-Q4 [G9527]), the Spanish Porcupine Bottom Trawl Survey (SpPGFS-WIBTS-Q3 [G5768]), the Irish Groundfish Survey (IGFS-WIBTS-Q4 [G7212]), the Irish Anglerfish and Megrim Survey (IE-IAMS [G3098]), and French surveys in the Bay of Biscay (FR-RESSGACQ [G2537]); constant maturity, and sex-and age-dependent natural mortality.
Discards and bycatch	Discard estimates from most fleets are available and included in the assessment.
Indicators	None.
Other information	Last benchmarked in 2022 (ICES, 2022a).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE).

History of the advice, catch, and management

Table 6 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. ICES advice and catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings	ICES discards	ICES catch
1987	Precautionary TAC; juvenile protection			63500	63369		
1988	Precautionary TAC; juvenile protection		54000	66200	64823	**	
1989	Precautionary TAC; juvenile protection		54000	59700	66473	**	
1990	Precautionary TAC; juvenile protection		59000	65100	59954		
1991	Precautionary TAC; juvenile protection		59000	67000	58129		
1992	If required, precautionary TAC		61500	69000	56617		
1993	Enforce juvenile protection legislation		-	71500	52144		
1994	F significantly reduced		-	60000	51259	**	
1995	30% reduction in F		31000	55100	57621		
1996	30% reduction in F		39000	51100	47210		
1997	20% reduction in F		54000	60100	42465		
1998	20% reduction in F		45000	59100	35060		
1999	Reduce F below F_{pa}		-	55100	39814	**	
2000	50% reduction in F		-	42100	42026	**	
2001	Lowest possible catch, recovery plan		-	22600	36675		
2002	Lowest possible catch/recovery plan		-	27000	40105		
2003	Lowest possible catch/recovery plan		-	30000	43162	1393	44555
2004	70% reduction in F or recovery plan		-	39100	46416	2614	49029
2005	F = 0.19		33000	42600	46550	4583	51133
2006	F = 0.25		44000	43900	41469	1222	42691
2007	Recovery plan limits		50500	52700	45093	2165	47258
2008	Recovery plan limits		54000	54000	47822	3368	51190
2009	F = 0.25 = F_{pa}		51500	51500	58781	11033	69814
2010	F = 0.25 = F_{pa}		55200	55105	72760	12118	84878
2011	See scenarios		50600	55105	87540	13903	101443
2012	MSY transition		51900	55105	85677	14870	100547
2013	MSY transition		45400	69440	86148	15450	101598

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC*	ICES landings	ICES discards	ICES catch
2014	MSY approach		81846	81846	89940	9832	99772
2015	MSY approach		78457	90849	95041	10921	105962
2016	MSY approach	≤ 109592	≤ 96651	108764	107546	11115	118662
2017	MSY approach	≤ 123777		119765	104671	7100	111771
2018	MSY approach	≤ 115335		111785	89695	7038	96733
2019	MSY approach	≤ 142240		141160	82291	4940	87238
2020	MSY approach	≤ 104763		112903	72579	3955	76534
2021	MSY approach (value revised in June 2021)	≤ 102888		98658	68058	3085	71142
2022	MSY approach	≤ 75052		78926			
2023	MSY approach	≤ 83130					

* Sum of area TACs, corresponding to Northern stock (subareas 4, 6, and 7 and in divisions 3.a, 8.a–b, and 8.d), Division 2.a (EU zone only; from 2021 onwards UK only) and divisions 3.b–d (except for 2019 onwards). There is no agreed TAC for Norwegian waters of Subarea 4.

** Partial discard estimates are available and used in the assessment. For remaining years where values are not presented, there are no valid discard estimates available for the assessment.

History of the catch and landings

Table 7 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Catch distribution by fleet in 2021 as estimated by ICES. All weights are in tonnes.

Catch	Landings				Discards
74799	9.53% unspecified gear	28.8% longline	32% gillnet	29.6% trawl	6738
	68061				

Table 8 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. History of commercial catch and landings; ICES estimated values (i.e. landings by area and total landings minus unallocated) are presented by area for each country participating in the fishery. All weights are in tonnes.

Year	ICES estimated landings*							ICES estimated discards						Total catches **
	3	4	6	7	8abd	Unallocated	Total	3	4	6	7	8abd	Total	
1961			-	-	-	95600	95600						-	95600
1962			-	-	-	86300	86300						-	86300
1963			-	-	-	86200	86200						-	86200
1964			-	-	-	76800	76800						-	76800
1965			-	-	-	64700	64700						-	64700
1966			-	-	-	60900	60900						-	60900
1967			-	-	-	62100	62100						-	62100
1968			-	-	-	62000	62000						-	62000
1969			-	-	-	54900	54900						-	54900
1970			-	-	-	64900	64900						-	64900
1971			8500	19400	23400	0	51300						-	51300
1972			9400	14900	41200	0	65500						-	65500
1973			9500	31200	37600	0	78300						-	78300
1974			9700	28900	34500	0	73100						-	73100
1975			11000	29200	32500	0	72700						-	72700
1976			12900	26700	28500	0	68100						-	68100
1977			8500	21000	24700	0	54200						-	54200
1978			8000	20300	24500	−2249	50551						-	50551
1979			8700	17600	27200	−2404	51096						-	51096
1980			9700	22000	28400	−2835	57265						-	57265
1981			8800	25600	22300	−2782	53918						-	53918
1982			5900	25200	26200	−2306	54994						-	54994
1983			6200	26300	27100	−2093	57507						-	57507
1984			9500	33000	22900	−2114	63286						-	63286
1985			9224	27459	21044	−1628	56099						-	56099

Year	ICES estimated landings*							ICES estimated discards						Total catches **
	3	4	6	7	8abd	Unallocated	Total	3	4	6	7	8abd	Total	
1986			7320	27408	23903	−1539	57092						-	57092
1987			7800	32900	24700	−2031	63369						-	63369
1988			8800	30900	26600	−1477	64823						-	64823
1989			7375	26938	31957	203	66473						-	66473
1990			6680	23011	34424	−4161	59954						-	59954
1991			8328	21546	31635	−3380	58129						-	58129
1992			8561	22475	23465	2116	56617						-	56617
1993			8484	20465	19849	3346	52144						-	52144
1994			5421	21080	24727	31	51259						+	51259
1995			5335	24056	28144	86	57621						-	57621
1996			4445	24738	18036	−9	47210						-	47210
1997			3312	18949	20339	−135	42465						-	42465
1998			3208	18705	13147	0	35060						-	35060
1999			4256	23955	11604	−1	39814						+	39814
2000			4033	25991	11998	4	42026						+	42026
2001			4367	23065	9244	0	36675						-	36675
2002			2944	21226	15935	0	40105						-	40105
2003			3284	25438	14440	0	43162						1393	44555
2004			4438	27483	14494	0	46416						2614	49029
2005			5461	26623	14467	0	46550						4583	51133
2006			6127	24709	10633	0	41469						1222	42691
2007			7017	27456	10620	0	45093						2165	47258
2008			10654	22834	14334	0	47822						3368	51190
2009			13057	25300	20424	0	58781						11033	69814
2010			14187	33500	25073	0	72760						12118	84878
2011			18789	18574	16604	32000^	87540						13903	101443
2012			22415	22166	16716	19300^	85677						14870	100547
2013	292	10684	5232	50054	19885	0	86148	314	2945	1545	6584	4061	15450	101598
2014	350	12082	11415	40538	25554	0 ^	89940	288	3104	952	4026	1462	9832	99772
2015	450	14615	7079^^	44400	28498	0 ^	95041	93	3444	72	4212	3100	10921	105962
2016	698	19591	11379 ^^	49388	26490	0	107546	144	4187	348^^	2285	4151	11115	118662
2017	775	19690	9615^^	45737	28854	0	104671	149	1777	314	1168	3692	7100	111771
2018	698	18915	7281^^	36906	25894	0	89695	287	1256	266	2124	3105	7038	96733
2019	1522	15569	6835^^	36873	21492	8	82291	235	926	297	1423	2059	4940	87238
2020	605	13080	4113^^	35100	19674	7	72579	280	336	296	1063	1979	3955	76534
2021	791	9300	3823^^	33393	20750	0	68058	110	340	619	926	1090	3085	71142

* Data for Subarea 8 for 1973–1978 include those for divisions 8.a and 8.b only. Divisions 3.a and 4.b–c are included in the column "3, 4, and 6" only after 1976. There are some unallocated landings.
** The working group used total catches from 1978.
^ Unallocated landings for the years 2011–2014 were revised in 2015.
^^ Landings and discards data from Subarea 5 are included.

Table 9 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. History of commercial catches by country as estimated by ICES. All weights are in tonnes.

Year	Belgium	Denmark	France	Germany	Ireland	Netherlands	Norway	Spain	Sweden	UK (England)	UK (Northern Ireland)	UK (Scotland)
2014	218	3407	41290	835	4919	221	3031	30747	106	2310	29	12659
2015	144	4242	46034	786	3873	693	4181	33471	103	3148	134	9154
2016	155	4617	49103	845	4168	883	5781	34503	94	2722	116	15675
2017	451	5125	47557	737	3477	188	3974	33317	90	2329	222	14303
2018	212	4529	41804	1212	4440	519	3960	26078	119	2689	130	11039
2019	362	3427	35341	760	4700	503	4144	25538	148	2763	127	9425
2020	190	4225	31635	409	4399	318	2968	23540	94	1879	96	6737
2021	141	3598	29208	696	4721	305	1995	23171	100	1779	155	5273

Summary of the assessment

Table 10 Hake in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock. Assessment summary. 'High' and 'Low' refer to 95% confidence intervals. SSB is for females only, all weights are in tonnes, and recruitment is in thousands.

Year	Recruitment age 0			Stock size				Landings	Discards **	Fishing pressure (15–80 cm)		
	R	High	Low	SSB	High	Low	TSB^					
	thousands			tonnes				tonnes		F	High	Low
1978	683793	1009868	463004	79409	103239	55579	165452	50551		0.30	0.35	0.25
1979	694155	1022100	471433	89683	111632	67734	170824	51096		0.32	0.37	0.27
1980	834917	1216139	573196	92068	113116	71021	166150	57265		0.39	0.45	0.32
1981	1175640	1575799	877097	84112	104211	64014	152225	53918		0.38	0.45	0.31
1982	614691	899366	420124	76137	95392	56883	154363	54994		0.36	0.42	0.30
1983	377577	551118	258682	78414	96056	60773	162353	57507		0.37	0.42	0.31
1984	620641	796870	483385	82226	97655	66796	155018	63286		0.44	0.51	0.38
1985	1106470	1325017	923970	70174	83943	56405	128792	56099		0.48	0.55	0.40
1986	647799	816081	514218	55524	68159	42888	120085	57092		0.53	0.63	0.42
1987	850153	1027361	703511	50084	60954	39214	124434	63369		0.59	0.70	0.49
1988	774160	920602	651013	51547	60782	42312	127307	64823		0.60	0.69	0.51
1989	708777	829472	605644	50868	58858	42878	129460	66473	68	0.60	0.67	0.52
1990	681849	791933	587067	51134	58166	44101	123406	59954		0.54	0.60	0.47
1991	455911	537741	386534	51017	57649	44385	118811	58129		0.55	0.61	0.49
1992	609905	711541	522786	47917	53873	41960	108362	56617		0.60	0.66	0.53
1993	912648	1021946	815039	41246	46392	36101	93438	52144		0.64	0.72	0.57
1994	517928	601140	446235	33808	38426	29190	93348	51259	356	0.65	0.73	0.57
1995	305821	371666	251641	35902	40119	31684	97616	57621		0.71	0.79	0.63
1996	836512	932012	750797	36507	40527	32487	84926	47210		0.66	0.73	0.58
1997	410473	498368	338080	30644	34689	26600	79002	42465		0.62	0.69	0.54
1998	731414	835575	640237	29633	33642	25624	80969	35060		0.50	0.56	0.44
1999	366120	445304	301017	35976	40499	31453	90711	39814	349	0.52	0.58	0.45
2000	439243	521290	370110	39052	43844	34260	95484	42026	77	0.52	0.59	0.46
2001	759622	871031	662463	40741	45746	35736	91736	36675		0.46	0.51	0.40
2002	589414	684584	507475	40092	45344	34839	97172	40107		0.48	0.54	0.42
2003	445111	528048	375200	41880	47195	36565	102175	43162	2110	0.51	0.57	0.45
2004	1099150	1227784	983993	44536	50074	38998	103502	46417	2548	0.54	0.61	0.47
2005	569922	681568	476564	43042	49145	36939	107877	46550	4676	0.55	0.64	0.46
2006	1192020	1366735	1039639	45885	53199	38571	126169	41467	1816	0.40	0.47	0.33
2007	2159010	2454608	1899009	64178	74307	54048	156177	45028	2191	0.32	0.37	0.27
2008	1712400	1980798	1480370	82270	95552	68989	216267	47739	3248	0.25	0.29	0.21
2009	540533	662387	441096	125660	143465	107855	332726	58818	10590	0.21	0.24	0.182
2010	932764	1086960	800442	202255	226085	178425	423769	72799	9978	0.185	0.21	0.162
2011	1065940	1254941	905404	253759	281786	225732	458471	87540	14156	0.190	0.21	0.168
2012	2031050	2267092	1819584	253980	284062	223898	454241	85677	12680	0.173	0.194	0.153
2013	940460	1102399	802309	248863	280080	217646	470863	77343	11098	0.159	0.177	0.141
2014	659779	775330	561449	267180	299560	234800	511899	89940	12131	0.171	0.190	0.151
2015	828652	965837	710952	294240	328413	260067	518740	95043	14446	0.185	0.21	0.164
2016	1149080	1337644	987097	289381	324867	253895	484606	107547	16041	0.22	0.24	0.189
2017	983549	1178767	820661	252412	288453	216371	433388	104670	10488	0.23	0.26	0.20
2018	676762	841934	543994	220187	257774	182600	395442	89695	9934	0.22	0.26	0.182
2019	812397	1011782	652303	206897	248472	165322	375357	82298	6966	0.21	0.26	0.168
2020	500739	649526	386035	199969	247338	152600	359331	72579	6946	0.193	0.24	0.146
2021	573606	815318	403553	195117	249154	141080	342088	68061	6738	0.184	0.24	0.131
2022	898602*			186358	247139	125577	320420					

* Recruitment estimated by the model; to carry out the short-term forecast.

** Model estimates.

^ Total stock size.

Sources and references

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Download the stock assessment data and figures.

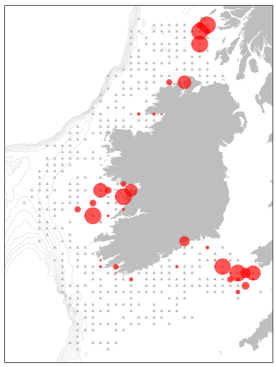
Recommended citation: ICES. 2022. Hake (*Merluccius merluccius*) in subareas 4, 6, and 7, and in divisions 3.a, 8.a–b, and 8.d, Northern stock (Greater North Sea, Celtic Seas, and the northern Bay of Biscay). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, hke.27.3a46-8abd. https://doi.org/10.17895/ices.advice.19448012.

HERRING

(CLUPEA HARENGUS)

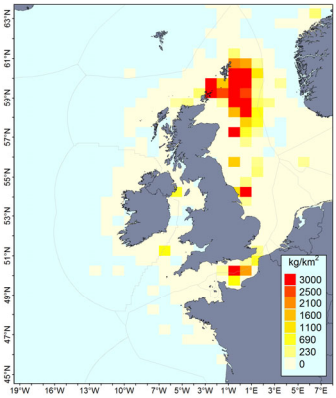
BIOLOGY – SPECIES

A pelagic schooling fish that are found in mid water or close to the bottom. Herring migrate to distant feeding grounds and are often found in mixed aggregations with other herring stocks. Their diet consists largely of zooplankton, mainly copepods. Fish reach a total length of between 28 and 37 cm, depending on the stock. Herring are important prey for marine mammals, birds and many predatory fish. Unusually for a marine fish, eggs are deposited on the bottom in discrete gravel beds. Herring eggs are also consumed by some gadoid species. In the waters around Ireland the main spawning grounds for herring are off the Donegal and Mayo coasts, and inshore along the south and west coast including Dunmore East and Cork Harbour (see overleaf). Herring reach full maturity by ages 2 or 3. They are not particularly fecund compared to other pelagic fish.

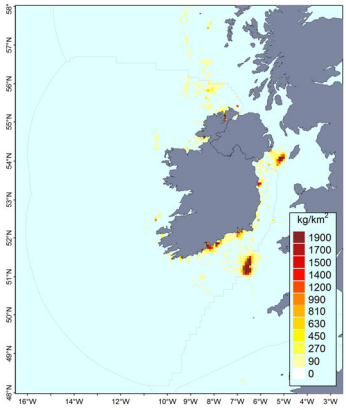


Groundfish Survey catches of juveniles since 2005

LANDINGS DISTRIBUTION



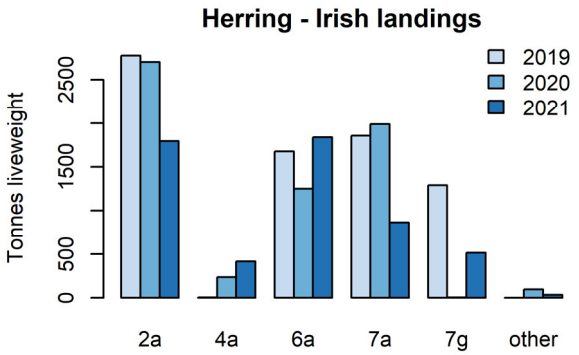
◀ The distribution of international landings of herring between 2016 and 2020. Herring are targeted by a number of fleets in the northern North Sea with large catches.

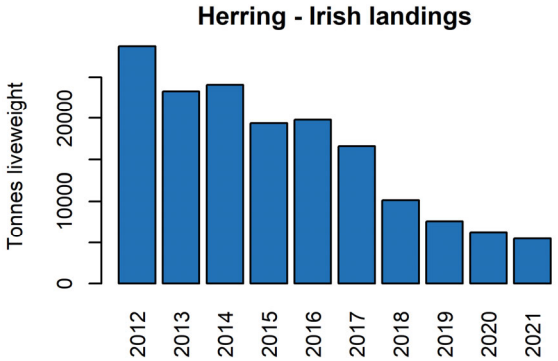


◀ The distribution of herring landings by Irish vessels between 2016 and 2020. Herring were caught mostly in Divisions 7.g and 6.aS.

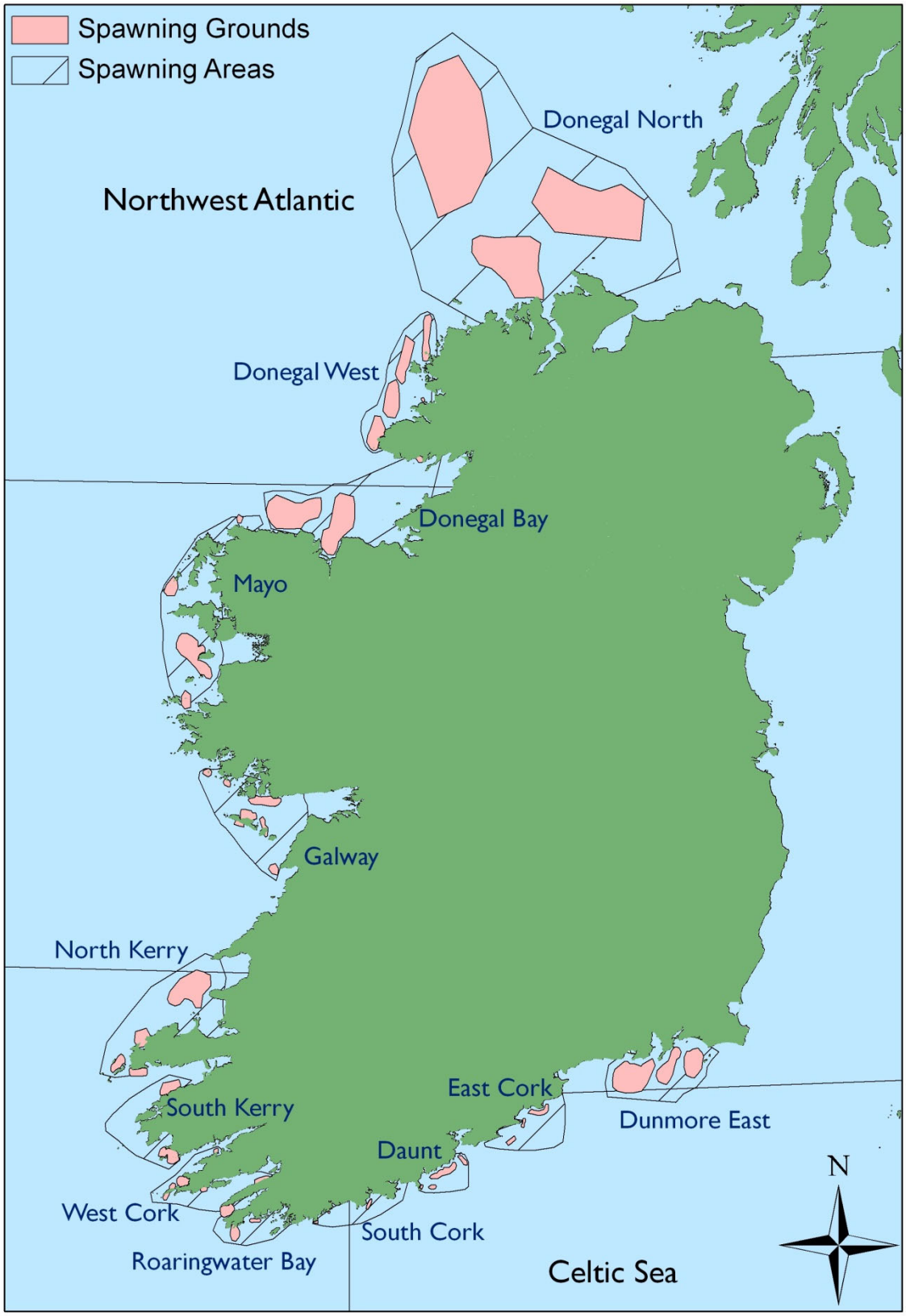
IRISH LANDINGS AND VALUE OF TAC

On average approximately 6,400 tonnes of herring were caught and landed by Irish vessels using mainly pelagic trawls annually between 2019 and 2021. Ireland dominates the fishery in 6.aS and in the Celtic Sea. In 2021 landings were worth approximately € 2.1 million to Irish vessels.





Approximate Locations of Herring Spawning Grounds and Areas

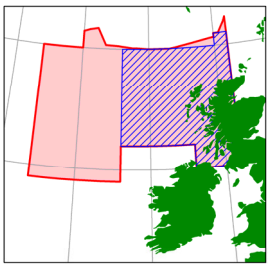


West of Scotland Herring

(Division 6.a North)

ADVICE FOR 2023

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 1,212 t.

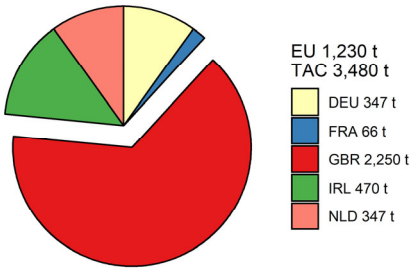


KEY POINTS

ICES Assessment Category	3 (Survey biomass trend)	
Management Plan	No	
Advice Basis	ICES MSY approach	Catch=1,212 t
Ranges	F_{MSY} Range Lower	Not Appropriate
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not Appropriate
Landing Obligation	From 2015	No derogations or exemptions

MANAGEMENT IN 2022

2022 Quota Allocations for Herring in 5.b, 6.b and 6.aN



- From 2016 until 2021, ICES gave one advice for two stocks in the combined area 6.aN, 6.aS, and 7.b-c. The 56°N boundary between 6.aS/7.b-c and 6.aN is not biologically meaningful. Created in 1981, it corresponds roughly to the boundary of the Irish and UK fishery patrol zones, or "EEZs". The boundary cuts through both the summer feeding grounds and the winter spawning grounds, and thus the fishing grounds also.
- Since 2015 all targeted herring fishing is prohibited in the part of the ICES zones subject to this TAC between 56°N and 57°30′N, with the exception of a six nautical mile limit measured from the baseline of the United Kingdom's territorial sea.
- In 2016, a scientific monitoring fishery (4,840 t) was considered appropriate by ICES to allow the collection of samples for the two stocks and to continue the time series.
- In 2022, a TAC of 4,840 t was agreed and was split for 6.b and 6.aN, UK and international waters of 5.b, (3,480 t, 72%) and 6.aS and 7b-c (1,360 t, 28%).
- The Irish herring fishery in 6.a opened on 1st November 2022.
- Irish and Dutch vessels are not allowed to fish herring inside the UK (Scottish) 6-12 nautical mile limits, including the outlying Hebridean Islands (Appendix VI). German and French vessels have access to herring fishing between 6 and 12 nautical miles in Scottish waters in most areas, though not the mainland limits east of the Butt of Lewis.

KEY STOCK CONSIDERATIONS

- This stock was benchmarked in 2022 and is now assessed separately from herring in 6.a South, 7.b-c. This was made possible by the development of a genetically split acoustic survey index, which is used as an indicator of stock development.
- The split survey biomass index is available from 2014-2021. The index has increased in 2020 and 2021 from the lowest observed level in 2019 (10,508 t) with the 2021 biomass index over 43,000 t.
- The current assessment represents autumn-spawning herring. Further genetic work is required to facilitate an assessment of Spring-spawning herring in 6.a North.

- There is evidence that autumn-spawning herring in 6.a North are genetically the same population as the North Sea autumn-spawning stock (NSAS) and a combined assessment should be considered.
- Genetic sampling of the catch is also required as the stocks recover and the fishing expands.
- Catches from 6.a North have been below the monitoring TAC from 2019-2021. As a result, sampling levels are also low.

Published 30 June 2022

Herring (*Clupea harengus*) in division 6.a (North), autumn spawners (West of Scotland)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 1212 tonnes.

Stock development over time

Fishing pressure on the stock is at or below $F_{MSY\ proxy}$ (figures 1 and 2). No reference points for stock size have been defined for this stock.

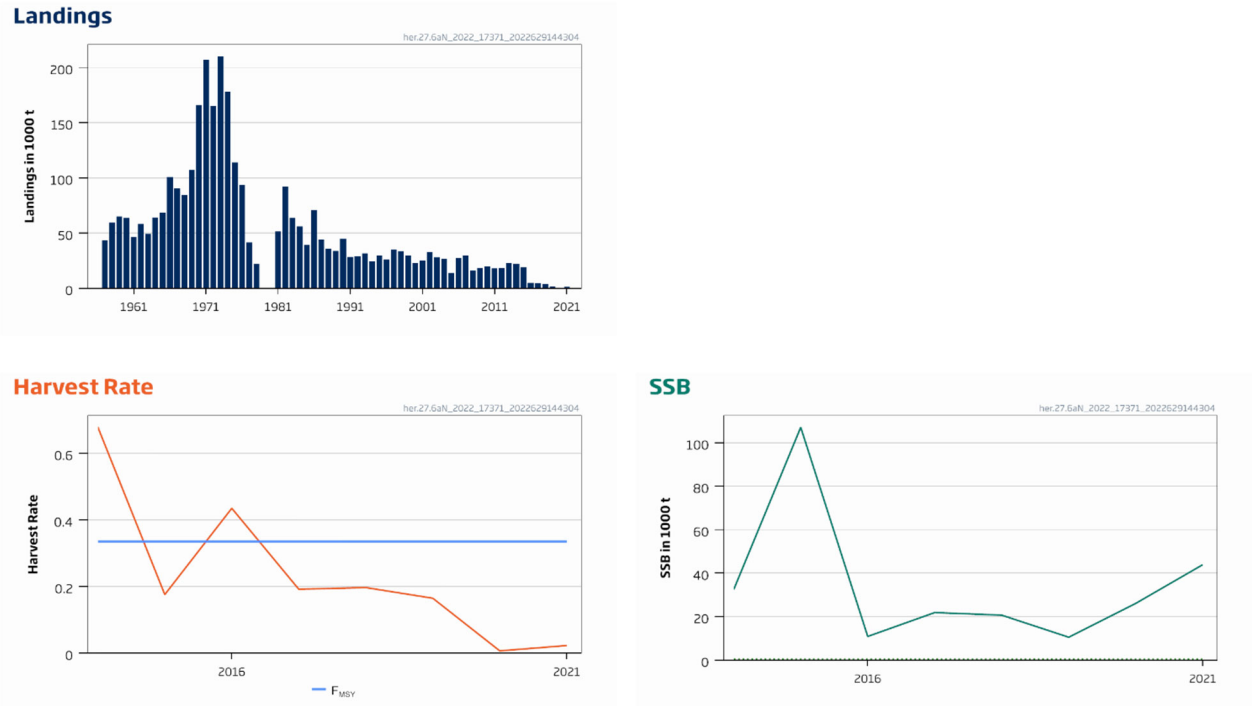


Figure 1 Herring in Division 6.a North. Summary of the stock assessment. Upper left: ICES estimated catches (in tonnes). Lower left: harvest rate (ratio between landings and acoustic survey SSB estimate). Lower right: spawning-stock biomass index of genetically split Malin Shelf Herring Acoustic Survey (tonnes) for Division 6.a (North).

Catch scenarios

ICES framework for category 3 stocks was applied (ICES, 2022a). The advice is based on the *chr* rule to provide MSY advice (ICES, 2022a, 2022b). A biomass index from the genetically split Malin Shelf Herring Acoustic Survey (MSHAS) was used as an indicator of stock development (ICES, 2022c). The advice is based on the stock indicator for 2021, multiplied by a constant harvest rate, a biomass safeguard, and a precautionary multiplier. As this is the first advice using this method for this stock, the harvest rate calculation was initialized using the average of the previous three

years' catch (ICES 2022d). The stability clause was considered and applied since the change from the previous catches is greater than +20%. The discard rate is considered negligible.

Table 1 Herring in Division 6.a North. The basis for the catch scenarios.*

Average of the previous three years of catch^		1010 tonnes
Biomass index		
I: most recent biomass index (I_{2021})		43 886 tonnes
MSY proxy harvest rate		
$F_{MSY\ proxy}$: MSY proxy harvest rate (average of the ratio of catch to biomass index for the years for which f > 1, where f = $L_{F=\gamma M,K=\theta M}$ [ICES, 2022e])		0.335
Biomass safeguard		
Index trigger value ($I_{trigger}$ = 1.4×I_{loss})		14 711 tonnes
b: index relative to trigger value, min{$I_{2021}/I_{trigger}$, 1}		1
Precautionary multiplier to maintain biomass above B_{lim} with 95% probability		
m: multiplier (generic multiplier based on life history)		0.5
CHR calculation**		7362 tonnes
Stability clause (+20%/−30% compared to A_y, only considered if b = 1)	Applied	+20%
Discard rate		Negligible
Catch advice A_{y+1} for 2023		1212 tonnes
% advice change***		-

* The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.
** Formula: $C_{y+1} = I_{y-1} \times F_{MSY\ proxy} \times b \times m$, limited by stability clause if applicable.
*** No advice for 2022 is available
^ As no advice value for 2022 is available, the average of the previous three years of catch has been used (ICES, 2022d).

This is the first year ICES has provided advice for this stock since 2014.

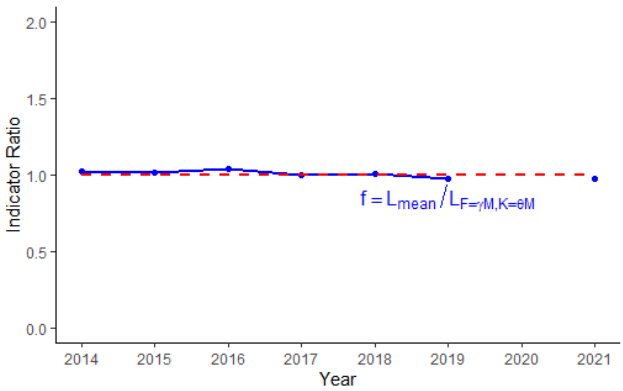


Figure 2 Herring in Division 6.a North. Indicator ratio L_{mean}/ $L_{F=\gamma M,K=\theta M}$ from the length-based indicator (LBI) method is used for the evaluation of the exploitation status. The exploitation status is below the $F_{MSY\ proxy}$ when the indicator ratio value is higher than 1 (shown by a dashed red line).

Basis of the advice

Table 2 Herring in division 6.a North. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of an agreed precautionary management plan for herring in this area

Quality of the assessment

Herring in Division 6.a North have been part of a combined assessment with Division 6.a South and divisions 7.b–c since 2015 (ICES, 2015a). Following a benchmark meeting in 2022 (ICES, 2022b), these two stocks are now assessed separately. This was made possible by the development of a genetically split acoustic survey index (MSHAS; ICES, 2022c).

A proportion of the acoustic survey biomass remains unassigned to a specific stock. Continued genetic work will aim to reduce the portion of this unassigned biomass in future years.

The calculation of the length based indicator (LBI) portion of the constant harvest rate (chr) requires adequate length frequency data from the commercial catch.

The time series of biomass index is very short comparing to the catch series for this stock covering only the recent period when catches have been low. The available time series for length data is very short and shows little contrast across years. Both of these factors increase the uncertainty in the assessment and the reference points. However, the advice rule partially addresses this with the inclusion of the stability clause.

Issues relevant for the advice

This is the first year ICES has provided advice for this stock since 2014. From 2015 to 2021 it was jointly assessed with herring in divisions 6.a South and 7.b–c. Zero catch advice was given for the joint stock, and a monitoring TAC [4170 tonnes 2016–2019, 3480 tonnes 2020–2022] was agreed for the 6.a North component.

The information presented here represents autumn-spawning herring in Division 6.a North. Spring-spawning herring in this area are currently not assessed, although historical estimates of catches in 6.a North will include fish from other populations. This is a mismatch with the survey index, which has been genetically split from 2014–present. Catches are still apportioned geographically (north of 56°N). Genetic sampling to split the commercial catches is required, particularly as the stocks recover and fishing expands.

There is evidence that autumn-spawning herring in 6.a North are genetically the same population as the North Sea autumn-spawning stock (NSAS). Further work should be carried out to evaluate the current view that NSAS and 6.a North herring stocks should continue to be assessed separately.

The length at first capture (L_c) and the target reference length were calculated independently for every year of data in order to be more responsive to changes in the stock and/or fishery selectivity as the stock rebuilds. As such, the $F_{MSY\ proxy}$ reference point may change in subsequent years.

The catches in 2020 and 2021 were considerably lower than the monitoring TAC, but this was due to a change in the management measures that prevented the use of the monitoring TAC in 6.a North. As a result, sampling levels are low for these years.

The average of the past three years' catch has been used as the basis for the catch advice. The low uptake of the monitoring TAC in 2020 and 2021 should be noted for the advice given for this stock. The low uptake of the monitoring TAC in 2020 and 2021 should be noted for the advice given for this stock.

There has been an increase in marine anthropogenic activity. Activities that have a negative impact on the spawning habitat of herring – such as the dumping of dredge spoil, the extraction of marine aggregates (e.g. gravel and sand), and the erection of structures such as wind turbines in the vicinity of spawning grounds – are a cause for concern (see for example de Groot, 1979, 1996; ICES, 2003, 2015b). This is because a gravel substratum is an essential habitat for herring spawning. Activities that have a negative impact on the spawning of herring should not occur, unless the effects of these activities have been assessed and shown not to be detrimental to the productivity of the stock (ICES, 2003, 2015b).

Reference points

Table 3 Herring in Division 6.a North. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger\ proxy}$	Not defined		
	$F_{MSY\ proxy}$	0.335	Average of the ratio of catch to biomass index for the years for which the fishing pressure proxy relative to MSY proxy (f) > 1, where f = $L_{mean}/L_{F=\gamma M,K=\Theta M}$ is based on L_c (length at 50% of modal abundance), which varies each year	ICES (2022e)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

Basis of the assessment

Table 4 Herring in division 6.a North. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2022d)
Assessment type	Survey biomass trend applying the *chr* rule for advice (ICES, 2022e)
Input data	Commercial catches (international landings and length frequencies from catch sampling), fixed natural mortality estimates, fixed life history parameters, 6.a.N autumn spawners genetic split from the Malin Shelf Herring Acoustic Survey data (MSHAS 2014–2021 [A9481])
Discards and bycatch	Considered negligible
Indicators	LBI based on lengths from commercial catch data (2014–2021)
Other information	This stock was benchmarked in 2022 (ICES, 2022b).
Working group	Herring Assessment Working Group for the Area South of 62°N (HAWG)

History of the advice, catch, and management

Table 5 Herring in Division 6.a North. ICES advice and ICES estimated catches. All weights are in tonnes.*

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Discards	ICES estimated catches
2023	MSY Approach	≤ 1212			

* Prior to the advice for 2023, ICES advised jointly for herring in Division 6.a North and herring in Division 6.a South, 7.b–c. See ICES Advice 2021 – her.27.6a7bc (https://doi.org/10.17895/ices.advice.7772) for the full histories of ICES advice, management, landings, and catches.

History of the catch and landings

Table 6 Herring in Sivision 6.a North. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings		Discards
1115 tonnes	Pelagic trawl 100%	Ringnets (negligible)	Negligible
	1115 tonnes		

Table 7 Herring in division 6.a North. The Division 6.a North component of the stock. ICES estimates of catch by country and ICES estimates of total annual misreportings, discards, and catch. All weights are in tonnes.

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Denmark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Faroe Islands	0	0	274	0	0	0	0	0	0	0	800	400	228	1810	570
France	119	818	5087	3672	2297	3093	1903	463	870	760	1340	1370	625	613	701
Germany	5640	4693	7938	3733	7836	8873	8253	6752	4615	3944	3810	2935	1046	2691	3152
Ireland	7985	8236	6093	3548	9721	1875	11199	7915	4841	4311	4239	3581	1894	2880	4352
Netherlands	8000	6132	8183	7808	9396	9873	8483	7244	4647	4534	4612	3609	8232	5132	7008
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	2389	7447	30676	4840	6223	4962	5317	2695	0	0	0	0	0	0	0
UK	32730	32602	-4287	42661	46639	44273	42302	36446	22816	21862	20604	16947	17706	17494	18284
Unallocated	−5485	−3753	700	−4541	−17753	−8015	−11748	−8155	0	277	6244	2820	3490	0	0
Discards*	200	0	0	0	0	62	90	0	0	0	0	0	123	772	163
Total	51578	56175	54664	61271	64359	64995	65799	61514	37789	35688	41649	31622	33344	31392	34230
Area misreported	−22593	−24397	−30234	−32146	−38254	−29766	−32446	−23623	−14627	−10437	−8735	−3581	−6885	−17263	−6884
ICES estimate	28985	31778	24430	29575	26105	35233	33353	29736	23162	25251	32914	28081	26459	14129	27346
Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021**
Denmark	0	0	0	0	0	0	0	0	0	23	0	39	71	0	0
Faroe Islands	484	927	1544	70	0	0	0	360	0	0	0	0	0	4	0
France	703	564	1049	511	504	244	586	589	0	0	0	7	46	0	0
Germany	1749	2526	27	3583	3518	1829	4025	3354	3292	1028	0	17	2	0	0
Ireland	5129	3103	1935	2728	3956	3451	3124	2632	1799	569	10	84	37	116	242
Netherlands	8052	4133	5675	3600	1684	3523	1775	1641	956	300	835	1000	653	85	5
Lithuania	0	0	0	0	0	0	0	770	0	0	0	0	0	0	0
Norway	0	0	0	0	0	0	0	0	1	0	0	4	3	0	0
UK	17618	13963	11076	12018	11696	12249	15906	16769	15260	3254	3356	2911	928	51	974
Unallocated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Discards *	0	0	0	95	0	0	30	0	0	0	0	0	0	0	0
Total	33735	25216	21306	22510	21358	21296	25446	26115	21307	5174	4200	4063	1739	256	1221
Area misreported	−4119	−9162	−2798	−2728	−3599	−2780	−2468	−4088	−2506	−450	0	0	0	−79	−106
ICES estimate	29616	16054	18508	19877	17759	18516	22978	22027	18801	4724	4200	4063	1739	177	1115

* Unraised discards.

** Preliminary

Summary of the assessment

Table 8 Herring in division 6.a North. Assessment summary. Weights are in tonnes. Catch (C), spawning-stock biomass index (I), harvest rate (C/I) and fishing pressure proxy relative to $F_{MSY\ proxy}$ ($L_{mean}/L_{F=\gamma M,K=\theta M}$) are given for the years used in the application of the *chr* rule (ICES, 2022e). L_{mean} refers to the mean length above length at first capture and $L_{F=\gamma M,K=\theta M}$ refers to the target reference length.

Year	Catch C_y	Biomass index I_y	Harvest rate C_y/I_y	Mean > L_c, L_{mean}	Target Ref Length, $L_{F=\gamma M,K=\theta M}$	f*= L_{mean}/ $L_{F=\gamma M,K=\theta M}$
2014	22027	32460	0.679	29.448	28.801	1.022
2015	18801	107113	0.176	29.208	28.801	1.014
2016	4724	10870	0.435	28.691	27.666	1.037
2017	4200	21863	0.192	27.702	27.666	1.001
2018	4063	20663	0.197	27.595	27.382	1.008
2019	1739	10508	0.165	23.982	24.543	0.977
2020	177	26070	0.007	NA	NA	NA**
2021	1115	43886	0.025	26.084	26.814	0.973

*Only harvest rates in years where f ratio is above 1 are included in the calculation of $F_{MSY\ proxy}$
**Length data missing for 2020

Sources and references

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Download the stock assessment data and figures.

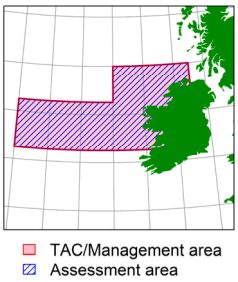
Recommended citation: ICES. 2022. Herring (Clupea harengus) in Division 6.a (North), autumn spawners (West of Scotland) *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, her.27.6aN. https://doi.org/10.17895/ices.advice.20179925.

NORTH WEST AND WEST OF IRELAND HERRING

(Divisions 6.a South and 7.b-c)

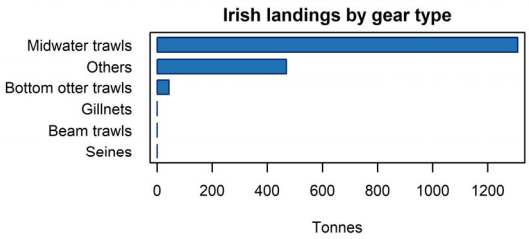
ADVICE FOR 2023

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 1,892 t.



KEY POINTS

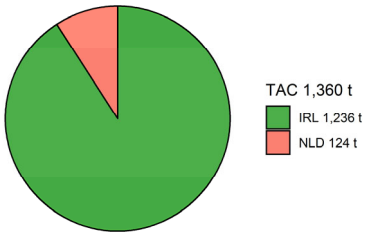
ICES Assessment Category	3 (Survey biomass trend)	
Management Plan	No	
Advice Basis	ICES MSY approach	Catch=1,892 t
Ranges	F_{MSY} Range Lower	Not Appropriate
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not Appropriate
Landing Obligation	From 2015	No derogations or exemptions



MANAGEMENT IN 2022

- From 2016 until 2021, ICES gave one advice for the two stocks in the combined area 6.aN, 6.aS, and 7.b-c. The 56°N boundary between 6.aS/7.b-c and 6.aN is not biologically meaningful. Created in 1981, it corresponds roughly to the boundary of the Irish and UK fishery patrol zones, or "EEZs". The boundary cuts through both the summer feeding grounds and the winter spawning grounds, and thus the fishing grounds also.
- Since 2015 all targeted herring fishing is prohibited in the part of the ICES zones subject to this TAC between 56°N and 57°30′N, with the exception of a six nautical mile limit measured from the baseline of the United Kingdom's territorial sea.
- In 2016, a scientific monitoring fishery (4,840 t) was considered appropriate by ICES to allow the collection of samples for the two stocks and to continue the time series.
- In 2022, a TAC of 4,840 t was agreed and was split for 6.b, 6.aN and UK and international waters of 5.b, (3,480 t, 72%) and 6.aS and 7b-c (1,360 t, 28%).
- Irish quota in 6.aS, 7.b-c is allocated to vessels in 4 different size categories.
- The Irish herring fishery in 6.a opened on 1st November 2022.
- Irish and Dutch vessels are not allowed to fish herring inside the UK (Scottish) 6-12 nautical mile limits, including the outlying Hebridean Islands (Appendix VI). German and French vessels have access to herring fishing between 6 and 12 nautical miles in Scottish waters in most areas, though not the mainland limits east of the Butt of Lewis.

2022 Quota Allocations for Herring in 6.aS, 7.b-c



KEY STOCK CONSIDERATIONS

- This stock was benchmarked in 2022 and is now assessed separately from herring in 6.a North. This was made possible by the development of a genetically split acoustic survey index, which is used as an indicator of stock development.
- The split survey biomass index is available from 2014-2021. The index has increased annually from the lowest observed level in 2016 (36,707 t) with the 2021 biomass index over 189,000 t.
- Ireland is the main participant in this fishery with the monitoring TAC taken close to the coast when the stocks are geographically isolated. Genetic sampling of the catch is required as the stocks recover and the fishing expands.

Published 30 June 2022

Herring (*Clupea harengus*) in division 6.a South of 56°00'N and West of 07°00'W and 7.b-c (Northwest and West of Ireland)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 1892 tonnes.

Stock development over time

Fishing pressure on the stock is at or below $F_{MSY\ proxy}$ (figures 1 and 2). No reference points for stock size have been defined for this stock.

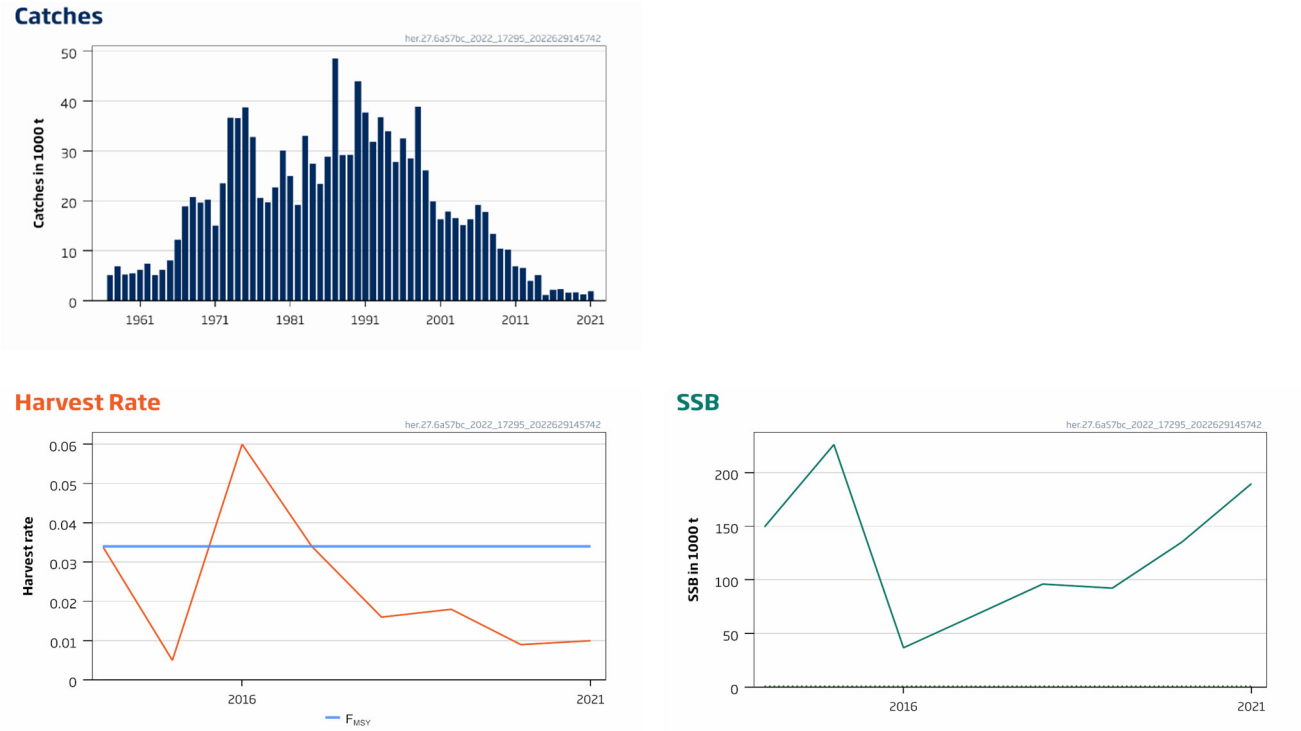


Figure 1 Herring in divisions 6.a South and 7.b–c. Summary of the stock assessment. Upper left: ICES estimated catches. Lower left: harvest rate (ratio between landings and acoustic survey SSB estimate). Lower right: Spawning-stock biomass index of genetically split Malin Shelf Herring Acoustic Survey for 6.a South, 7.b–c.

Catch scenarios

ICES framework for category 3 stocks was applied (ICES, 2022a). The advice is based on the *chr* rule to provide MSY advice (2022a, 2022b). A biomass index from the genetically split Malin Shelf Herring Acoustic Survey (MSHAS) was used as an indicator of stock development (ICES, 2022c). The advice is based on the stock indicator for 2021, multiplied by a constant harvest rate, a biomass safeguard, and a precautionary multiplier. As this is the first advice using this method for this stock, the harvest rate calculation was initialized using the average of the previous three years' catch (ICES, 2022d). The stability clause was considered and applied since the change from the previous average catch was greater than +20%. The discard rate is considered negligible.

Table 1 Herring in divisions 6.a South and 7.b-c. The basis for the catch scenarios.*

Average of the previous three years of catch^		1577 tonnes
Biomass index		
I: most recent biomass index (I_{2021})		189 856 tonnes
MSY proxy harvest rate		
$F_{MSY\ proxy}$: MSY proxy harvest rate (average of the ratio of catch to biomass index for the years for which f > 1, where f = $L_{F = \gamma M, K = \theta M}$ [ICES, 2022e])		0.034
Biomass safeguard		
Index trigger value ($I_{trigger} = 1.4 \times I_{loss}$)		51 390 tonnes
b: index relative to trigger value, min{$I_{2021}/I_{trigger}$, 1}		1
Precautionary multiplier to maintain biomass above B_{lim} with 95% probability		
m: multiplier (generic multiplier based on life history)		0.5
CHR calculation**		3241 tonnes
Stability clause (+20%/−30% compared to A_y, only considered if b = 1)^	Applied	+20%
Discard rate		Negligible
Catch advice A_{y+1} for 2023		1892 tonnes
% advice change***		-

* The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.
** Formula: $A_{y+1} = I \times F_{MSY\ proxy} \times b \times m$, limited by stability clause if applicable.
*** No advice value for 2022 is available.
^ As no advice value for 2022 is available, the average of the previous three years of catch has been used (ICES, 2022d).

This is the first year ICES has provided advice for this stock since 2014.

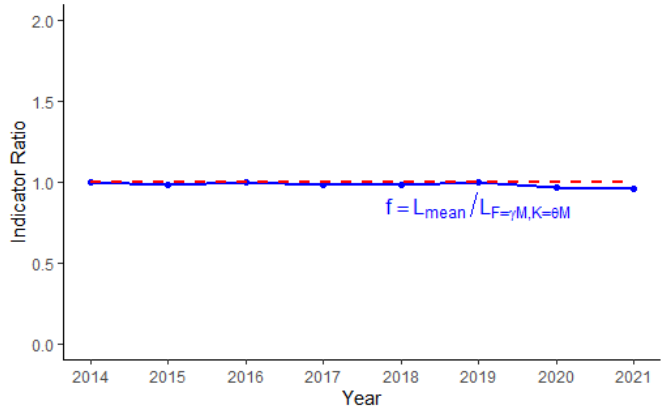


Figure 2 Herring in divisions 6.a South and 7.b–c. Indicator ratio L_{mean}/ $L_{F = \gamma M, K = \theta M}$ from the length-based indicator (LBI) method is used for the evaluation of the exploitation status. The exploitation status is below the $F_{MSY\ proxy}$ when the indicator ratio value is higher than 1 (shown by a dashed red line).

Basis of the advice

Table 2 Herring in divisions 6.a South and 7.b-c. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of an agreed precautionary management plan for herring in this area

Quality of the assessment

Herring in 6.a South, 7.b–c have been part of a combined assessment with 6.a North since 2015 (ICES, 2015a). Following a benchmark meeting in 2022 (ICES, 2022b), these two stocks are now assessed separately. This was made possible by the development of a genetically split acoustic survey index (MSHAS; ICES, 2022c).

In each of the last three years about 20% of the acoustic survey biomass remains unassigned to a specific stock. Continued genetic work will reduce the portion of this unassigned biomass in future years.

The time series of biomass index is very short comparing to the catch series for this stock covering only the recent period when catches have been low. The available time series for length data is very short and shows little contrast across years. Both of these factors increase the uncertainty in the assessment and the reference points. However, the advice rule partially addresses this with the inclusion of the stability clause.

Issues relevant for the advice

From 2015 to 2021 this stock was jointly assessed with herring in 6.a North because it was not possible to segregate the two stocks in commercial catches or surveys. The development of a genetic method to split the summer acoustic survey (MSHAS) into the component stocks means that separate advice is now possible. The survey index has been genetically split from 2014–present, but catches are still apportioned geographically (south of 56°N and west of 7°W). This has not been an issue in recent years, as the agreed 6.aS,7.b–c monitoring TAC has been taken close to the Irish coast at a time when the stocks are geographically isolated. Genetic sampling to split the commercial catches is required, particularly as the stocks recover and fishing expands.

The length at first capture (L_c) and the target reference length were calculated independently for every year of data in order to be more responsive to changes in the stock and/or fishery selectivity as the stock rebuilds. As such, the $F_{MSY\ proxy}$ reference point may change in subsequent years.

There has been an increase in marine anthropogenic activity. Activities that have a negative impact on the spawning habitat of herring – such as the dumping of dredge spoil, the extraction of marine aggregates (e.g. gravel and sand), and the erection of structures such as wind turbines in the vicinity of spawning grounds – are a cause for concern (see for example de Groot, 1979, 1996; ICES, 2003, 2015b). This is because a gravel substratum is an essential habitat for herring spawning. Activities that have a negative impact on the spawning of herring should not occur, unless the effects of these activities have been assessed and shown not to be detrimental to the productivity of the stock (ICES, 2003, 2015b).

Reference points

Table 3 Herring in divisions 6.a South and 7.b–c. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger\ proxy}$	Not defined		
	$F_{MSY\ proxy}$	0.034	Average of the ratio of catch to biomass index for the years for which the fishing pressure proxy relative to MSY proxy (f) > 1, where $f = L_{mean}/L_{F = \gamma M, K = \Theta M}$ is based on L_c (length at 50% of modal abundance), which varies each year.	ICES (2022e)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

Basis of the assessment

Table 4 Herring in divisions 6.a South and 7.b–c. Basis of the assessment and advice.

ICES stock data category	3 (ICES 2022d)
Assessment type	Survey biomass trend and applying the chr rule for advice (ICES, 2022e)
Input data	Commercial catches; length frequencies from catch sampling; genetically split Malin Shelf Herring Acoustic Survey data (MSHAS 2014–2021 [A9481]), fixed natural mortality estimates, fixed life history parameters.
Discards and bycatch	Not included, considered negligible
Indicators	LBI based on lengths from commercial catch data (2014–2021)
Other information	Benchmarked in WKNSCS (ICES, 2022b)
Working group	Herring Assessment Working Group for the Area South of 62°N (HAWG)

History of the advice, catch, and management

Table 5 Herring in divisions 6.a South and 7.b–c. ICES advice and official landings*. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Discards	ICES estimated catches
2023	MSY Approach	≤ 1892			

* Prior to the advice for 2023, ICES advised jointly for herring in Division 6.a North and herring in Division 6.a South, 7.b–c. See ICES Advice 2021 – her.27.6a7bc (https://doi.org/10.17895/ices.advice.7772) for the full histories of ICES advice, management, landings, and catches.

History of the catch and landings

Table 6 Herring in divisions 6.a South and 7.b–c. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings		Discards
1821 tonnes	Pelagic trawl 100%	Ringnets (negligible)	Negligible
	1821 tonnes		

Table 7 Herring in divisions 6.a South and 7.b–c. ICES estimates of landings by country and ICES estimates of total annual misreportings, discards, and catch. All weights are in tonnes.

Year	France	Germany	Ireland	Netherlands	UK (England & Wales)	UK Scotland	Total landings	Unallocated /area misreported	Discards *	ICES estimated catch
1992	0	250	26000	900	0	0	27150	4600	100	31850
1993	0	0	27600	2500	0	200	30300	6250	250	36800
1994	0	0	24400	2500	50	0	26950	6250	700	33900
1995	0	11	25450	1207	24	0	26692	1100	0	27792
1996	0	0	23800	1800	0	0	25600	6900	0	32500
1997	0	0	24400	3400	0	0	27800	700	50	28550
1998	0	0	25200	2500	0	0	27700	11200	0	38900
1999	0	0	16325	1868	0	0	18193	7916	0	26109
2000	0	0	10164	1234	0	0	11398	8448	0	19846
2001	0	0	12820	2088	0	0	14908	1390	0	16298
2002	515	0	13072	366	0	0	13953	3873	0	17826
2003	0	0	12921	0	0	0	12921	3581	0	16502
2004	0	0	12290	64	0	0	12354	2813	0	15167
2005	0	0	13351	0	0	0	13351	2880	0	16231
2006	0	0	14840	353	0	6	15199	4000	0	19199
2007	0	0	12662	13	0	0	12675	5116	0	17791
2008	0	0	10237	0	0	0	10237	3103	0	13340
2009	0	0	8533	0	0	0	8533	1935	0	10468
2010	0	0	7513	0	0	0	7513	2728	0	10241
2011	0	0	4247	0	0	0	4247	2672	0	6919
2012	0	0	3727	0	0	0	3791	2780	0	6571
2013	0	0	1460	40	0	0	1500	2468	0	3968
2014	0	0	2933	0	0	0	2933	2163	0	5096
2015	0	0	73	0	0	5	78	1000	0	1078
2016	0	0	1171	72	0	0	1243	971	0	2214
2017	0	0	1707	0	0	0	1707	520	0	2227
2018	0	0	970	0	0	0	970	525	0	1495
2019	0	0	1625	65	0	0	1690	0	0	1690
2020**	0	0	1138	3	0	0	1141	79	0	1220
2021**	0	0	1715	0	0	0	1715	106	0	1821

* Unraised discards.
** Preliminary

Summary of the assessment

Table 8 Herring in divisions 6.a South and 7.b–c. Assessment summary. Weights are in tonnes. Catch (C), spawning-stock biomass index (I), harvest rate (C/I) and fishing pressure proxy relative to $F_{MSY\ proxy}$ ($L_{mean}/L_{F=\gamma M,K=\theta M}$) are given for the years used in the application of the *chr* (ICES, 2022e). L_{mean} refers to the mean length above length at first capture (L_c) and $L_{F=\gamma M,K=\theta M}$ refers to the target reference length.

Year	Catch C_y	SSB index I_y	Harvest rate C_y/I_y	L_{mean}	Target Reference Length $L_{F=\gamma M,K=\theta M}$	f* $L_{mean}/L_{F=\gamma M,K=\theta M}$
2014	5096	149270	0.034	27.996	27.958	1.001
2015	1078	226293	0.005	27.68	28.241	0.98
2016	2213	36707	0.06	27.298	27.393	0.996
2017	2227	66342	0.034	27.006	27.393	0.986
2018	1495	96138	0.016	27.184	27.676	0.982
2019	1690	92364	0.018	26.17	26.264	0.996
2020	1220	135335	0.009	25.03	25.981	0.963
2021	1821	189856	0.01	25.993	27.111	0.959

*Only harvest rates in years where f ratio is above 1 are included in the calculation of $F_{MSY\ proxy}$

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Herring (*Clupea harengus*) in division 6.a South of 56°00'N and West of 07°00'W and 7.b-c (Northwest and West of Ireland). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, her.27.6aS7bc. https://doi.org/10.17895/ices.advice.20179979.

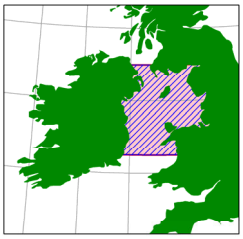
IRISH SEA HERRING

Division 7.a North of 52°30' (Irish Sea)

ADVICE FOR 2023

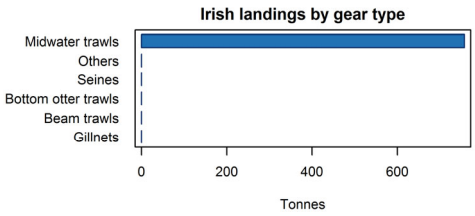
ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 7,309 t.

FEAS notes that further work is required to quantify the mixing between Celtic Sea and Irish Sea herring stocks in the Irish Sea.

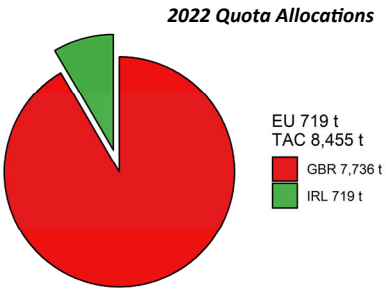


KEY POINTS

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	No	
Advice Basis	ICES MSY approach	Catch=7,309 t
Ranges	F_{MSY} Range Lower	Not Appropriate
	F_{MSY}	0.266
	F_{MSY} Range Upper	Not Appropriate
Landing Obligation	From 2015	No derogations or exemptions



MANAGEMENT IN 2022



- The stock and management units are both ICES Division 7.aN.
- There are two closed areas in operation to protect the spawning stock during part of the spawning season and to prevent exploitation of juveniles. These measures were introduced during the period of the industrial fishery in the Irish Sea (1969 – 1979). The area off County Louth and County Down is closed from the 21st September – 31st December and the Douglas Bank area, east of the Isle of Man is closed from 21st September until 15th November (Appendix VI).
- Vessels of less than 40 feet in length may fish within the Down-Louth seasonal closed box, but only using driftnets of mesh size ≥ 54 mm.
- Republic of Ireland vessels are not permitted to fish herring in any part of the 0-12 nautical mile limits off England, Wales, Scotland or east of the Isle of Man. Republic of Ireland vessels are permitted to fish in waters between 6-12 nautical miles, west of the Isle of Man.
- In 2022 the fishery in the Irish Sea opened on the 19th of September and closes on the 19th of November. The Irish quota in 7.aN is allocated to vessels on a lottery basis.

KEY STOCK CONSIDERATIONS

- SSB has been above the reference points since 2005 and F has been below the reference points since 2004.
- Average catches from 2005-2017 were around 4,750 t. From 2018-2021 the average catch increased to over 7,000 t due to increased TACs. Ireland caught close to their full quota in 2018 - 2021.
- The assessment is carried out on a mixed stock and may overestimate the Irish Sea stock due to the presence of herring from other stocks.
- Genetic work on stock identification of the Irish Sea and Celtic Sea herring populations is on-going. Tools to identify fish from each population have been developed but are soon to be applied.

Published 30 June 2022

Herring (*Clupea harengus*) in Division 7.a North of 52°30'N (Irish Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 7309 tonnes.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

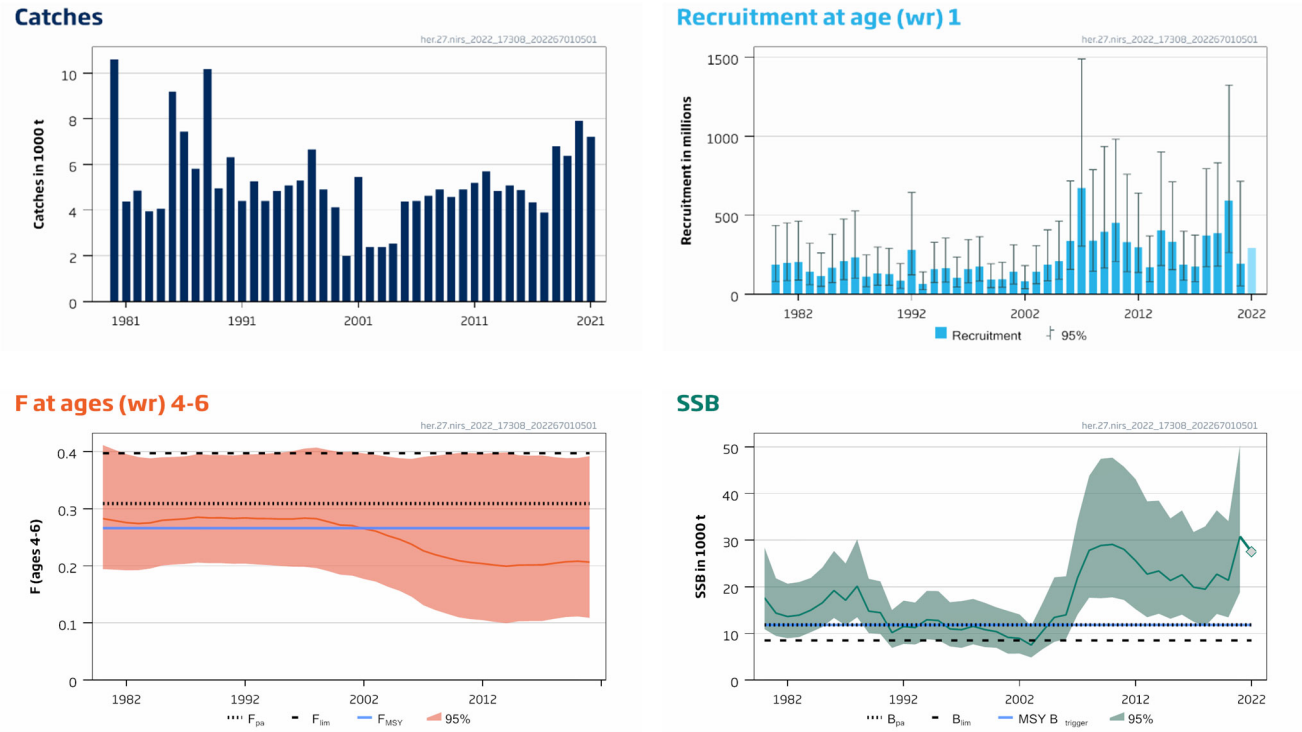


Figure 1 Herring in Division 7.a North of 52°30'N. Summary of the stock assessment. The assumed final-year recruitment value is in a lighter shade, and the predicted SSB is shown with a grey diamond. (WR is winter ring).

Catch scenarios

Table 1 Herring in Division 7.a North of 52°30'N. Basis for the catch scenarios. Assumptions made for the interim year and the forecast.

Variable	Value	Notes
$F_{ages\ (wr)\ 4–6}$ (2022)	0.284	F based on the assumed catch for 2022
SSB (2022)*	24 716	Short-term forecast; in tonnes
$R_{age\ (wr)\ 1}$ (2022–2023)	294 667	Geometric mean over 2010–2019; in thousands
Total catch (2022)	8455	TAC in 2022; in tonnes

* For autumn-spawning stocks, the SSB is determined at spawning time and is influenced by fisheries between 1 January and spawning (set for September).

Table 2 Herring in Division 7.a North of 52°30'N. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	$F_{4–6}$ (2023)	SSB* (2023)	SSB*, ^ (2024)	% SSB change**	% advice change^^
ICES advice basis						
MSY approach: F_{MSY}	7309	0.266	23076	22204	−7	−14
Other scenarios						
F = 0	0	0.000	28552	32681	16	−100
F_{pa}	10359	0.397	20797	18480	−16	23
F_{lim}	8346	0.309	22301	20895	−10	−1
$F = F_{sq}$	7748	0.284	22748	21952	−8	−8
SSB (2023) = B_{lim}	27238	1.567	8500	11655	−66	222
SSB (2023) = B_{pa}	22529	1.124	11831	14294	−52	166
SSB (2023) =MSY $B_{trigger}$	22529	1.124	11831	14294	−52	166

* For autumn-spawning stocks, the SSB is determined at spawning time and is influenced by fisheries between 1 January and spawning (set for September).
** SSB 2023 relative to SSB 2022.
^ Assuming same catch scenario in 2024 as in 2023.
^^ Advice value for 2023 relative to the advice/TAC value for 2022 (8455 tonnes).

The decrease in catch advice for 2023 is the result of a reduction in the estimated stock size at the start of the TAC year .

Basis of the advice

Table 3 Herring in Division 7.a North of 52°30'N. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for herring in this area

Quality of the assessment

The herring assessment for Division 7.a North of 52°30'N is performed on a mixed stock (including juveniles from the Celtic Sea), which affects the estimates of the younger ages. Both the catches and acoustic survey indices contain an unknown amount of fish from other stocks. Due to the presence of herring from other stocks, the assessment may overestimate the Irish Sea stock. There is interannual variation in the proportion of juvenile Celtic Sea herring present in the Irish Sea, as well as variation in the distribution patterns.

The interannual variation in herring migration patterns affects the quality of the assessment. The timing of the acoustic survey is occasionally mismatched with the assumed migration pattern of the spawning stock into the Irish Sea from the Malin Shelf.

While the trend in fishing mortality is estimated to be stable, a historical comparison of the current assessment with previous assessments shows annual upward revision of fishing mortality and wide confidence intervals. The assessed historic SSB appears to be sensitive to addition of a new year of data resulting in revision during the recent time period.

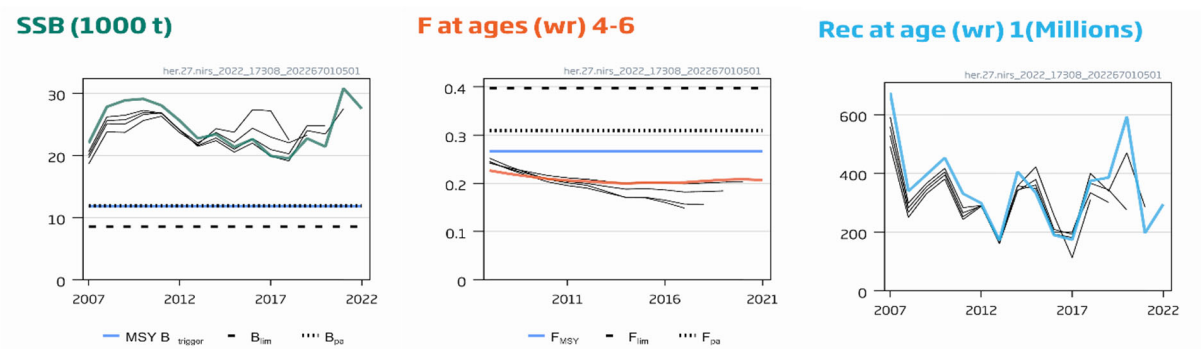


Figure 2 Herring in Division 7.a North of 52°30'N. Historical assessment results. Final-year recruitment estimates and forecast SSB are included.

Issues relevant for the advice

There has been an increase in marine anthropogenic activity. Activities that have a negative impact on the spawning habitat of herring – such as the dumping of dredge spoil, the extraction of marine aggregates (e.g. gravel and sand), and the erection of structures such as wind turbines in the vicinity of spawning grounds – are a cause for concern (see for example de Groot, 1979, 1996; ICES, 2003, 2015). This is because a gravel substratum is an essential habitat for herring spawning. Activities that have a negative impact on the spawning of herring should not occur unless the effects of these activities have been assessed and shown not to be detrimental to the productivity of the stock (ICES, 2003, 2015).

It is known that juvenile Celtic Sea herring mix with the Irish Sea stock, and the consequence of this needs to be further evaluated for management and advice. This stock should be considered as part of a metapopulation.

Reference points

Table 4 Herring in Division 7.a North of 52°30'N. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	11831	MSY $B_{trigger} = B_{pa}$.	ICES (2017a)
	F_{MSY}	0.266	Based on simulation using a combined stock–recruitment relationship (EqSim)	ICES (2017a)
Precautionary approach	B_{lim}	8500	Lowest SSB producing above-average recruitment	ICES (2017a)
	B_{pa}	11831	$B_{pa} = B_{lim} \times \exp(1.645 \times \sigma)$, with $\sigma = 0.201$, based on the estimated CV from the terminal assessment year	ICES (2017a)
	F_{lim}	0.397	Equilibrium F maintaining SSB > B_{lim} with 50% probability	ICES (2017a)
	F_{pa}	0.309	The F that provides a 95% probability for SSB to be above B_{lim} (F_{P05} with advice rule)	ICES (2017a, 2021)
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

Basis of the assessment

Table 5 Herring in Division 7.a North of 52°30'N. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical assessment (FLSAM; ICES, 2022b) that uses catches in the model and in the forecast
Input data	Two survey indices (Northern Ireland Acoustic Surveys: AC [Division 7.a North; A2002] and SSB acoustic survey included as an absolute index [A4705]); commercial catch-at-age data and annual maturity ogives; annual stock weights from AC (Division 7.a North)
Discards and bycatch	Discarding is considered to be negligible
Indicators	None
Other information	Benchmarked in WKIRISH3 and HAWG (ICES, 2017a, 2017b). Age is given in winter rings (wr), so for example: a 2-year-old fish is termed "1-winter ring", as fish do not lay down a ring in their first winter.
Working group	Herring Assessment Working Group for the Area South of 62°N (HAWG)

History of the advice, catch, and management

Table 6 Herring in Division 7.a North of 52°30'N. ICES advice, ICES estimates of catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES estimated catch
1987	TAC	4300	4500	5823
1988	TAC (Revised advice in 1988)	10500 (5600)	10500	10172
1989	TAC	5500	6000	4962
1990	Precautionary TAC	5700	7000	6312
1991	TAC	5600	6000	4398
1992	TAC	6600	7000	5270
1993	TAC	4900–7400	7000	4408
1994	Precautionary TAC	5300	7000	4828
1995	Precautionary TAC	5100	7000	5076
1996	If required, precautionary TAC	5000	7000	5302

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES estimated catch
1997	No advice given	-	9000	6651
1998	*Status quo* F	6500	9000	4905
1999	F = proposed F_{pa} = 0.36	4900	6600	4127
2000	F = 90% F (98) = 0.31	3900	5400	2002
2001	*Status quo* F = 0.26	5100	6900	5461
2002	Average catch of 1996–2000	4800	4800	2393
2003	2002 TAC	4800	4800	2399
2004	Advice 2003 catch	4800	4800	2531
2005	*Status quo* TAC	4800	4800	4387
2006	*Status quo* TAC	4800	4800	4402
2007	*Status quo* TAC	4800	4800	4629
2008	Recent catches	4400	4800	4895
2009	Same advice as last year	4400	4800	4594
2010	Recent TAC	4800	4800	4894
2011	No increase in catch	< 4800	5200	5202
2012	No increase in catch	-	5280	5693
2013	MSY approach	< 5100	4993	4828
2014	MSY approach	< 5251	5251	5208
2015	MSY approach	< 4854	4854	4891
2016	MSY approach	≤ 4575	4575	4327
2017	MSY approach	≤ 4127	4127	3896
2018	MSY approach	≤ 7016	7016	6804
2019	MSY approach	≤ 6896	6896	6377
2020	MSY approach	≤ 8064	8064	7927
2021	MSY approach	≤ 7341	7341	7208
2022	MSY approach	≤ 8455	8455	
2023	MSY approach	≤ 7309		

History of the catch and landings

Table 7 Herring in Division 7.a North of 52°30'N. Catch by fleet in 2021 as estimated by ICES. All weights are in tonnes.

Catch	Landings		Discards
7208	Pelagic trawlers > 99%	Other gears < 1%	Negligible
	7208		

Table 8 Herring in Division 7.a North of 52°30'N. History of landings; ICES estimated values presented for each country. All weights are in tonnes.

Year	Country		Total
	Ireland	UK	
1987	1200	3290	5823
1988	2579	7593	10172
1989	1430	3532	4962
1990	1699	4613	6312
1991	80	4318	4398
1992	406	4864	5270
1993	0	4408	4408
1994	0	4828	4828
1995	0	5076	5076
1996	100	5180	5324
1997	0	6651	6651
1998	0	4905	4905
1999	0	4127	4127
2000	0	2002	2002
2001	862	4599	5461
2002	286	2107	2393
2003	0	2399	2399
2004	749	1782	2531
2005	1153	3234	4387

Year	Country		Total
	Ireland	UK	
2006	581	3821	4402
2007	0	4629	4629
2008	0	4895	4895
2009	0	4594	4594
2010	0	4894	4894
2011	0	5202	5202
2012	18	5675	5693
2013	0	4828	4828
2014	119	5089	5208
2015	0	4868	4891
2016	82	4245	4327
2017	200	3696	3896
2018	1299	5504	6804
2019	1317	5061	6378
2020	1957	5969	7927
2021	753	6455	7208

Summary of the assessment

Table 9 Herring in Division 7.a North of 52°30'N. Assessment summary. Weights are in tonnes, recruitment in thousands. 'High' and 'Low' refer to 95% confidence intervals.

Year	Recruitment			Spawning-stock biomass			Catches	Fishing mortality		
	Age (wr) 1	High	Low	SSB*	High	Low		F (ages 4–6)	High	Low
1980	189662	436733	82366	17659	28517	10935	10613	0.28	0.41	0.194
1981	198988	452664	87474	14364	21821	9456	4377	0.28	0.40	0.193
1982	204434	463433	90182	13623	20672	8977	4855	0.28	0.40	0.192
1983	140505	323991	60933	13929	21033	9224	3933	0.27	0.39	0.192
1984	115382	261498	50910	14995	21904	10266	4066	0.28	0.39	0.195
1985	169058	381696	74878	16574	24150	11375	9187	0.28	0.39	0.20
1986	211293	476865	93621	19199	27689	13312	7440	0.28	0.39	0.20
1987	233281	528455	102980	17123	25033	11713	5823	0.28	0.39	0.20
1988	110968	250066	49243	20149	30167	13458	10172	0.29	0.40	0.21
1989	132455	299999	58481	14778	21729	10051	4949	0.28	0.39	0.20
1990	129832	291705	57786	14459	21178	9872	6312	0.28	0.39	0.20
1991	86422	195298	38243	10182	15035	6896	4398	0.28	0.39	0.20
1992	281813	645238	123084	11490	17041	7747	5270	0.28	0.40	0.20
1993	65121	143310	29591	11261	16631	7625	4409	0.28	0.40	0.20
1994	158261	330497	75784	12940	19129	8754	4828	0.28	0.40	0.20
1995	166708	356758	77900	12769	19079	8546	5076	0.28	0.40	0.200
1996	105240	236623	46806	10969	16700	7204	5301	0.28	0.40	0.199
1997	159213	347558	72934	10813	16945	6900	6651	0.28	0.41	0.198
1998	175255	365650	84000	11545	17406	7658	4905	0.28	0.41	0.196
1999	91675	193861	43352	10825	16581	7067	4127	0.28	0.40	0.191
2000	95416	203604	44715	10389	15610	6914	2002	0.27	0.40	0.185
2001	143487	314724	65418	9165	14842	5660	5461	0.27	0.40	0.183
2002	81552	182292	36484	8945	14085	5680	2393	0.27	0.40	0.177
2003	143631	308991	66765	7512	11651	4844	2399	0.26	0.39	0.172
2004	187775	409563	86091	10534	16670	6657	2531	0.25	0.39	0.163
2005	210449	464029	95444	13448	22041	8205	4387	0.25	0.39	0.156
2006	337729	718438	158763	13986	22267	8784	4402	0.24	0.39	0.146
2007	674684	1490620	305376	21954	34314	14046	4629	0.23	0.39	0.131
2008	339083	789204	145688	27806	43796	17654	4895	0.22	0.39	0.123
2009	395537	936542	167050	28854	47450	17546	4594	0.21	0.40	0.116
2010	452707	982607	208571	29086	47699	17736	4894	0.21	0.40	0.110
2011	330711	760287	143853	28029	45747	17173	5202	0.21	0.40	0.107
2012	298343	641231	138809	25591	43094	15197	5693	0.20	0.40	0.105

Year	Recruitment			Spawning-stock biomass			Catches	Fishing mortality		
	Age (wr) 1	High	Low	SSB*	High	Low		F (ages 4–6)	High	Low
2013	171957	370531	79802	22720	38336	13465	4828	0.20	0.40	0.102
2014	405550	902050	182330	23389	38478	14217	5083	0.199	0.40	0.100
2015	333367	713146	155836	21354	34679	13149	4891	0.20	0.39	0.103
2016	189473	399847	89784	22584	36390	14016	4327	0.20	0.39	0.103
2017	174033	375365	80688	19922	31761	12497	3896	0.20	0.39	0.103
2018	373996	795291	175876	19489	32965	11522	6804	0.20	0.39	0.107
2019	385386	832201	178469	22720	36414	14176	6377	0.21	0.39	0.110
2020	593030	1324780	265466	21401	34088	13436	7927	0.21	0.39	0.111
2021	196418	716188	53869	30792	50397	18813	7208	0.21	0.39	0.109
2022	294667**			24716***						

*For autumn-spawning stocks, the SSB is determined at spawning time and is influenced by fisheries between 1 January and spawning (September).
** Geometric mean recruitment 2010–2019 and SSB from assessment model.
*** From the short-term forecast.

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Herring (*Clupea harengus*) in Division 7.a North of 52°30'N (Irish Sea). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, her.27.nirs. https://doi.org/10.17895/ices.advice.19448006.

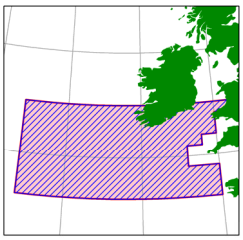
CELTIC SEA HERRING

Divisions 7.a South of 52°30' North, 7.g–h, and 7.j–k (Irish Sea, Celtic Sea, and southwest of Ireland)

ADVICE FOR 2023

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in 2023.

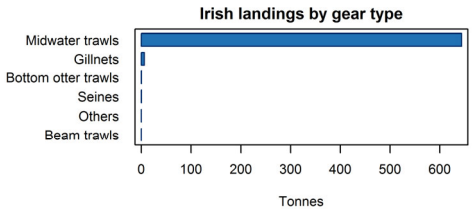
FEAS notes that further work is required to quantify the mixing between Celtic Sea and Irish Sea herring stocks in the Irish Sea.



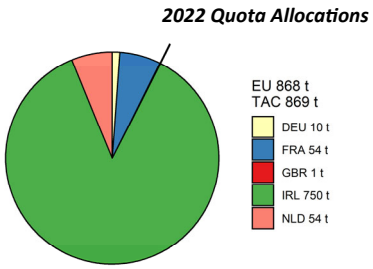
KEY POINTS

ICES Assessment Category	1(Quantitative Assessment)	
Management Plan	No	
Advice Basis	ICES MSY approach*	Catch=0 t
Ranges	F_{MSY} Range Lower	Not Appropriate
	F_{MSY}	0.26
	F_{MSY} Range Upper	Not Appropriate
Landing Obligation	From 2015	No derogations or exemptions

* Under the ICES MSY approach, when spawning stock biomass (SSB) is below B_{lim} and no catch scenario enables the stock to recover above B_{lim} in one year, the advised fishing mortality is 0.



MANAGEMENT IN 2022



- The Celtic Sea Herring Management Advisory Committee was established in 2005 to provide industry input to the management of the Irish Celtic Sea herring fishery.
- Council set a TAC of 869 t based on the catch level considered appropriate by ICES to allow the continued collection of samples. The Irish quota for 2022 is 750 t.
- Spawning Box B (see Appendix IV) will be closed as part of the triennial spawning box closures that are enshrined in EC legislation.
- The fishery in Division 7.aS is confined to vessels of <17 m LOA.
- The UK, Netherlands, France and Germany can fish for herring in the Irish territorial limits from 6–12 nm, however, in recent years they have not fished in this area.
- The Irish quota is allocated to individual vessels on a weekly basis in two pools, one for the main fishery and one for the sentinel fishery in Division 7.aS.
- The TAC is set by calendar year but the assessment is carried out for the period 1st April – 31st March.
- When less than 10 % of the total catches by live weight are below the minimum conservation reference size of 20 cm, the MCRS shall not apply.

Key Stock Considerations

- There was very low uptake of the monitoring TAC in 2020. In 2021 uptake was higher (745 t) but the full monitoring TAC of 869 t was not taken.
- Recruitment has been below average since 2013. Due to the current low SSB the incoming recruitments for 2022 and 2023 are expected to be low.
- The SSB has been below B_{lim} since 2016. There are no catch scenarios that will rebuild the stock above B_{lim} by 2024.
- Once again, the addition of the latest year of data to the assessment revised the SSB downwards and the fishing mortality upwards.
- Genetic work on stock identification of the Irish Sea and Celtic Sea herring populations is on-going. Tools to identify fish from each population have been developed and are soon to be applied.

Published 30 June 2022

Herring (*Clupea harengus*) in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k (Irish Sea, Celtic Sea, and southwest of Ireland)

ICES advice on fishing opportunities

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in 2023.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and spawning-stock size is below MSY $B_{trigger}$, B_{pa}, and B_{lim}.

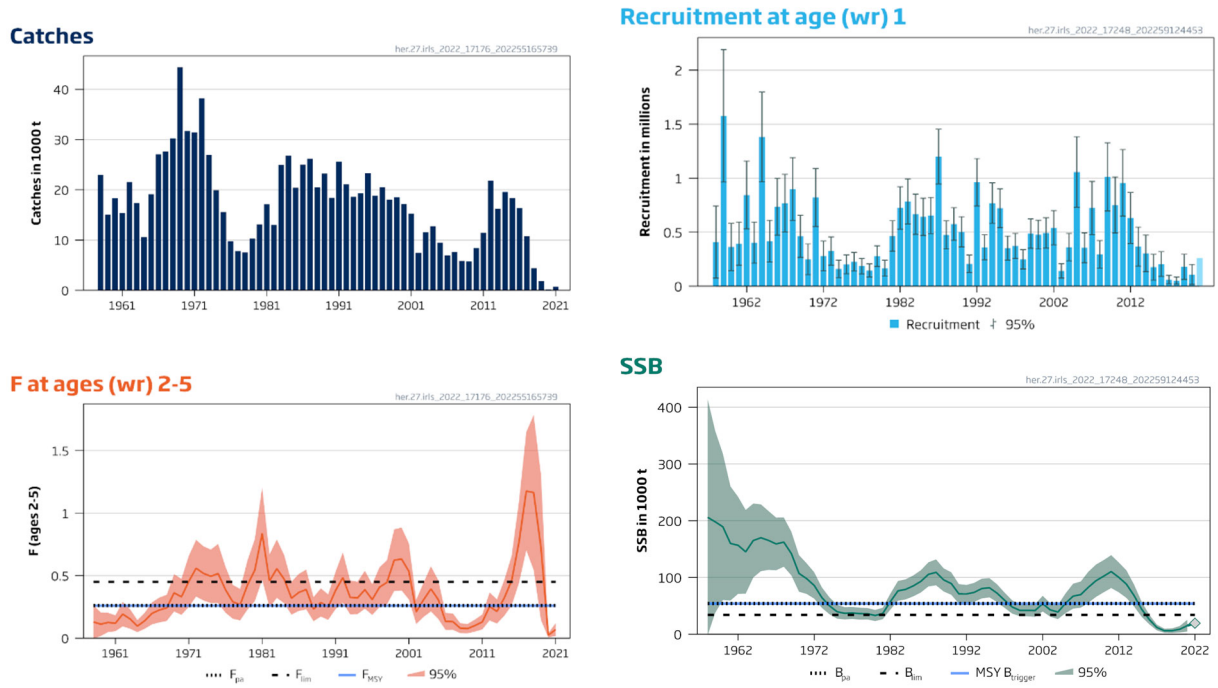


Figure 1 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Summary of the stock assessment. The assumed recruitment is in a lighter shade, and the forecast spawning-stock biomass (SSB) value is indicated with a grey diamond. (WR is winter ring).

Catch scenarios

Table 1 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ (wr)\ 2–5}$ (2022)	0.058	The F that corresponds to the monitoring TAC
$R_{age\ (wr)\ 1}$ (2022–2023)	197 044	Stock–recruitment relationship based on the SSB_{2020} from the assessment output; in thousands
SSB (2022)	19 349	Short-term forecast; in tonnes
Total catch (2022)	869	Monitoring TAC; in tonnes

Table 2 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	$F_{2–5}$ (2023)	SSB* (2023)	% SSB change**	SSB* (2024)#	% TAC change***	% advice change^
ICES advice basis							
MSY approach: zero catch	0	0	22746	17.6	25875	−100	
Other scenarios							
F_{MSY}	4475	0.26	20454	5.7	20049	415	-
$F_{MSY} \times SSB_{2022}/MSY\ B_{trigger}$	1725	0.093	21891	13.1	23546	98.5	-
F = 0	0	0	22746	17.6	25875	−100	-
F_{pa}	4475	0.26	20454	5.7	20049	415	-
F_{lim}	7150	0.45	18953	−2	16914	722.8	-
$SSB_{2023} = B_{lim}$^^	-	-	-	-	-	-	-
$SSB_{2023} = B_{pa}$^^	-	-	-	-	-	-	-
$SSB_{2023} = MSY\ B_{trigger}$^^	-	-	-	-	-	-	-
$F = F_{2022}$	1091	0.058	22209	14.8	24390	25.5	-
TAC = monitoring TAC	869	0.046	22319	15.3	24746	0	-

* For this autumn- and winter-spawning stock, the SSB is determined at spawning time and is influenced by fisheries between 1 April and spawning (October).
** SSB 2023 relative to SSB 2022.
*** Total catch in 2023 relative to the advised monitoring TAC in 2022 (869 tonnes).
^ Advice value for 2023 relative to the advice value for 2022 (0 tonnes).
^^ These catch scenarios are left blank because the stated SSB cannot be achieved, even with F = 0.
# **Assuming the same catch scenario in 2024 as in 2023.**

There are no catch scenarios that will rebuild the stock above B_{lim} by 2024, and the ICES advice for zero catch is the same as last year.

Basis of the advice

Table 3 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for herring in this area

Quality of the assessment

SSB is consistently overestimated and fishing mortality is consistently underestimated; however, this bias does not impact the outcome of the advice.

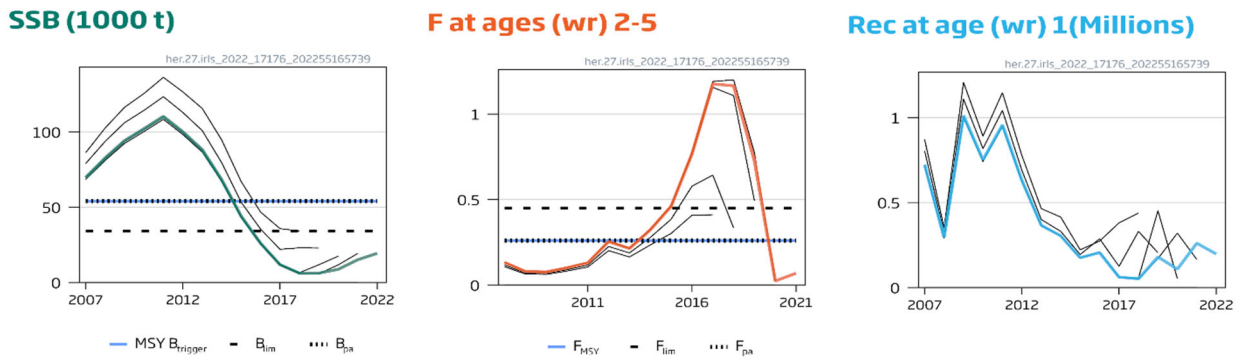


Figure 2 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Historical assessment results. Final-year recruitment and SSB estimates included. The reference points were revised in 2018 (following an interbenchmark), and only assessment results from the last four years should be compared to the reference points indicated.

Issues relevant for the advice

There has been an increase in marine anthropogenic activity. Activities that have a negative impact on the spawning habitat of herring – such as the dumping of dredge spoil, the extraction of marine aggregates (e.g. gravel and sand), and the erection of structures such as wind turbines in the vicinity of spawning grounds – are a cause for concern (see for example de Groot, 1979, 1996; ICES, 2003, 2015a). This is because a gravel substratum is an essential habitat for herring spawning. Activities that have a negative impact on the spawning of herring should not occur unless the effects of these activities have been assessed and shown not to be detrimental to the productivity of the stock (ICES, 2003, 2015a).

Recruitment estimates are uncertain because of a lack of recruitment indices. It is known that juvenile Celtic Sea herring mix with the Irish Sea stock, but the level of mixing is unknown. The consequence of this needs to be further evaluated for management and advice.

Reference points

Table 4 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	54000	B_{pa}	ICES (2018b)
	F_{MSY}	0.26	Stochastic simulations using a segmented regression stock–recruitment relationship from 1970–2014	ICES (2018b)
Precautionary approach	B_{lim}	34000	B_{loss} = the lowest observed SSB (1980)	ICES (2018b)
	B_{pa}	54000	$B_{pa} = B_{lim} \times \exp(1.645 \times \sigma_B)$, with $\sigma_B = 0.29$ from assessment uncertainty in the terminal year	ICES (2018b)
	F_{lim}	0.45	Equilibrium F maintaining SSB > B_{lim} with 50% probability	ICES (2018b)
	F_{pa}	0.26	The F that provides a 95% probability for SSB to be above B_{lim} (F_{P05} with advice rule [AR])	ICES (2018b)
Management Plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

Basis of the assessment

Table 5 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical assessment (ASAP; ICES, 2022b) that uses catches in the model and in the forecast
Input data	Commercial catches (weights, ages, and length frequencies from catch sampling); Acoustic survey index (CSHAS [A4057], excluding 2017); annual weights in the stock; fixed maturity ogive; natural mortality assumed constant
Discards and bycatch	Included in the assessment
Indicators	None
Other information	Benchmarked in WKWEST (ICES, 2015b) and interbenchmarked in 2018 (ICES, 2018b). Assessed on a seasonal basis, 1 April–31 March, to allow for the inclusion of the spawning cycle in the assessment period. This is an autumn-/winter-spawning stock. Age is given in winter rings (wr), so for example: a 2-year-old fish is termed "1-winter ring" as fish do not lay down a ring in their first winter.
Working group	Herring Assessment Working Group for the Area South of 62°N (HAWG)

History of the advice, catch, and management

Table 6 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. ICES advice, official landings, and ICES estimated catch.
All weights are in tonnes.

Year^	ICES advice	Catch corresponding to advice	Agreed TAC	ICES landings	Discards	ICES estimated catch
1988	TAC	13000	18000	16800	2400	19200
1989	TAC	20000	20000	19200	3500	22700
1990	TAC	15000	17500	17700	2500	20200
1991	TAC (TAC excluding discards)	15000 (12500)	21000	21700	1900	23600
1992	TAC	27000	21000	20900	2100	23000
1993	Precautionary TAC (including discards)	20000–24000	21000	19200	1900	21100
1994	Precautionary TAC (including discards)	20000–24000	21000	17400	1700	19100
1995	No specific advice		21000	18300	700	19000
1996	TAC	9800	16500–21000**	18800	3000	21800
1997	If required, precautionary TAC	< 25000	22000	18100	700	18800
1998	Catches below 25	< 25000	22000	20300	0	20300
1999	F = 0.4	19000	21000	18100	0	18100
2000	F < 0.3	20000	21000	18267	0	18267
2001	F < 0.34	17900	20000	17729	0	17729
2002	F < 0.35	11000	11000	10550	0	10550
2003	Substantially less than recent catches	-	13000	10875	0	10875
2004	60% of average catch 1997–2000	11000	13000	11065	0	11065
2005	60% of average catch 1997–2000	11000	13000	8452	0	8452
2006	Further reduction 60% average catch 2002–2004	6700	11000	8530	0	8530
2007	No fishing without rebuilding plan		9400	8268	0	8268
2008	No targeted fishing without rebuilding plan		7900	6853	0	6853
2009	No targeted fishing without rebuilding plan		5900	5760	0	5760
2010	F_{mgt} = 0.19	10150	10150	8406	0	8406
2011	See scenarios		13200	11503	0	11503
2012	MSY approach	< 26900	21100	21604	161	21765
2013	MSY approach	< 18500	17200	16067	118	16185
2014	MSY approach	< 35942	22300	18930	644	19574
2015	MSY approach	< 15140	15700*	17579	247	17826
2016	MSY approach	< 23164	15400*	16659	182	16841
2017	MSY approach	< 16145	14500*	11194	130	11324

Year^	ICES advice	Catch corresponding to advice	Agreed TAC	ICES landings	Discards	ICES estimated catch
2018	MSY approach	≤ 5445	10100*	4589	0	4589
2019	MSY approach	≤ 4742	4742	1841	0	1841
2020	MSY approach	0	869^^	132	0	132
2021	MSY approach	0	869^^	609	0	609
2022	MSY approach and precautionary considerations	0	869^^			
2023	MSY approach and precautionary considerations	0				

* Initial TAC before carry-over of unused quota from previous year.
** Revised in 1996 after the ACFM May meeting.
^ By calendar year.
^^ Monitoring TAC.

History of the catch and landings

Table 7 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Catch distribution by fleet in 2021/2022 as estimated by ICES. All weights are in tonnes.

Catch	Landings	Discards
745	Pelagic trawlers 100%	Negligible
	745	

Table 8 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. ICES estimates of landings by country and ICES estimates of total annual unallocated/misreported, discards, and catch by assessment year. All weights are in tonnes.

Year	Denmark	France	Germany	Ireland	Netherlands	UK	Unallocated/misreported	Discards	Total
1988/1989	-	-	-	17000	-	-	-	3400	20400
1989/1990	-	+	-	15000	1900	-	2600	3600	23100
1990/1991	-	+	-	15000	1000	200	700	1700	18600
1991/1992	-	500	100	21400	1600	-	−100	2100	25600
1992/1993	-	-	-	18000	1300	-	−100	2000	21200
1993/1994	-	-	-	16600	1300	+	−1100	1800	18600
1994/1995	-	+	200	17400	1300	+	−1500	1900	19300
1995/1996	-	200	200	20000	100	+	−200	3000	23300
1996/1997	-	1000	-	17900	1000	-	−1800	750	18850
1997/1998	-	1300	-	19900	1400	-	−2100	-	20500
1998/1999	-	+	-	17700	1200	-	−700	-	18200
1999/2000	-		200	18300	1300	+	−1300	-	18500
2000/2001	-	573	228	16962	44	1	−617	-	17191
2001/2002	-	-	-	15236	-	-	-	-	15236
2002/2003	-	734	-	7465	257	-	−991	-	7465
2003/2004	-	800	-	11536	610	14	−1424	-	11536
2004/2005	-	801	41	12702	-	-	−801	-	12743
2005/2006	-	821	150	9494	799	-	−1770	-	9494
2006/2007	-	-	-	6944	518	5	−523	-	6944
2007/2008	-	379	248	7636	327	-	−954	-	7636
2008/2009	-	503	191	5872	150	-	−844	-	5872
2009/2010	-	364	135	5745	-	-	−499	-	5745
2010/2011	-	636	278	8370	325	-	−1239	n/a	8370
2011/2012	-	241	-	11470	7	-	−248	n/a	11470
2012/2013	-	3	230	16132	3135	-	2104	161	21765
2013/2014	-	-	450	14785	832	-	-	118	16185
2014/2015	-	244	578	17287	821	-	-	644	19574
2015/2016	-	-	477	16320	1304	+	-	254	18355
2016/2017	-	-	419	14585	1025	559	−451	182	16319
2017/2018	-	-	298	9627	648	64	-	130	10767
2018/2019	-	-	-	4227	436	-	−245	-	4418
2019/2020	-	-	-	1803	38	-	-	-	1841
2020/2021	1	-	-	132	+	-	-	-	133
2021/2022	-	-	-	745	-	-	-	-	745

+ Designates catch of less than 0.5 tonnes.

Summary of the assessment

Table 9 Herring in divisions 7.a South of 52°30'N, 7.g–h, and 7.j–k. Assessment summary. All weights are in tonnes and recruitment is in thousands. 'High' and 'Low' refer to 95% confidence intervals.

Year^	Recruitment at age (wr) 1	High	Low	SSB**	High	Low	Total catch^	F at ages (wr) 2–5	High	Low
1958	408556	742916	74204	206015	414368	0	22978	0.130	0.26	0
1959	1577690	2191396	964004	197957	358131	37789	15086	0.112	0.21	0.0168
1960	362961	581990	143930	189253	318267	60233	18283	0.126	0.20	0.048
1961	393717	592934	194506	159919	260499	59341	15372	0.119	0.183	0.056
1962	843980	1157913	530047	156601	242158	71042	21552	0.192	0.29	0.094
1963	402905	593224	212576	145174	219042	71298	17349	0.153	0.23	0.075
1964	1381900	1798028	965772	165103	230311	99889	10599	0.096	0.145	0.048
1965	416515	609615	223425	169927	228787	111073	19126	0.139	0.20	0.075
1966	735267	998655	471885	165194	217065	113315	27030	0.199	0.29	0.110
1967	768497	1035648	501352	159041	205484	112596	27658	0.23	0.32	0.126
1968	899711	1190064	609356	162296	205751	118849	30236	0.24	0.35	0.138
1969	461941	656468	267412	141929	180495	103365	44389	0.36	0.51	0.21
1970	248671	391417	105923	107098	139385	74815	31727	0.33	0.47	0.186
1971	821309	1090281	552339	97962	124988	70936	31396	0.45	0.66	0.25
1972	279417	417622	141218	85877	109150	62604	38203	0.56	0.79	0.33
1973	325406	456671	194149	64565	82708	46422	26936	0.52	0.73	0.30

Year^	Recruitment at age (wr) 1	High	Low	SSB**	High	Low	Total catch^	F at ages (wr) 2–5	High	Low
1974	160325	240937	79723	50062	64974	35148	19940	0.49	0.71	0.28
1975	202064	289678	114442	39631	51968	27294	15588	0.52	0.75	0.28
1976	226223	312599	139841	36804	47643	25965	9771	0.39	0.57	0.20
1977	184803	256273	113327	37415	48045	26785	7833	0.29	0.43	0.155
1978	145587	206656	84524	36168	46742	25594	7559	0.27	0.39	0.142
1979	278555	374323	182777	36022	46144	25900	10321	0.43	0.62	0.23
1980	166477	240942	92018	33006	42833	23179	13130	0.54	0.79	0.30
1981	464972	605982	323958	36517	46658	26376	17103	0.84	1.21	0.47
1982	724433	920802	528058	57440	71500	43380	13000	0.46	0.67	0.25
1983	784556	993182	575938	76388	93818	58958	24981	0.56	0.79	0.32
1984	666197	851616	480784	78994	96722	61266	26779	0.47	0.66	0.28
1985	642488	815309	469671	85081	103564	66598	20426	0.32	0.45	0.188
1986	654169	821436	486904	93073	112716	73430	25024	0.37	0.51	0.22
1987	1200230	1453961	946439	105472	126789	84151	26200	0.39	0.55	0.23
1988	475514	605932	345088	108978	131881	86079	20447	0.23	0.33	0.135
1989	575732	726301	425159	95704	116137	75271	23254	0.29	0.40	0.172
1990	503380	643048	363712	89224	109110	69338	18404	0.25	0.35	0.146
1991	207415	287852	126968	71049	88243	53855	25562	0.38	0.53	0.23
1992	962480	1182039	742921	70955	86887	55023	21127	0.48	0.69	0.28
1993	359813	475826	243794	73640	90500	56780	18618	0.33	0.46	0.190
1994	768796	957052	580548	80405	97815	62995	19300	0.32	0.45	0.192
1995	722078	901324	542836	81907	98932	64882	23305	0.39	0.54	0.24
1996	352309	463509	241111	72428	88163	56693	18816	0.31	0.43	0.185
1997	372858	489112	256608	59884	73358	46408	20496	0.41	0.57	0.25
1998	248780	338266	159294	47984	59675	36293	18041	0.45	0.62	0.27
1999	486666	622145	351195	41994	52244	31744	18485	0.62	0.87	0.38
2000	477218	610357	344083	42058	52569	31548	17191	0.63	0.88	0.38
2001	493295	634271	352309	41690	52703	30677	15269	0.53	0.76	0.31
2002	541125	699792	382448	53818	67673	39963	7465	0.21	0.31	0.113
2003	141584	209043	74117	42833	54876	30790	11536	0.31	0.44	0.169
2004	361343	488689	233991	39041	51556	26526	12743	0.39	0.57	0.21
2005	1057130	1384361	729839	54401	71860	36942	9494	0.31	0.46	0.153
2006	355901	494188	217612	67024	89012	45034	6944	0.133	0.20	0.065
2007	723893	970811	476969	69764	92931	46597	7636	0.132	0.198	0.066
2008	294385	423058	165722	82687	110119	55255	5872	0.079	0.120	0.039
2009	1011860	1327930	695870	94170	122710	65630	5745	0.076	0.114	0.038
2010	751592	1010271	492909	102117	130562	73678	8370	0.101	0.149	0.053
2011	956829	1265060	648600	110331	139318	81342	11470	0.130	0.190	0.070
2012	631242	868184	394296	100126	126514	73746	21820	0.25	0.37	0.141
2013	365882	546329	185431	88219	112611	63827	16247	0.21	0.31	0.116
2014	304081	473332	134828	68225	87622	48828	19574	0.32	0.47	0.179
2015	175780	295246	56314	44041	57385	30697	18355	0.46	0.66	0.26
2016	204642	319259	90021	26000	34530	17470	16318	0.77	1.09	0.44
2017	60833	99404	22262	11791	16914	6668	10767	1.18	1.65	0.70
2018	51314	84054	18574	6082	9788	2375	4418	1.16	1.78	0.55
2019	180019	296905	63135	6168	10309	2027	1841	0.73	1.31	0.143
2020	108106	200395	15825	8741	14453	3028	132	0.023	0.042	0.0053
2021	260375	627850	0	15084	25474	4694	745	0.069	0.120	0.0178
2022	197044***			19349*						

* From the short-term forecast.

** SSB estimated at spawning time (1 October).

*** Stock–recruitment relationship based on SSB_{2020} from the assessment output.

^ Assessment year (1 April–31 March).

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Herring (*Clupea harengus*) in divisions 7.a South of 52°30'N, 7.g-h, and 7.j-k (Irish Sea, Celtic Sea, and southwest of Ireland). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, her.27.irls. https://doi.org/10.17895/ices.advice.19448003.

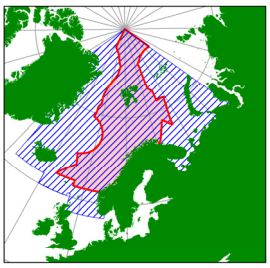
NORWEGIAN SPRING-SPAWNING HERRING

(The Northeast Atlantic and the Arctic Ocean)

Sub-areas 1, 2 and 5 and in Divisions 4.a and 14.a

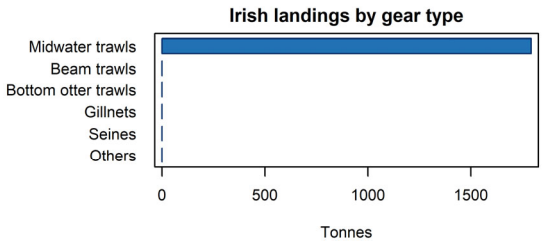
ADVICE FOR 2023

ICES advises that when the long-term management strategy agreed by the European Union, the Faroe Islands, Iceland, Norway, and the Russian Federation is applied, catches in 2023 should be no more than 511,171 t.



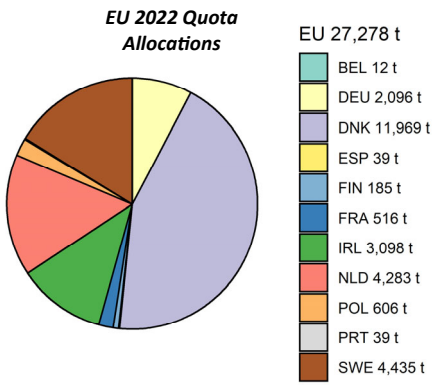
KEY POINTS

ICES Assessment Category	1(Quantitative Assessment)	
Management Plan	Yes (EU, the Faroe Islands, Iceland, Norway, and Russia in 2018)	
Advice Basis	Management plan	Catch = 511,171 t
Ranges	F_{MSY} Range Lower	Not Appropriate
	F_{MSY}	Catch = 568,410 t
	F_{MSY} Range Upper	Not Appropriate
Landing Obligation	From 2015	No derogations or exemptions relevant to Ireland



MANAGEMENT IN 2022

- A long term management strategy (LTMS) was agreed by Coastal States; the EU, the Faroe Islands, Iceland, Norway, and Russia in 2018.
- ICES considers that the HCR proposed for the LTMS is consistent with the precautionary approach.
- Since 2013, there has been no agreement by the Coastal States on TAC sharing. This has led to unilaterally set quotas, which together are higher than the TAC indicated by the management plan.
- In 2022, the sum of the declared national quotas is 827,963 t, which is above the ICES advice of 598,588 t.
- The Irish quota is allocated to a small number of vessels on a lottery basis.
- EU access to the Norwegian sector where the most fishable aggregations occur is negotiated on a yearly basis. The Irish quota is not useable without EU access to the Norwegian EEZ.



KEY STOCK CONSIDERATIONS

- The stock has stabilised, following a steady decline since 2008, SSB is estimated to be above MSY $B_{trigger}$ in 2022.
- Fishing mortality has increased since 2015 and is estimated to be above F_{MSY} in 2021.
- The advice is based on the target fishing mortality in the long-term management strategy, but it does not take into account the deviations from the plan as evident from the sum of declared unilateral quotas.
- SSB is predicted to decline below MSY $B_{trigger}$ in 2024 following the management plan advice for 2023.

- The only available catch data from Russian Federation for 2021 was total catch by ICES division from the ICES preliminary catch database, and no Russian catch samples were available.
- The 2016 year-class is expected to dominate the catches in 2023 and the subsequent year classes recruiting to the fishery are estimated to be weak.
- Irish vessels were unable to catch their full quota in 2021 due to the EU quota being exhausted before they had the opportunity to fully exploit their share of the EU quota.

Published 30 September 2022

Herring (*Clupea harengus*) in subareas 1, 2, and 5, and in divisions 4.a and 14.a, Norwegian spring-spawning herring (the Northeast Atlantic and the Arctic Ocean)

ICES advice on fishing opportunities

ICES advises that when the long-term management strategy agreed by the European Union, the Faroe Islands, Iceland, Norway, and the Russian Federation is applied, catches in 2023 should be no more than 511 171 tonnes.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and between F_{pa} and F_{lim}; spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

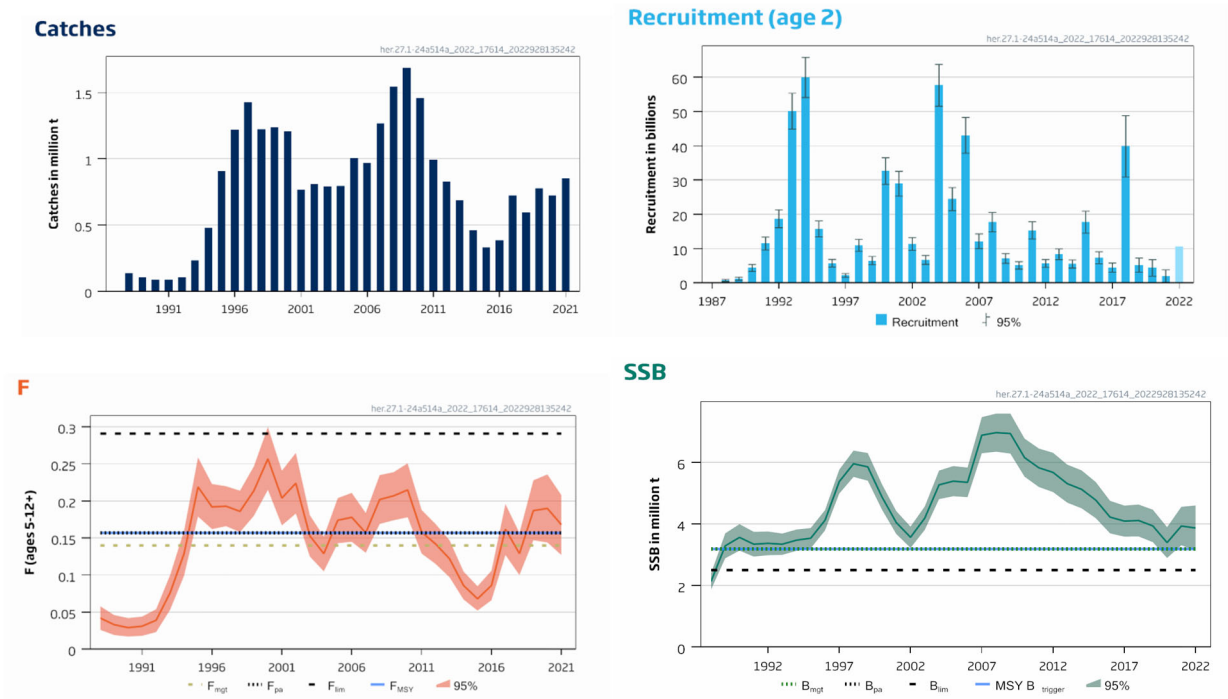


Figure 1 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour.

Catch scenarios

Table 1 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 5–12+}$ (2022)	0.192	Based on assumed catches in 2022
SSB (2023)	3 531 608	From the assessment model; in tonnes
$R_{age\ 2}$ (2022)	10.671	Median stochastic recruitment based on the years 1988–2021; in billions
$R_{age\ 2}$ (2023)	10.671	Median stochastic recruitment based on the years 1988–2021; in billions
Catch (2022)	827 963	Sum of declared unilateral quotas from the individual parties; in tonnes

Table 2 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	F (2023)	SSB (2024)	% SSB change*	% catch change**	% advice change***
ICES advice basis						
Agreed management strategy^	511171	0.14	3147970	−11	−38	−15
Other scenarios						
MSY approach: F_{MSY}	568410	0.157	3098334	−12	−31	−5
F = 0	0	0	3592990	2	−100	−100
F_{pa}	568410	0.157	3098334	−12	−31	−5
F_{lim}	986742	0.291	2736980	−23	19	65
$SSB_{2024} = B_{lim}$ ^^	1262850	0.390	2500025	−29	53	111
$SSB_{2024} = B_{pa} = MSY\ B_{trigger}$^^	469646	0.128	3184005	−10	−43	−22
$F = F_{2022}$	684536	0.192	2997770	−15	−17	14

* SSB_{2024} relative to SSB_{2023}.
** Catch in 2023 relative to ICES estimated catch in 2022 (827 963 tonnes).
*** Advice value 2023 relative to advice value 2022 (598 588 tonnes).
^ According to the harvest control rule in the management strategy F (2023) = F_{mgt} = 0.14, since the SSB is forecasted to be above $B_{trigger}$ on 1 January 2023.
^^ SSB_{2024} values are the closest available approximation to B_{lim} and $B_{trigger}$.

The advice for 2023 is 15% lower than for 2022 because the stock size is declining as a result of low recruitment since the large 2016 year class.

Basis of the advice

Table 3 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). The basis of the advice.

Advice basis	Management strategy
Management strategy	A long-term management strategy was agreed by the European Union, the Faroe Islands, Iceland, Norway, and Russian Federation in 2018 (Anon, 2018). ICES has evaluated the long-term management strategy and found it to be precautionary (ICES, 2018a).

Quality of the assessment

The estimated SSB and fishing mortality are generally in line with the estimates from last year's assessment.

The only available catch data from Russian Federation for 2021 was total catch by ICES division from ICES preliminary catch database, and no Russian catch samples were available. Historically, preliminary catches are comparable to ICES final estimated catch. There were adequate samples from other fishing nations operating in the same areas, which were used to estimate catch-at-age and weight-at-age.

The Barents Sea survey (IESNS; A3675) was not conducted in 2022. There was no survey information on age 2, and therefore median stochastic recruitment based on the years 1988–2021 was used instead in the forecast. However, this has negligible impact on the advised catches.

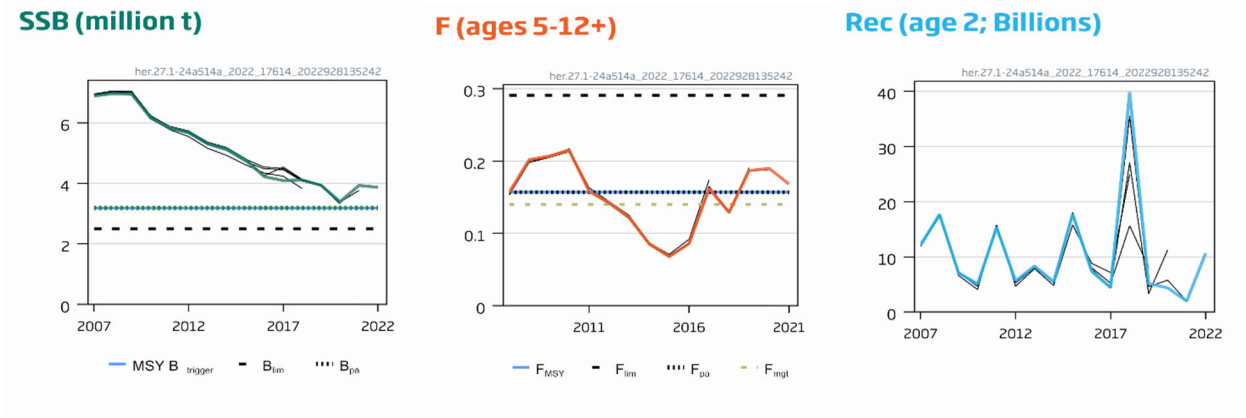


Figure 2 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Historical assessment results.

Issues relevant for the advice

The 2016 year class is expected to dominate the catches in 2023, and the subsequent year classes recruiting to the fishery are estimated to be weak.

SSB is predicted to be below SSB_{mgt} in 2024 if F_{mgt} is applied in 2023.

There has been an overshoot of the catches in relation to the advised TAC since 2013. The advice is based on the target fishing mortality in the long-term management strategy agreed by the European Union, the Faroe Islands, Iceland, Norway, and the Russian Federation; it does not consider the deviations from the long-term management strategy as evident from the sum of declared unilateral quotas. During the evaluation of the long-term management strategy (ICES, 2018a), the implementation error in the form of a consistent overshoot of the TAC was not included. Therefore, failing to adhere to the advised catches as derived from the application of the long-term management strategy may not be precautionary. Specifically, this may result in an increased risk for the stock to fall below B_{lim}, loss of catch in the long term, and unsustainable utilization of the resource.

Reference points

Table 4 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Reference points, values, and their technical basis. F values corresponded to fishing mortality weighted by the population numbers, for ages 5–12+.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	3.184	B_{pa}; in million tonnes.	ICES (2018b)
	F_{MSY}	0.157	Stochastic simulations with Beverton–Holt, segmented regression, and Ricker stock–recruitment relationships, capped to F_{P05}	ICES (2018a)
Precautionary approach	B_{lim}	2.5	MBAL (accepted in 1998) ; in million tonnes	ICES (2018b)
	B_{pa}	3.184	Based on B_{lim} and assessment uncertainties. $B_{lim} \times \exp(1.645 \times \sigma)$, with $\sigma = 0.147$; in million tonnes	ICES (2018b)
	F_{lim}	0.291	Equilibrium scenarios with stochastic recruitment: F value corresponding to 50% probability of (SSB < B_{lim})	ICES (2018a)
	F_{pa}	0.157	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability	ICES (2018a, 2021)
EU–Faroes–Iceland–Norway–Russian Federation long-term management strategy	SSB_{mgt_lower}	2.5	Precautionary HCR evaluated by MSE. SSB values in million tonnes.	ICES (2018a)
	SSB_{mgt}	3.184		
	F_{mgt_lower}	0.05		
	F_{mgt}	0.14		

Basis of the assessment

Table 5 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Statistical assessment model (XSAM; ICES, 2016) that uses catches in the model and in the forecast and also includes uncertainty in catches and abundance indices
Input data	Assessment period 1988–2022: commercial catches-at-age (stock weight-at-age from surveys and, since 2009, from catch sampling). Three survey indices: Norwegian acoustic survey on spawning grounds in February/March (NASF [A7918]; 1988–1989, 1994–1996, 1998–2000, 2005–2008, 2015–2022); International Ecosystem Survey in the Nordic Seas (IESNS; A3675) covering the adult stock in the Nordic seas (1996–2022), and the juvenile stock in the Barents Sea (1991–2002, 2005–2007, 2009-2019, 2021). Maturity ogive variable by year-class strength. Natural mortalities are fixed values from historical analyses (age 2 = 0.9; ages greater than 2 = 0.15).
Discards and bycatch	Not included, considered negligible
Indicators	None
Other information	This stock was benchmarked in 2016 (ICES, 2016). A re-evaluation of reference points and the current management plan took place in 2018 (ICES, 2018a, 2019b).
Working group	Working Group on Widely Distributed Stocks (WGWIDE; ICES 2022b).

History of the advice, catch, and management

Table 6 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). ICES advice and landings. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Sum of agreed quotas	ICES catch
1987	TAC	150000	115000	127306
1988	TAC	120000–150000	120000	135301
1989	TAC	100000	100000	103830
1990	TAC	80000	80000	86411
1991	No fishing from a biological point of view	0	76000	84683
1992	No fishing from a biological point of view	0	98000	104448
1993	No increase in F	119000	200000	232457
1994	Gradual increase in F towards $F_{0.1}$; TAC suggested	334000	450000	479228
1995	No increase in F	513000	900000*	905501
1996	Keep SSB above 2.5 million tonnes	-	1425000*	1220283
1997	Keep SSB above 2.5 million tonnes	-	1500000	1426507
1998	Do not exceed the harvest control rule	-	1300000	1223131
1999	Do not exceed the harvest control rule	1263000	1300000	1235433
2000	Do not exceed the harvest control rule	≤ 1500000	1250000	1207201
2001	Do not exceed the harvest control rule	753000	850000	766136
2002	Do not exceed the harvest control rule	853000	850000	807795
2003	Do not exceed the harvest control rule	710000	711000*	789510
2004	Do not exceed the harvest control rule	825000	825000*	794066
2005	Do not exceed the harvest control rule	890000	1000000*	1003243
2006	Do not exceed the harvest control rule	732000	967000*	968958
2007	Do not exceed the harvest control rule	1280000	1280000	1266993
2008	Do not exceed the harvest control rule	1518000	1518000	1545656
2009	Do not exceed the harvest control rule	1643000	1643000	1687371
2010	Do not exceed the harvest control rule	1483000	1483000	1457015
2011	See scenarios in the 2010 advice	988000–1170000	988000	992997
2012	Follow the management plan	833000	833000	826000
2013	Follow the management plan	619000	692000*	684743
2014	Follow the management plan	418487	436893*	461306
2015	Follow the management plan	283013	328206*	328740
2016	Follow the management plan	≤ 316876	376612*	383174
2017	Follow the management plan	≤ 437364**	805142*	721566
2018	Follow the management plan	≤ 384197	546448*	592899
2019	Follow the management strategy, F_{mgt} = 0.14 and B_{mgt} = 3.184 million tonnes	≤ 588562	773750*	777165

Year	ICES advice	Catch corresponding to advice	Sum of agreed quotas	ICES catch
2020	Follow the management strategy, F_{mgt} = 0.14 and B_{mgt} = 3.184 million tonnes	≤ 525594	693915*	720937
2021	Follow the management strategy, F_{mgt} = 0.14 and B_{mgt} = 3.184 million tonnes	≤ 651033	881097*	851813
2022	Follow the management strategy, F_{mgt} = 0.14 and B_{mgt} = 3.184 million tonnes	≤ 598588	827963*	
2023	Follow the management strategy, F_{mgt} = 0.14 and B_{mgt} = 3.184 million tonnes	≤ 511171		

* There was no agreement on the TAC; the number is the sum of the declared unilateral quotas from the individual parties.
** Value corrected in October 2017 (previously 646 075 tonnes).

Table 7 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Catches inside and outside the NEAFC Regulatory Area (RA), as estimated by ICES, as well as total landings. Weights are in tonnes.

Year	Inside the NEAFC RA	Outside the NEAFC RA	Total catches	Percentage inside the NEAFC RA
2019	281092	496073	777165	36
2020	95322	625615	720937	13
2021 *	20347	738626	758972	2

* Without catches from the Russian Federation which did not report catches inside/outside the NEAFC RA for 2021. In the past, around 50% of Russian catches were taken inside the NEAFC RA.

History of the catch and landings

Table 8 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Catch distribution by fleet in 2021 as estimated by ICES.

Catch (2021)	Landings		Discards
851813 tonnes	48% purse seine	52% pelagic trawl	Discarding is considered to be negligible, but some slippage is known to occur
	851813 tonnes		

Table 9 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). History of commercial landings; ICES estimated values are presented for each country participating in the fishery. All weights are in tonnes.

Year	Norway	Russian Federation*	Denmark	Faroes	Iceland	Ireland	Netherlands	Greenland	UK	Germany	France	Poland	Sweden	Total
198	199256	26000	-	-	-	-	-	-	-	-	-	-	-	225256
198	108417	18889	-	-	-	-	-	-	-	-	-	-	-	127306
198	115076	20225	-	-	-	-	-	-	-	-	-	-	-	135301
198	88707	15123	-	-	-	-	-	-	-	-	-	-	-	103830
199	74604	11807	-	-	-	-	-	-	-	-	-	-	-	86411
199	73683	11000	-	-	-	-	-	-	-	-	-	-	-	84683
199	91111	13337	-	-	-	-	-	-	-	-	-	-	-	104448
199	199771	32645	-	-	-	-	-	-	-	-	-	-	-	232457
199	380771	74400	-	2911	21146	-	-	-	-	-	-	-	-	479228
199	529838	10198	3057	57084	17410	-	7969	2500	881	556	-	-	-	905501
199	699161	11929	6068	52788	16495	1954	1966	-	4613	1197	-	-	2242	122028
199	860963	16890	4429	59987	22015	1117	8694	-	2514	6190	150	-	1949	142650
199	743925	12404	3551	68136	19778	2437	1282	-	1597	7003	605	-	1486	122313
199	740640	15732	3701	55527	20338	2412	5871	-	1920	-	-	-	1405	123543
200	713500	16326	3496	68625	18603	8939	-	-	1409	3298	-	-	1474	120720
200	495036	10905	2403	34170	77693	6070	6439	-	1223	1588	-	-	9818	766136
200	487233	11376	1899	32302	12719	1699	9392	-	3482	3017	-	122	9486	807795
200	477573	12284	1414	27943	11791	1400	8678	-	9214	3371	-	-	6431	789510
200	477076	11587	2311	42771	10278	11	1736	-	1869	4810	400	-	7986	794066
200	580804	13209	2836	65071	15646	-	2151	-	-	1767	0	561	680	100324
200	567237	12083	1844	63137	15747	4693	1162	-	1252	9958	80	-	2946	968958
200	779089	16243	2291	64251	17362	6411	2976	4897	1324	6038	0	433	0	126699
200	961603	19311	3112	74261	21760	7903	2815	3810	1973	8338	0	0	0	154565
200	101667	21010	3232	85098	26547	1001	2402	3730	2547	1445	0	0	0	168737
201	871113	19947	2679	80281	20586	8061	2669	3453	2415	1113	0	0	0	145701
201	572641	14442	2674	53271	15107	5727	8348	3426	1404	1329	0	0	0	992997
201	491005	11859	2175	36190	12095	4813	6237	1490	1231	1194	0	0	705	826000
201	359458	78521	1716	10503	90729	3815	5626	1178	8342	4244	0	0	23	684743
201	263253	60292	1251	38529	58828	706	9175	1310	4233	669	0	0	0	461306
201	176321	45853	9105	33031	42625	1400	5255	1243	55	2660	0	0	0	328740
201	197501	50455	1038	44727	50418	2048	3519	1750	4031	2582	0	0	0	383174
201	389383	91118	1903	98170	90400	3495	6679	1256	4358	5201	0	1	1155	721566
201	332028	64185	1705	82062	83393	2428	4290	2465	2582	1989	0	0	425	592899
201	430507	84364	2120	11394	10804	2775	5111	3190	1801	4188	0	132	705	777165
202	409436	74936	1652	10302	98173	2704	5060	3546	143	2969	0	135	3065	720937
202	489632	92841	1585	11429	11429	1793	1093	6456	0	3365	0	124	1101	851813

* USSR before 1992

^ From ICES preliminary catch database

Summary of the assessment

Table 10 Herring in subareas 1, 2, and 5, and in divisions 4.a and 14.a (Norwegian spring-spawning herring). Assessment summary. All weights are in tonnes and recruitment in thousands. F is the fishing mortality weighted by population numbers.

Year	Recruitment (age 2)			SSB			Total catch	F (ages 5–12+)		
	Low	Value	High	Low	Value	High		Low	Value	High
1988	349000	672000	996000	1863000	2126000	2389000	135301	0.026	0.042	0.058
1989	693000	1173000	1653000	2881000	3287000	3694000	103830	0.0190	0.033	0.046
1990	3320000	4339000	5358000	3131000	3562000	3993000	86411	0.0170	0.029	0.042
1991	9592000	11466000	13340000	2937000	3340000	3743000	84683	0.0180	0.031	0.044
1992	16058000	18683000	21308000	2982000	3368000	3753000	104448	0.023	0.039	0.054
1993	44859000	50101000	55342000	2993000	3340000	3687000	232457	0.053	0.076	0.100
1994	54096000	59953000	65811000	3125000	3471000	3817000	479228	0.099	0.129	0.160
1995	13419000	15751000	18082000	3205000	3536000	3868000	905501	0.179	0.22	0.26
1996	4601000	5722000	6843000	3787000	4118000	4450000	1220283	0.162	0.192	0.22
1997	1587000	2152000	2716000	4984000	5374000	5765000	1426507	0.166	0.193	0.22
1998	9163000	10941000	12719000	5526000	5954000	6383000	1223131	0.158	0.186	0.21
1999	5246000	6461000	7677000	5403000	5854000	6304000	1235433	0.180	0.21	0.25
2000	28751000	32626000	36501000	4458000	4873000	5287000	1207201	0.22	0.26	0.30
2001	25328000	28927000	32527000	3669000	4043000	4416000	766136	0.167	0.20	0.24
2002	9465000	11339000	13212000	3218000	3565000	3913000	807795	0.183	0.22	0.27
2003	5399000	6678000	7956000	3806000	4189000	4571000	789510	0.125	0.153	0.181
2004	51584000	57658000	63732000	4805000	5269000	5734000	794066	0.105	0.129	0.152
2005	21072000	24428000	27784000	4898000	5389000	5880000	1003243	0.143	0.174	0.20
2006	37840000	43044000	48247000	4868000	5350000	5832000	968958	0.145	0.178	0.21
2007	9976000	12127000	14277000	6294000	6882000	7471000	1266993	0.130	0.157	0.184
2008	14863000	17706000	20549000	6346000	6965000	7584000	1545656	0.169	0.20	0.24
2009	5681000	7109000	8536000	6285000	6937000	7588000	1687373	0.174	0.21	0.24
2010	3977000	5074000	6171000	5533000	6154000	6775000	1457014	0.178	0.22	0.25
2011	12785000	15315000	17846000	5198000	5824000	6450000	992998	0.129	0.158	0.188
2012	4504000	5658000	6812000	5034000	5673000	6312000	825999	0.115	0.142	0.169
2013	6760000	8319000	9879000	4687000	5307000	5926000	684743	0.097	0.122	0.147
2014	4300000	5491000	6681000	4506000	5123000	5741000	461306	0.067	0.086	0.105
2015	14504000	17709000	20913000	4183000	4772000	5360000	328740	0.052	0.068	0.085
2016	5588000	7341000	9094000	3690000	4220000	4750000	383174	0.066	0.086	0.106
2017	3113000	4432000	5752000	3585000	4091000	4596000	721566	0.127	0.162	0.196
2018	30907000	39850000	48793000	3590000	4110000	4630000	592899	0.100	0.129	0.157
2019	3066000	5149000	7231000	3406000	3934000	4463000	777165	0.147	0.187	0.23
2020	1958000	4358000	6757000	2891000	3393000	3895000	720937	0.144	0.190	0.24
2021	148000	1958000	3768000	3304000	3930000	4555000	851813	0.127	0.168	0.21
2022		10671000		3134000	3867000	4600000				

Sources and references

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Download the stock assessment data and figures.

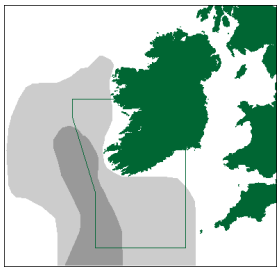
Recommended citation: ICES. 2022. Herring (*Clupea harengus*) in subareas 1, 2, 5 and divisions 4.a and 14.a, Norwegian spring-spawning herring (the Northeast Atlantic and Arctic Ocean). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, her.27.1-24a514a. https://doi.org/10.17895/ices.advice.19772380

HORSE MACKEREL

(*TRACHURUS TRACHURUS*)

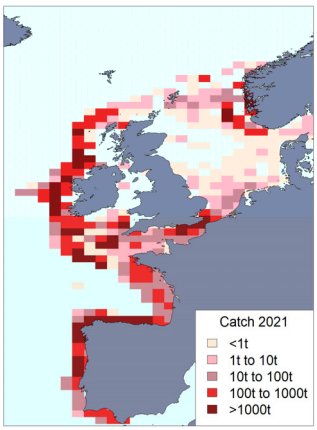
BIOLOGY – SPECIES

Horse mackerel is a widely-distributed pelagic species, sometimes regarded as semi-pelagic as they are often found near the seabed. They are a relatively long lived species that can live for more than 26 years. Large fluctuations in year class strength are a feature of horse mackerel stocks. Maturity is reached between the ages of 2 and 4. The western stock spawns in the Celtic Sea in June, followed by a northerly feeding migration. The stock may enter the North Sea from the north with abundance associated with the influx of Atlantic water. The return migration takes place in late autumn. Juveniles are pelagic feeders while larger individuals feed closer to the bottom, mainly on 0-group fish.

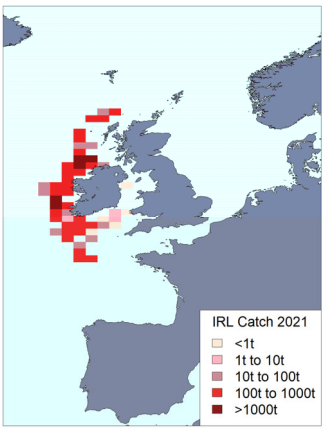


Horse Mackerel Spawning Areas

LANDINGS DISTRIBUTION



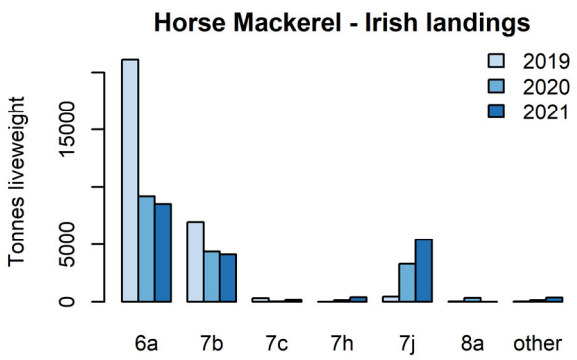
◀ The distribution of international landings of horse mackerel in 2021. Catches were mainly taken west of Ireland, off the Iberian coast, in the eastern Channel and northern North Sea.

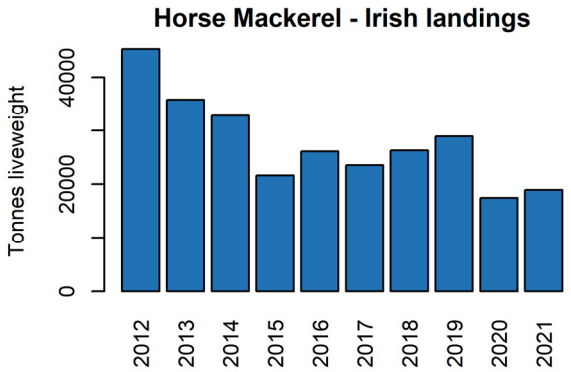


◀ The distribution of Irish catches of horse mackerel in 2021. Most of the catches were taken west of Ireland.

IRISH LANDINGS AND VALUE OF TAC

On average, approximately 21,800 tonnes of horse mackerel were caught and landed by Irish vessels between 2019 and 2021, mainly from subareas 6.a and 7.b. In 2021 landings were worth approximately €16.5 million for Irish vessels.



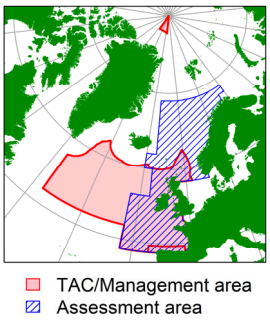


Western Horse Mackerel

Sub-area 8 and Divisions 2.a, 4.a, 5.b, 6.a, 7.a–c and 7.e–k

Advice for 2023

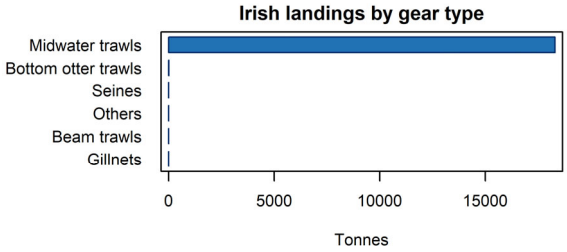
ICES advises that when the MSY approach is applied there should be zero catch in 2023.



Key Points

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	No	
Advice Basis	ICES MSY approach	Catch=0 t
	F_{MSY} Range Lower	Not available
Ranges	F_{MSY}	Catch=73,950 t
	F_{MSY} Range Upper	Not available
Landing Obligation	From 2015	Area and gear specific de minimis exemptions in 2021-23*

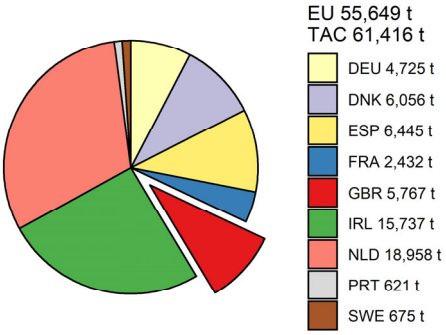
* Commission delegated regulation 2020/2015



Management in 2022

- The TAC only applies to EU and UK waters. There are occasional fisheries outside the TAC area that are not limited by the TAC.
- Since 2005, ICES advice for the Western Stock has included Division 8.c, although the EU continues to set a separate TAC for Division 8.c.
- Up to 5% of the quota may be fished in United Kingdom and EU waters of Divisions 2.a and 4.a before 30th June and counted against the North Sea Horse Mackerel quota.
- Up to 5% of the quota may consist of bycatches of boarfish, haddock, whiting and mackerel provided that, in combination with provisions for other bycatch species, the total does not exceed 9% of the quota.

2022 quota allocation for Divisions 2.a, 4.a, 5.b, 6, 7a-c, 7e-k, 8abde, 12 and 14



Key Stock Considerations

- The 2022 assessment shows the same trend as the previous assessment, but rescales the absolute level of SSB and F. SSB is below B_{lim} (834,480 t) and forecast to remain below in 2024 under all catch scenarios.
- F has been revised upward with the current estimate above F_{MSY} (0.074) and between F_{pa} (0.079) and F_{lim} (0.103).
- In the past, the stock and fishery have been dependent on occasional high recruitments. Recruitment estimates for 2014-2018 were around average but are estimated to be low from 2019 -2021.
- The Pelagic Advisory Council have proposed a rebuilding plan for this stock. This was reviewed by ICES in 2021 and was found to be precautionary in the long term. A catch scenario consistent with the plan has been provided by ICES this year. The recovery time frame will differ from that indicated during the evaluation as the perception of the stock has changed following the 2022 assessment.

Published 30 September 2022

Horse mackerel (*Trachurus trachurus*) in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k (Northeast Atlantic)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied there should be zero catch in 2023.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and between F_{pa} and F_{lim}; spawning-stock size is below MSY $B_{trigger}$, B_{pa}, and B_{lim}.

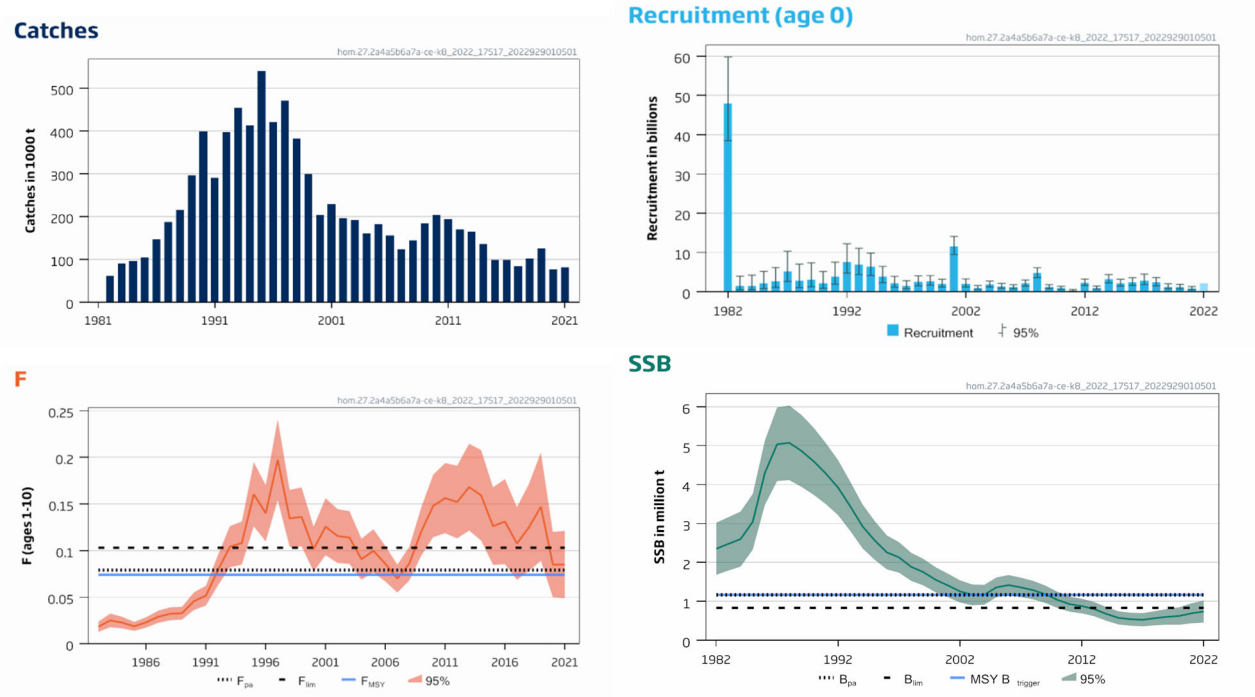


Figure 1 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a paler colour.

Catch scenarios

Table 1 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Values in the forecast and for the interim year

Variable	Value	Notes
$F_{ages\ 1–10}$ (2022)	0.072	Based on assumed catches in 2022
SSB (2023)	754 163	Short-term forecast; in tonnes
$R_{age\ 0}$ (2022–2023)	2 174 351	Geometric mean (1983–2021); in thousands
Catch (2022)	71 138	TAC for 2022; in tonnes

Table 2 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	F (2023)	SSB (2024)	% SSB change*	% advice change**
ICES advice basis					
MSY approach: F = 0	0	0	805 946	6.9	−100
Other scenarios					
$F = F_{MSY}$	73 950	0.074	737 593	−2.2	3.95
$F = F_{P05} = F_{pa}$	78 719	0.079	733 196	−2.8	10.7
$F = F_{lim}$	101 225	0.103	712 460	−5.5	42.3
SSB_{2024} = MSY $B_{trigger}$ or B_{pa} or B_{lim}***					
$SSB_{2024} = SSB_{2023}$ ^	56 059	0.055	754 102	0.0	−21.2
$F = F_{2022}$	71 813	0.072	739 564	−1.94	0.95
PelAC proposed HCR^^	15 513	0.015	791 583	4.96	−78

* SSB 2024 relative to SSB 2023 (754 163 t).
** Advice value for 2023 relative to advice value for 2022 (71 138 tonnes).
*** The B_{pa}, B_{lim}, and MSY $B_{trigger}$ options were left blank because none of them be achieved in 2024, even with a zero catch in 2023.
^ Closest available approximation to SSB_{2023}.
^^ HCR proposed by PelAC 2020 and reviewed by ICES (ICES, 2021a). The recovery time frame will differ from that indicated during the evaluation in 2020 as the perception of the stock has changed.

The catch advice for 2023 is 100% lower compared to that provided in 2022. The stock has been revised down in the latest assessment such that SSB is below B_{lim} and is forecast to remain below B_{lim} in 2024 even under a scenario of zero catch in 2023.

Basis of the advice

Table 3 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for horse mackerel in this area

Quality of the assessment

Recent assessments show a strong retrospective pattern with a consistent downward revision in absolute level of SSB and an upward revision in F. However, this does not affect the zero catch advice for 2023.

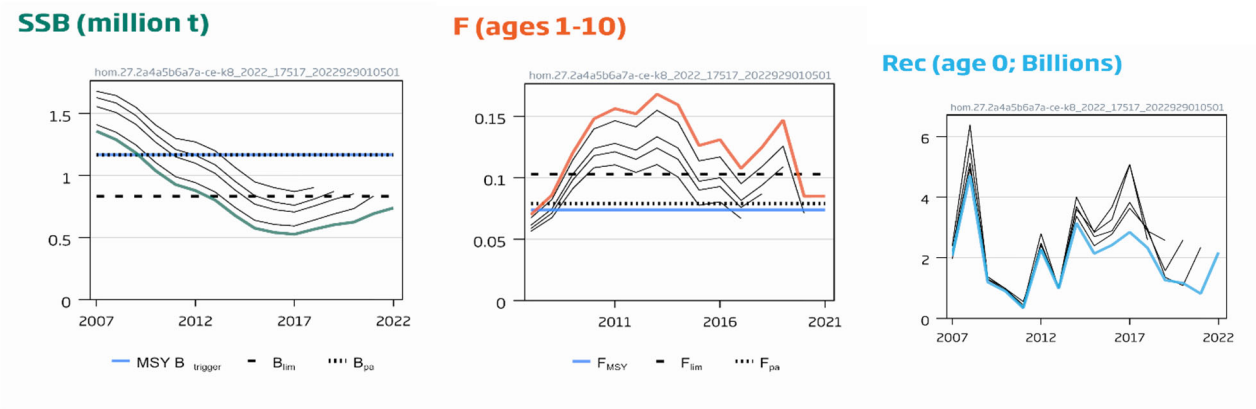


Figure 2 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Historical assessment results. The reference points were revised in 2019 following an interbenchmark (ICES, 2019), and only the last four assessment results should be compared to the reference points.

Issues relevant for the advice

ICES provides zero-catch advice for this stock in 2023 because the SSB remains below B_{lim} by 2024 under all catch scenarios.

Reference points

Table 4 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	1 168 272	B_{pa}; in tonnes	ICES (2019)
	F_{MSY}	0.074	Stochastic simulations (EqSim)	ICES (2019)
Precautionary approach	B_{lim}	834 480	B_{pa}/1.4; in tonnes	ICES (2019)
	B_{pa}	1 168 272	SSB_{2003}; in tonnes	ICES (2019)
	F_{lim}	0.103	Stochastic simulations (EqSim)	ICES (2019)
	F_{pa}	0.079	The F that provides a 95% probability for SSB to be above B_{lim} (F_{P05})	ICES (2019, 2021b)
	F_{P05}	0.079	Stochastic simulations (EqSim)	ICES (2019)
Management plan	SSB_{mgt}			
	F_{mgt}			

Basis of the assessment

Table 5 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Length- and age-based analytical assessment (Stock Synthesis 3; NOAA Toolbox)
Input data	Commercial catches: international catches, length and age data from catch sampling. Three survey indices: triennial egg survey index (I4189, 1992–2019); a combined recruitment index (2003–2021) derived from EVHOE (G9527), IGFS (G7212), SCOWCGFS (G4748 and G4815), and SWC-IBTS (G1179 and G4299); PELACUS acoustic biomass index ([A2548], 1992–2019, 2021). Length frequency distribution from the PELACUS survey. Time variant maturity-at-age. Natural mortality constant at 0.15 for all ages and years.
Discards and bycatch	Partial (prior to 2014) and full (since 2014) discards are included in the assessment.
Indicators	None
Other information	The stock was benchmarked in 2017 (ICES, 2017). The reference points were updated in 2019 (ICES, 2019) and 2021 (ICES, 2021b)
Working group	Working Group on Widely Distributed Stocks (WGWIDE; ICES 2022b)

History of the advice, catch, and management

Table 6 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. ICES advice, TACs, and catches. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice**	Agreed TAC*	ICES estimated landings***	ICES estimated discards***	ICES estimated catch***
1987	Not assessed	-	155000	187338	-	187338
1988	No increase in catches	102000	169000	210989	3740	214729
1989	If sustained catches required; TAC	100000	153000	294887	1150	296037
1990	TAC	~200000	203000	388721	9930	398651
1991	Within safe biological limits	-	230000	284623	5440	290063
1992	Within safe biological limits	-	250000	395559	1820	397379
1993	Within safe biological limits	-	250000	445484	8600	454084
1994	Prudent not to increase F	-	300000	408968	3935	412903
1995	Reduction in catch	-	300000	538611	2046	540657
1996	Reduction in catch	-	300000	403869	16870	420739
1997	Reduction in F	173000	300000	470252	158	470410
1998	Reduction in F to 0.15	150000	320000	381411	913	382324
1999	Effectively limit catches to 200 000 t	< 200000	265000	299431	0	299431
2000	Effectively limit catches to 200 000 t	< 200000	240000	202350	382	202732
2001	Effectively limit catches to 224 000 t	< 224000	233000	228827	254	229081
2002	Effectively limit catches to 98 000 t	< 98000	150000	195813	307	196120
2003	Effectively limit catches to 113 000 t	< 113000	137000	191014	842	191856
2004	Limit catches to less than 130 000 t	< 130000	137000	157386	2356	159742
2005	Limit catches to less than 150 000 t	< 150000	137000	180199	1802	182001
2006	Limit catches to less than 150 000 t	< 150000	137000	154474	1353	155827
2007	Limit catches to less than 150 000 t	< 150000	137000	122985	370	123356

Year	ICES advice	Catch corresponding to advice**	Agreed TAC*	ICES estimated landings***	ICES estimated discards***	ICES estimated catch***
2008	Follow proposed management plan	180000	170000	142875	474	143349
2009	Follow proposed management plan	180000	170000	183335	447	183782
2010	Follow proposed management plan	180000	183191	202680	432	203112
2011	See scenarios	181000–229000	195130	193268	430	193698
2012	MSY framework	≤ 211000	183000	166579	3279	169858
2013	MSY framework	≤ 126000	181000	160676	4582	165258
2014	MSY approach	≤ 110546	133220	134463	1896	136360
2015	MSY approach	≤ 99304	97603	94192	4228	98419
2016	MSY approach	≤ 126103	124403	94394	4417	98811
2017	MSY approach	≤ 69186	95500	79033	3928	82961
2018	MSY approach	≤ 117070	115470	99072	2609	101682
2019	MSY approach	≤ 145237	136376	121806	3141	124947
2020	MSY approach	≤ 83954	81796	73682	2740	76422
2021	MSY approach	≤ 81376	81375	79916	1641	81557
2022	MSY approach	≤ 71138	71138			
2023	MSY approach	0				

* EU and UK TAC.
** Division 8.c is not included prior to 2005.
*** Division 8.c is not included prior to 2003.

History of the catch and landings

Table 7 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Landings distribution by fleet in 2021 as estimated by ICES.

Catch (2021)	Landings				Discards
81 557	Pelagic trawl 45%	Otter trawl 3%	Purse seine 18%	Unspecified and other gears* 33%	1641 tonnes
	79 916 tonnes				

* Most of those catches are taken by pelagic trawls.

Table 8 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. History of commercial catch and landings; official landing values presented by area and ICES estimated discards. All weights are in tonnes.

Year	ICES divisions						Discards	Total western stock
	2.a and 5.b	3.a***	4.a	6.a–b	7.a–c and 7.e–k	8.a–e		
1982	-		-	6283	32231	22683	-	61197
1983	412		-	24881	36926	28223	-	90442
1984	23		94	31716	38782	25629	500	96744
1985	79		203	33025	35296	27740	7500	103843
1986	214		776	20343	72761	43405	8500	145999
1987	3311		11185	35197	99942	37703	-	187338
1988	6818		42174	45842	81978	34177	3740	214729
1989	4809		85304*	34870	131218	38686	1150	296037
1990	11414	14878	112753*	20794	182580	46302	9930	398645
1991	3200	2725	56157*	29726	149975	42840	5440	290063
1992	13457	2374	103725	39061	182770	54172	1820	397379
1993		850	141220	65397	193291	44726	8600	454084
1994	759	2492	106911	69616	193689	35501	3935	412903
1995	13151	128	92728	83568	320329	28707	2046	540657
1996	3366	0	16783	81311	254049	48360	16870	420739
1997	2601	2037	63646	40145	321017	40806	158	470410
1998	2544**	3693	17001	35073	284529	38571	913	382324
1999	2557^	2095	47315	40381	158733	48350		299431
2000	919^^	1014	4314	20735	121171	54197	382	202732
2001	310	134	11438	24839	117038	75067	254	229081

Year	ICES divisions						Discards	Total western stock
	2.a and 5.b	3.a***	4.a	6.a–b	7.a–c and 7.e–k	8.a–e		
2002	1324	174	36221	14843	87354	55897	307	196120
2003	36	1843	21272	23772	102379	41711	842	191856
2004	42	48	11708	22177	99284	24126	2356	159746
2005	176	284	24983	22053	91211	41491	1802	182001
2006	27	58	27156	15722	77394	34121	1353	155827
2007	366	110	4940	25949	63224	28396	370	123356
2008	572^^^	2.98	12107	25867	70570	33756	474	143349
2009	1847	17	58738	17775	71378	33580	447	183782
2010	1667	88	11442	23199	126624	39659	432	203112
2011	648	0.23	14723	39496	103156	35245	430	193698
2012	66	8.9	3311	44971	101012	17209	3279	169858
2013	30	10.0	6702	43266	83684	26983	4582	165258
2014	424	4096	10573	32444	56081	30844	1896	136360
2015	10	65	9078	24153	41063	19822	4228	98419
2016	45	0	8960	32186	35692	17511	4417	98811
2017	5	697	9332	28170	22510	18307	3939	82961
2018	718	380	8547	38896	27140	23393	2609	101682
2019	867	490	8314	47351	35144	29640	3141	124947
2020	290	96	10387	19037	24232	19639	2740	76422
2021	12	12	3751	13726	42813	19602	1641	81557

* Norwegian catches from Division 4.b included.
** Includes 1937 t from Division 5.b.
*** Catches in the western part of Division 3.a are allocated to horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k.
^ Includes 132 t from Division 5.b.
^^ Includes 250 t from Division 5.b.
^^^ All from Division 5.b.

Summary of the assessment

Table 9 Horse mackerel in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a–c, and 7.e–k. Assessment summary. High and low refer to 95% confidence intervals. All weights are in tonnes and recruitment in thousands. F is the fishing mortality weighted by population numbers.

Year	Recruitment			SSB			Total Catch	F		
	Low	Value at age 0	High	Low	Value	High		Low	Mean ages 1–10	High
1982	38491699	47973500	59790988	1680611	2351030	3021449	61197	0.0127	0.0183	0.0239
1983	498387	1409080	3983863	1791394	2477960	3164526	90442	0.0177	0.0251	0.0324
1984	5520183	1529300	4236742	1892698	2600980	3309262	96744	0.0165	0.0227	0.0290
1985	814160	2061350	5219076	2327714	3044610	3761506	103843	0.0139	0.0187	0.0236
1986	1098775	2605390	6177841	3477237	4307560	5137883	145999	0.0174	0.0230	0.0285
1987	2634346	5209590	10302300	4091365	5036810	5982255	187338	0.0224	0.0289	0.0355
1988	1057169	2733740	7069193	4113947	5073630	6033313	214729	0.0252	0.0322	0.0391
1989	1311134	3106180	7358786	3940293	4865000	5789707	296037	0.0259	0.0329	0.0398
1990	873850	2128810	5186053	3737157	4599300	5461443	398645	0.0363	0.0458	0.0553
1991	1963772	3848570	7542369	3497870	4282640	5067410	290063	0.0410	0.0517	0.0624
1992	4749191	7613940	12206729	3214272	3922920	4631568	397379	0.0625	0.0789	0.0952
1993	4361982	6952140	11080343	2808567	3443150	4077733	454084	0.0820	0.104	0.126
1994	4154507	6397130	9850332	2364242	2930260	3496278	412903	0.0849	0.108	0.131
1995	2333578	3888900	6480839	2069738	2568610	3067481	540657	0.126	0.160	0.195
1996	1145261	2130800	3964433	1822011	2258940	2695869	420739	0.110	0.140	0.170
1997	748259	1455050	2829462	1737772	2130370	2522968	470410	0.154	0.198	0.241
1998	1532223	2488060	4040171	1526143	1887400	2248657	382324	0.104	0.135	0.165
1999	1703261	2653150	4132782	1410359	1751820	2093281	299431	0.104	0.136	0.168
2000	1192835	1952630	3196389	1233816	1556520	1879224	202732	0.0774	0.102	0.126
2001	9488813	11569200	14105704	1108372	1411810	1715248	229081	0.0950	0.126	0.156
2002	1190639	1982640	3301472	973007	1257880	1542753	196120	0.0867	0.116	0.145
2003	614023	988367	1590932	898410	1167000	1435590	191856	0.0856	0.114	0.142
2004	1197612	1801970	2711309	917128	1171620	1426112	159746	0.0688	0.0908	0.113
2005	878020	1366060	2125374	1106949	1362250	1617551	182001	0.0766	0.0998	0.123
2006	720700	1137640	1795789	1160114	1418690	1677266	155827	0.0667	0.0859	0.105
2007	1432072	2071850	2997450	1108107	1359080	1610053	123356	0.0550	0.070	0.0850
2008	3614561	4713810	6147360	1051919	1290160	1528401	143349	0.0678	0.0859	0.104
2009	798308	1196590	1793578	959598	1183320	1407042	183782	0.0945	0.121	0.147
2010	567831	893847	1407042	830953	1039260	1247567	203112	0.114	0.148	0.182
2011	189719	338534	604077	733910	928577	1123245	193698	0.119	0.156	0.194
2012	1594164	2277900	3254889	691985	880027	1068069	169858	0.113	0.152	0.191
2013	655327	982006	1471534	618889	803142	987395	165258	0.122	0.168	0.215
2014	2252754	3140900	4379197	502560	679877	857194	136360	0.111	0.159	0.208
2015	1438809	2138820	3179400	406998	576525	746052	98419	0.0846	0.126	0.168
2016	1626934	2419130	3597066	374504	541909	709314	98811	0.0853	0.131	0.177
2017	1814679	2846550	4465169	357558	527801	698044	82961	0.0686	0.108	0.147
2018	1498203	2329200	3621119	385126	568172	751218	101682	0.0782	0.125	0.172
2019	779457	1260210	2037482	402220	604308	806396	124947	0.0889	0.147	0.205
2020	712122	1165290	1906838	399516	625449	851382	76422	0.0498	0.0850	0.120
2021	501332	816224	1328904	436761	693991	951221	81557	0.0489	0.0851	0.121
2022		2174351*		454253	739665	1025077				

* R (age 0) is the geometric mean of the time-series from 1983 to 2021.

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ICES. 2017. Report of the Benchmark Workshop on Widely Distributed Stocks (WKWIDE), 30 January–3 February 2017, ICES HQ, Copenhagen, Denmark. ICES CM 2017/ACOM:36. 196 pp.

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Download the stock assessment data and figures.

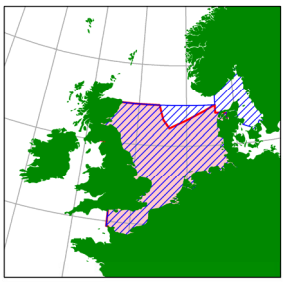
Recommended citation: ICES. 2022. Horse mackerel (*Trachurus trachurus*) in Subarea 8 and divisions 2.a, 4.a, 5.b, 6.a, 7.a-c,e–k (the Northeast Atlantic). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, hom.27.2a4a5b6a7a-ce-k8. https://doi.org/10.17895/ices.advice.19772383

North Sea Horse Mackerel

Divisions 3.a (eastern part), 4.b-c and 7.d

Advice for 2023

ICES advises that when the precautionary approach is applied, catches should be no more than 8,969 t in 2022 and 2023.



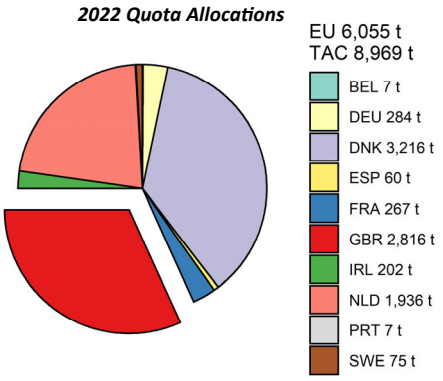
Key Points

ICES Assessment Category	3 (Trend–based assessment)	
Management Plan	No	
Advice Basis	ICES PA approach	Catch=8,969 t
Ranges	F_{MSY} Range Lower	Not Available
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Available
Landing Obligation	From 2015	Area and gear specific de minimis exemptions in 2021-23*

* Commission delegated regulations 2020/2015

Management in 2022

- The stock distribution area is Divisions 4.b-c, 7.d and also 3.a and 4.a in quarters 1 and 2.
- The agreed TAC covers 4.b-c and 7.d. There is no TAC covering Norwegian waters or the fisheries in Divisions 3.a and 4.a (quarters 1 and 2).
- Up to 5% of the quota may consist of bycatches of boarfish, haddock, whiting and mackerel provided that, in combination with provisions for other bycatch species, the total does not exceed 9% of the quota.
- Quota uptake has increased in recent years as the TAC has been reduced. The largest proportion of catch is taken in Division 7.d where a large proportion of the catch consists of juvenile fish.



Key Stock Considerations

- Advice for this stock is biennial.
- The stock is considered to remain at a low level.
- The stock was benchmarked in 2017 and an abundance index based on groundfish surveys in the North Sea was developed. Consequently, the stock is now in category 3 and the index is used to provide catch advice.
- In 2012, catches from Division 7.d accounted for over 80% of the total catch. Since then catches in this area has decreased (to 65% in 2021).

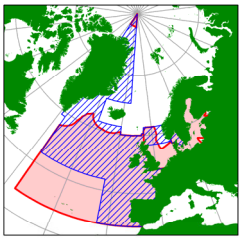
For ICES advice on Horse mackerel (*Trachurus trachurus*) in divisions 3.a, 4.b–c, and 7.d - please see:
https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2021/2021/hom.27.3a4bc7d.pdf

Ling in Northeast Atlantic and Arctic Ocean

Sub-areas 3, 4, 6 - 9, 12, and 14

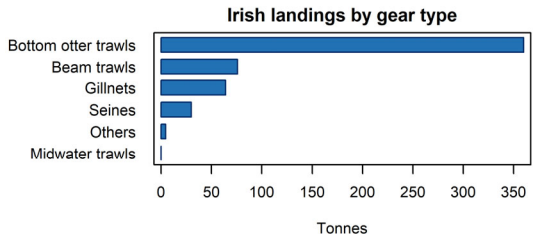
Advice for 2023

ICES advises that when the precautionary approach is applied, catches should be no more than 15,092 t in each of the years 2022 and 2023.



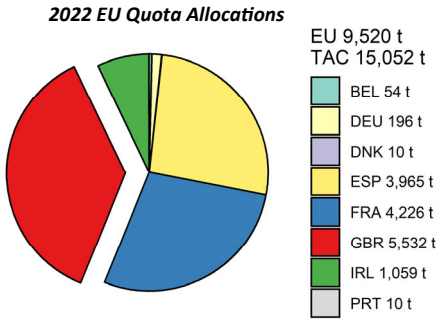
Key Points

ICES Assessment Category	3 (Trend–based assessment)	
Management Plan	No	
Advice Basis	ICES PA approach	Catch ≤15,092 t
Ranges	F_{MSY} Range Lower	Not appropriate
	F_{MSY}	Not appropriate
	F_{MSY} Range Upper	Not appropriate
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

- The areas of the TACs do not correspond to the assessment area.
- EU TACs for ling in 2022 were: 144 t for EU waters of Sub-area 3, 3,217 t for Sub-area 4, and 15,052 t for Sub-areas 6, 7, 8, 9, 10, 12 and 14, with an Irish quota of 1,059 t.
- A TAC is negotiated for Norwegian and Faroese vessels fishing in EU waters. In 2022, the Norwegian quota for Ling in EU sub-areas 5.b, 6 and 7 was 0 t, while the Faroese quota was 0 t for divisions 6.a and 6.b.
- The EU quota for Norwegian waters of Sub-area 4 is 700 t.



Key Stock Considerations

- The advice was given in 2021 for 2022 and 2023 and has not been updated this year.
- The average recent discard rate was 4.4% (average of 2018-2020).
- Preliminary international landings for 2021 were 12,358 t. Irish landings of ling in 2021 were 529 t.

Further information on this stock can be found in the 2021 Stock Book.

MACKEREL

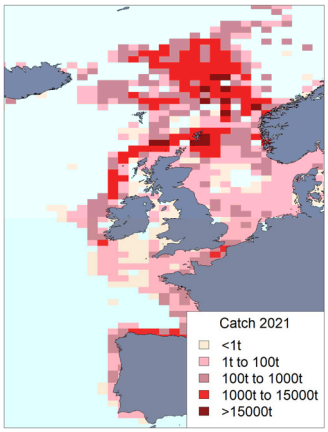
(SCOMBER SCOMBRUS)

BIOLOGY – SPECIES

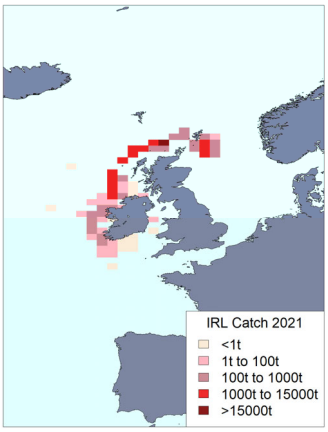
The Atlantic Mackerel is a widely distributed, migratory pelagic fish that inhabits much of the north-eastern Atlantic shelf. It is streamlined and fast swimming, forming dense shoals when migrating to spawning grounds to the south and west of Ireland. Spawning takes place between February and July after which they migrate north, disperse and feed. Diet depends on season but consists mainly of zooplankton and juvenile fish. Juvenile mackerel grow rapidly and reach 30cm after 2 years at which point more than half are mature. The majority of mackerel caught are between 4 and 8 years of age with individuals older than 15 being rare.

Mackerel Spawning Grounds off Ireland

LANDINGS DISTRIBUTION



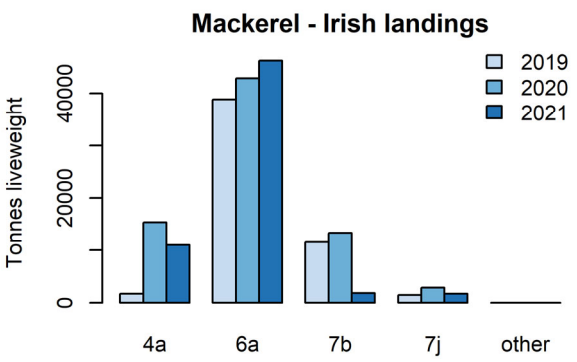
◀ The distribution of international landings in 2021 (excluding Russia). Mackerel are targeted by a number of fleets throughout the year with large catches in northern waters during summer and in the northern North Sea and to the west of Scotland and Ireland during the spawning migration.

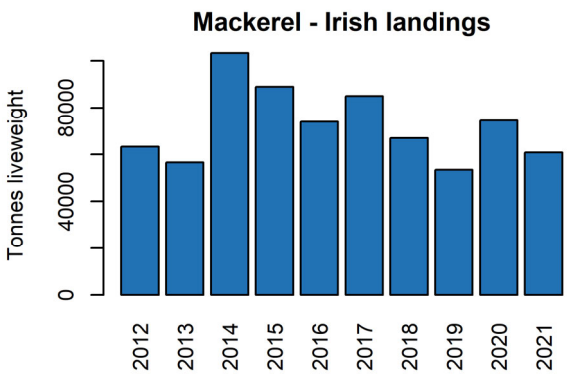


◀ Irish catches of mackerel in 2021. The Irish fleet targets large mackerel shoals as they migrate south during the winter to spawn.

IRISH LANDINGS AND VALUE OF TAC

On average, approximately 62,900 tonnes of mackerel were caught and landed annually by Irish vessels between 2019 and 2021, primarily from ICES divisions 4.a, 6.a and 7.b. It is the most valuable pelagic stock to Ireland worth approximately €70 million euros in 2021.



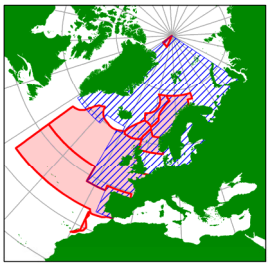


NORTHEAST ATLANTIC MACKEREL

Sub-areas 1-8 and 14 and division 9.a

ADVICE FOR 2023

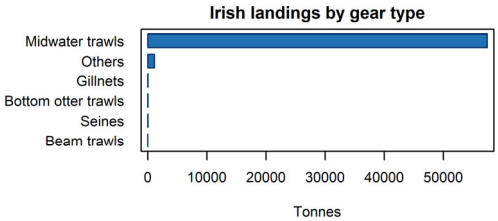
ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 782,066 t.



KEY POINTS

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	No	
Advice Basis	MSY approach	Catch=782,066 t
Ranges	F_{MSY} Range Lower	Not Appropriate
	F_{MSY}	Catch=782,066 t
	F_{MSY} Range Upper	Not Appropriate
Landing Obligation	From 2015	Area and gear specific *de minimis* and survivability exemptions in 2021-23*

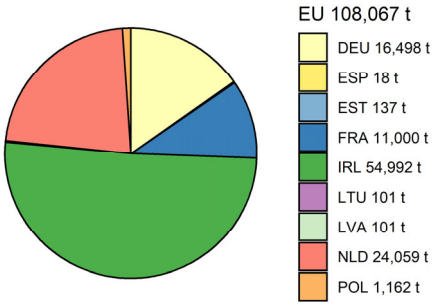
* Commission delegated regulation 2020/2015



MANAGEMENT IN 2022

- There is currently no agreed long-term management strategy involving all nations fishing this stock.
- Historically, the TAC has been divided into a North Sea TAC (EU and Norway), a Western TAC (EU, Norway and Faroes), a Southern TAC (EU) and a NEAFC TAC (Coastal States, Iceland and Russia). However, there has been no sharing agreement involving all fishing parties since 2008 and a 2014 agreement between the EU, Norway and the Faroes ceased after 2020. Norway and the Faroes subsequently declared increased quotas in 2021-22. The remaining parties (including the UK following its departure from the EU) declared unilateral quotas such that the total expected catch for 2022 is approximately 1,131 kt. The advised catch for 2022 is 795 kt.
- The Irish 2022 quota of 54,992 t was derived from the Western TAC and may be fished in UK waters of 4.a during the periods 1st Jan to 14th Feb and 1st Aug to 31st Dec 2022.
- The Cornwall box is closed to directed trawling (Appendix III) and measures to protect the North Sea spawning component remain in place.

2022 EU quota allocation for 6, 7, 8abde; EU and international waters of 5.b; international waters of 2.a, 12 and 14 (Western TAC)



KEY STOCK CONSIDERATIONS

- A number of above average year classes between 2000 and 2011 resulted in an increased stock size and an expanded geographic distribution. SSB has been falling since 2014 with catches consistently above advice, although it remains above MSY $B_{trigger}$. Fishing mortality has been increasing since 2016 and is above F_{MSY} in 2020 and 2021.
- An evaluation of long-term management strategies for NEA Mackerel was conducted in 2020 following a request from the EU, Norway and the Faroe Islands. A range of harvest rule parameters that are both precautionary in the long

term and maximise long term yield were identified. The evaluations also resulted in revised reference point estimates with F_{MSY} estimated to be 0.26, reflecting the increased stock productivity observed over the past 20 years.

Published 30 September 2022

Mackerel (*Scomber scombrus*) in subareas 1–8 and 14, and in Division 9.a (the Northeast Atlantic and adjacent waters)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 782 066 tonnes.

Stock development over time

Fishing pressure on the stock is above F_{MSY} but below F_{pa} and F_{lim}; spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

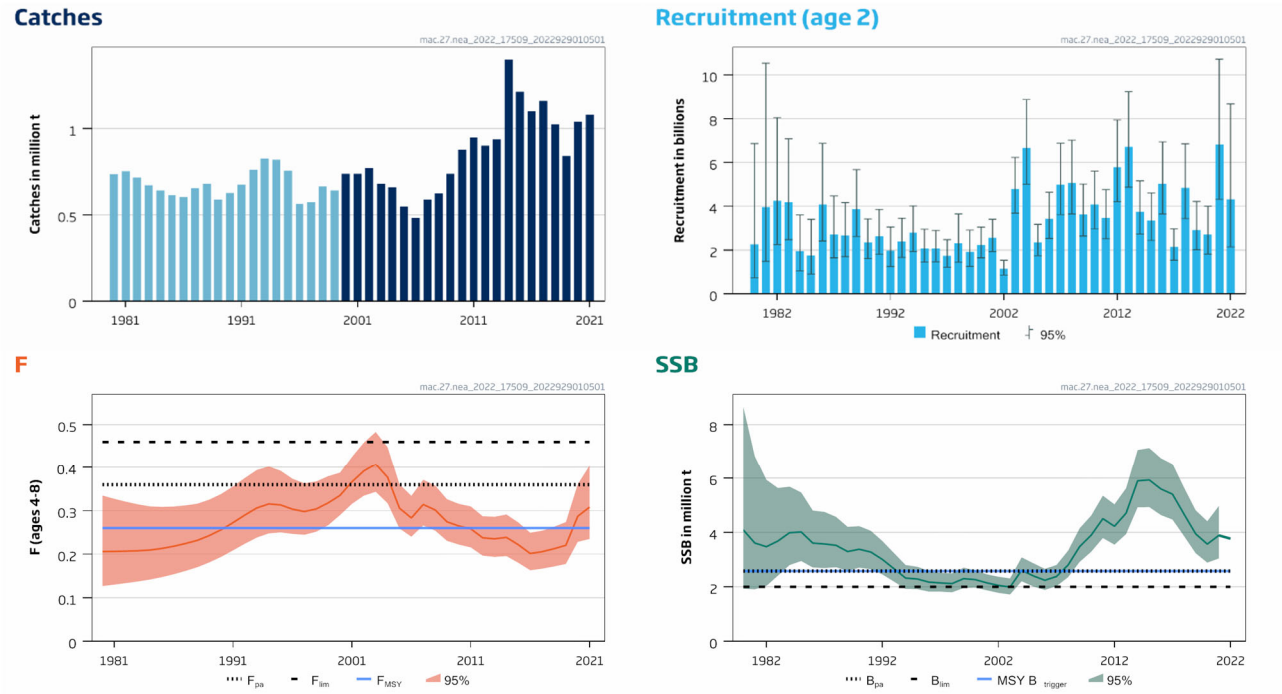


Figure 1 Mackerel in subareas 1–8 and 14, and in Division 9.a. Summary of the stock assessment. Catches prior to 2000 have been down-weighted in the assessment because of the considerable underreporting suspected to have taken place in this period. Abundance estimates of age 0 and 1 from the assessment model poorly reflect year-class strength and therefore recruitment is shown at age 2.

Catch scenarios

Table 1 Mackerel in subareas 1–8 and 14, and in Division 9.a. Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 4–8}$ (2022)	0.36	From the forecast for 2022, based on assumed catch in 2022
SSB (2022) at spawning time	3 769 326	From the forecast for 2022; in tonnes
$R_{age\ 0}$ (2022–2023)	4 497 060	Geometric mean of the abundance at age 0 (1990–2020); in thousands
Total catch (2022)	1 131 416	Sum of expected landings and discards, accounting for the interannual transfers from 2021; in tonnes

Table 2 Mackerel in subareas 1–8 and 14, and in Division 9.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch	$F_{ages\ 4–8}$	SSB at spawning time		% change		
	2023	2023–2024	2023	2024	SSB*	Catch**	Advice***
ICES advice basis							
MSY approach: $F = F_{MSY}$	782066	0.26	3676187	3649119	−1%	−31%	−2%
Other scenarios							
F = 0	0	0	3834187	4442903	16%	−100%	−100%
$Catch_{2023} = catch_{2022} - 20\%$	905133	0.31	3649147	3494839	−4%	−20%	14%
$Catch_{2023} = catch_{2022}$	1131416	0.40	3597636	3333051	−7%	0%	42%
$Catch_{2023} = catch_{2022} + 25\%$	1414270	0.52	3529667	3131128	−11%	25%	78%
$F = F_{2022}$	1046177	0.36	3617323	3393970	−6%	−8%	32%
F_{pa}	1042720	0.36	3618114	3397266	−6%	−8%	31%
F_{lim}	1284085	0.46	3561472	3169986	−11%	13%	62%
$SSB_{2024} = B_{lim}$	2654020	1.23	3168962	1995707	−37%	135%	234%
$SSB_{2024} = B_{pa}$^	1945604	0.78	3389356	2577596	−24%	72%	145%

* SSB 2024 relative to SSB 2023.
** Catch in 2023 relative to estimated catches in 2022 (1 131 416 tonnes). There is no internationally agreed TAC for 2022.
*** Advice value for 2023 relative to the advice value for 2022 (794 920 tonnes).
^ SSB_{2024} values are the closest available approximation to B_{lim} and B_{pa}.

Basis of the advice

Table 3 Mackerel in subareas 1–8 and 14, and in Division 9.a. The basis of the advice.

Advice basis	MSY approach
Management plan	There is no long-term management strategy for Northeast Atlantic (NEA) mackerel agreed by all parties involved in the mackerel fishery. In 2019 Coastal State delegations from Norway, the EU, and the Faroes requested ICES to review new harvest control rule (HCR) options for a management strategy. ICES delivered the advice from this evaluation in August 2020 (ICES, 2020a).

Quality of the assessment

The only available catch data from Russian Federation for 2021 was total catch by ICES division from ICES preliminary catch database, and no Russian catch samples were available. Historically, preliminary catches are comparable to ICES final estimated catch. There were adequate samples from other fishing nations operating in the same areas which were used to estimate catch-at-age and weight-at-age.

The inclusion of a new year of data modifies the relative weight of the different data sources in the assessment, which leads to revisions of the perception of the stock. In 2022, there has been an upwards revision of SSB and a downwards revision of fishing mortality for the period 2007 to 2017, and a revision in the opposite direction for the most recent SSB and F estimates (Figure 2). The relative weights of the data sources in the assessment are dependent on both the length of the time-series and the consistency of the information. With the new data included this year, the influence of the tagging data in the assessment model increased slightly.

The abundance index for age 0 from the IBTS surveys could not be updated, and no value was available for 2021; however, this has no effect on the advice.

The SSB index from the 2022 mackerel egg survey used in this year's assessment is a preliminary value, and it is 26% larger than the previous estimate in 2019. The final value will be used in next year's assessment.

The stock assessment and the short-term forecast include ages from 0 to 12. The abundance estimates at ages 0 and 1 are highly uncertain, and year-class strength only becomes apparent when fish enter the fishery at age 2 to 3. Therefore, this year, recruitment is presented for age 2.

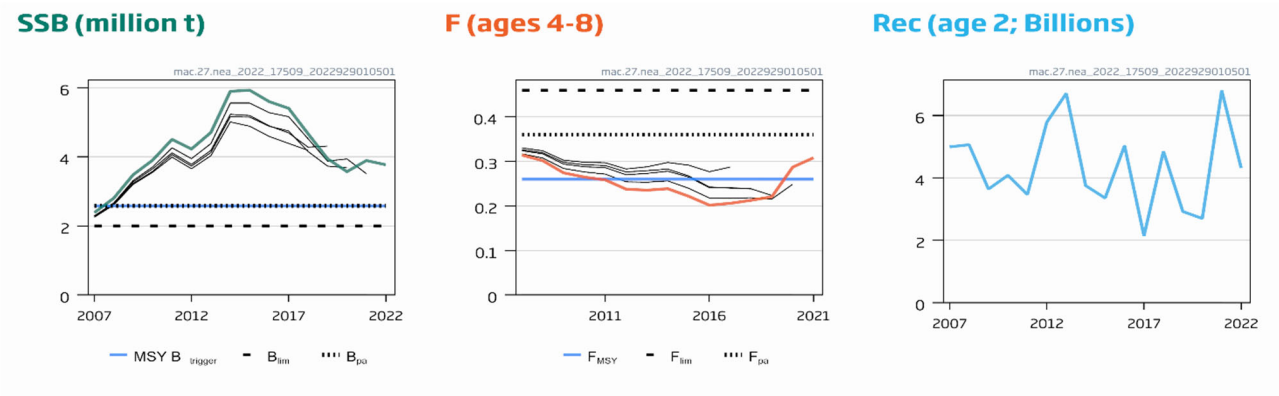


Figure 2 Mackerel in subareas 1–8 and 14, and in Division 9.a. Historical assessment results. Note that this year´s assessment presents recruitment at age 2. Prior to this, recruitment was presented as age 0 and is not shown.

Issues relevant for the advice

The sum of the unilateral quotas for mackerel and the resulting catches have exceeded the scientific advice by on average 41% since 2010. The F_{MSY} reference point that is used as a basis for the advice has been derived from an evaluation that assumed that annual catches would be aligned with the scientific advice based on the MSY approach, as the implementation error in the form of a consistent overshoot of the TAC was not included. Therefore, failing to adhere to the advised catches as derived from the application of the MSY approach may not be precautionary. Specifically, this may result in an increased risk for the stock to fall below B_{lim}, loss of catch in the long term, and unsustainable utilization of the resource.

ICES currently considers the NEA mackerel stock to consist of three spawning components – the western, southern, and North Sea (ICES, 2016) – although the stock structure and spawning behaviour is likely to be more dynamic (Jansen and Gislason, 2013). The existing management measures to ensure the protection of the North Sea component (i.e. no mackerel fishing in divisions 3.a and 4.b–c, except for Norway, where a limited amount of the TAC can be fished in Division 3.a; no mackerel fishing in Division 4.a during the period 15 February–31 July; and a 30 cm minimum conservation reference size) should remain in place for precautionary reasons. However, given the new knowledge on stock structure of mackerel that is currently becoming available, a review of the appropriateness of the use of stock components and the associated protection measures should be carried out.

Reference points

Table 4 Mackerel in subareas 1–8 and 14, and in Division 9.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	2 580 000	B_{pa}; in tonnes	ICES (2020b)
	F_{MSY}	0.26	Stochastic simulations	ICES (2020b)
Precautionary approach	B_{lim}	2 000 000	B_{loss} in 2003 from the 2019 WGWIDE assessment; in tonnes	ICES (2020b)
	B_{pa}	2 580 000	$B_{lim} \times \exp(1.645 \times \sigma)$, $\sigma = 0.15$; in tonnes	ICES (2020b)
	F_{lim}	0.46	The F that on average leads to B_{lim}	ICES (2020b)
	F_{pa}	0.36	The F that provides a 95% probability for SSB to be above B_{lim} (F_{P05}).	ICES (2020b)
Management plan	SSB_{mgt}			
	F_{mgt}			

Basis of the assessment

Table 5 Mackerel in subareas 1–8 and 14, and in Division 9.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical model (SAM) that uses catches in the model and in the forecast
Input data	Catch data, steel tagging data ([L3182] 1980–2006) and RFID tagging data ([L5543] 2014–2021), and three survey indices: SSB index from the triennial egg survey ([I4189] 1992–2022), abundance indices from the IBTS survey (G1022, G1179, G3239, G4299, G4493, G4748, G4815, G7212 and G9527) (combined Q1 and Q4; age 0, 1998–2020), and from the IESSNS survey ([A7806] ages 3–11, 2010, 2012–2022). Catches prior to 2000 are given a very low weight in the assessment. Natural mortality (0.15 for all ages and years) is based on tagging studies from the early 1980s.
Discards	Discarding is known to take place (0.3% of the total catch in weight in 2021), but is only quantified for part of the fisheries; the proportion of the landings covered cannot be calculated. Partial discard estimates are included in the assessment and overall discarding in recent years is assumed negligible.
Indicators	None
Other information	Interbenchmarked in 2019 (IBPNEAMac; ICES, 2019), a long-term management strategy evaluation was conducted in 2020 (WKMSEMAC; ICES 2020b)
Working group	Working Group on Widely Distributed Stocks (WGWIDE; ICES 2022b)

History of the advice, catch, and management

Table 6 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of ICES advice, the TAC, and ICES estimates of catch. All weights are in tonnes.

Year	ICES advice	Catch corressponding to advice	TAC *	Official landings	Discards and slipping	ICES catch
1987	Given by stock component		442000	616000	10789	654992
1988	Given by stock component		610000	622000	35566	680491
1989	Given by stock component		532000	576000	7090	585920
1990	Given by stock component		562000	580000	15600	626107
1991	Given by stock component		612000	609000	30700	675665
1992	Given by stock component		707000	729000	25000	760690
1993	Given by stock component		767000	784000	18180	824568
1994	Given by stock component		837000	794000	5370	819087
1995	Given by stock component		645000	729000	7721	756277
1996	Significant reduction in F	-	452000	509000	11415	563472
1997	Significant reduction in F	-	470000	517000	18864	573029
1998	F between 0.15 and 0.2	498000	549000	627000	8012	666316
1999	F of 0.15 consistent with PA	437000	562000	585000	n/a	640309
2000	F = 0.17: F_{pa}	642000	612000	655000	2084	738606
2001	F = 0.17: F_{pa}	665000	670000	660000	1188	737463
2002	F = 0.17: F_{pa}	694000	683000	685000	23774	771422
2003	F = 0.17: F_{pa}	542000	583000	600000	19427	679287
2004	F = 0.17: F_{pa}	545000	532000	587000	19962	660491
2005	F = 0.15 to 0.20	320000–420000	422000	447000	25788	549514
2006	F = 0.15 to 0.20	373000–487000	444000	420878	26594	481181
2007	F = 0.15 to 0.20	390000–509000	502000	511016	15444	586206
2008	F = 0.15 to 0.20	349000–456000	458000	547506	37075	623165
2009	F = 0.15 to 0.20	443000–578000	605000^^	631805	15934	737969
2010	Harvest control rule	527000–572000	885000^^^	831825	13045	877272
2011	See scenarios	529000–672000	959000^^^	926258	10894	948963
2012	Follow the management plan	586000–639000	927000^^^	876278	15174	899551
2013	Follow the management plan	497000–542000	906000^^^	935646	4732	938299
2014	Follow the management plan	927000–1011000	1392000^^^	1382772	6451	1401788
2015	Follow the management plan	831000–906000	1229000^^^	1202687	10431	1215827
2016	MSY approach	≤ 773842	1057000^^^	1088664	5971	1100135
2017	MSY approach	≤ 857185	1173000^^^	1170804	2832	1159641
2018	MSY approach	≤ 550948	998000^^^	990715	2890	1023144
2019	MSY approach	≤ 770358	864000^^^	828649	7807	839727
2020	MSY approach	≤ 922064	1090879^^^	1030161^	9280	1039513
2021	MSY approach	≤ 852284	1199103^^^	1075763^	3129	1081540
2022	MSY approach	≤ 794920	1131416^^^			
2023	MSY approach	≤ 782066				

n/a = not available.
* For all areas, except some catches in international waters in Subarea 2.
^ Preliminary.
^^ Does not include the unilateral Norway–Faroe Islands TAC, first declared in 2009, nor the Icelandic quota.
^^^ No internationally agreed quotas. Values presented are the sum of unilateral quotas (including quotas and transfers).

Table 7 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of ICES advice, the TAC, and ICES estimates of catch for the **western component**. All weights are in tonnes.

Year	ICES advice	Catch corressponding to advice	TAC*	Discards and slippage	ICES catch**
1987	SSB = 1.5 million t; TAC	380000	405000	11000	633000
1988	F = $F_{0.1}$; TAC; closed area; landing size	430000	573000	36000	656000
1989	Halt SSB decline; TAC	355000	495000	7000	571000
1990	TAC; F = $F_{0.1}$	480000	525000	16000	606000
1991	TAC; F = $F_{0.1}$	500000	575000	31000	647000
1992	TAC for both 1992 and 1993	670000	670000	25000	742000
1993	TAC for both 1992 and 1993	670000	730000	18000	805000
1994	No long-term gains in increased F	831000 ***	800000	5000	796000
1995	20% reduction in F	530000	608000	8000	728000
1996	No separate advice	-	422000	11000	529000
1997	No separate advice	-	416000	19000	529000
1998	No separate advice	-	514000	8000	623000
1999	No separate advice	-	520000	0	597000
2000	No separate advice	-	573000	2000	703000
2001	No separate advice	-	630000	1000	694000
2002	No separate advice	-	642000	24000	723000
2003	No separate advice	-	548000	9000	644000
2004	No separate advice	-	500000	11000	615000
2005	No separate advice	-	397000	20000	494000
2006	No separate advice	-	418000	17000	420000
2007	No separate advice	-	472000	8000	519000
2008	No separate advice	-	431000	27000	552000
2009	No separate advice	-	569000	13000	627000
2010	No separate advice	-	^	4000	817000
2011	No separate advice	-	^	8000	920000
2012	No separate advice	-	^	11000	864000
2013	No separate advice	-	^	2000	910000
2014	No separate advice	-	^	6000	1342000
2015	No separate advice	-	^	3000	1161000
2016	No separate advice	-	^	3000	1058000
2017	No separate advice	-	^	3000	1120298
2018	No separate advice	-	^	2372	984775
2019	No separate advice	-	^	6794	792652
2020	No separate advice	-	^	9083	951176
2021	No separate advice	-	^	2855	1041882
2022	No separate advice	-	^		
2023	No separate advice	-			

* TAC for mackerel taken in all divisions and subareas 6, 7, 8.a, 8.b, 8.d, 5.b, 2.a, 3.a, and 4.a.

** Landings and discards of the western component; includes some catches from the North Sea component.

*** Catch at *status quo* F.

^ No internationally agreed TAC.

Table 8 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of ICES advice, the TAC, and ICES estimates of catch for the **North Sea component**. All weights are in tonnes.

Year	ICES advice	Catch corressponding to advice*	TAC**	ICES catch
1987	Lowest practical level (LPL)	LPL	55000	3000
1988	Closed areas and seasons; min. landing size; bycatch regulations	LPL	55000	6000
1989	Closed areas and seasons; min. landing size; bycatch regulations	LPL	49200	7000
1990	Closed areas and seasons; min. landing size; bycatch regulations	LPL	45200	10000
1991	Closed areas and seasons; min. landing size; bycatch regulations	LPL	65500	n/a
1992	Closed areas and seasons; min. landing size; bycatch regulations	LPL	76300	n/a
1993	Maximum protection; closed areas and seasons; min. landing size	LPL	83100	n/a
1994	Maximum protection; closed areas and seasons; min. landing size	LPL	95700	n/a
1995	Maximum protection; closed areas and seasons; min. landing size	LPL	76300	n/a
1996	Maximum protection; closed areas and seasons; min. landing size	LPL	52800	n/a
1997	Maximum protection; closed areas and seasons; min. landing size	LPL	52800	n/a
1998	Maximum protection; closed areas and seasons; min. landing size	LPL	62500	n/a
1999	Maximum protection; closed areas and seasons; min. landing size	LPL	62500	n/a
2000	Maximum protection; closed areas and seasons; min. landing size	LPL	69700	n/a
2001	Maximum protection; closed areas and seasons; min. landing size	LPL	71400	n/a
2002	Maximum protection; closed areas and seasons; min. landing size	LPL	72900	n/a
2003	Maximum protection; closed areas and seasons; min. landing size	LPL	62500	n/a
2004	Maximum protection; closed areas and seasons; min. landing size	LPL	57700	n/a
2005	Maximum protection; closed areas and seasons; min. landing size	LPL	44900	n/a
2006	Maximum protection; closed areas and seasons; min. landing size	LPL	47100	n/a
2007	Maximum protection; closed areas and seasons; min. landing size	LPL	53100	n/a
2008	Maximum protection; closed areas and seasons; min. landing size	LPL	48600	n/a
2009	Maximum protection; closed areas and seasons; min. landing size	LPL	63800	n/a
2010	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2011	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2012	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2013	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2014	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2015	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2016	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2017	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2018	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2019	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2020	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2021	Maximum protection; closed areas and seasons; min. landing size	LPL	-	n/a
2022	Maximum protection; closed areas and seasons; min. landing size	LPL	-	
2023	Maximum protection; closed areas and seasons; min. landing size	LPL	-	

LPL = Lowest practical level.
n/a = not available.
* Subarea 4 and Division 3.a.
** TAC for Subarea 4, divisions 3.a and 3.b–d (EU zone), and Division 2.a (EU zone).

Table 9 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of ICES advice, the agreed TAC, and ICES estimates of catch for the **southern component**. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	TAC *	ICES catch
1987	Reduce juvenile exploitation	-	36570	22000
1988	Reduce juvenile exploitation	-	36570	25000
1989	No advice	-	36570	18000
1990	Reduce juvenile exploitation	-	36570	21000
1991	Reduce juvenile exploitation	-	36570	21000
1992	No advice	-	36570	18000
1993	No advice	-	36570	20000
1994	No advice	-	36570	25000
1995	No advice	-	36570	28000
1996	No separate advice	-	30000	34000
1997	No separate advice	-	30000	41000
1998	No separate advice	-	35000	44000
1999	No separate advice	-	35000	44000
2000	No separate advice	-	39200	36000
2001	No separate advice	-	40180	43000
2002	No separate advice	-	41100	50000
2003	No separate advice	-	35000	26000
2004	No separate advice	-	32310	35000
2005	No separate advice	-	24870	50000
2006	No separate advice	-	26180	53000
2007	No separate advice	-	29610	63000
2008	No separate advice	-	27010	60000
2009	No separate advice	-	35830	108000
2010	No separate advice	-	33880	55466
2011	No separate advice	-	37140	28145
2012	No separate advice	-	36740	33240
2013	No separate advice	-	31160	27322
2014	No separate advice	-	56640	57875
2015	No separate advice	-	48140	50869
2016	No separate advice	-	40920	42276
2017	No separate advice	-	46631	36739
2018	No separate advice	-	37305	34279
2019	No separate advice	-	29844	24764
2020	No separate advice	-	38895	37529
2021	No separate advice	-	36306	31928
2022	No separate advice	-		
2023	No separate advice	-		

* Division 8.c, subareas 9 and 10, and CECAF Division 34.1.1 (EU waters only).

History of the catch and landings

Table 10 Mackerel in subareas 1–8 and 14, and in Division 9.a. Landings distribution by fleet and discards, as estimated by ICES.

Catch (2021)	Landings			Discards
1 081 540 tonnes	Pelagic trawl 74.6%	Purse-seine 25.1%	Others 0.3%	3129 tonnes*
	1 078 411 tonnes			

* Only quantified for part of the fisheries.

Table 11 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of commercial catch and landings; the official values are presented by country. All weights are in tonnes. "Misreported" refers to assumed area misreporting between divisions 4.a and 6.a, and "Unallocated" indicates differences between official reported values and ICES estimates.

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Belgium	20	37		125	102	191	351	106	62	114	125	177	146	97	22	2
Denmark	36853	34264	35800	41505	42164	42502	50142	36780	28526	21971	27416	30011	29177	22522	34376	27900
Estonia					616		3302	2286	3741	4422	7356	3595	2673	219		
Faroe Islands	2622	5032	10000	11131	3347	12575	21568	31199	16851	11513	11229	11620	21023	24184	19768	14014
France	10706	14911	19000	6480	962	3836	11573	11782	15663	20916	17835	16367	19445	20956	21878	22906
Germany, Fed. Rep	16457	22512	21600	14537	13719	13236	26508	24415	16227	15374	21412	19949	22979	25307	26532	24061
Germany, Dem. Rep.		2409														
Greenland																
Guernsey																
Iceland									92	925	357				53	122
Ireland	85800	69980	74300	30138	35088	36982	89028	78534	54313	53129	66650	59675	71233	70452	72172	67355
Jersey																
Latvia					311	4700	1508	389	233							
Lithuania													2085			
Netherlands	28664	31343	38200	69418	82860	89543	44335	35789	36760	23700	30163	28621	32385	36095	33444	30424
Norway	163450	150400	151700	208266	239965	257800	258094	202205	136436	137523	158177	160738	174098	180372	184291	163406
Poland						600				22						
Portugal	4388	3112	3819	2789	3576	2015	2158	2893	3023	2080	2897	2002	2253	3119	2934	2749
Romania							2903									
Spain	21884	16609	17892	22011	17234	20864	27113	29165	33371	46470	44607	45915	38321	44142	50123	23762
Sweden	1003	6601	6400	4227	5100	5934	7099	6285	5307	4714	5146	5233	4994	5098	5232	445
United Kingdom	210815	187760	193900	200019	232829	256275	237841	212147	146205	321821	185948	160152	184902	192631	194045	183008
USSR/Russian Federation	27924	12088	28900	13361	42440	49600	28041	44537	44545	53732	67836	51348	50772	41567	45811	40026
Misreported							109625	18647				−211	4816		6009	
Unallocated	34330	25361	8100	12956	15038		4632	29228	10839	5679	11498	38996	66235	62825	50543	59172
Discards	35576	7090	15600	30750	25000	18380	5370	7721	11415	18864	8030		3832	1188	23774	9481
Total	680492	589509	625211	667713	760351	815033	931194	774108	563610	742969	666682	634545	731459	730774	771007	668833

Table 11 (cont.)

Country	2004	2005	2006	2007	2008	2009	2010*	2011	2012	2013	2014	2015	2016	2017	2018 **	2019 **	2020	2021
Belgium	5	1	3	1	2	3	29	21	39	62	56	52	143	128	168	66	124	110
Denmark	25665	23212	24219	25223	26726	23491	41445	35958	36501	33218	42222	46871	41139	40028	30690	30563	38485	32796
Estonia										1367								
Faroe Islands	13030	9769	12067	13430	11289	14062	70987	122050	107630	143001	150236	108412	93267	99667	81079	62665	69064	105096
France	20266	16338	14953	20038	15602	18340	11379	12766	20467	14643	21719	25704	20189	22950	21471	17869	21878	16442
Germany, Fed. Rep	23244	19040	16608	18221	15502	22703	19055	24083	18944	20931	28456	28257	23411	24858	19883	16904	25030	11996
Germany, Dem. Rep																		
Greenland								62	7402	54148	78581	30351	36142	46388	62973	30241	26577	33360
Guernsey			10					10	5	9	9	4			12	9		
Iceland		363	4222	36706	112286	116160	121008	159263	149282	151235	172960	169333	170374	167366	168330	128077	151534	132109
Ireland	61102	45687	40664	49259	44760	61056	57994	61596	63049	56511	103178	88744	76526	84915	66747	53312	74114	60752
Jersey		9	8	6	7	8	6	7	8	8	7	3	3		3	2	5	
Latvia																		
Lithuania			95	7				23			9598	554	2540				815	6655
Netherlands	27532	22734	24157	24244	19972	23568	23088	28395	25817	21159	46665	39807	37929	43766	30392	22698	30321	24594
Norway	157363	119678	121993	131691	121524	121229	233952	208065	176023	164607	277731	242231	209352	222356	187207	159107	211672	270653
Poland		570	1368	978								24		1	4057	3706	5302	1779
Portugal	2289	1509	2620	2605	2381	1753	4120*	3263*	5691*	5388*	7950*	8295*	6688*	4331*	4565*	3940*	4799	4723
Romania																		
Spain			54136	62946	64637	114074	52737	18725	19386	16414	37806	34530	30036	32885	30036	21112	34307	27783
Sweden	4437	3204	3209	3858	3664	7303	3429	3248	4564	2906	4422	3930	3663	3701	3966	2958	3671	3513
United Kingdom	214771	152801	95815	133688	112394	157010	160417	180972	169745	163807	287851	247986	217638	225409	190028	152146	203716	209876
USSR/Russian Federation	49489	40495	33580	35408	32728	41414	59310	73601	74587	80817	116433	128433	121644	138061	118255	126544	128817	136176
Misreported																		
Unallocated	41335	68414	4954	12453	1069	−139	5271	5961	5237	3336	9457	1876	3480		392			
Discards	19962	25788	26594	15444	37075	15934	13045	10894	15174	4732	6451	10430	5971	2832	2890	7807	9280	3129
Total	660491	549514	481276	586206	621618	737969	877272	948963	899551	938299	140178	121582	110013	115964	102314	839727	103951	108154

* Catch data revised in 2021.

** Catch and discards data revised in 2021.

Table 12 Mackerel in subareas 1–8 and 14, and in Division 9.a. History of catch and landings; the ICES estimates are presented by area. All weights are in tonnes.

Year	Subarea 6			Subarea 7 and divisions 8.a, 8.b, 8.d, and 8.e			Subareas 3 and 4			Subareas 1, 2, 5, and 14			Divisions 8.c and 9.a			Total		
	Land.	Disc.	Catch	Land.	Disc.	Catch	Land.	Disc.	Catch	Land.	Disc.	Catch	Land.	Disc.	Catch	Land.	Disc.	Catch
1969	4800		4800	47404		47404	739175		739175	7		7	42526		42526	833912		833912
1970	3900		3900	72822		72822	322451		322451	163		163	70172		70172	469508		469508
1971	10200		10200	89745		89745	243673		243673	358		358	32942		32942	376918		376918
1972	13000		13000	130280		130280	188599		188599	88		88	29262		29262	361229		361229
1973	52200		52200	144807		144807	326519		326519	21600		21600	25967		25967	571093		571093
1974	64100		64100	207665		207665	298391		298391	6800		6800	30630		30630	607586		607586
1975	64800		64800	395995		395995	263062		263062	34700		34700	25457		25457	784014		784014
1976	67800		67800	420920		420920	305709		305709	10500		10500	23306		23306	828235		828235
1977	74800		74800	259100		259100	259531		259531	1400		1400	25416		25416	620247		620247
1978	151700	15100	166800	355500	35500	391000	148817		148817	4200		4200	25909		25909	686126	50600	736726
1979	203300	20300	223600	398000	39800	437800	152323	500	152823	7000		7000	21932		21932	782555	60600	843155
1980	218700	6000	224700	386100	15600	401700	87931		87931	8300		8300	12280		12280	713311	21600	734911
1981	335100	2500	337600	274300	39800	314100	64172	3216	67388	18700		18700	16688		16688	708960	45516	754476
1982	340400	4100	344500	257800	20800	278600	35033	450	35483	37600		37600	21076		21076	691909	25350	717259
1983	320500	2300	322800	235000	9000	244000	40889	96	40985	49000		49000	14853		14853	660242	11396	671638
1984	306100	1600	307700	161400	10500	171900	43696	202	43898	98222		98222	20208		20208	629626	12302	641928
1985	388140	2735	390875	75043	1800	76843	46790	3656	50446	78000		78000	18111		18111	606084	8191	614275
1986	104100		104100	128499		128499	23309	7431	243740	101000		101000	24789		24789	594697	7431	602128
1987	183700		183700	100300		100300	290829	10789	301618	47000		47000	22187		22187	644016	10789	654805
1988	115600	3100	118700	75600	2700	78300	308550	29766	338316	120404		120404	24772		24772	644926	35566	680492
1989	121300	2600	123900	72900	2300	75200	279410	2190	281600	90488		90488	18321		18321	582419	7090	589509
1990	114800	5800	120600	56300	5500	61800	300800	4300	305100	118700		118700	21311		21311	611911	15600	627511
1991	109500	10700	120200	50500	12800	63300	358700	7200	365900	97800		97800	20683		20683	637183	30700	667883
1992	141906	9620	151526	72153	12400	84553	364184	2980	367164	139062		139062	18046		18046	735351	25000	760351
1993	133497	2670	136167	99828	12790	112618	387838	2720	390558	165973		165973	19720		19720	806856	18180	825036
1994	134338	1390	135728	113088	2830	115918	471247	1150	472397	72309		72309	25043		25043	816025	5370	821395
1995	145626	74	145700	117883	6917	124800	321474	730	322204	135496		135496	27600		27600	748079	7721	755800
1996	129895	255	130150	73351	9773	83124	211451	1387	212838	103376		103376	34123		34123	552196	11415	563611
1997	65044	2240	67284	114719	13817	128536	226680	2807	229487	103598		103598	40708		40708	550749	18864	569613
1998	110141	71	110212	105181	3206	108387	264947	4735	269682	134219		134219	44 164		44164	658652	8012	666664
1999	116362		116362	94290		94290	313014		313014	72848		72848	43796		43796	640311		640311
2000	187595	1	187595	115566	1918	117484	285567	165	304898	92557		92557	36074		36074	736524	2084	738608
2001	143142	83	143142	142890	1081	143971	327200	24	339971	67097		67097	43198		43198	736274	1188	737462
2002	136847	12931	149778	102484	2260	104744	375708	8583	394878	73929		73929	49576		49576	749131	23774	772905
2003	135690	1399	137089	90356	5712	96068	354109	11785	365894	53883		53883	25823	531	26354	659831	19427	679288
2004	134033	1705	134738	103703	5991	109694	306040	11329	317369	62913	9	62922	34840	928	35769	640529	19962	660491
2005	79960	8201	88162	90278	12158	102436	249741	4633	254374	54129		54129	49618	796	50414	523726	25788	549514

Year	Subarea 6			Subarea 7 and divisions 8.a, 8.b, 8.d, and 8.e			Subareas 3 and 4			Subareas 1, 2, 5, and 14			Divisions 8.c and 9.a			Total		
	Land.	Disc.	Catch	Land.	Disc.	Catch	Land.	Disc.	Catch	Land.	Disc.	Catch	Land.	Disc.	Catch	Land.	Disc.	Catch
2006	88077	6081	94158	66209	8642	74851	200929	8263	209192	46716		46716	52751	3607	56358	454587	26594	481181
2007	110788	2450	113238	71235	7727	78962	253013	4195	257208	72891		72891	62834	1072	63906	570762	15444	586206
2008	76358	21889	98247	73954	5462	79416	227252	8862	236113	148669	112	148781	59859	750	60609	586090	37075	623165
2009	135468	3927	139395	88287	2921	91208	226928	8120	235049	163604		163604	107747	966	108713	722035	15934	737969
2010*	106732	2904	109636	104128	4614	108741	246818	883	247700	355725	5	355729	50826	4640	55466	864229	13045	877272
2011*	160756	1836	162592	51098	5317	56415	301746	1906	303652	398132	28	398160	26337	1807	28144	938070	10894	948963
2012*	121115	952	122067	65728	9701	75429	218400	1089	219489	449325	1	449326	29809	3431	33240	884377	15174	899551
2013*	132062	273	132335	49871	1652	51523	260921	337	261258	465846	15	465861	24867	2455	27322	933567	4732	938299
2014*	180068	340	180408	93709	1402	95111	383887	334	384221	684082	91	684173	53591	4284	57875	1395337	6451	1401788
2015*	134728	30	134757	98563	3155	101718	295877	34	295911	632493	78	632571	43735	7133	50869	1205396	10431	1215827
2016*	206326	200	206526	37300	1927	39227	248041	570	248611	563440	54	563494	39056	3220	42276	1094163	5971	1100135
2017*	225959	151	226110	21128	1992	23119	269404	400	269804	603806	62	603869	36512	227	36739	1156809	2832	1159641
2018*	157239	90	157329	32037	1611	33649	341527	620	342147	455689	51	455740	33761	518	34279	1020254	2890	1023144
2019*	122995	144	123139	32840	5902	38742	307235	812	308047	345019	18	345037	23832	931	24763	831920	7807	839727
2020*	130577	341	130918	48806	8065	56871	456479	732	457211	356985		356985	37386	143	37529	1030233	9280	1039513
2021	146519	117	146635	15901	2524	18425	221019	423	221442	663111		663111	31862	65	31928	1078411	3129	1081540

* Catch data revised in 2021

Table 13 Mackerel in subareas 1–8 and 14, and in Division 9.a. Catches inside and outside the NEAFC Regulatory Area (RA), as estimated by ICES, as well as total catches. Weights are in tonnes.

Year	Inside the NEAFC RA	Outside the NEAFC RA	Total catch	Percentage inside the NEAFC RA
2018	213608	809536	1023144	21%
2019	207200	632527	839727	25%
2020	247901	791612	1039513	24%
2021*	195938	749427	945365	21%

* Without catches from the Russian Federation, as it did not report catches inside/outside the NEAFC RA for 2021. In the past, around 90% of Russian catches were taken inside the NEAFC RA.

Summary of the assessment

Table 14 Mackerel in subareas 1–8 and 14, and in Division 9.a. Assessment summary. Weights are in tonnes and recruitment in thousands.

Year	Recruitment (age 2)			SSB at spawning time			Total catch	F (ages 4–8)		
	Low	Value	High	Low	Value	High		Low	Value	High
1980	741662	2256379	6864651	1931692	4095763	8684237	734950	0.13	0.21	0.33
1981	1483866	3954164	10536946	1908690	3610917	6831242	754045	0.13	0.21	0.33
1982	2251174	4258180	8054508	2034611	3475244	5935937	716987	0.13	0.21	0.32
1983	2476430	4189394	7087228	2412006	3685894	5632577	672283	0.14	0.21	0.31
1984	1048672	1945021	3607518	2800858	3989717	5683201	641928	0.14	0.21	0.31
1985	911867	1761799	3403932	2949017	4015844	5468602	614371	0.15	0.21	0.31
1986	2414771	4075432	6878145	2709488	3608231	4805089	602201	0.15	0.22	0.31
1987	1645418	2713304	4474253	2689623	3575982	4754438	654992	0.16	0.22	0.31
1988	1704717	2668074	4175837	2719049	3526114	4572730	680491	0.17	0.23	0.32
1989	2626296	3859714	5672396	2586241	3297725	4204941	585920	0.18	0.24	0.33
1990	1615372	2352987	3427412	2703312	3381620	4230127	626107	0.19	0.26	0.34
1991	1806495	2640685	3860081	2648612	3278987	4059393	675665	0.21	0.27	0.36
1992	1255408	1959426	3058250	2453803	3005914	3682253	760690	0.22	0.29	0.38
1993	1667703	2400478	3455227	2192074	2665757	3241797	824568	0.24	0.31	0.39
1994	1937535	2792997	4026163	1924591	2323071	2804054	819087	0.25	0.32	0.40
1995	1447844	2068160	2954245	1914732	2290278	2739483	756277	0.25	0.31	0.39
1996	1465444	2062647	2903224	1825764	2174598	2590081	563472	0.25	0.30	0.37
1997	1220370	1738105	2475486	1824264	2144607	2521204	573029	0.24	0.30	0.36
1998	1445736	2299083	3656118	1799608	2120261	2498049	666316	0.25	0.30	0.37
1999	1262250	1918742	2916672	1958221	2301530	2705027	640309	0.27	0.32	0.38
2000	1646261	2242303	3054147	1970480	2266622	2607272	738606	0.29	0.34	0.39
2001	1930231	2565296	3409305	1874159	2147511	2460732	737463	0.32	0.37	0.43
2002	863381	1152032	1537189	1778419	2054100	2372516	771422	0.33	0.39	0.46
2003	3687488	4794496	6233834	1718635	1993516	2312361	679287	0.34	0.41	0.48
2004	5011045	6668900	8875242	2204914	2608232	3085323	660491	0.32	0.38	0.45
2005	1745850	2356809	3181573	2013569	2404435	2871174	549514	0.26	0.31	0.36
2006	2532416	3427824	4639829	1888395	2242585	2663208	481181	0.24	0.28	0.33
2007	3624149	4994825	6883900	2021689	2380749	2803579	586206	0.27	0.31	0.37
2008	3651784	5064453	7023604	2354473	2800351	3330667	623165	0.25	0.30	0.36
2009	2640841	3641939	5022536	2915680	3480016	4153581	737969	0.23	0.27	0.33
2010	2971798	4083427	5610870	3290915	3901258	4624797	877272	0.22	0.26	0.32
2011	2520467	3464819	4762994	3791504	4504765	5352206	948963	0.22	0.26	0.31
2012	4214540	5786958	7946034	3548472	4225513	5031731	899551	0.20	0.24	0.29
2013	4871399	6709016	9239829	3935828	4705814	5626437	938299	0.19	0.24	0.29
2014	2729554	3753792	5162367	4924869	5898500	7064615	1401788	0.20	0.24	0.29
2015	2437757	3352679	4610983	4928398	5928946	7132621	1215827	0.18	0.22	0.27
2016	3652137	5035066	6941658	4638104	5598144	6756902	1100135	0.16	0.20	0.25

Year	Recruitment (age 2)			SSB at spawning time			Total catch	F (ages 4–8)		
	Low	Value	High	Low	Value	High		Low	Value	High
2017	1541675	2141687	2975221	4469022	5404599	6536037	1159641	0.17	0.21	0.25
2018	3434902	4853899	6859101	3859967	4667166	5643167	1023144	0.17	0.21	0.26
2019	2020927	2923019	4227783	3233573	3945436	4814014	839727	0.18	0.22	0.27
2020	1816780	2698510	4008168	2888782	3570188	4412324	1039513	0.23	0.29	0.36
2021	4313470	6801162	10723570	3044947	3891546	4973528	1081540	0.23	0.31	0.40
2022	2148239	4317473	8677141		3769326 †					

† Estimated value from the forecast.

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Download the stock assessment data and figures.

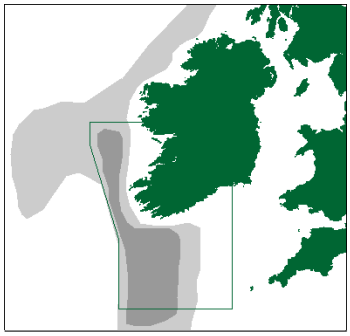
Recommended citation: ICES. 2022. Mackerel (*Scomber scombrus*) in subareas 1-8 and 14 and division 9.a (the Northeast Atlantic and adjacent waters). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, mac.27.nea. https://doi.org/10.17895/ices.advice.7789

MEGRIM

(*LEPIDORHOMBUS SPP.*)

BIOLOGY – SPECIES

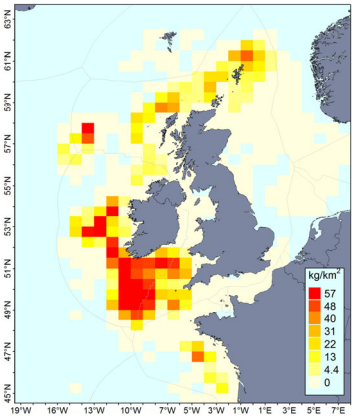
Megrim (*Lepidorhombus whiffiagonis*) and four-spot megrim (*L. boscii*) are two closely related flatfish species, *L. whiffiagonis* occurs throughout the north-east Atlantic while *L. boscii* occurs from the Mediterranean up to the Faroe Islands. Both species occur from inshore waters up to depths of around 800m but *L. whiffiagonis* are most abundant around 100-300m while *L. boscii* are most abundant around 200-600m. Irish landings are nearly exclusively *L. whiffiagonis*.



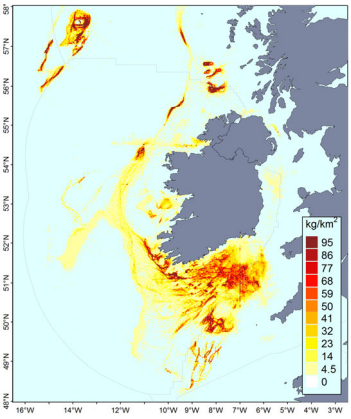
Megrim Spawning Grounds

Adult megrim feed on small demersal fish, cephalopods and crustaceans. Megrim are relatively slow growing and long-lived. They spawn around January-March. Females grow larger, mature later and live longer than males. Females mature around 22cm; the minimum conservation reference size is 20cm.

LANDINGS DISTRIBUTION



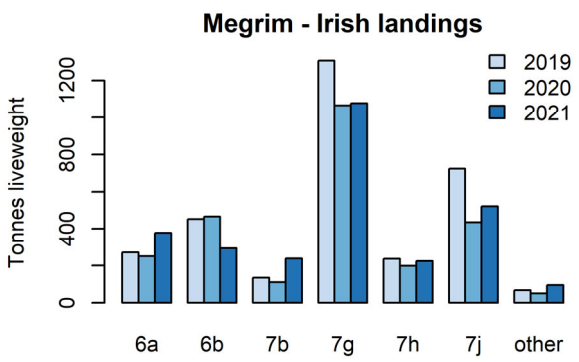
◀ The distribution of EU landings of megrim (mostly *L. whiffiagonis*) 2016-2020. Most landings were taken from the western Celtic Sea.

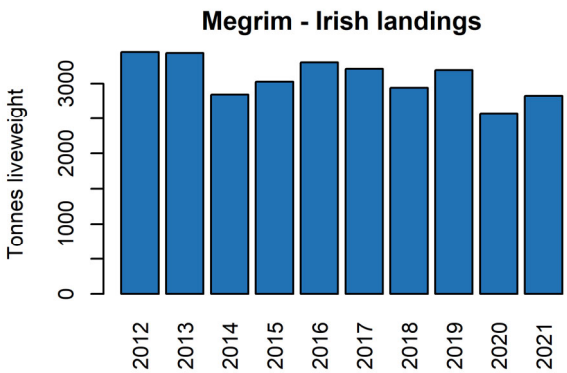


◀ The distribution of megrim landings by Irish vessels (nearly exclusively *L. whiffiagonis*) 2016-2020. Most Irish landings were taken in the Celtic Sea.

IRISH LANDINGS AND VALUE OF TAC

Approximately 2,900 tonnes of megrim are landed per year by Irish vessels operating in a mixed demersal fishery between 2019 and 2021. Most of the catches originate from area 7.g. In 2021 the landings were worth nearly €9 million for Irish vessels.





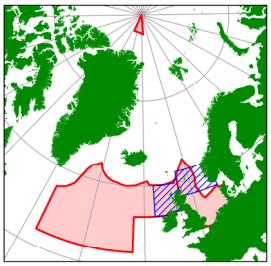
West of Scotland and Northern North Sea Megrim

Sub-areas 4.a & 6.a

Advice for 2023

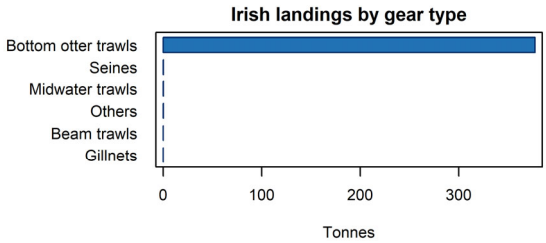
ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 7,200 t.

ICES notes the existence of a precautionary management plan, developed and adopted by some of the relevant management authorities for this stock.



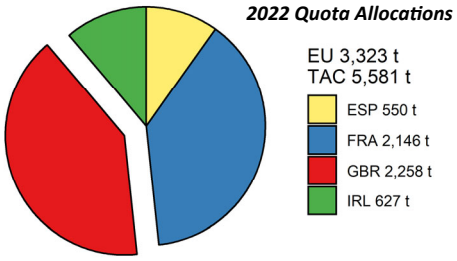
Key Points

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target)	
Advice basis	ICES MSY approach	Catch=7,200 t
Ranges	F_{MSY} Range Lower	Catch=5,550 t
	F_{MSY}	Catch=7,200 t
	F_{MSY} Range Upper	Catch=7,200 t
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

- There are two TAC areas, the first covers the United Kingdom and Union waters of 4 and United Kingdom waters of 2.a. The second covers Sub-area 6 and United Kingdom and international waters of 5.b; international waters of 12 and 14. Ireland has no quota in the TAC area 2.a and 4.
- There are special conditions allowing quota flexibilities between TAC areas; 20% of the 4 and 2.a quota may be fished in United Kingdom, Union and international waters of 6a north of 58°30'N and 25% of the 6 and 5.b quota may be fished in United Kingdom and Union waters of 2.a and 4.



- For assessment purposes, megrim in 4.a and 6.a are considered a single stock; with megrim in 6.b a separate stock. The assessment areas are therefore incompatible with the TAC areas.
- Official Landings in areas 6 are well below the TAC (39%); uptake by France is low at 6% and Ireland usually utilises its full quota allocation.

Key Stock Considerations

- Megrim landings in 6.a are taken as a by-catch in mixed fisheries primarily landed with haddock, other gadoids and anglerfish. Irish Landings in 2021 were 378 tonnes; representing a large increase compared to recent years.
- Irish discards are primarily from bottom otter trawls targeting mixed demersal fish with a mesh size 100-119mm.
- The state of the stock has not changed substantially since last year; fishing mortality has remained below F_{MSY} since 2002, and biomass has been above MSY $B_{trigger}$ for the entire time series.

Published 30 June 2022

Megrim (*Lepidorhombus spp.*) in divisions 4.a and 6.a (northern North Sea, West of Scotland)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 7200 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Management should be implemented at the stock level.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

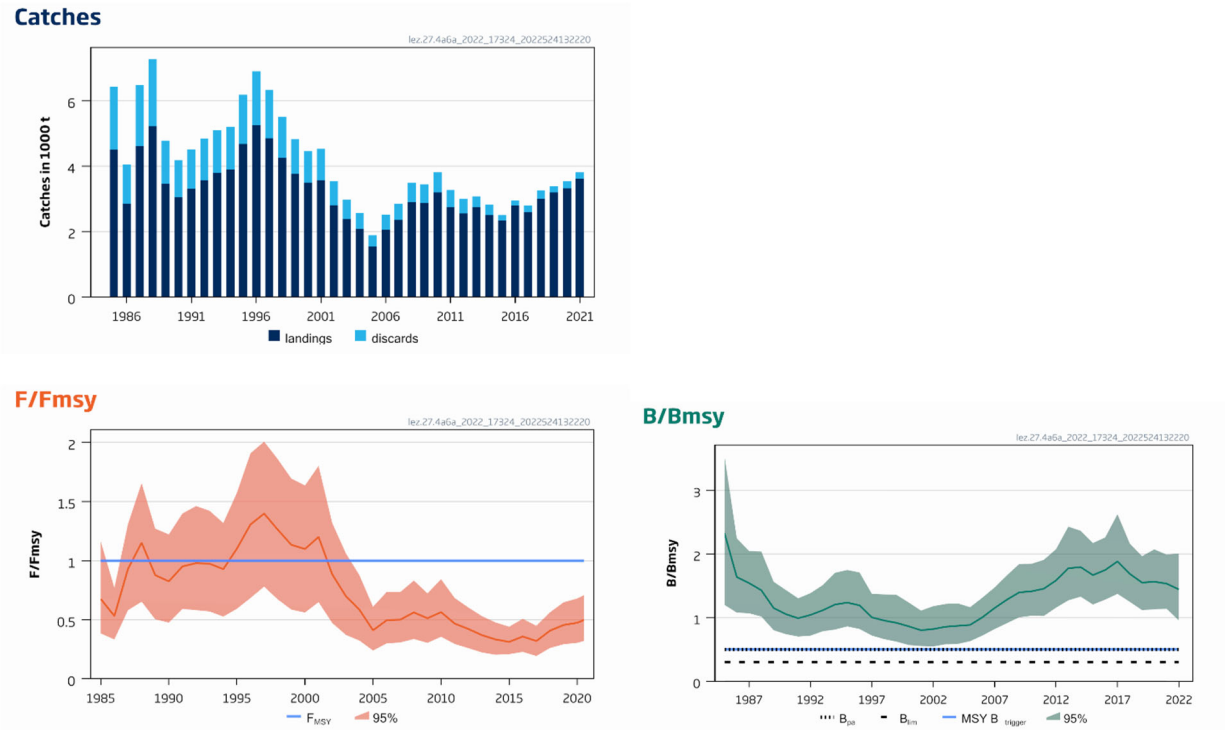


Figure 1 Megrim in divisions 4.a and 6.a. Summary of the stock assessment.

Catch scenarios

Table 1 Megrim in divisions 4.a and 6.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F_{2022}/F_{MSY}	0.52	*Status quo*: F_{sq} = relative F (2021)
B_{2023}/B_{MSY}	1.53	Short-term forecast
Catch (2022)	3580	Short-term forecast; in tonnes
Projected landings (2022)	3380	Assuming average landings ratio (2019–2021); in tonnes
Projected discards (2022)	200	Assuming average discard ratio (2019–2021); in tonnes

Table 2 Megrim in divisions 4.a and 6.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	Fishing mortality F_{2023}/F_{MSY}	Stock size B_{2024}/B_{MSY}	% B change*	% advice change^
ICES advice basis							
MSY approach: F= F_{MSY}	7200	6798	402	1	1.32	−13. 6	-2.0
Other scenarios							
EU MAP^^: F_{MSY}	7200	6798	402	1	1.32	−13. 6	-2.0
EU MAP^^ $F_{MSY\ lower}$	5550	5240	310	0.76	1.41	−7.6	−24
EU MAP^^ $F_{MSY\ upper}$	7200	6798	402	1	1.32	−13.6	−2.0
F = 0	0	0	0	0	1.71	11.7	−100
$B_{2024} = B_{lim}$	26800	25302	1498	3.70	0.33	−79	264
$B_{2024} = B_{pa}$ = MSY $B_{trigger}$	13000	12273	727	1.80	1.01	−34	77
$B_{2024} = B_{2023}$	3500	3304	196	0.48	1.52	0	−52
$F = F_{2022}$	3400	3210	190	0.52	1.52	0	−54

* Biomass 2024 relative to biomass 2023.
^ Advice value for 2023 relative to the advice value for 2022 (7350 tonnes).
^^ EU multiannual plan (MAP) for the Western Waters (EU, 2019).

Basis of the advice

Table 3 Megrim in divisions 4.a and 6.a. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

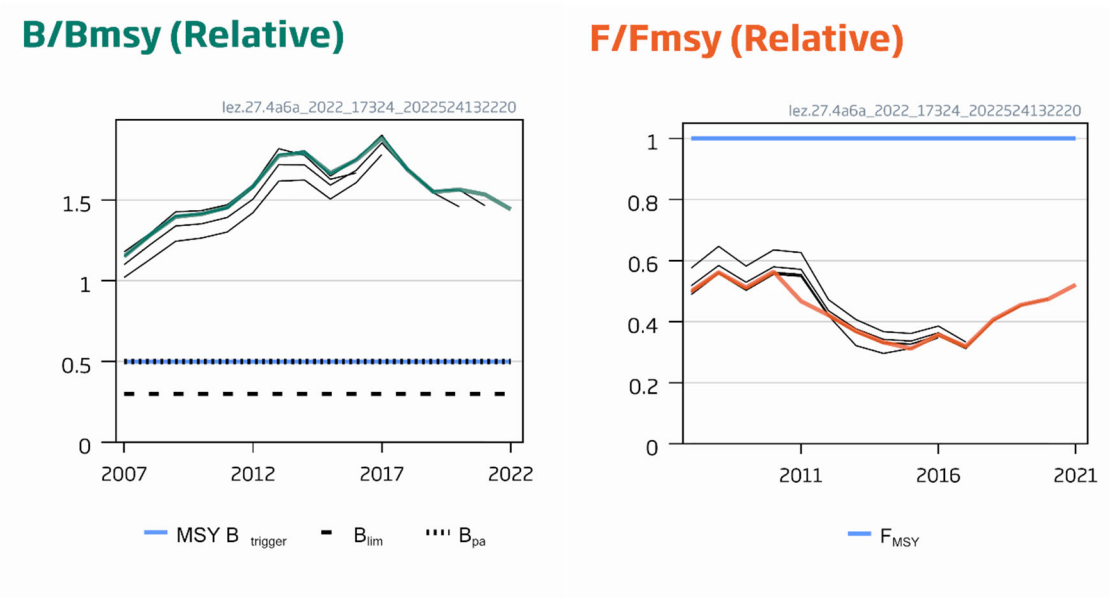


Figure 2 Megrim in divisions 4.a and 6.a. Historical assessment results (B/B_{MSY} final-year assumption included).

Issues relevant for the advice

This advice is for the two species, *L. whiffiagonis* and *L. boscii* combined. Available information indicates that *L. boscii* constitute a negligible proportion, based on historical sampling of the Scottish and Irish megrim catch.

ICES notes that the TAC is for subareas 4 and 6 and includes Division 6.b, for which advice is given separately. ICES advises that management should be implemented at the stock level.

Reference points

Table 4 Megrim in divisions 4.a and 6.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	0.5 × BMSY*	0.25 × *K*. Relative value. B_{MSY} is estimated directly from the assessment surplus production model and changes when the assessment is updated.	ICES (2015a)
	F_{MSY}	*r*/2*	Relative value. F_{MSY} is estimated directly from the assessment surplus production model and changes when the assessment is updated.	ICES (2015a)
Precautionary approach	B_{lim}	0.30 × B_{MSY}*	0.15 × *K*. Relative value.	ICES (2015a)
	B_{pa}	0.5 × B_{MSY}*	MSY $B_{trigger}$	ICES (2017)
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	MAP MSY $B_{trigger}$	0.5 × B_{MSY}*	MSY $B_{trigger}$	ICES (2015b)
	MAP B_{lim}	0.30 × B_{MSY}*	B_{lim}	ICES (2015b)
	MAP F_{MSY}	F_{MSY}*	F_{MSY}	ICES (2015b)
	MAP range F_{lower}	0.77 × F_{MSY}*	The lower bound is set at 0.39 of the intrinsic biomass growth rate	ICES (2015b)
	MAP range F_{upper}	F_{MSY}*	The upper bound is set to the same level as F_{MSY}	ICES (2015b)

* Fishing mortality is presented only in relation to F_{MSY}, and total stock biomass is presented only in relation to B_{MSY}. *K* is the carrying capacity and *r* is the intrinsic biomass growth rate. These values are directly estimated from the stock assessment and change when the assessment is updated.

Basis of the assessment

Table 5 Megrim in divisions 4.a and 6.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Bayesian state–space biomass dynamic model that uses catches in the model and in the forecast (ICES, 2022b)
Input data	Commercial sampling of landings and discards; six survey indices SIAMISS-Q2 (G3745), IAMISS-Q2 (G1794), Sco-IBTS-Q1 (G1022), Sco-IBTS-Q3 (G2829), Sco-WIBTS-Q1 until 2010 (G1179), and Sco-WIBTS-Q4 until 2010 (G4299)
Discards and bycatch	Discards have been included in the assessment, from bottom otter trawl fleets. Discard estimates since 2013 are based on observed discards. Discard estimates prior to 2013 were reconstructed using limited sampling information.
Indicators	None
Other information	This stock was benchmarked at WKFLAT (ICES, 2011) and at IBPMEG (ICES, 2012)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Megrim in divisions 4.a and 6.a. History of ICES advice, the agreed TAC, official landings, and ICES estimates of landings and discards. All weights are in tonnes.

Year	ICES advice	Catches corresponding to advice*	Landings corresponding to advice	Agreed TAC in Div 2.a and Subarea 4	Agreed TAC in Subarea 6^	Official landings in subareas 4 and 6	ICES landings** in divisions 4.a and 6.a	ICES discards in divisions 4.a and 6.a^^
1991	No advice	-	-	-	4840	4415	3310	1204
1992	No advice	-	-	-	4840	4689	3574	1263
1993	No long-term gain in increased F	-	-	-	4840	4788	3802	1305
1994	No long-term gain in increased F	-	-	-	4840	5031	3900	1300
1995	No advice	-	-	-	4840	5565	4670	1511
1996	No advice	-	-	-	4840	6148	5253	1649

Year	ICES advice	Catches corresponding to advice*	Landings corresponding to advice	Agreed TAC in Div 2.a and Subarea 4	Agreed TAC in Subarea 6^	Official landings in subareas 4 and 6	ICES landings** in divisions 4.a and 6.a	ICES discards in divisions 4.a and 6.a^^
1997	No advice	-	-	-	4840	5944	4856	1478
1998	Adequate catch controls	-	-	3000	4840	5417	4253	1254
1999	Maintain current TAC	-	4840	3000	4840	4437	3759	1074
2000	Maintain current TAC	-	4840	2700	4840	4503	3494	966
2001	Maintain current TAC	-	4840	2700	4360	4381	3571	956
2002	Maintain current TAC	-	4360	2700	4360	3266	2803	725
2003	Maintain current TAC	-	4360	1890	4360	3008	2369	592
2004	Reduce TAC to recent landings	-	3600	1740	3600	2547	2067	499
2005	Reduce TAC to recent landings	-	2300	1740	2880	1920	1527	356
2006	Reduce TAC to recent landings	-	2300	1479	2880	2373	2054	461
2007	Reduce TAC to recent landings	-	2100	1597	2880	2733	2348	508
2008	Reduce TAC to recent landings	-	1400	1597	2592	3162	2894	602
2009	Same advice as last year	-	1400	1757	2799	3229	2871	574
2010	No increase in effort	-	-	3000	3079	3346	3197	614
2011	No increase in catches	-	-	1845	3387	2912	2743	526
2012	No increase in catches	-	-	1845	3387	2798	2545	449
2013	MSY framework	-	4700	1937	3387	2996	2737	327
2014	MSY approach	7000	5950	2083	4074	2823	2500	309
2015	Same advice as for 2014	7000	5950	2083	4129	2781	2340	159
2016	MSY approach	≤ 8567	≤ 7539	2639	5214	3209	2792	167
2017	Same advised values as for 2016	≤ 8567	≤ 7539	2639	5682	2686	2594	193
2018	MSY approach	≤ 7800	≤ 7217	2526	5432	3077	3087	230
2019	MSY approach	≤ 8250	≤ 7592	2887	5782	3163	3197	184
2020	Management plan	8350 (range 6450–8350)		2922	5901	3324***	3315	214
2021	Management plan	7300 (range 5700-7300)		2587	5225	3618***	3603	200
2022	MSY approach	≤ 7350		2763	5581			
2023	MSY approach	≤ 7200						

* Before 2011, advice was provided for megrim in divisions 4.a, 6.a, and 6.b combined.
** Landings in divisions 4.a and 6.a and unallocated landings from Subarea 4.
*** Preliminary.
^ Subarea 6; EC waters of Division 5.b; EC and international waters of subareas 12 and 14 (considered negligible).
^^ Discard estimates prior to 2013 were reconstructed using limited sampling information.

History of the catch and landings

Table 7 Megrim in divisions 4.a and 6.a. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings			Discards		
	Finfish trawls	*Nephrops* trawls	Other gears	Finfish trawls	*Nephrops* trawls	Other gears
3803 tonnes	98%	< 1%	1.6%	34%	66%	< 1%
	3603 tonnes			200 tonnes		

Table 8 Megrim in Division 6.a. History of commercial landings. All weights are in tonnes.

Year	Belgium	France	Ireland	Netherlands	Spain	UK (E, W, and NI)	UK (Scotland)	UK	Official total	ICES landings
1990	0	398	317	0	91	25	1093	-	1924	2210
1991	1	455	260	0	48	167	1223	-	2154	2432
1992	0	504	317	0	25	392	887	-	2125	2549
1993	0	517	329	0	7	298	896	-	2047	2721
1994	1	408	304	0	1	327	866	-	1907	2693
1995	0	618	535	0	24	322	952	-	2451	3498
1996	0	462	460	0	22	156	944	-	2044	4054
1997	0	192	438	1	87	123	954	-	1795	3272
1998	0	172	433	0	111	65	841	-	1622	2705
1999	0	0	438	0	83	42	831	-	1394	2648
2000	0	135	417	0	98	20	754	-	1424	2247
2001	0	252	509	0	92	7	770	-	1630	2473
2002	0	79	280	0	89	14	643	-	1105	1828
2003	0	92	344	0	98	13	558	-	1105	1642
2004	0	50	278	0	45	17	469	-	859	1328
2005	0	48	156	0	69	10	269	-	552	561
2006	0	53	221	0	52			346	672	875
2007	0	104	191	0	5			667	967	1301
2008	0	92	172	0	149			874	1287	1545
2009	0	174	188	0	112			953	1427	1387
2010	0	271	318	0	288			822	1699	1698
2011	0	153	227	0	217			715	1312	1297
2012	0	140	214	0	142			590	1086	1132
2013	0	105	203	0	213			470	991	949
2014	0	126	246	0	57			465	894	948
2015	0	140	311	0	140			520	1110	1110
2016	0	189	408	0	146			694	1437	1437
2017	0	132	336	0	313			579	1359	1359
2018	0	117	301	0	273			680	1370	1392
2019	0	122	271	0	368			844	1606	1611
2020*	0	119	250	0	302			710	1381	1380
2021*	0	123	378	0	335			633	1468	1464

* Preliminary official landings.

Table 9 Megrim in divisions 4.a. History of commercial landings; both the official and ICES estimated values are presented for each country. All weights are in tonnes.

Year	Belgium	Denmark	France	Germany	Germany, Fed. Rep.	Ireland	Netherlands	Norway	Spain	Sweden	UK (E, W, and NI)	UK (E&W)	UK (NI)	UK (Scotland)	UK	Official total	ICES landings
1990	4	2			3		24				17			1126		1176	837
1991	3	1		6			28				9			1169		1216	878
1992	2	4	36	3			27				47			1372		1491	1025
1993	7	6	25	4			30				8			1736		1816	1081
1994	2	1	27	1			28				19			2000		2078	1207
1995	7	2	24	2			26				44			2193		2298	1172
1996	5	7	14	1			9				4			3221		3261	1199
1997	3	5	16	2			20				3			3091		3140	1584
1998	5	18	14	4			30				5			2628		2704	1548
1999	4	21		1			26				4			2121		2177	1111
2000	10	29	7	3			20				2			2044		2115	1247
2001	2	52	5	1			11				2			1854		1927	1098
2002	5	8	6				9				3			1675		1706	975
2003	3	11	11	2		1	7	< 0.5			1			1235		1271	727
2004		7	9	2			11	< 0.5			1			1130		1160	739
2005		1	3	4			19	< 0.5			1			958		986	n/a
2006	0	3	4	1		0	6	1	0	0					1342	1357	1179
2007	0	11	18	4		0	1	1	0	0					1437	1472	1047
2008	0	31	20	1		0	1	4	0	0					1524	1581	1349
2009	0	54	9	0		0	0	6	0	0					1474	1543	1484
2010	0	22	1	0		0	1	2	0	0					1440	1466	1499
2011	0	23	10	3		0	0	1	0	0					1394	1431	1421
2012	0	35	5	3		0	0	1	0	0					1397	1441	1458
2013	0	48	8	3		0	0	17	0	0					1690	1765	1788
2014	0	35	6	1		0	0	12	0	0					1475	1530	1551
2015	0	26	7	0		0	0	8	0	0					1175	1217	1230
2016	0	46	13	2		0	2	21	0	0					1273	1357	1361
2017	0	60	36	3		0	< 0.5	29	0	0					1199	1327	1235
2018	0	61	67	1		0	1	34	0	0					1543	1706	1611
2019	0	63	103	4		0	1	46	0	0					1340	1557	1585
2020*	< 0.5	40	80	3		0	4	48	0	< 0.5					1768	1943	1935
2021*	0	73	74	9		0	1	49	0	< 0.5					1944	2150	2139

* Preliminary official landings.

Summary of the assessment

Table 10 Megrim in divisions 4.a and 6.a. Assessment summary. 'High' and 'Low' refers to 95% confidence intervals. All weights are in tonnes.

Year	B/B_{MSY}			Landings	Discards*	F/F_{MSY}		
	Low	Value	High			Low	Value	High
1985	1.20	2.33	3.54	4499	1928	0.38	0.68	1.16
1986	1.08	1.64	2.25	2858	1193	0.33	0.53	0.77
1987	1.07	1.54	2.05	4614	1874	0.58	0.93	1.31
1988	1.02	1.43	2.04	5212	2061	0.65	1.15	1.66
1989	0.80	1.15	1.56	3451	1327	0.50	0.88	1.27
1990	0.74	1.05	1.43	3047	1140	0.47	0.82	1.22
1991	0.70	0.99	1.30	3310	1204	0.59	0.95	1.40
1992	0.72	1.04	1.38	3574	1263	0.58	0.98	1.46
1993	0.79	1.12	1.51	3802	1305	0.57	0.97	1.42
1994	0.81	1.21	1.70	3900	1300	0.53	0.93	1.32
1995	0.86	1.24	1.75	4670	1511	0.59	1.10	1.57
1996	0.82	1.19	1.71	5253	1649	0.68	1.31	1.91
1997	0.72	1.00	1.37	4856	1478	0.78	1.40	2.01
1998	0.66	0.95	1.37	4253	1254	0.67	1.26	1.86
1999	0.62	0.92	1.36	3759	1074	0.59	1.13	1.70
2000	0.57	0.86	1.24	3494	966	0.56	1.10	1.64
2001	0.55	0.80	1.11	3571	956	0.65	1.20	1.80
2002	0.55	0.82	1.18	2803	725	0.47	0.88	1.32
2003	0.58	0.86	1.21	2369	592	0.37	0.70	1.06
2004	0.59	0.87	1.22	2067	499	0.32	0.58	0.88
2005	0.63	0.89	1.16	1527	356	0.24	0.41	0.61
2006	0.72	1.01	1.31	2054	461	0.30	0.49	0.73
2007	0.82	1.15	1.47	2348	508	0.31	0.50	0.73
2008	0.91	1.28	1.66	2894	602	0.34	0.56	0.83
2009	1.01	1.40	1.84	2871	574	0.30	0.51	0.72
2010	1.03	1.41	1.85	3197	614	0.36	0.56	0.84
2011	1.03	1.45	1.91	2743	526	0.29	0.47	0.68
2012	1.16	1.58	2.08	2545	449	0.26	0.42	0.60
2013	1.27	1.77	2.43	2737	327	0.22	0.37	0.53
2014	1.33	1.79	2.36	2500	309	0.20	0.33	0.48
2015	1.21	1.67	2.17	2340	159	0.21	0.31	0.44
2016	1.28	1.75	2.26	2792	167	0.23	0.36	0.51
2017	1.37	1.88	2.62	2594	193	0.19	0.32	0.45
2018	1.25	1.69	2.16	3003	255	0.26	0.41	0.56
2019	1.12	1.55	1.96	3197	184	0.29	0.45	0.65
2020	1.13	1.56	2.07	3316	214	0.30	0.47	0.68
2021	1.14	1.53	1.99	3603	200	0.34	0.52	0.74
2022	0.95	1.44	2.01					

* Discard estimates prior to 2013 were reconstructed using limited sampling information.

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Megrim (*Lepidorhombus* spp.*)* in divisions 4.a and 6.a (northern North Sea, West of Scotland). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, lez.27.4a6a. https://doi.org/10.17895/ices.advice.19448042.

Rockall Megrim

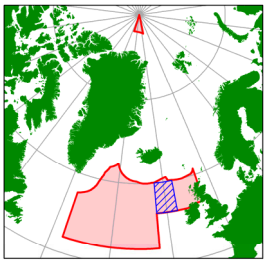
Division 6.b

Advice for 2023

ICES advise that when the MSY approach is applied, catches in 2023 should be no more than 1,022 t.

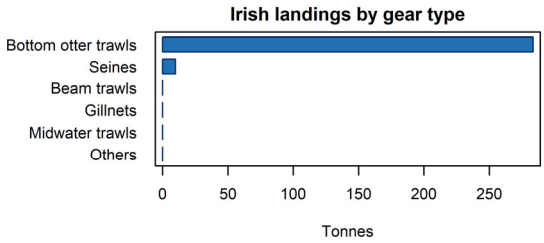
ICES notes the existence of a precautionary management plan, developed and adopted by some of the relevant management authorities for this stock.

Management should be implemented at the stock level.



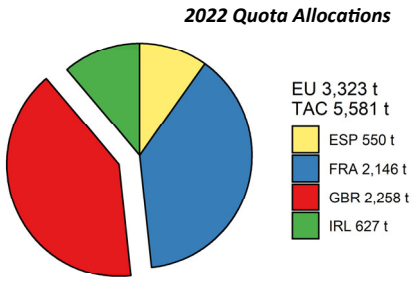
Key Points

ICES Assessment Category	2 (Quantitative assessment)	
Management Plan	WWMAP (target)	
Advice Basis	ICES MSY Approach	Catch=1,022 t
Ranges	F_{MSY} Range Lower	Not Available
	F_{MSY}	Catch=1,116 t
	F_{MSY} Range Upper	Not Available
Landing Obligation	From 2019	No derogation or exemptions



Management in 2022

- The TAC for this stock covers Subarea 6 and United Kingdom and international waters of 5b; international waters of 12 and 14.
- A separate assessment is carried out for Megrim in 4.a and 6.a. The stock at Rockall (6.b) and on the northern shelf (4.a and 6.a) are currently fished sustainably; however, management of two stocks under a single TAC could lead to over-exploitation of one stock.
- There are special conditions allowing quota flexibilities between TAC areas; 20% of the 4 and 2.a quota may be fished in United Kingdom, Union and international waters of 6.a north of 58°30'N and 25% of the 6 and 5.b quota may be fished in United Kingdom and Union waters of 2.a and 4.
- Official Landings in areas 6 are well below the TAC (39%); uptake by France is low at 6% and Ireland utilises its full quota allocation.



Key Stock Considerations

- This stock was benchmarked in 2021 and the assessment category was changed from 3 to 2; this meant that MSY advice could be provided.
- Most Irish landings in Subarea 6 are taken south of Rockall at depths below 200m in a fishery targeting anglerfish. Some catches of megrim also occur in the fishery targeted at haddock closer to Rockall in shallower water.
- In 2021 Ireland had the highest landings followed by the UK and Spain, with the majority coming from demersal otter trawls.
- Fishing mortality has been stable in recent years and remains below F_{MSY}. Stock biomass appears stable and above B_{MSY}.

Published 28 October 2022

Megrim (*Lepidorhombus* spp.) in Division 6.b (Rockall)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 1022 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Management should be implemented at the stock level.

Stock development over time

Fishing pressure on the stock is below F_{MSY} and biomass is above MSY $B_{trigger}$ and B_{lim}.

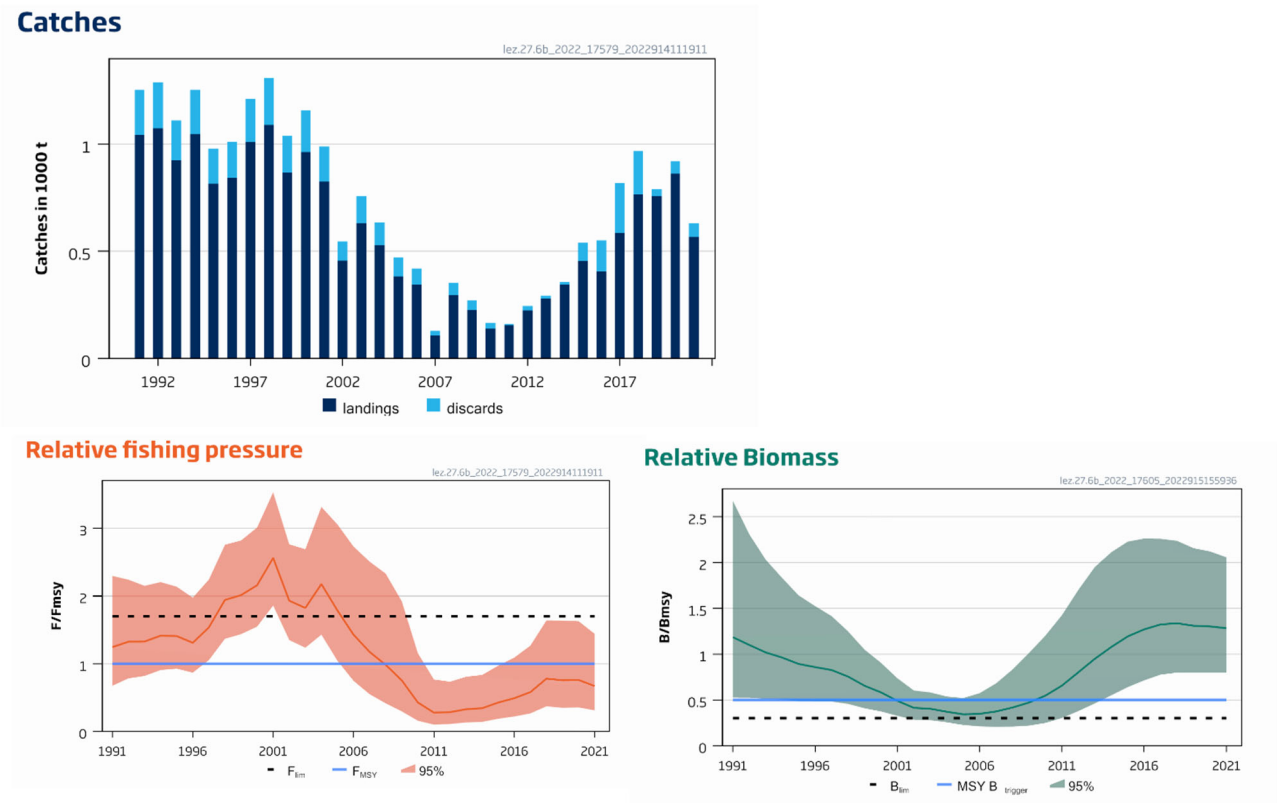


Figure 1 Megrim in Division 6.b. Summary of the stock assessment. Discard data are only available since 2005; values prior to that are assumed to be 20% of landings based on the observed ratio from 2017 to 2020.

Catch scenarios

Table 1 Megrim in Division 6.b. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F (2022)/F_{MSY}	0.62	F corresponding to *status quo* catch
B (2023)/B_{MSY}	1.31	Short term forecast (STF) with *status quo* catch
Catch (2022)	759	Status quo catch (average 2019-2021) ; in tonnes

Table 2 Megrim in 6.b. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	F_{2023}/F_{MSY}	B_{2024}/B_{MSY}	% B change ^	% advice change ^^
ICES advice basis					
MSY approach (35th percentile of predicted catch distribution under F = F_{MSY})	1022	0.91	1.26	−3.7	2.9
Other scenarios					
F_{MSY}	1116	1.00	1.24	−5.2	12.3
F_{2021}	793	0.69	1.31	−0.06	−20
F=0	0	0	1.47	12.4	−100

^ Biomass 2024 relative to biomass 2023.

^^ Advice value for 2023 relative to the advice value for 2022 (994 tonnes).

Basis of the advice

Table 3 Megrim in Division 6.b. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with the UK for this stock, and ICES provides advice according to its MSY approach.

Quality of the assessment

The SCO-IV-VI-AMISS-Q2 survey was unable to sample Division 6.b in 2022 due to logistics, so no value for the index is available (or in 2020 due to the COVID-19 pandemic). Sensitivity analyses showed the assessment to be robust to missing survey data to the current extent.

Issues relevant for the advice

There is a mismatch between management and assessment area, and as a result there is a potential for catches to exceed advice.

Reference points

Table 4 Megrim in Division 6.b. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	0.5 × B_{MSY}	Relative value (B/B_{MSY}) from the SPiCT assessment model. B_{MSY} is estimated directly from the SPiCT model and changes when the assessment is updated	ICES (2021)
	F_{MSY}	1 × F_{MSY}	Relative value (F/F_{MSY}) from the SPiCT assessment model. F_{MSY} is estimated directly from the SPiCT model and changes when the assessment is updated.	ICES (2021)
Precautionary approach	B_{lim}	0.3 × B_{MSY}	Relative value (B/B_{MSY}) (equilibrium yield at this biomass is 50% of MSY)	ICES (2021)
	B_{pa}	Not defined		
	F_{lim}	1.7 × F_{MSY}	Relative value (F/F_{MSY}) (the F that drives the stock to B_{lim})	ICES (2021)
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

* No reference points are defined for this stock in terms of absolute values. The SPiCT estimated values of the ratios F/F_{MSY} and B/B_{MSY} are used to estimate stock status relative to the MSY reference points.

Basis of the assessment

Table 5 Megrim in Division 6.b. Basis of the assessment and advice.

ICES stock data category	2 (ICES, 2022a)
Assessment type	Surplus Production model in Continuous Time (SPiCT; ICES, 2022b)
Input data	Commercial landings and discard estimates; one dedicated industry–science survey index (SCO-IV-VI-AMISS-Q2 [G1794])
Discards and bycatch	Discard estimates are available from 2005 onwards. Prior to 2005 discards were assumed to be 20% of landings based on the observed ratio 2017 to 2020.
Indicators	None
Other information	Last benchmarked in 2021 (ICES, 2021)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Megrim in Division 6.b. ICES advice, official landings, and ICES estimates of landings and discards. All weights are in tonnes.

Year	ICES advice*	Catches corresponding to advice	Landings corresponding to advice	Agreed TAC Division 5.b (EC) and subareas 6, 12, and 14	Official landings Division 6.b	ICES landings	ICES discards**
1990	Not assessed		-	4840	804		
1991	No advice		-	4840	1045	1045	
1992	No advice		-	4840	1073	1073	
1993	No long-term gain in increased F		-	4840	925	925	
1994	No long-term gain in increased F		-	4840	1046	1046	
1995	No advice		-	4840	816	816	
1996	No advice		-	4840	843	843	
1997	No advice		-	4840	1009	1009	
1998	Adequate catch controls		-	4840	1091	1091	
1999	Maintain current TAC		4840	4840	866	866	
2000	Maintain current TAC		4840	4840	964	964	
2001	Maintain current TAC		4840	4360	824	824	
2002	Maintain current TAC		4360	4360	455	455	
2003	Maintain current TAC		4360	4360	632	632	
2004	Reduce TAC to recent landings		3600	3600	528	528	
2005	Reduce TAC to recent landings		2300	2880	382	382	87
2006	Reduce TAC to recent landings		2300	2880	344	344	75
2007	Reduce TAC to recent landings		2100	2880	106	106	22
2008	Reduce TAC to recent landings		1400	2592	294	294	59
2009	Same advice as last year		1400	2799	226	226	44
2010	No increase in effort		-	3079	139	139	26
2011	No increase in catches		-	3387	155	155	7
2012	No increase in catches		-	3387	224	224	21
2013	Catch decrease by 7%		< 160	3387	278	278	15
2014	Landings increase of no more than 20%		< 207	4074	343	343	15
2015	Landings increase of no more than 20%		< 262	4129	453	453	85
2016	Precautionary approach (no more than 20% increase of recent advised landings)		≤ 314	5214	405	405	145
2017	Precautionary approach	≤ 379	≤ 342	5682	586	586	233
2018	Precautionary approach	≤ 443	-	5432	762	764	203
2019	Precautionary approach	≤ 419	-	5782	791	757	34
2020	Precautionary approach	≤ 473	-	5901	866^	861	59
2021	Precautionary approach	≤ 512	-	5225	577^	566	65
2022	MSY approach	≤ 994	-	5581			
2023	MSY approach	≤ 1022					

* Prior to 2011, advice was given for megrim in divisions 4.a, 6.a, and 6.b combined.
** Discard data are only available from 2005 onwards.
^ Preliminary.

History of the catch and landings

Table 7 Megrim in Division 6.b. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings		Discards
631 tonnes	Otter trawls 85%	Other gears 15%	Otter trawls 100%
	566 tonnes		65 tonnes

Table 8 Megrim in Division 6.b. History of catch and landings; official landings presented by country and ICES estimated catch. All weights are in tonnes.

Year	France	Ireland	Spain	UK (England, Wales, & Northern Ireland)	UK (England & Wales)	UK (Scotland)	UK	Official landings	ICES catch
1990	-	196	363	19	-	226	-	804	-
1991	-	240	587	14	-	204	-	1045	-
1992	-	139	683	53	-	198	-	1073	-
1993	-	128	594	56	-	147	-	925	-
1994	-	176	574	38	-	258	-	1046	-
1995	-	117	520	27	-	152	-	816	-
1996	-	124	515	92	-	112	-	843	-
1997	-	141	628	76	-	164	-	1009	-
1998	-	218	549	116	-	208	-	1091	-
1999	-	127	404	57	-	278	-	866	-
2000	4	167	427	57	-	309	-	964	-
2001	< 0.5	176	370	42	-	236	-	824	-
2002	< 0.5	87	120	41	-	207	-	455	-
2003	-	83	93	74	-	382	-	632	-
2004	-	43	71	42	-	372	-	528	-
2005	-	68	88	19	-	207	-	382	469
2006	-	95	59	-	-	-	190	345	419
2007	-	87	19	-	-	-	188	294	128
2008	-	68	84	-	-	-	142	294	353
2009	-	48	46	-	-	-	165	259	270
2010	-	47	41	-	-	-	93	180	165
2011	-	72	28	-	-	-	69	169	162
2012	-	120	61	-	-	-	89	270	245
2013	-	181	-	-	-	-	58	240	293
2014	-	230	73	-	-	-	95	398	358
2015	-	256	190	-	-	-	130	576	538
2016	-	272	69	-	-	-	116	457	550
2017	-	358	215	-	-	-	180	753	819
2018	-	438	61	-	-	-	263	763	967
2019	25	76 †	94	-	-	-	229	425 †	791
2020*	41	467	112	-	-	-	246	866	920
2021*	1	293	71	-	-	-	212	577	631

* Landing values are preliminary.

† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

Table 9 Megrim in Division 6.b. Assessment summary. ICES estimated landings and discards. Discard data are only available since 2005; values prior to that are assumed to be 20% of landings based on the observed ratio from 2017 to 2020. High and low refers to 95% confidence intervals. All weights in tonnes.

Year	Relative biomass			Landings	Discards	Relative fishing pressure		
	Relative B	High	Low			Relative F	High	Low
1991	1.19	2.68	0.52	1045	209	1.25	2.30	0.68
1992	1.10	2.31	0.52	1073	215	1.33	2.24	0.78
1993	1.02	2.03	0.51	925	185	1.33	2.15	0.82
1994	0.96	1.83	0.51	1046	209	1.41	2.21	0.91
1995	0.89	1.64	0.49	816	163	1.41	2.14	0.93
1996	0.86	1.53	0.48	843	169	1.31	1.98	0.87
1997	0.83	1.42	0.48	1009	202	1.54	2.24	1.05

1998	0.75	1.25	0.46	1091	218	1.94	2.76	1.37
1999	0.66	1.05	0.41	866	173	2.01	2.82	1.44
2000	0.58	0.91	0.37	964	193	2.16	3.01	1.55
2001	0.49	0.74	0.33	824	165	2.56	3.53	1.86
2002	0.41	0.60	0.28	455	91	1.93	2.76	1.35
2003	0.40	0.58	0.28	632	126	1.82	2.69	1.24
2004	0.37	0.54	0.26	528	106	2.18	3.32	1.43
2005	0.34	0.52	0.23	382	87	1.79	3.06	1.04
2006	0.35	0.57	0.21	344	75	1.43	2.73	0.75
2007	0.37	0.68	0.20	106	22	1.17	2.51	0.55
2008	0.42	0.83	0.21	294	59	0.98	2.33	0.42
2009	0.47	1.01	0.22	226	44	0.76	1.92	0.30
2010	0.55	1.20	0.25	139	26	0.43	1.16	0.16
2011	0.66	1.43	0.30	155	7	0.28	0.77	0.10
2012	0.80	1.70	0.38	224	21	0.29	0.74	0.11
2013	0.95	1.95	0.46	278	15	0.33	0.81	0.13
2014	1.08	2.11	0.55	343	15	0.34	0.84	0.14
2015	1.19	2.23	0.64	453	85	0.43	0.97	0.19
2016	1.27	2.26	0.71	405	145	0.49	1.09	0.22
2017	1.32	2.26	0.78	586	233	0.58	1.27	0.27
2018	1.34	2.24	0.80	764	203	0.78	1.64	0.37
2019	1.31	2.16	0.80	757	34	0.76	1.64	0.35
2020	1.30	2.12	0.80	861	59	0.76	1.63	0.35
2021	1.28	2.06	0.80	566	65	0.67	1.44	0.31
2022	1.30	2.04	0.83					

Sources and references

EU. 2019. Regulation (EU) 2019/472 of the European Parliament and of the Council of 19 March 2019 establishing a multiannual plan for stocks fished in the Western Waters and adjacent waters, and for fisheries exploiting those stocks, amending Regulations (EU) 2016/1139 and (EU) 2018/973, and repealing Council Regulations (EC) No 811/2004, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007 and (EC) No 1300/2008. Official Journal of the European Union, L 83: 1–17. http://data.europa.eu/eli/reg/2019/472/oj

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ICES. 2022b. Working Group for the Celtic Seas Ecoregion (WGCSE). ICES Scientific Reports. 4:45. http://doi.org/10.17895/ices.pub.19863796

Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Megrim (*Lepidorhombus spp*.) in Division 6.b (Rockall). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, lez.27.6b. https://doi.org/10.17895/ices.advice.19772389

Celtic Sea and Bay of Biscay Megrim

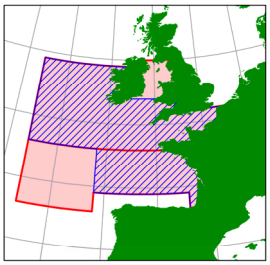
Divisions 7b-k and 8.a,b,d

Advice for 2023

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 23,596 t.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

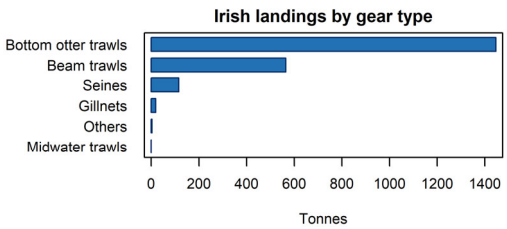
Management of catches of the two megrim species, *L. whiffiagonis* and *L. boscii*, under a combined species TAC prevents effective control of the single-species exploitation rates, and could lead to the overexploitation of either species.



Key Points

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target)	
Advice Basis	ICES MSY approach	Catch=23,596 t
F_{MSY} Ranges	F_{MSY} Range Lower	Catch=15,101 t
	F_{MSY}	Catch=23,596 t
	F_{MSY} Range Upper	Catch=38,191 t
Landing Obligation	From 2019	Area and gear specific *de minimis* exemption*

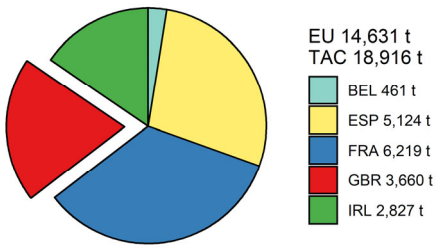
* EU 2020/2015.



Management in 2022

- There are two TAC areas covering the assessment area. Ireland only has quota for the TAC in area 7. Up to 5% of the area 7 TAC may be fished in 8.a,b,d,e, there is currently no flexibility from 8.a,b,d,e to 7.
- The TACs cover two megrim species (megrim *L. whiffiagonis* and four-spot megrim *L. boscii*). There is no catch advice for four-spot megrim. This species normally constitutes less than 5% of total landings.

2022 Quota Allocation Area 7



Key Stock Considerations

- Most Irish landings are taken as a by-catch in mixed fisheries and are landed with anglerfish, *Nephrops*, haddock, whiting, hake and other species. A small number of trips appear to specifically target megrim.
- The advice implies an Irish quota for 2023 of approximately 2,994 t. (assuming the same approach to four-spot megrim catches and the same allocation between area 7 and 8.a,b,d,e as recent years).
- The landings are usually lower than the TAC, mainly due to low uptake by France and Spain. In some years, the quota for Ireland has been restrictive.

Published 14 Oct 2022

Megrim (*Lepidorhombus whiffiagonis*) in divisions 7.b–k, 8.a–b, and 8.d (west and southwest of Ireland, Bay of Biscay)

ICES advice on fishing opportunities

Please note: the present advice replaces the advice given in June 2022.

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 23 596 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Management of catches of the two megrim species—megrim (*Lepidorhombus whiffiagonis*) and four-spot megrim (*Lepidorhombus boscii*)—under a combined species TAC prevents effective control of the single-species exploitation rates and could lead to the overexploitation of either species.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

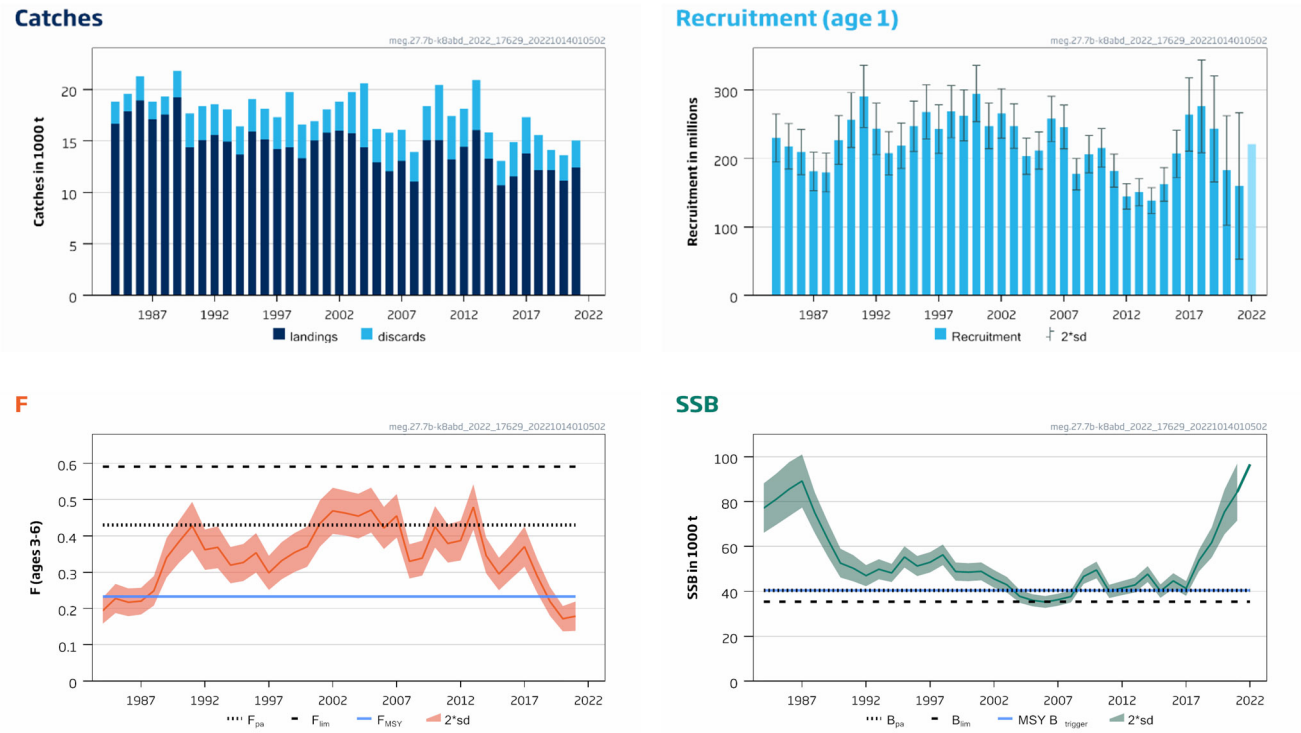


Figure 1 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour. The 2022 SSB value is a model forecast.

Catch scenarios

Table 1 Megrim in divisions 7.b–k, 8.a–b, and 8.d. The basis of the catch scenarios.

Variable	Value	Notes
$F_{ages\ 3–6}$(2022)	0.190	Average F (2019–2021).
SSB (2023)	96184	Short-term forecast (STF); in tonnes.
$R_{age\ 1}$ (2022–2023)	221058	Geometric mean of recruitment (1984–2019); in thousands.
Catch (2022)	19412	STF; in tonnes.
Projected landings (2022)	16612	STF; average (2019–2021) landings ratio at age; in tonnes.
Projected discards (2022)	2800	STF; average (2019–2021) discards ratio at age; in tonnes.

Table 2 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Annual catch scenarios. All weights are in tonnes. Note: The % change in TAC is not computed because the TAC is for the two megrim species combined.

Basis	Total catch (2023)	Projected landings* (2023)	Projected discards**(2023)	$F_{ages\ 3–6}$ Total (2023)	SSB (2024)	% SSB change***	% advice change^
ICES advice basis							
MSY approach: F_{MSY}	23596	20264	3332	0.23	90976	−5.4	2.8
Other scenarios							
EU MAP^^ = F_{MSY}	23596	20264	3332	0.23	90976	−5.4	2.8
F = MAP^^ $F_{MSY\ lower}$	15101	12982	2119	0.14	99893	3.9	−34
F = MAP^^ $F_{MSY\ upper}$	38191	32733	5457	0.41	75788	−21	66
F = 0	0	0	0	0	115855	20	−100
F_{pa}	39638	33966	5672	0.43	74293	−23	73
F_{lim}	50197	42939	7258	0.591	63458	−34	119
SSB (2024) = B_{lim}	78477	66677	11800	1.241	35398	−63	242
SSB (2024) = B_{pa}	73241	62327	10914	1.084	40444	−58	219
SSB (2024) = MSY $B_{trigger}$	73241	62327	10914	1.084	40444	−58	220
SSB (2024) = SSB (2023)	18629	16008	2621	0.176	96184	0	−18.9
F = F_{2022}	19945	17136	2809	0.19	94803	−1.44	−13.1

* Marketable landings, assuming recent discard rate.
** Including BMS landings (EU stocks), assuming recent discard rate.
*** SSB 2024 relative to SSB 2023.
^ Advice value for 2023 relative to advice value for 2022 (22 964 tonnes).
^^ EU multiannual plan (MAP) for the Western Waters (EU, 2019).

The advice for 2023 is higher than the advice for 2022 because of a re-estimation of F_{MSY}.

Basis of the advice

Table 3 Megrim in divisions 7.b–k, 8.a–b, and 8.d. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

This stock was benchmarked in 2022 and this resulted in a different assessment model and data revisions, including the removal of all commercial abundance indices and revision and raising of discard estimates (ICES, 2022a). These changes triggered the calculation of new reference points. Such changes have led to a different picture of the historical assessment results in comparison with previous years' assessments. However, the perception of stock status, in relation to reference points, does not change in comparison to previous years' assessments.

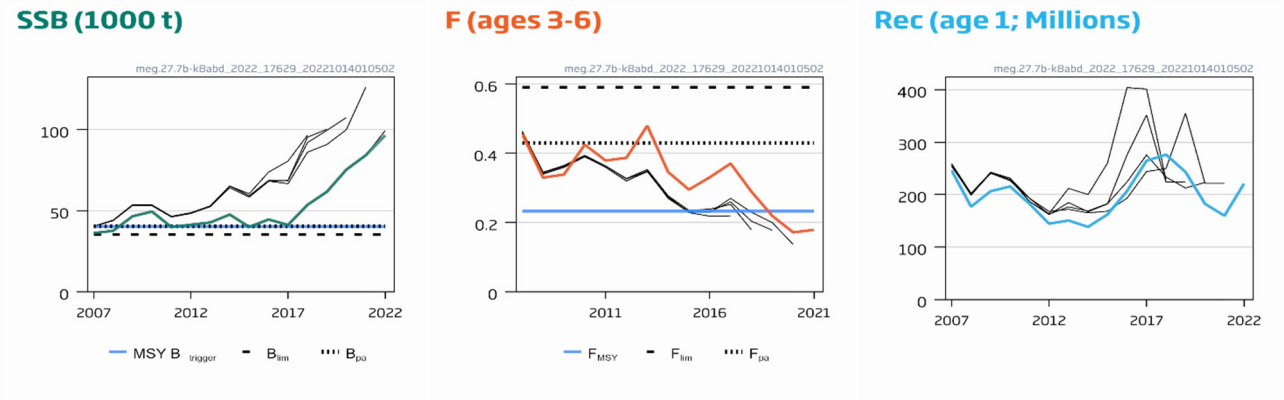


Figure 2 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Historical assessment results (final-year recruitment assumptions included for each line). The reference points were revised in 2022 following a benchmark, and only the last assessment results should be compared to the reference points indicated.

Issues relevant for the advice

The two megrim species are not separated in the landings statistics. The TACs are set separately for subarea 7 and divisions 8.a–b,d,e with each TAC covering catches of both species. Species specific landings are estimated by ICES. ICES considers that management of the catches of these two species under a combined TAC prevents effective control of single-species exploitation rates and could lead to overexploitation of either species.

Reference points

Table 4 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY Approach	MSY $B_{trigger}$	40444	B_{pa}; in tonnes.	ICES (2022a)
	F_{MSY}	0.233	F giving maximum yield at equilibrium. Median EqSim estimate for landings.	ICES (2022a)
EU Management plan (MAP); EU (2019)	MAP MSY $B_{trigger}$	40444	MSY $B_{trigger;}$ in tonnes.	ICES (2022a)
	MAP F_{MSY}	0.233	F_{MSY}	ICES (2022a)
	MAP range F_{lower}	0.140	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2022a)
	MAP range F_{upper}	0.414	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2022a)
Precautionary Approach	B_{lim}	35398	$B_{loss,}$ which is the lowest biomass observed; in tonnes.	ICES (2022a)
	B_{pa}	40444	B_{lim} * exp(1.645* σ), with $\sigma = 0.081$; in tonnes.	ICES (2022a)
	F_{lim}	0.591	The F that gives 50% probability of SSB being above $B_{lim.}$	ICES (2022a)
	F_{pa}	0.430	F_{P05} with Advice Rule (AR) (F that gives 5% probability of SSB below B_{lim}).	ICES (2022a)

Basis of the assessment

Table 5 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022b).
Assessment type	A4a statistical catch at age (ICES, 2022a, 2022c) using catches in the model and forecast.
Input data	Commercial catches (international landings, ages, and length frequencies from catch sampling). Three survey indices: Spanish Porcupine Bottom Trawl Survey [G5768], IE-IGFS [G7212] and EVHOE [G9527]; the latter two surveys are combined into a single index. Natural mortality, a fixed value of 0.2 is used for all age groups and all years, and histologically derived maturity ogives are described in ICES (2022a).
Discards and bycatch	Discards are included in the assessment.
Indicators	None.
Other information	Last benchmarked in 2022 (ICES, 2022a).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE).

History of the advice, catch, and management

Table 6 Megrim in divisions 7.b–k, 8.a–b, and 8.d. ICES advice and landings. All weights are in tonnes.

Year	ICES advice	Catch/landings corresponding to advice ***	Agreed TAC*	ICES landings	Discards	ICES catch
1987	Not assessed	-	16460	17114	1705	18819
1988	Not assessed	-	18100	17577	1725	19302
1989	Not assessed	-	18100	19233	2582	21815
1990	Not assessed	-	18100	14370	3284	17654
1991	No advice	-	18100	15094	3282	18376
1992	No advice	-	18100	15600	2988	18588
1993	Within safe biological limits	-	21460	14929	3108	18037
1994	Within safe biological limits	-	20330	13684	2700	16384
1995	No particular concern	-	22590	15862	3206	19068
1996	No long-term gain in increased F	16600	21200	15109	3026	18135
1997	No advice	14300	25000	14230	3066	17296
1998	No increase in F	15200	25000	14345	5371	19716
1999	Reduce F below F_{pa}	14600	20000	13305	3297	16601
2000	Reduce F below F_{pa}	< 14200	20000	15031	1870	16750
2001	Reduce F below F_{pa}	< 14100	16800	15778	2262	18040
2002	Reduce F below F_{pa}	< 13000	14900	15987	2813	18800
2003	Reduce F below F_{pa}	< 16100	16000	15711	4008	19719
2004	Reduce F below F_{pa}	< 20200	20200	14358	6243	20602
2005	Reduce F below F_{pa}	< 22600	21500	12888	3275	16163
2006	Reduce F below F_{pa}	<13600	20425	12037	3751	15788
2007	Less than average landings 2003–2005	< 14200	20425	13060	3033	16092
2008	Less than average landings 2004–2006	< 13000	20425	11048	2860	13908
2009	Same advice as last year	< 13000	20425	15064	3278	18342
2010	No increase in effort	< 13000	20425	15101	5343	20444
2011	See scenarios	-	20106	13226	4187	17413
2012	Catch and effort reduction	-	19101	14433	3704	18137
2013	Decrease landings by 4% (20% increase, followed by 20% PA reduction)	< 12000	19101	16025	4885	20910
2014	Same advice as 2013	< 12000	19101	13277	2569	15846
2015	Increase landings by no more than 13%	< 15180	19101	11569	1507	13076
2016	Precautionary approach (increase recent advised landings by no more than 20%)	≤ 18216	20056	11548	2445	13992
2017	MSY approach (catch advice)	≤ 16021	15043	13784	2173	15957
2018	MSY approach (catch advice)	≤ 15720	13528	12147	1738	13528
2019	MSY approach (catch advice)	≤ 18976	19836	12164	989	13153
2020	Management plan	19982 (range 13218–28838) **	20526	11141	885	12026
2021	Management plan	19184 (range 12706–27748) **	20181^	12417	2603	15020
2022	MSY approach	≤ 22964	20786			
2023	MSY approach	≤ 23596				

* Includes *L. boscii* and divisions 7.a and 8.e.

** Catches corresponding to F, EU MAP range in brackets (EU, 2019).

*** Advice is for catches starting in2017.

^ EU (2021).

History of catch and landings

Table 7 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Catch distribution by fleet in 2021 as estimated by ICES. All weights are in tonnes.

Catch	Landings		Discards
15020	98% trawl	2% other gears	2603
	12417		

Table 8 Megrim in divisions 7.b–k, 8.a–b, and 8.d. History of commercial catch and landings; ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Year	France	Spain	UK (England & Wales)	UK (Scotland)	Ireland	Northern Ireland	Belgium	Unallocated	ICES estimated landings	ICES estimated discards	ICES estimated catch
1984									16659	2169	18828
1985									17865	1732	19597
1986	4896	10242	2048		1563		178		18927	2321	21248
1987	5056	8772	1600		1561		125		17114	1705	18819
1988	5206	9247	1956		995		173		17577	1725	19302
1989	5452	9482	1451		2548		300		19233	2582	21815
1990	4336	7127	1380		1381		147		14370	3284	17654
1991	3709	7780	1617		1956		32		15094	3282	18376
1992	4104	7349	1982		2113		52		15600	2988	18588
1993	3640	6526	2131		2592		40		14929	3108	18037
1994	3214	5624	2309		2420		117		13684	3284	16968
1995	3945	6129	2658		2927		203		15862	2652	18514
1996	4146	5572	2493		2699		199		15109	3026	18135
1997	4333	5472	2875		1420		130		14230	3066	17296
1998	4232	4870	2492		2621		129		14345	5371	19716
1999	3751	4615	2193		2597		149		13305	3297	16601
2000	4173	6047	2185		2512		115		15031	1870	16901
2001	3645	7575	1710		2767		80		15778	2262	18040
2002	2929	8797	1787		2413		62		15987	2813	18800
2003	3227	8340	1732		2249		163		15711	4008	19719
2004	2817	7526	1622		2288		106		14358	6243	20602
2005	2972	5841	1764		2155		156		12888	3275	16163
2006	2763	5916	1509		1751		99		12037	3751	15788
2007	2745	6895	1462		1763		195		13060	3033	16092
2008	2578	5402	1387		1514		167		11048	2860	13908
2009	3032	8062	1840		1918	2	209		15064	3278	18342
2010	3651	7095	1805		2283	5	261		15101	5343	20444
2011	3235	3500	1845		2227		330	2089	13226	4187	17413
2012	4012	4055	1744		3047		609	966	14433	3704	18137
2013	4549	4982	2918		3038		538		16025	4885	20910
2014	4311	3318	2753	176	2391		179	150	13277	2569	15846
2015	3073	2863	2804	147	2436		246	1	11569	2393**	13962
2016	3141	2672	2694	145	2593		302	1	11548	3315**	14863
2017	5101	3178	2512	176	2458		360		13784	3518**	17303
2018	4680	2276	2337	112	2128	6	347	261	12147	3415**	15562
2019	4332	2617	2150	129	2454	1	481		12164	1966**	14130
2020	4387	2420	1883	5	1797	1	649		11141	2485**	13626
2021	4380	2896	2199	144	2075	5	718		12417	2603	15020

**Updated including imported and raised discards (ICES, 2022a).

Summary of the assessment

Table 9 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Assessment summary. 'High' and 'Low' refer to two standard deviations (sd) confidence intervals

Year	Recruitment (age 1)			Spawning-stock biomass			Landings	Discards	Fishing pressure (ages 3–6)		
	R	High	Low	SSB	High	Low			F	High	Low
	thousands			tonnes			tonnes				
1984	230209	265242	195175	77102	88124	66080	16659	2169	0.194	0.23	0.158
1985	218022	251314	184730	81159	92574	69743	17865	1732	0.23	0.27	0.187
1986	209635	242605	176665	85603	97663	73543	18927	2321	0.22	0.26	0.179
1987	181309	209443	153175	89217	101067	77367	17114	1705	0.22	0.26	0.184
1988	179649	207940	151357	74999	84090	65908	17577	1725	0.25	0.29	0.21
1989	227252	262902	191602	63394	71172	55616	19233	2582	0.34	0.39	0.29
1990	256378	296286	216469	52602	59042	46162	14370	3284	0.39	0.44	0.33
1991	290949	336422	245475	50325	56172	44477	15094	3282	0.43	0.49	0.36
1992	243615	281171	206060	47032	51751	42313	15600	2988	0.36	0.42	0.31
1993	207721	239400	176041	49875	54361	45390	14929	3108	0.37	0.43	0.31
1994	218801	251945	185658	48238	52317	44160	13684	2700	0.32	0.37	0.27
1995	247262	284147	210376	55356	60110	50601	15862	3206	0.33	0.38	0.28
1996	268341	307884	228797	51311	55809	46813	15109	3026	0.35	0.41	0.30
1997	243209	278827	207590	52984	57523	48445	14230	3066	0.30	0.35	0.25
1998	268759	306946	230572	56305	60912	51698	14345	5371	0.33	0.38	0.28
1999	263151	300474	225827	48825	52897	44753	13305	3297	0.35	0.41	0.30
2000	295083	336301	253865	48578	52588	44569	15031	1870	0.37	0.43	0.32
2001	247844	281141	214546	48929	52933	44924	15778	2262	0.43	0.50	0.37
2002	266020	302166	229874	45578	49530	41626	15987	2813	0.47	0.53	0.41
2003	247611	280197	215025	42966	46478	39453	15711	4008	0.46	0.52	0.40
2004	203492	230060	176925	37800	40694	34906	14358	6243	0.45	0.52	0.39
2005	211827	239074	184579	36054	38755	33352	12888	3275	0.47	0.53	0.41
2006	257924	290979	224868	35289	37947	32632	12037	3751	0.42	0.48	0.36
2007	246254	278248	214260	36299	39009	33590	13060	3033	0.46	0.52	0.40
2008	177204	200255	154153	37711	40365	35056	11048	2860	0.33	0.38	0.28
2009	206609	233900	179318	46675	50012	43338	15064	3278	0.34	0.39	0.29
2010	215687	243973	187402	49553	53284	45821	15101	5343	0.43	0.48	0.37
2011	182433	206464	158401	39998	42973	37024	13226	4187	0.38	0.43	0.33
2012	144699	163308	126091	41474	44617	38330	14433	3704	0.39	0.44	0.33
2013	150806	170656	130955	42850	46187	39512	16025	4885	0.48	0.54	0.42
2014	138656	157627	119685	47716	51282	44150	13277	2569	0.35	0.40	0.30
2015	162385	186943	137826	40129	43137	37121	10682	2393	0.30	0.34	0.25
2016	206961	241614	172308	44679	48131	41228	11548	3315	0.33	0.38	0.28
2017	264621	318140	211103	41330	44631	38029	13784	3518	0.37	0.43	0.32
2018	276376	344190	208563	53716	58558	48873	12147	3415	0.29	0.34	0.24
2019	243439	320924	165954	61793	68522	55065	12164	1966	0.22	0.26	0.179
2020	182574	262595	102554	75432	85413	65450	11141	2485	0.172	0.21	0.137
2021	159912	266826	52998	84327	97067	71587	12418	2603	0.179	0.22	0.139
2022	221058*			96645							

* Geometric mean (1984–2019).

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022.Megrim (*Lepidorhombus whiffiagonis*) in divisions 7.b–k, 8.a–b, and 8.d (west and southwest of Ireland, Bay of Biscay). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, meg.27.7b-k8abd, https://doi.org/10.17895/ices.advice.21333687

LANTERNFISH, PEARLSIDES AND OTHER MESOPELAGIC SPECIES

Sub-areas 6 and 7

ADVICE FOR 2023

ICES does not provide advice for these species.

KEY POINTS

ICES Assessment Category	Not available
Management Plan	No
ICES Advice Basis	None
MSY Range	Not available
Landing Obligation	No

https://www.meeso.org/about

MANAGEMENT IN 2022

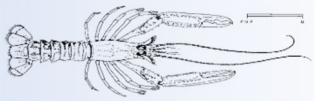
- There are no TACs for mesopelagic species in Sub-areas 6 and 7.
- There is no management plan for any mesopelagic species in Sub-areas 6 and 7.
- There are no assessments for these stocks.
- EC vessels are not allowed to target these species, or any other non-listed species (annex VI part B), with a cod end, extension piece, or any such attachment to any towed net with mesh sizes of less than 120 mm (or at least 100 mm in ICES sub-area 7b-7k), under Regulation 2019/1241.

KEY STOCK CONSIDERATIONS

- The Marine Institute is a partner in an EU H2020 project MEESO which is investigating ecologically and economically sustainable management of mesopelagic fisheries. The MI is leading a task in a work package to assess the distribution of mesopelagic resources using acoustic methods within the project.
- Some opportunistic mesopelagic sampling trials were carried out during the IBWSS 2021 and the Western European Shelf Acoustic Survey (WESPAS) in 2020 and 2021.
- A dedicated mesopelagic survey was carried out in September 2022 on RV Tom Crean. The survey assessed the persistence of the mesopelagic layer over a short time scale and collected eDNA samples to investigate species composition.
- Fishing trials have been conducted by various nations. Iceland fished for mesopelagic species in 2009 and 2010 in Sub-area 5.a. Russia had a fishery in Faroese waters in the early 2000s. Scottish and Irish vessels had some trial fisheries in 2013 and Norway started a small fishery with a first commercial catch in 2018 off the west coast of Norway.
- The scientific literature stresses that the role and function of mesopelagic fish need to be investigated more to assess the ecological sustainability of any potential fishery. Studies are needed on the suite of mesopelagic species that are caught, both wanted and unwanted.

NEPHROPS

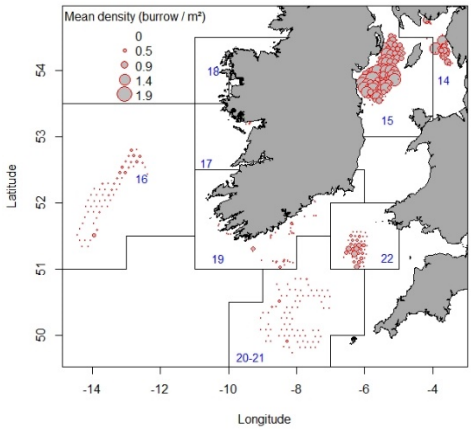
(NEPHROPS NORVEGICUS)



BIOLOGY – SPECIES

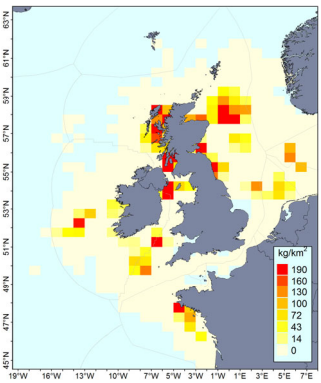
Nephrops norvegicus is widely distributed on muddy substrates throughout the north-east Atlantic from Iceland in the north to Morocco in the south. Around Ireland they are found in depths from 20 m – 600 m but mainly at average depths of ~100 m on the shelf. They construct shallow burrows in muddy sediments which limits the distribution. *Nephrops* larvae hatch in late spring/early summer. The females leave the burrows to hatch the eggs and mate. The eggs take about 4-8 weeks to develop into juveniles depending on water temperature. For the remainder of the year mature females then spend the majority of time in their burrows, first to spawn the eggs and then incubate them. Male *Nephrops* are more active outside of the burrows foraging for food.

Unlike fish, there is no direct way to age *Nephrops*. Growth rates vary considerably in different areas. Mean size is negatively correlated with density of individuals. The maximum carapace length recorded for *Nephrops* is a male of 9.3 cm from the Porcupine Bank Irish sampling programme.

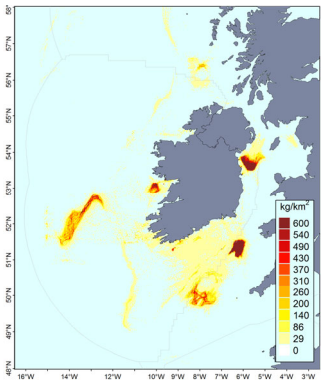


Nephrops grounds and burrow densities in 2022

LANDINGS DISTRIBUTION



◀ The distribution of international landings of *Nephrops* between 2016-2020. Most landings taken in the Irish Sea, west of Scotland, North Sea, Celtic Sea and Bay of Biscay.

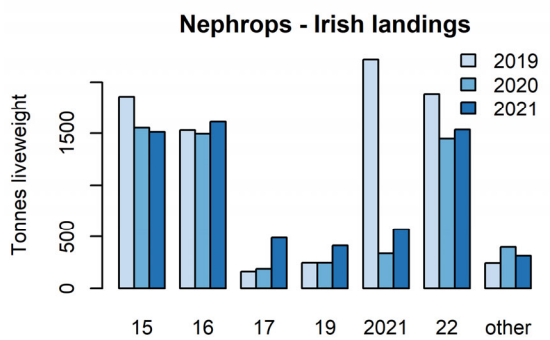


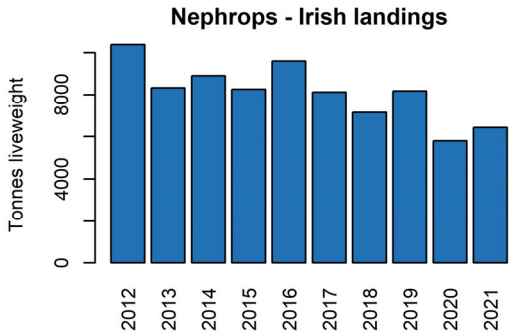
◀ The distribution of *Nephrops* landings by Irish vessels between 2016-2020. Most Irish landings are taken in the Celtic Sea.

Catches of *Nephrops* in the waters around Ireland are usually taken by *Nephrops* directed otter trawl fisheries where *Nephrops* account for the majority of the landings. The main by catch varies across the fishing grounds.

IRISH LANDINGS AND VALUE OF TAC

On average approximately 6,800 tonnes of *Nephrops* were landed in *Nephrops* fisheries by Irish vessels between 2019 and 2021. The Porcupine Bank stock (FU16) accounted for the highest percentage of landings (25%) in 2021. In 2021 landings were worth approximately €54 million for Irish vessels.





Nephrops FU11-13 and Outside FUs (North West of Ireland and West of Scotland)

Division 6.a

Advice for 2023

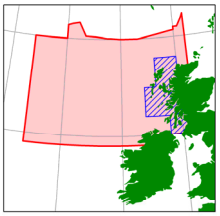
ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches and landings in 2023 should be no more than the advice in the table below. The TAC is normally set based on the sum of the ICES landings advice because the landings obligation permits discarding through a high survivability exemption.

Stock Area (Functional Unit)	Catches (Tonnes)	Landings (Tonnes)
North Minch (FU11)	**3,784**	**3,688**
South Minch (FU12)	**5,242**	**5,103**
Firth of Clyde (FU13)	**4,122**	**3,866**
Sound of Jura (FU13)	**474**	**445**
Other rectangles	*****	**< 209**

* ICES cannot quantify the corresponding total catches.

To ensure that the stock in Functional Unit (FU) 11, 12 and 13 is exploited sustainably, management should be implemented at the Functional Unit level.

ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for subarea 6. ICES considers this plan to be precautionary when implemented at the Functional Unit level.



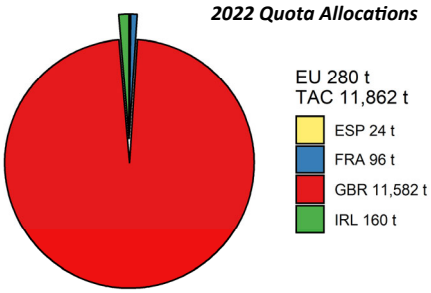
Key Points

FU		11	12	13 Clyde	13 Jura
ICES Assessment Category		1 (Quantitative Assessment)			
Management Plan		WWMAP (target); No management plan has been agreed between all the relevant management authorities.			
ICES advice basis		ICES MSY approach			
Ranges	F_{MSY} Lower	Catch=2,943 t	Catch=4,165 t	Catch=2,702 t	Catch=371 t
	F_{MSY}	Catch=3,784 t	Catch=5,242 t	Catch=4,122 t	Catch=474 t
	F_{MSY} Upper	Catch=3,784 t	Catch=5,242 t	Catch=4,122 t	Catch=474 t
Landing Obligation		From 2016		Gear specific high survivability exemption*	
MSY $B_{trigger}$ (million individuals)		540	1,020	580	160

* Described below under Key Stock Considerations, details in (EU 2020/2015).

MANAGEMENT IN 2022

- The current TAC area and stock assessment area do not match. The TAC area covers Sub-area 6 and Division 5.b. Division 6.a contains three main fisheries, the North Minch (FU 11), South Minch (FU 12) and Firth of Clyde (FU 13) there are also landings outside these FUs.
- Since 2016, EU fisheries catching *Nephrops* in Division 6.a have been covered by the EU landing obligation. Pot, trap and creel and in 2021 most trawl fisheries had a high survivability exemption under the Landing Obligation.



KEY STOCK CONSIDERATIONS

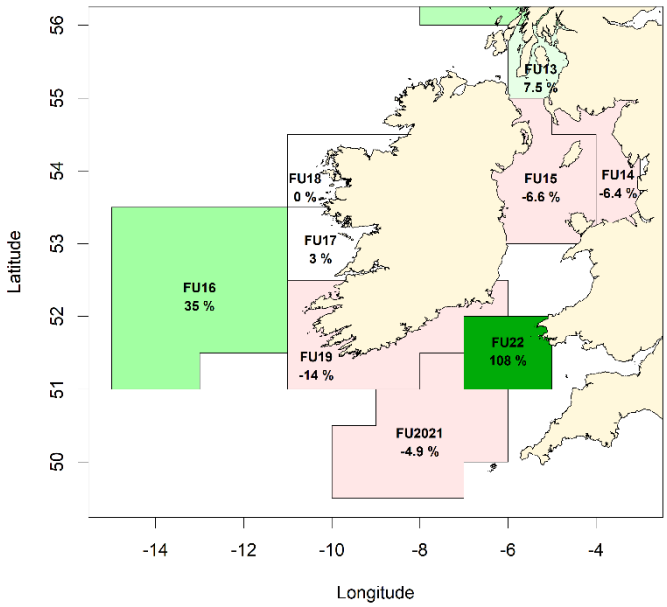
- Irish landings mainly come from outside Functional Units that are not currently assessed using UWTV surveys.
- The sum of the single stock projected landings advice for all functional units in 6 is 13,311t. This is a 12.2% increase on the landings advice given last year and the 2022 TAC of 11,862t.
- Under the Landing Obligation *Nephrops* trawl fisheries have a high survivability exemption, based on studies which showed a survivability greater than 50% in Sub-area 6.a (Fox and Albalat, 2018[1]). This exemption applies to otter trawls (OTT, OTB, TBS, TBN, TB, PTB, OT, PT, TX) with a mesh size of 80-110 mm within twelve nautical miles of the coast (EU 2020/2015). There is also a high survivability exemption for creel caught *Nephrops* in Sub-area 6a.

For ICES advice on *Nephrops* in 6.a – please see:
https://www.ices.dk/advice/Pages/Latest-Advice.aspx

Overview of ICES advice for Nephrops in Sub-area 7

Advice Overview

- **The landings advice for 2023 (18,353 t) is 7.7% more than the 2022 TAC of 17,038 t. The TAC is normally set based on the sum of the ICES landings advice because the landings obligation permits discarding through a high survivability exemption. The total catch advice for 2023 is 6.7% more than for 2022.**
- **The map below summarises the advice changes for each FU.**
- **ICES advises that to ensure that the stock in each Functional Unit (FU) is exploited sustainably; management should be implemented at the Functional Unit level.**
- **In recent years TAC has been set for the whole of Sub-area 7 with a provision for limiting the catch from the Porcupine Bank stock (FU 16).**
- **The assessments indicate that all the stocks were exploited below F_{MSY} in 2021.**
- **Three stocks, FU 17, FU 19 and FU 22 were estimated to be below MSY $B_{trigger}$ in 2022. The MSY $B_{trigger}$ for FU 16 has not yet been defined due to the short UWTV time series.**
- **The 2022 UWTV survey in FU17 was incomplete so the assessment and advice was based on the 2021 survey.**



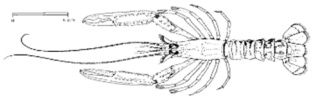
◂ Figure showing the % change in total landings advice for each Functional Unit compared with last year.

FU 14	Eastern Irish Sea
FU 15	Western Irish Sea
FU 16	Porcupine Bank
FU 17	Aran Grounds
FU 18 & 7 other	
FU 19	SE and SW Coasts of Ireland
FU 20-21	Labadie, Jones and Cockburn
FU 22	The Smalls

	Stock Status		Advice for 2023				Advice for 2022		% Change in advice	
Functional Unit	F_{2021} < FMSY	SSB_{2022} > B_{trig}	Total catches (t)	Landings (wanted catch) (t)	Harvest rate	Discard rate by weight	Total catches (t)	Landings (wanted catch) (t)	Total catch	Landings (wanted catch)
FU14	✓	✓	789	735	11.0%	6.84%	835	785	-5.5%	-6.4%
FU15	✓	✓	11,069	9,271	18.2%	16.24%	11,785	9,924	-6.1%	-6.6%
FU16	✓	?	3,787	3,787	6.2%	0.00%	2,804	2,804	35.1%	35.1%
FU17	✓	✗	363	312	5.2%	14.05%	360	303	0.8%	3.0%
FU19	✓	✗	338	230	5.6%	31.95%	378	266	-10.6%	-13.5%
FU2021	✓	✓	1,803	1,620	6.0%	10.15%	1,978	1,703	-8.9%	-4.9%
FU22	✓	✗	2,548	2,248	11.6%	11.77%	1,257	1,083	102.7%	107.6%
Other Rectangles	?	?	na	150	na	0.00%	na	150	na	0.0%
Total advice			20,847*	18,353	–	12.0%	19,547*^	17,018^	6.7%	7.8%

*Including landings advice for other rectangles
^ The advice for FU 19 was revised slightly in September 2022 (previous total landings advice was 17,038t)

Nephrops FU14 (Irish Sea, East)



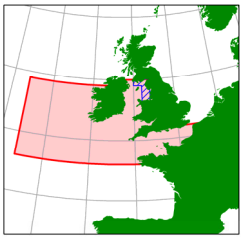
Division 7.a

Advice for 2023

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 should be no more than 789 t.

To ensure that the stock in Functional Unit 14 is exploited sustainably, management should be implemented at the Functional Unit level.

ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for subarea 7. ICES considers this plan to be precautionary when implemented at the Functional Unit level.



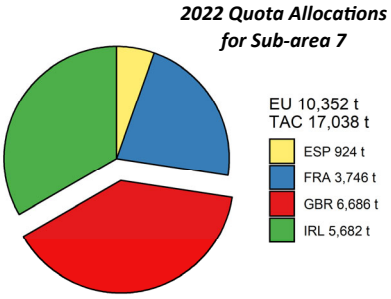
Key Points

ICES assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target); No management plan has been agreed between all the relevant management authorities.	
Advice Basis	MSY approach	Catch=789 t
Ranges	F_{MSY} Range Lower	Catch=653 t
	F_{MSY}	Catch=789 t
	F_{MSY} Range Upper	Catch=789 t
Landing Obligation	From 2016	Gear specific high survivability exemption*
MSY $B_{trigger}$ (million individuals)	350	

*Described below under Key Stock Considerations, details in (EU 2020/2015).

Management in 2022

- The current TAC area and stock assessment area do not match.
- Since 2016, EU fisheries catching *Nephrops* in Division 7.a have been covered by the EU landing obligation. Pot, trap and creel and in 2021 most trawl fisheries had a high survivability exemption under the Landing Obligation (there are negligible creel fisheries in this area).
- Irish vessels (>12 m) fishing *Nephrops* in the Irish Sea are required to use one of four highly selective gears and a cod end mesh size >80mm (S.I. No. 510 of 2016 and EU 2021/2324).



Key Stock Considerations

- The advised catch of 789 t results in projected landings advice of 735 t (assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021).
- Under the Landing Obligation *Nephrops* trawl fisheries in Division 7a have a high survivability exemption, based on studies which showed a survivability of about 64% (BIM, 2017). This exemption applies to bottom trawls (OTT, OTB, TBS, TBN, TB, PTB, OT, PT, TX) with a mesh size ≥100 mm or with a mesh size 70-99 mm in combination with highly selective gear options such as: 300mm square mesh panels, seltra panel, 35 mm sorting grid, CEFAS Netgrid or Flip-flap trawl (EU 2021/2324).
- A high survivability exemption also applies to creel caught *Nephrops* in Sub-area 7.

Published 28 October 2022

Norway lobster (*Nephrops norvegicus*) in Division 7.a, Functional Unit 14 (Irish Sea, East)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 should be no more than 789 tonnes.

To ensure that the stock in Functional Unit (FU) 14 is exploited sustainably, management should be implemented at the FU level.

ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for Subarea 7. ICES considers this plan to be precautionary when implemented at the FU level.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and stock size is above MSY $B_{trigger}$.

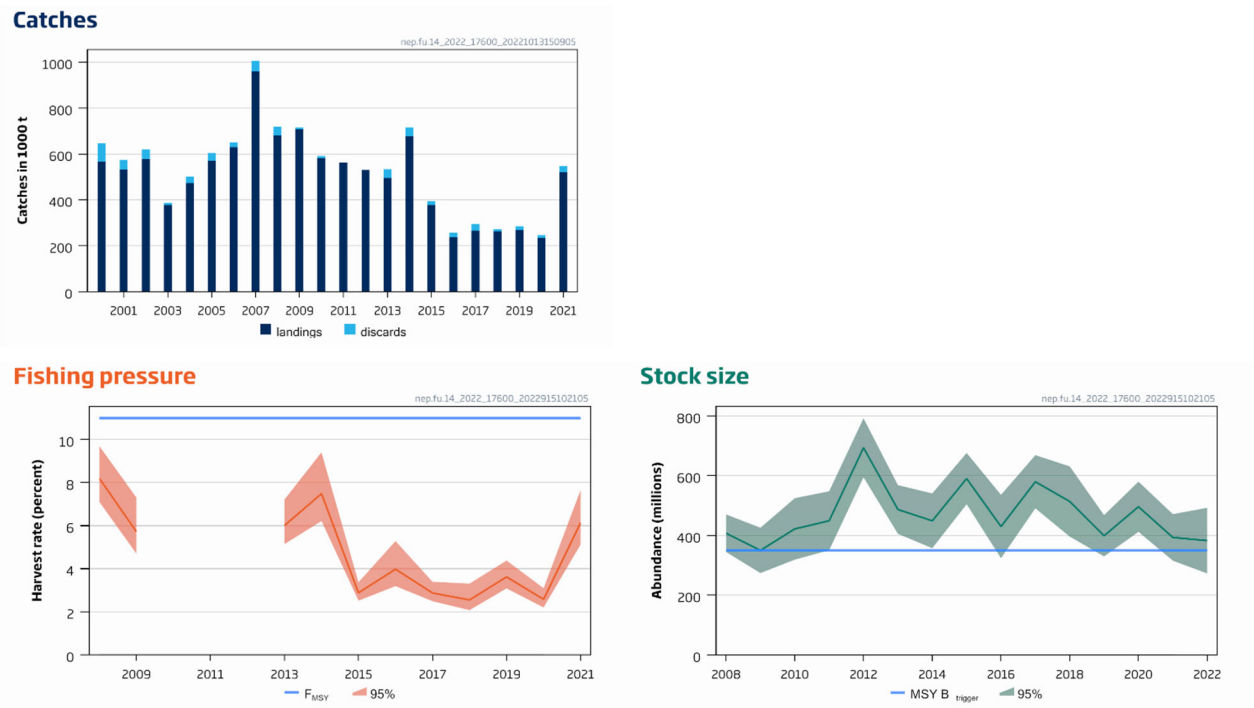


Figure 1 Norway lobster in Division 7.a, Functional Unit 14. Summary of the stock assessment. Catches, harvest rate (sum of landings and dead discards in numbers, divided by stock abundance), and stock abundance (underwater TV survey). No reliable harvest rate estimates exist for the period 2010–2012 because of insufficient catch sampling. The harvest rate in 2020 was derived from 2017–2019 sampling.

Catch scenarios

Table 1 Norway lobster in Division 7.a, Functional Unit 14. The basis for the catch advice and scenarios.

Variable	Value	Notes
Stock abundance (2023)	386	UWTV survey 2022; individuals in millions
Mean weight in projected landings	19.85	Average 2019–2021; in grammes
Mean weight in projected discards	9.13	Average 2019–2021; in grammes
Projected discard rate	13.9	Average 2019–2021; percentage by number of the total catch
Discard survival rate	10.0	Percentage by number of the discards

Table 2 Norway lobster in Division 7.a, Functional Unit 14. Annual catch advice and scenarios. All weights are in tonnes. The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.

Basis	Total catch	Dead removals	Projected landings	Projected dead discards	Projected surviving discards	% harvest rate*	% advice change **
	PL + PDD + PSD	PL + PDD	PL	PDD	PSD	for PL + PDD	
ICES advice basis							
MSY approach	789	784	735	49	5	11.0	–5.5
Other scenarios							
$F_{MSY\ upper}$ ***	789	784	735	49	5	11.0	–5.5
$F_{MSY\ lower}$	653	649	608	41	5	9.1	–22
F_{2021}	185	184	172	12	1	2.6	–78

* By number.
** Advice values for 2023 are relative to the 2022 advice (F_{MSY} advice of 835 tonnes).
*** $F_{MSY\ upper}$ = F_{MSY} for this stock.

The decrease in total catch advice is the result of the lower estimated stock abundance in 2022, together with a small decrease in mean weights in landings and discards.

Basis of the advice

Table 3 Norway lobster in Division 7.a, Functional Unit 14. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the EU multiannual plan (MAP) that has been agreed for this stock (EU, 2019) and considers it to be precautionary when implemented at the FU level. There is no agreement with the UK regarding this plan, and it is not used as the basis for the advice for this stock. ICES provides catch scenarios consistent with the F_{MSY} ranges in the MAP.

Quality of the assessment

From 2013 onwards sampling information has improved, but it remains poor. Sampling was impacted by the COVID-19 pandemic with no catch samples available for 2020. Estimates of mean sizes and discard rates 2017–2019 were therefore used in the assessment (ICES, 2020). This is considered to have had minor impact on the quality of the assessment because discard rates have been consistently low in recent years and are in line with historical observed ranges in the fishery (ICES, 2021 and 2022a). Although sampling has resumed, its coverage is partial in 2021.

Since 2008 the underwater television survey (UWTV) has provided abundance estimates for FU 14 (Figure 2) with acceptable precision.

Issues relevant for the advice

During 2016–2020, the EU landing obligation was applied to all catches of Norway lobster fisheries in ICES Subarea 7 with exemptions for high survival. In 2022, this stock is still under a landing obligation and there are still exemptions in place. Observations from the fishery indicate some discarding above the minimum conservation reference size (MCRS) continues (Figure 3). Consequently, ICES is providing advice for 2023 assuming average discard rates as observed over the period 2019–2021. This is considered to be the most realistic assumption. In a situation where all catch is landed, there would be no surviving discards, and the total catch advice and MSY harvest rate would be lower than those given in the catch scenario table (Table 2). However, reducing the catch of smaller Norway lobster would allow an increase in landings above those given in the catch scenario table.

The survival rate of discards of 10% assumed for FUs 14 and 15 is lower than that for other stocks because these are largely spring/summer fisheries, during which catch is exposed to warmer temperatures and fishing practices are associated with long sorting times.

The density of Norway lobster in FU 14 is considered medium (~0.44 burrow m^{-2}, average 2013–2022) compared with other FUs. Some biological parameters are poorly known, and the sampling levels in the recent past have been low and variable. Harvest rate estimates have been below $F_{0.1}$ for combined sexes; therefore ICES considers that $F_{0.1}$ is a suitable F_{MSY} proxy for this stock (ICES, 2016a).

A single TAC covers the entire ICES Subarea 7. Management should be implemented at the FU level (Figure 2) to avoid local over-exploitation and to ensure that fishing opportunities are in line with the scale of the resource for each of the stocks and consistent with an MSY approach.

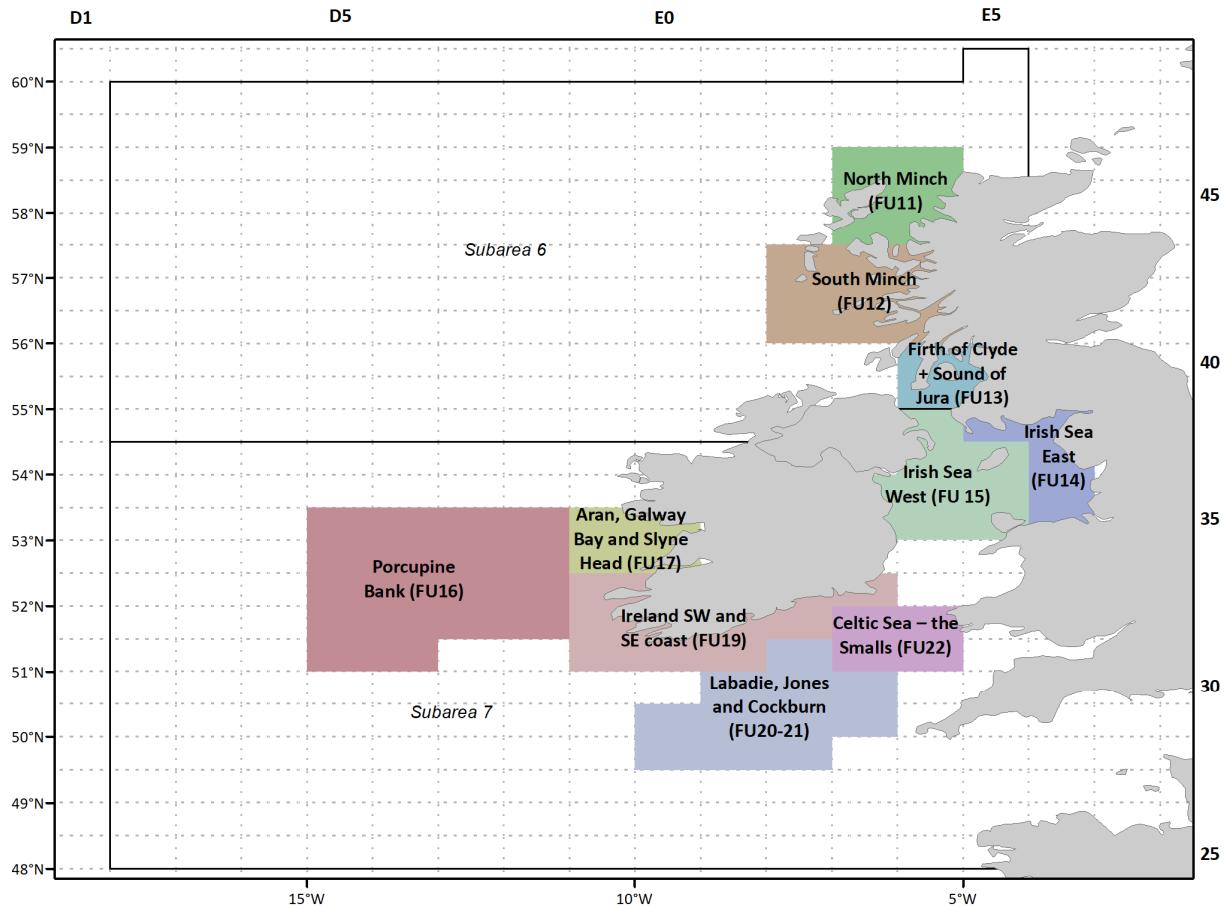


Figure 2 Norway lobster functional units in subareas 6 and 7.

Reference points

Table 4 Norway lobster in Division 7.a, Functional Unit 14. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	350	The lowest observed abundance estimate from the UWTV survey time-series; individuals in millions.	ICES (2016b)
	F_{MSY}	11.0	Proxy harvest rate equivalent to $F_{35\%SPR}$ for combined sexes, derived from a length-based per recruit analysis; percentage by numbers.	ICES (2016b)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
EU Management plan (EU, 2019)	MAP MSY $B_{trigger}$	350	MSY $B_{trigger}$; individuals in millions	ICES (2016b)
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	11.0	Harvest rate equivalent to F_{MSY}; percentage by numbers	ICES (2016b)
	MAP Lower range of F_{MSY}	9.1–11.0	Harvest rate, consistent with ranges provided by ICES resulting in no more than 5% reduction in long-term yield compared with MSY; percentage by number	ICES (2016b)
	MAP Upper range of F_{MSY}	11.0–11.0	Harvest rate, $F_{MSY\ upper}$ value capped at F_{MSY} because it has not been possible to evaluate the probability of SSB < B_{lim} as no B_{lim} is defined; percentage by number	ICES (2016b)

Basis of the assessment

Table 5 Norway lobster in Division 7.a, Functional Unit 14. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Underwater TV survey (ICES, 2022b)
Input data	One survey index (FU14-UWTV [U3016]); commercial catches (international landings); length frequencies from the fishery; maturity data; natural mortalities from Brander and Bennett (1986, 1989); discard survival rate
Discards and bycatch	Included in the assessment since 2000, data series from the majority of the fleets/main fleets
Indicators	Sex ratio, length frequencies
Other information	This stock was benchmarked in 2015 (IBPNeph; ICES, 2016a)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Norway lobster in Division 7.a, Functional Unit 14. ICES advice, landings, and discards. All weights are in tonnes.

Year	ICES advice	Landings advice	Catch advice**	Recommended landings (FUs 14 + 15)	ICES landings	Total discards*
1989					400	
1990					560	
1991					750	
1992				8900	430	
1993				9400	520	
1994				9400	450	
1995				9400	580	
1996				9400	480	
1997				9400	570	
1998				9400	390	
1999				9400	620	

Year	ICES advice	Landings advice	Catch advice**	Recommended landings (FUs 14 + 15)	ICES landings	Total discards*
2000				9400	567	80
2001				9400	532	42
2002	Set TAC in line with 1995–1999 landings			9550	577	42
2003	Set TAC in line with 1995–1999 landings			9550	377	11
2004	Set TAC in line with 1995–1999 landings			9550	472	28
2005	Set TAC in line with 1995–1999 landings			9550	570	33
2006	No increase in effort			9550	628	22
2007	No increase in effort			-	959	47
2008	As for 2007			-	681	37
2009	No increase in effort and landings (2007)	< 1000		-	708	6
2010	No new advice, same as for 2009	< 1000		-	582	n/a
2011	Transition towards ICES MSY framework	< 680		-	561	n/a
2012	MSY approach	< 960		-	530	n/a
2013	MSY approach	< 880		-	495	39
2014	MSY approach	< 951		-	679	32
2015	MSY approach	< 662		-	378	18
2016	MSY approach		≤ 1272 ***	-	237	20
2017	MSY approach		≤ 995	-	265	29
2018	MSY approach		≤ 1281		263	9
2019	MSY approach		≤ 922		270	15
2020	Management plan		779 (range 644–779)		232	15
2021	Management plan		1053 (range 871–1053)		519	58
2022	MSY approach		≤ 835			
2023	MSY approach		≤ 789			

* Dead + surviving discards.
** Assuming recent discarding rates (from 2017).
*** Assuming all catches are landed.
n/a = not available.

History of the catch and landings

Table 7 Norway lobster in Division 7.a, Functional Unit 14. Catch distribution by fleet in 2021 as estimated by ICES.

Catch		Landings		Discards	
99% dead	1% surviving	Directed *nephrops* fishery 99%	Demersal fishery 1%	90% dead	10% surviving
577 tonnes		519 tonnes		58 tonnes	

Table 8 Norway lobster in Division 7.a, Functional Unit 14. History of landings and discards; ICES estimated landings are presented for each country. All weights are in tonnes. The figures in the table are rounded and therefore the total landings may not match.

Year	Republic of Ireland	UK	Other countries	Total landings	Discards*
2000	114	451	2	567	80
2001	26	506	0	532	42
2002	203	373	1	577	42
2003	69	306	1	377	11
2004	62	409	1	472	28
2005	34	536	0	570	33
2006	34	594	0	628	22
2007	86	873	0	959	47
2008	29	652	0	681	37
2009	16	692	0	708	6
2010	45	538	0	582	n/a
2011	31	530	0	561	n/a

Year	Republic of Ireland	UK	Other countries	Total landings	Discards*
2012	53	478	0	530	n/a
2013	35	460	0	495	39
2014	31	648	0	679	32
2015	88	290	0	378	18
2016	21	216	0	237	20
2017	7	258	0	265	29
2018	5	263	0	263	9
2019	9	260	0	270	15
2020	23	209	0	232	15
2021	0	519	0	519	58

* Dead + surviving discards.
n/a = not available.

Summary of the assessment

Table 9 Norway lobster in Division 7.a, Functional Unit 14. Assessment summary.

Year	UWTV abundance estimate	High 95% confidence interval	Low 95% confidence interval	Landings in numbers	Total discards in numbers*	Removals in numbers	Harvest rate (by numbers)	Landings	Discards	Mean weight in landings	Mean weight in discards	Discard rate (by numbers)	Dead discard rate (by numbers)
	millions						%	tonnes		grammes		%	
2000				30	11	40		567	80	19.05	7.52	26	24
2001				26	5	31		532	42	20.87	7.97	17.0	15.5
2002				26	5	30		577	42	22.41	8.98	15.4	14.1
2003				13	1	14		377	11	29.12	7.62	9.9	9.0
2004				22	4	25		472	28	21.93	7.57	14.8	13.5
2005				27	4	30		570	33	21.48	8.44	13.0	11.8
2006				25	3	28		628	22	25.07	7.98	10.1	9.2
2007				40	6	46		959	47	23.94	7.33	13.8	12.5
2008	408	471	345	30	4	34	8.2	681	37	22.88	8.49	12.7	11.6
2009	350	426	274	19	1	20	5.7	708	6	36.49	8.58	3.7	3.3
2010**	422	525	319					582					
2011**	449	548	350					561					
2012**	694	793	595					530					
2013	487	569	405	25	5	30	6.0	495	39	19.94	7.87	16.4	15.0
2014	449	541	357	30	4	34	7.5	679	32	22.37	9.60	10.8	9.8
2015	591	677	505	15	2	17	2.9	378	18	25.19	7.82	13.0	11.9
2016	433	536	324	15	2	17	4.0	237	20	15.82	8.38	13.6	12.4
2017	580	669	491	14	3	17	2.9	265	29	18.97	9.50	17.6	16.2
2018	514	632	396	12	1	13	2.6	263	9	21.39	9.78	7.0	6.3
2019	399	468	330	13	2	14	3.6	270	15	20.93	8.40	12.2	11.1
2020***	496	580	412	11	2	13	2.6	232	15	20.43	9.23	12.3	11.2
2021	393	471	315	21	4	24	6.1	519	58	19.56	9.07	3.9	12.7
2022	386	493	273										

* Dead + surviving discards.
** No estimates because of insufficient sampling.
*** Mean weights, discard rates and discard numbers for 2020 estimated from average of 2017–2019 values.

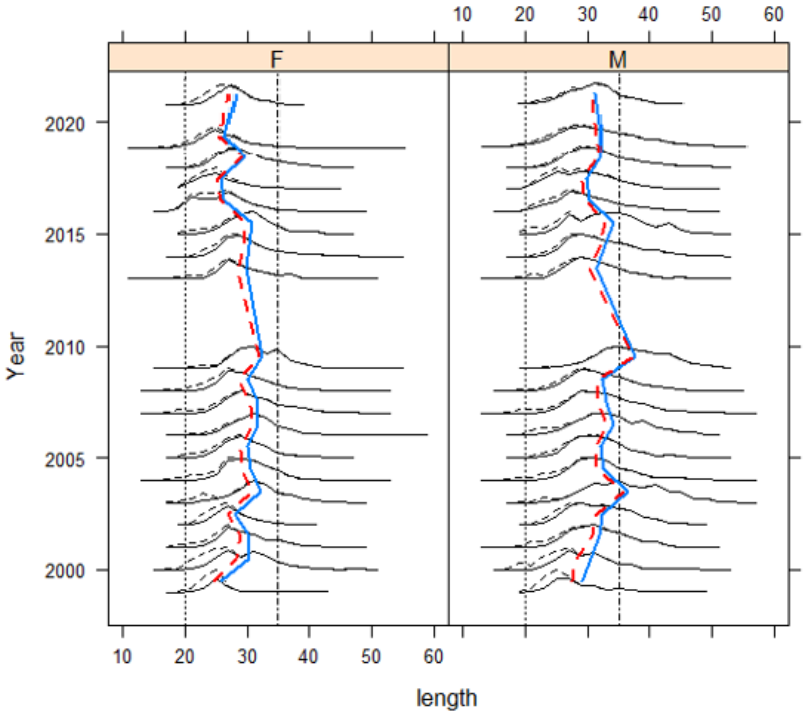


Figure 3 Norway lobster in Division 7.a, Functional Unit 14. The dashed lines represent catches while the solid lines represent landings. Annual length–frequency distributions are shown on the horizontal, the vertical bold lines represent mean lengths. Minimum conservation reference size (20 mm) and 35 mm visual reference levels indicated. All lengths are shown in carapace length (mm).

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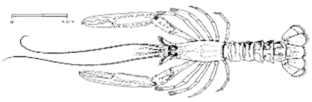
Download the stock assessment data and figures.

Recommended citation: ICES. 2022 Norway lobster (*Nephrops norvegicus*) in Division 7.a, Functional Unit 14 (Irish Sea, East). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, nep.fu.14. https://doi.org/10.17895/ices.advice.19772404

Nephrops FU15 (Irish Sea, West)



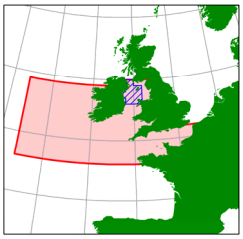
Division 7.a

Advice for 2023

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 should be no more than 11,069 t.

To ensure that the stock in Functional Unit 15 is exploited sustainably, management should be implemented at the functional unit level.

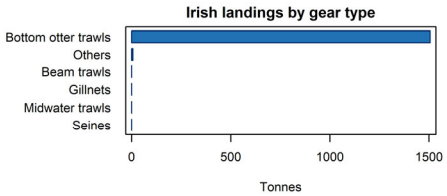
ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for subarea 7. ICES considers this plan to be precautionary when implemented at the Functional Unit level.



Key Points

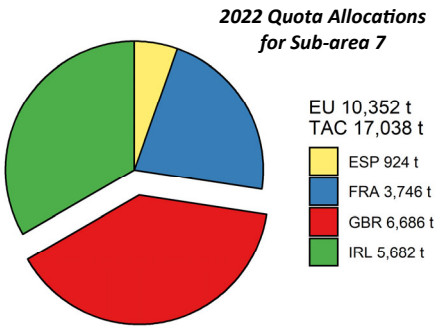
ICES assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target); No management plan has been agreed between all the relevant management authorities.	
Advice Basis	MSY approach	Catch=11,069 t
Ranges	F_{MSY} Range Lower	Catch=7,541 t
	F_{MSY}	Catch=11,069 t
	F_{MSY} Range Upper	Catch=11,069 t
Landing Obligation	From 2016	Gear specific high survivability exemption*
MSY $B_{trigger}$ (million individuals)	3,000	

* Described below under Key Stock Considerations, details in (EU 2020/2015).



Management in 2022

- The current TAC area and stock assessment area do not match.
- Since 2016, fisheries catching *Nephrops* in Division 7.a have been covered by the EU Landing Obligation. Pot, trap and creel and in 2021 most trawl fisheries had a high survivability exemption under the Landing Obligation (there are negligible creel fisheries in this area).
- Irish vessels (>12 m) fishing *Nephrops* in the Irish Sea are required to use one of four highly selective gears and a cod end mesh size >80mm (S.I. No. 510 of 2016 and EU 2021/2324).



Key Stock Considerations

- The advised catch of 11,069 t results in projected landings advice of 9,271 t (assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021).
- Irish landings of Irish Sea *Nephrops* are taken in a highly targeted fishery; in 2021 90% of the landings came from trips targeting *Nephrops*.

- Under the Landing Obligation *Nephrops* trawl fisheries in Division 7a have a high survivability exemption, based on studies which showed a survivability of about 64% (BIM, 2017). This exemption applies to bottom trawls (OTT, OTB, TBS, TBN, TB, PTB, OT, PT, TX) with a mesh size ≥100 mm or with a mesh size 70-99 mm in combination with highly selective gear options such as: 300mm square mesh panels, seltra panel, 35 mm sorting grid, CEFAS Netgrid or Flip-flap trawl (EU 2021/2324).
- A high survivability exemption also applies to creel caught *Nephrops* in Sub-area 7.

Published 28 October 2022

Norway lobster (*Nephrops norvegicus*) in Division 7.a, Functional Unit 15 (Irish Sea, West)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 should be no more than 11 069 tonnes.

To ensure that the stock in Functional Unit (FU) 15 is exploited sustainably, management should be implemented at the FU level.

ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for Subarea 7. ICES considers this plan to be precautionary when implemented at the FU level.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and stock size is above MSY $B_{trigger}$.

Figure 1 Norway lobster in Division 7.a, Functional Unit 15. Summary of the stock assessment. Catches (discard data are only available since 1986), harvest rate (sum of landings and dead discards in numbers, divided by stock abundance), and stock abundance (underwater TV survey). Harvest rates between 2003 and 2006 may be underestimated because of underreporting of landings.

Catch scenarios

Table 1 Norway lobster in Division 7.a, Functional Unit 15. The basis for the catch scenarios.

Variable	Value	Notes
Stock abundance (2023)	4498	UWTV survey 2022; numbers of individuals in millions
Mean weight in projected landings	15.03	Average 2019–2021; in grammes
Mean weight in projected discards	8.07	Average 2019–2021; in grammes
Projected discard rate	27	Average 2019–2021; percentage by number of the total catch
Discard survival rate	10	Percentage by number of the discards

Table 2 Norway lobster in Division 7.a, Functional Unit 15. Annual catch advice and scenarios. All weights are in tonnes. The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.

Basis	Total catch	Dead removals	Projected landings	Projected dead discards	Projected surviving discards	% harvest rate*	% advice change**
	PL + PDD + PSD	PL + PDD	PL	PDD	PSD	for PL + PDD	
ICES advice basis							
MSY approach	11069	10889	9271	1618	180	18.2	–6.1
Other scenarios							
$F_{MSY\ upper}$***	11069	10889	9271	1618	180	18.2	–6.1
$F_{MSY\ Lower}$	7541	7419	6317	1102	122	12.4	–36
$F_{2019–2021}$	7658	7658	6520	1138	126	12.8	–35
F_{2021}	7419	7419	6317	1102	122	12.4	–37

* By number.
** Advice values for 2023 are relative to the 2022 advice (F_{MSY} advice of 11 785 tonnes).
*** $F_{MSY\ upper} = F_{MSY}$

The catch advice for 2023 is reduced compared to 2022 due to a reduction in the estimated stock abundance.

Basis of the advice

Table 3 Norway lobster in Division 7.a, Functional Unit 15. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the EU multiannual management plan (MAP) that has been agreed for this stock (EU, 2019) and considers it to be precautionary when implemented at the FU level. There is no agreement with the UK regarding this plan, and it is not used as the basis of the advice for this stock. ICES provides catch scenarios consistent with the F_{MSY} ranges in the MAP.

Quality of the assessment

Levels of catch sampling in 2020 were reduced due to the COVID-19 pandemic. Sampling levels in 2021 have returned to pre-2020 levels. The quality of input data and level of sampling for this stock are considered to be good.

An annual underwater TV survey (UWTV) has taken place since 2003, which gives abundance estimates for FU 15 (Figure 2) with high precision. In 2022, 3% of stations were not surveyed due to the presence of static fishing gear on the inshore boundary of the survey ground. This is considered to have had minor impact on the abundance estimate and quality of the survey, based on historical observations of these stations and comparing coefficients of variation from the current and previous survey years.

Issues relevant for the advice

During 2016–2020, the EU landing obligation was applied to all catches of Norway lobster fisheries in ICES Subarea 7 with exemptions for high survival. In 2022, this stock is still under a landing obligation and there are still exemptions in place.

Observations from the 2019–2021 fishery indicate that some discarding above the minimum conservation reference size (MCRS) continues (Figure 3). Consequently, ICES is providing advice for 2023 assuming average discard rates as observed over the last three years. This is considered to be the most realistic assumption. In a situation where all catch is landed, there would be no surviving discards, and the total catch advice and MSY harvest rate would be lower than those given in the catch scenario table (Table 2). However, reducing the catch of smaller Norway lobster would allow an increase in landings above those given in the catch scenario table.

The survival rate of discards of 10% assumed for FUs 15 and 14 is lower than that for other stocks because the fishery is largely a spring/summer fishery during which catch is exposed to warmer temperatures and fishing practices are associated with long sorting times.

The density of Norway lobster in FU 15 is considered to be high (average density 0.74 individuals m^{-2} in 2022) compared to other FUs. A harvest rate consistent with a combined-sex F_{MAX} of 18.2% is considered an appropriate proxy for F_{MSY}.

A single TAC covers the entire ICES Subarea 7. Management should be implemented at the FU level (Figure 2) to avoid local over-exploitation and to ensure that fishing opportunities are in line with the scale of the resource for each of the stocks and consistent with an MSY approach.

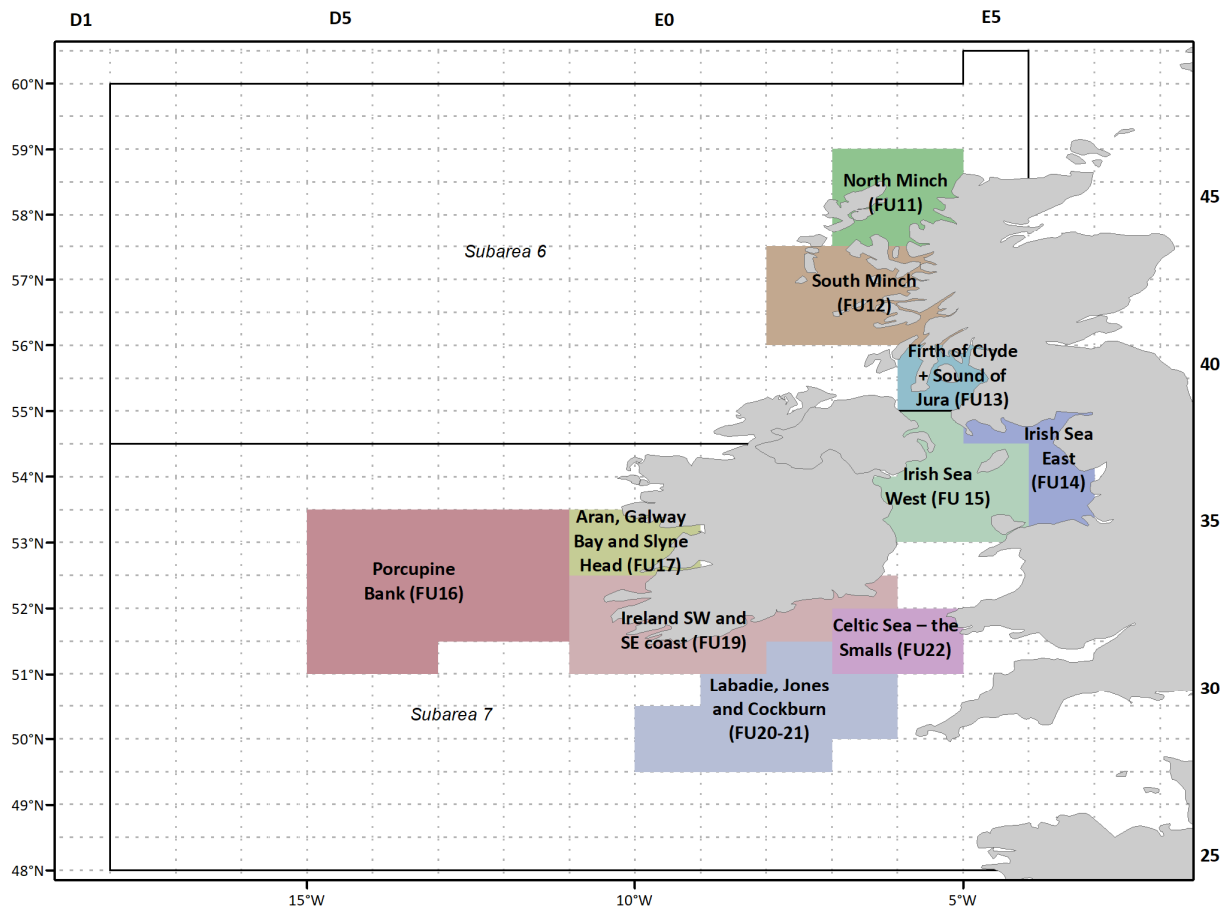


Figure 2 Norway lobster Functional Units (FU) in subareas 6 and 7.

Reference points

Table 4 Norway lobster in Division 7.a, Functional Unit 15. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	3000	Minimum abundance observed based on a scaled trawl survey index; individuals in millions	ICES (2016)
	F_{MSY}	18.2	Proxy harvest rate equivalent to F_{MAX} for combined sexes, derived from a length-based per recruit analysis; percentage by number	ICES (2016)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
EU Management plan (EU, 2019)	MAP MSY $B_{trigger}$	3000	MSY $B_{trigger}$; individuals in millions	ICES (2016)
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	18.2	Harvest rate equivalent to F_{MSY}; percentage by number	ICES (2016)
	MAP Lower range of F_{MSY}	12.4–18.2	Harvest rate consistent with ranges provided by ICES resulting in no more than 5% reduction in long-term yield compared with MSY; percentage by number	ICES (2016)
	MAP Upper range of F_{MSY}	18.2–18.2	Harvest rate, $F_{MSY\ upper}$ value capped at F_{MSY} because it has not been possible to evaluate the probability of SSB < B_{lim} as no B_{lim} is defined; percentage by number	ICES (2016)

Basis of the assessment

Table 5 Norway lobster in Division 7.a, Functional Unit 15. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Underwater TV survey (ICES, 2022b)
Input data	One survey index (UWTV-FU 15 [U5543]); commercial catches (international landings, length frequencies from catch sampling); fixed maturity ogive based on survey sampling, fixed natural mortality; discard survival rate
Discards and bycatch	Included in the assessment since 2003
Indicators	Length–frequency distributions of the catches by sex. CPUE from *Nephrops* trawl survey.
Other information	The latest benchmark (based on the UWTV survey) was performed in 2009 (ICES, 2009)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Norway lobster in Division 7.a, Functional Unit (FU) 15. ICES advice, landings, and discards. All weights are in tonnes.

Year	ICES advice	Landings advice	Catch advice *	Recommended landings (FUs 14 + 15)	ICES landings	Total discards **
1989					8128	673
1990					8300	276
1991					9554	345
1992				8900	7541	1079
1993				9400	8102	1622
1994				9400	7606	1185
1995				9400	7796	1724
1996				9400	7247	1202
1997				9400	9971	1330
1998				9400	9128	1560
1999				9400	10786	2913
2000				9400	8370	2293
2001				9400	7441	2112
2002	Set TAC in line with 1995–1999 landings			9550	6793	1732
2003	Set TAC in line with 1995–1999 landings			9550	7065	2659
2004	Set TAC in line with 1995–1999 landings			9550	7270	1993
2005	Set TAC in line with 1995–1999 landings			9550	6554	1412
2006	No increase in effort			9550	7561	2285
2007	No increase in effort				8491	3246

Year	ICES advice	Landings advice	Catch advice *	Recommended landings (FUs 14 + 15)	ICES landings	Total discards **
2008	No increase in effort				10508	1421
2009	No increase in effort and landings	< 8500			9198	2934
2010	Harvest rate no greater than the equivalent to fishing at $F_{0.1}$	< 5500			8963	1539
2011	Transition scheme towards ICES MSY framework	< 9500			10162	2683
2012	MSY approach	< 9800			10529	1871
2013	MSY approach	< 9300			8672	1590
2014	MSY approach	< 8200			8613	1418
2015	MSY approach	< 8223			8643	2228
2016	MSY approach		≤ 8682 ***		7327	1939
2017	MSY approach		≤ 11248		6150	1222
2018	MSY approach		≤ 11807		5756	1231
2019	MSY approach		≤ 11107		7591	1159
2020	Management plan		10377 (range 7070–10377)		6115	1294
2021	Management plan		11691 (range 7965–11691)		6779	1379
2022	MSY approach		≤ 11785			
2023	MSY approach		≤ 11069			

* Assuming recent discard rates from 2017 onwards.
** Dead + surviving discards.
*** Assuming all catches are landed.

History of the catch and landings

Table 7 Norway lobster in Division 7.a, Functional Unit 15. Catch distribution by fleet in 2021 as estimated by ICES.

Catch		Landings		Discards	
98% dead	2% surviving	99% Directed *Nephrops* fishery	1% other	90% dead	10% surviving
8158 tonnes		6779 tonnes		1379 tonnes	

Table 8 Norway lobster in Division 7.a, Functional Unit 15. History of ICES estimates of landings by country and discards. All weights are in tonnes.

Year	Ireland	UK	UK (E&W)	UK (NI)	UK	UK (Isle of Man) *	Total landings	Discards **
1965		1018					1018	
1966		1701					1701	
1967		2077					2077	
1968		1987					1987	
1969	1011	2803					3814	
1970	1392	3001					4393	
1971	1384	3190					4574	
1972	1604	4120					5724	
1973	1863	4031					5894	
1974	982	2689					3671	
1975	909	4165					5074	
1976	1614	3989					5603	
1977	2469	4045					6514	
1978	2921	4375					7296	
1979	3436	5512					8948	
1980	1709	2869					4578	
1981	3202	4047					7249	
1982	4398	4917					9315	
1983	4324	5124					9448	
1984	3306	4454					7760	
1985	2421	4480					6901	
1986	4682	5296					9978	1680
1987	4639	5114					9753	1608
1988	3201	5385					8586	639

Year	Ireland	UK	UK (E&W)	UK (NI)	UK	UK (Isle of Man) *	Total landings	Discards **
1989	2477	5651					8128	673
1990	2710	5590					8300	276
1991	3371	6183					9554	345
1992	2370	5171					7541	1079
1993	2715	5387					8102	1622
1994	1768	5838					7606	1185
1995	2259	5538					7796	1724
1996	1574	5673					7247	1202
1997	3349	6622					9971	1330
1998	3101	6027					9128	1560
1999	4582	6198				6	10786	2913
2000	3433	4937				0	8370	2293
2001	2689	4749				3	7441	2112
2002	2291	4501				1	6793	1732
2003	2709	4352				4	7065	2659
2004	2786	4470				13	7270	1993
2005	2133	4420				0	6554	1412
2006	2051		56	5429	23	1	7561	2285
2007	2767		102	5585	36	0	8491	3246
2008	3132		131	7166	26	50	10508	1421
2009	2343		200	6622	32	1	9198	2934
2010	2578		100	6251	33	0	8963	1539
2011	3575		88	6444	52	2	10162	2683
2012	3794		106	6586	39	3	10529	1871
2013	2465		56	6069	50	31	8672	1590
2014	2938		88	5558	29		8613	1418
2015	2202		26	6404	11		8643	2228
2016	1609		52	5638	25		7327	1939
2017	1253		81	4789	26		6150	1222
2018	1387		69	4293	7		5756	1231
2019	1859		138	5539	54		7590	1159
2020	1555		4	4550	6		6115	1294
2021	1512		20	5201	46		6779	1379

* Since 2014 included in UK (E&W) landings.
** Dead + surviving discards.

Summary of the assessment

Table 9 Norway lobster in Division 7.a, Functional Unit 15. Assessment summary. High and low refer to 95% confidence intervals

Year	UWTV abundance estimate	High	Low	Landings in number	Total discards in number *	Removals in number	Harvest rate (by number)	Landings	Total discards *	Discard rate (by number)	Dead discard rate (by number)	Mean weight in landings	Mean weight in discards
	millions			millions			%	tonnes		%		grammes	
200	5485	5740	5230	404	291	666	12.1	7065	265	42	39	17.45	9.1
200	5547	5784	5310	416	218	612	11.0	7270	199	34	32	17.48	9.1
200	5673	6000	5346	346	157	488	8.6	6554	141	31	29	18.85	8.9
200	5402	5716	5088	467	261	701	13.0	7561	228	36	33	16.14	8.7
200	5150	5378	4922	511	375	848	16.5	8491	324	42	40	16.49	8.6
200	4288	4432	4144	755	191	927	21.6	1050	142	20	18.6	13.88	7.4
200	4623	4813	4433	567	335	868	18.8	9198	293	37	35	16.23	8.7
201	4990	5188	4792	572	180	733	14.7	8963	153	24	22	15.67	8.5
201	4871	5047	4695	644	332	943	19.4	1016	268	34	32	15.79	8.0
201	5062	5311	4813	771	258	1003	19.8	1052	187	25	23	13.66	7.2
201	4310	4484	4136	662	229	867	20.1	8672	159	26	24	13.10	6.9
201	4593	4754	4432	641	198	819	17.8	8613	141	24	22	13.44	7.1
201	4373	4575	4171	620	280	872	19.9	8643	222	31	29	13.88	7.9
201	5076	5308	4844	562	245	783	15.4	7327	193	30	28	13.01	7.9
201	5312	5579	5045	426	152	563	10.6	6150	122	26	24	14.44	8.0
201	4932	5120	4744	360	145	491	10.0	5756	123	29	27	16.15	7.4
201	4404	4587	4221	536	154	675	15.3	7590	115	22	21	14.15	7.5
202	4775	5066	4484	371	153	509	10.7	6115	129	29	27	15.53	8.6
202	4733	5014	4452	440	172	595	12.4	6779	137	28	26	15.41	8.0
202	4498	4691	4305										

* Dead + surviving discards.

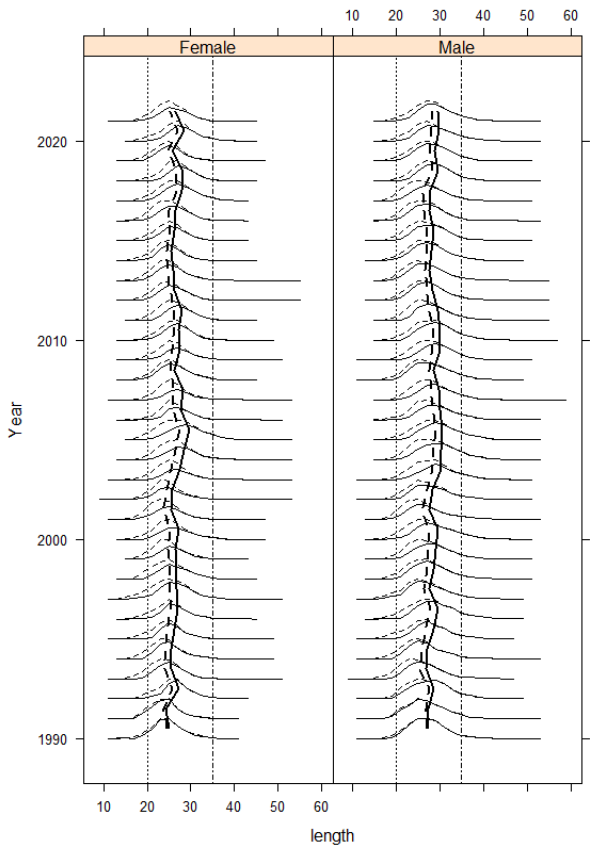


Figure 3 Norway lobster in Division 7.a, Functional Unit 15. The dashed lines represent catches while the solid lines represent landings. Annual length–frequency distributions are shown on the horizontal, the vertical bold lines represent mean lengths. Minimum conservation reference size (20 mm) and 35 mm visual reference levels indicated. All lengths are shown in carapace length (mm).

Sources and references

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Norway lobster (*Nephrops norvegicus*) in Division 7.a, Functional Unit 15 (Irish Sea, West). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, nep.fu.15, https://doi.org/10.17895/ices.advice.19772407

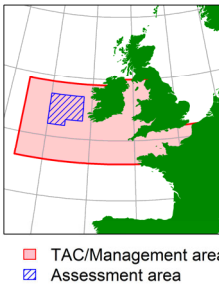
Nephrops FU16 (Porcupine Bank)

Division 7.b, 7.c, 7.j and 7.k

Advice for 2023

ICES advises that when the EU multiannual plan (MAP) for Western Waters and adjacent waters is applied, and assuming zero discards, catches in 2023 that correspond to the F ranges in the MAP are between 3,054 t and 3,787 t. The entire range is considered precautionary when applying the ICES advice rule.

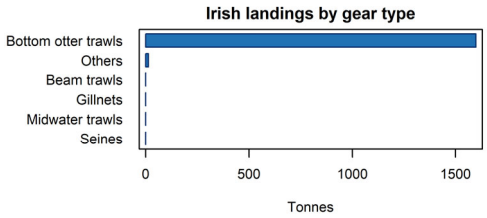
To ensure that the stock in Functional Unit 16 is exploited sustainably, management should be continued at the Functional Unit level.



Key Points

ICES assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target)	
Advice Basis	Management Plan	Catch=3,787 t
Ranges	F_{MSY} Range Lower	Catch=3,054 t
	F_{MSY}	Catch=3,787 t
	F_{MSY} Range Upper	Catch=3,787 t
Landing Obligation	From 2016	Gear specific high survivability exemption*
MSY $B_{trigger}$	Not defined	

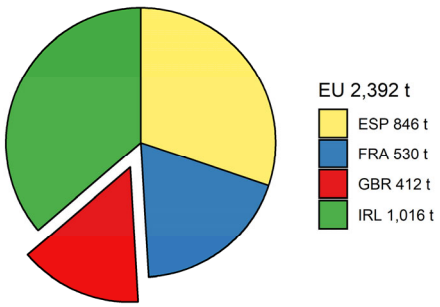
* Described below under Key Stock Considerations, details in (EU 2020/2015).



Management in 2022

- A separate catch limit for FU16 within the wider TAC for Sub-area 7 has been in place since 2011. This has resulted in very restrictive quotas for some vessels and increases the risk of discarding. Area misreporting was also a problem in the past.
- The Irish fishery was closed from May 2022, when 89% of the Irish quota was exhausted, and reopened in October.
- A spatio-temporal closure of the Porcupine bank for EU fisheries was in place between 1 May – 31 July 2010-2012. The period of the EU regulatory closure was reduced to only one month (May) after 2013 and is now included in the technical measures regulation EU 2019/1241.

2022 "of which" Quota Allocation Limits for FU 16 within Area 7 TAC



- Since March 2018 Irish vessels targeting *Nephrops* in Sub-areas 6 and 7 may only fish in either of (1) Sub-area 6 and Sub-area 7, excluding FU16, or (2) FU16 of Sub-area 7 (Fisheries Management Notice No. 20 of 2018).
- In September 2022 the EU introduced an implementing regulation to protect VMEs between 400-600m as part of the deep sea access regulation (EU 2016/2336). This closes an area in the south of the Porcupine *Nephrops* grounds to all mobile bottom contacting gears (EU 2022/1614). The area closed accounts for approximately 14% of the total *Nephrops* grounds.

Key Stock Considerations

- The mean weight for this stock has been fluctuating strongly since 2000 due to changes in recruitment patterns. For this reason, a three-year average (2019–2021) weight in the landings was considered the most appropriate basis in the calculation of catch scenarios.
- Since 2020, due to COVID-19, industry self-sampling has been used to derive mean weights and this is considered the best available estimate of mean weight currently.
- The 2022 UWTV survey sampled 88% of the planned stations; this is considered to have had minimal impact on the abundance estimate and quality of the survey, based on burrow densities in adjoining areas and comparing coefficients of variation from the current and previous survey years.
- The UWTV abundance estimate increased by 34% in 2022. No MSY $B_{trigger}$ has been defined for this stock due to the short time series. The lowest abundance observed of 722 million individuals in 2014 could be used as a MSY $B_{trigger}$ proxy.
- *Nephrops* on the Porcupine Bank are fished in deep waters and the grounds occur over a fairly wide area at relatively low burrow abundance (compared to the inshore *Nephrops* grounds). Productivity of deep water *Nephrops* stocks are lower than those on the shelf although the individual *Nephrops* grow to relatively larger size and attain higher market prices.
- Nearly 90% of the Irish landings of Porcupine Bank *Nephrops* come from trips where *Nephrops* was the dominant species, the main bycatch species is anglerfish.
- Historic Irish sampling data shows that female *Nephrops* constitute a higher proportion of the catch between late May (week 22) and early July (week 27) on the Porcupine Bank. If a spatiotemporal closure is maintained the optimum month for closure would be June followed by May and then July.
- Highly variable discarding practices have been observed on individual trips since 2016. The ICES advice assumes that all catches are landed.
- Under the Landing Obligation *Nephrops* fisheries in Sub-area 7 have a high survivability exemption, based on studies which showed a survivability of about 64% (BIM, 2017). This exemption applies to bottom trawls (OTT, OTB, TBS, TBN, TB, PTB, OT, PT, TX) with a mesh size ≥100 mm or with a mesh size 70-99 mm in combination with highly selective gear options such as: square mesh panels, seltra panel, sorting grid or separation panel.
- A high survivability exemption also applies to creel caught *Nephrops* in Sub-area 7.

Published 28 October 2022

Norway lobster (*Nephrops norvegicus*) in divisions 7.b–c and 7.j–k, Functional Unit 16 (west and southwest of Ireland, Porcupine Bank)

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) for Western Waters and adjacent waters is applied, and assuming
zero discards, catches in 2023 that correspond to the F ranges in the MAP are between 3054 and 3787 tonnes. The entire range is considered precautionary when applying ICES advice rule.

To ensure that the stock in FU 16 is exploited sustainably, management should be continued at the FU level.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and no reference points for stock size have been defined for this stock.

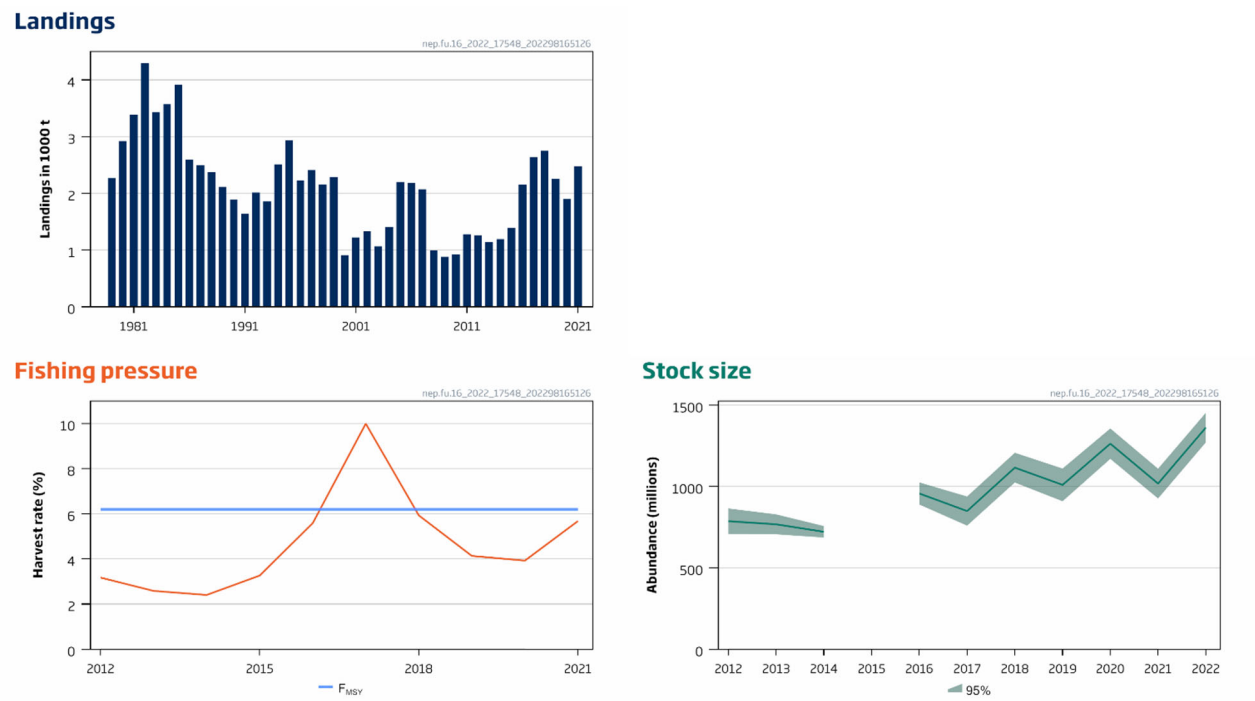


Figure 1 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. Summary of the stock assessment. Landings (between 1979–2015 discarding is considered negligible; from 2016 onwards, discards are not quantified), harvest rate (sum of landings in numbers, divided by stock abundance), and stock abundance (underwater TV survey). The harvest rate in 2015 was calculated using an interpolated value for abundance, as no survey data are available. Harvest rates since 2016 may be underestimated because of the unknown discard levels.

Catch scenarios

Table 1 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. The basis for the catch scenarios.

Variable	Value	Notes
Stock abundance (2023)	1363	UWTV survey 2022; individuals in millions
Mean weight in projected landings	44.82	Average 2019–2021; in grammes
Mean weight in projected discards	-	Unknown
Projected discards rate	-	Unknown
Discards survival rate	-	Not applicable

Table 2 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. Annual catch scenarios. All weights are in tonnes. The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.

Basis	Total catch	Projected landings	Projected discards	% harvest rate*	% advice change**
	PL + PD	PL	PD	For PL + PD	
ICES advice basis					
EU MAP^: F_{MSY}	3787	3787	0	6.2	35
EU MAP^: $F_{MSY\ lower}$	3054	3054	0	5	35
EU MAP^: $F_{MSY\ upper}$***	3787	3787	0	6.2	35
Other scenarios					
MSY approach	3787	3787	0	6.2	35
F_{2021}	3467	3467	0	5.7	24

* By number.
** Advice values for 2023 relative to the corresponding 2022 values (MAP advice of 2804, 2261, and 2804 tonnes, respectively); other option values are relative to 2804 tonnes.
*** $F_{MSY\ upper}$ = F_{MSY} for this stock.
^ EU multiannual plan (MAP) for the Western Waters (EU, 2019).

The increase in total catch advice is the result of the higher estimated stock abundance after the addition of new data.

Basis of the advice

Table 3 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. The basis of the advice.

Advice basis	Management plan
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and for making use of the F_{MSY} range for the stock. ICES considers the MAP to be precautionary when implemented at the FU level. Full details of the plan are described in EU (2019)

Quality of the assessment

The main uncertainties for the stock assessment relate to mean weight and discarding. The mean weight for this stock has been fluctuating strongly since 2000 due to changes in recruitment patterns (Figure 2). For this reason, a three-year average (2019–2021) weight in the landings was considered the most appropriate basis in the calculation of catch scenarios. Since 2020 industry self-sampling has been used to derive mean weights and this is considered appropriate.

Up to 2015, discarding was considered negligible for this FU. Since 2016 some discarding has been observed, and these observations have shown high variability. Sampling levels are insufficient to estimate total discards accurately, and projections assume no discards. Not including discards in the assessment results in an underestimation of the actual fishing pressure. The current estimate is just below F_{MSY}.

Historical landings are considered to be well estimated, including an unallocated component related to area misreporting from 2011 to 2017. Since 2018, following the implementation of new legislation limiting fishing trips to single FUs, misreporting is not included in the assessment.

The UWTV survey has provided abundance for FU 16 (Figure 3) since 2012 (except 2015) with high precision, but the time-series is still too short to provide an MSY $B_{trigger}$ for this FU. The 2022 UWTV survey sampled 88% of the planned stations; this is considered to have had minimal impact on the abundance estimate and quality of the survey, based on burrow densities in adjoining areas and comparing coefficients of variation from the current and previous survey years.

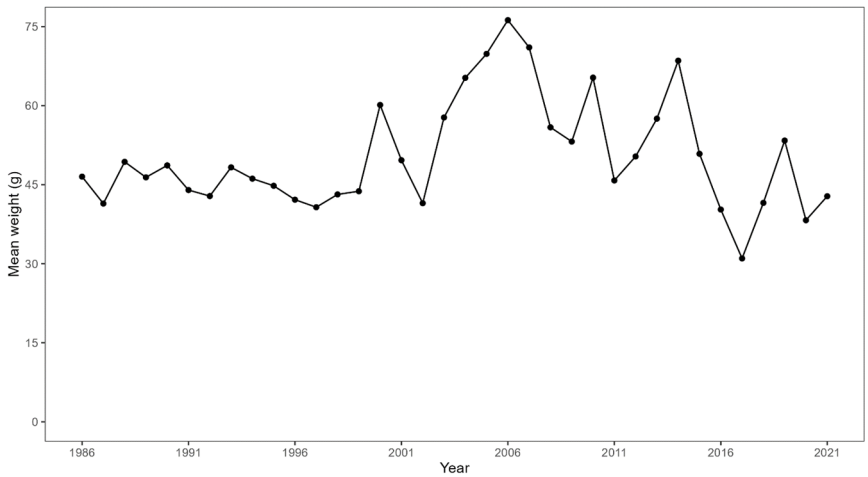


Figure 2 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. Mean weight (g) estimations.

Issues relevant for the advice

There is a separate catch limit for FU 16 within the wider TAC for Subarea 7 (Figure 3). National legislation was introduced in 2018 preventing Irish vessels from fishing in both FU 16 and other areas during the same fishing trip.

Productivity of deep-water Norway lobster stocks is generally lower and recruitment is more sporadic than in shelf waters, though individual Norway lobster grow to relatively large sizes and attain high market prices. This makes these stocks more vulnerable to overexploitation and potential recruitment failure, as was observed in the early 2000s (ICES, 2018). The separate catch limit for FU 16 should, therefore, remain in place.

From 2016 the EU landing obligation was applied to all catches of Norway lobster fisheries in ICES Subarea 7, with several exemptions. There is insufficient catch sampling to quantify discards in this fishery, although discarding has been observed recently. The current advice assumes that all catches will be landed in 2023.

The density observed in the UWTV survey is low for FU 16 compared to other Norway lobster FUs, with an average density below 0.2 individuals m^{-2}. Under these circumstances, $F_{0.1}$ is considered to be an appropriate F_{MSY} proxy.

With the recent introduction of area closures under the EU Deep-sea Access regulation, approximately 14% of the defined fishing ground is anticipated to be closed to fishing activities using bottom gears in 2023 (EU, 2016).

Mixed-fisheries considerations

Norway lobster in Functional Unit 16 is caught as part of a mixed fishery together with other demersal stocks.

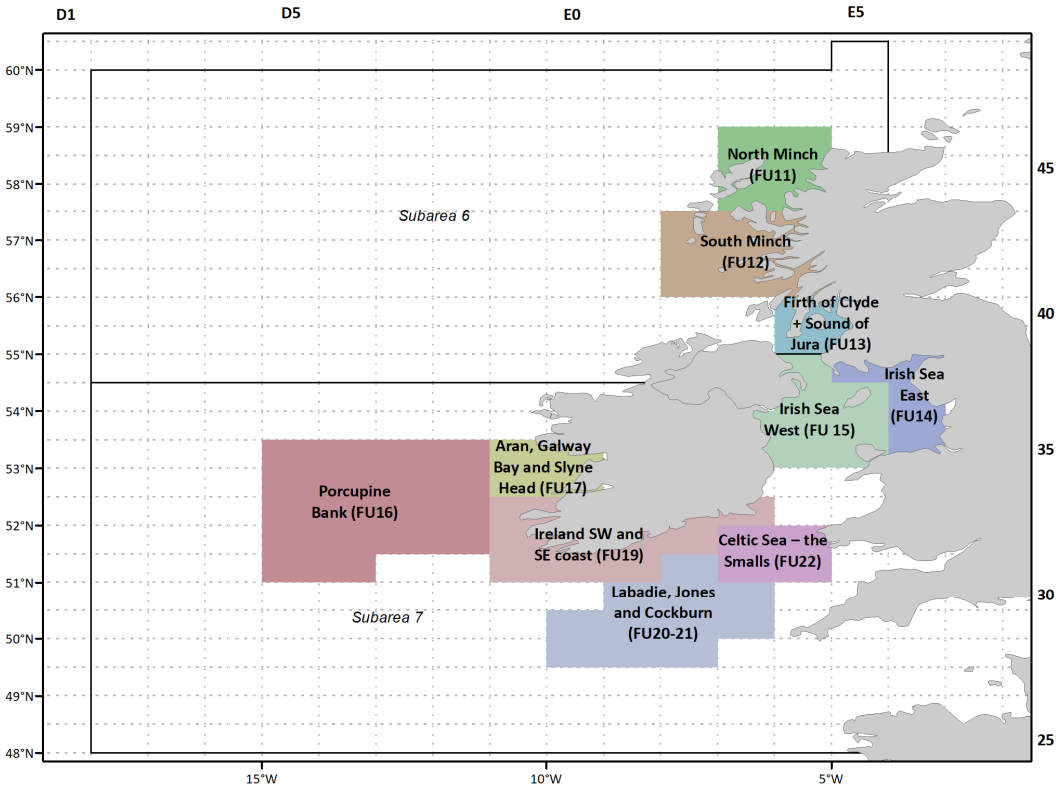


Figure 3 Norway lobster Functional Units in subareas 6 and 7.

Reference points

Table 4 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	Not defined		
	F_{MSY}	6.2	Proxy harvest rate equivalent to $F_{0.1}$ for combined sexes, derived from a length-based per recruit analysis; percentage by number	ICES (2016)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
EU management plan (EU, 2019)	MAP MSY $B_{trigger}$	Not defined		
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	6.2	Harvest rate equivalent to F_{MSY}; percentage by numbers	ICES (2016)
	MAP Lower range of F_{MSY}	5.0–6.2	Harvest rate, consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY; percentage by number	ICES (2016)
	MAP Upper range of F_{MSY}	6.2–6.2	Harvest rate, $F_{MSY\ upper}$ value capped at F_{MSY} because it has not been possible to evaluate the probability of SSB < B_{lim} as no B_{lim} is defined; percentage by number	ICES (2016)

Basis of the assessment

Table 5 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Underwater TV survey (ICES, 2022b)
Input data	Commercial catches (international landings and length frequencies reconstructed from sampling and industry data); one UWTV survey (UWTV-FU 16 [U5917]); fixed maturity and natural mortality
Discards and bycatch	Not included, considered negligible until 2016 and not quantified since
Indicators	Trawl survey (SpPGFS-WIBTS-Q4 [G5768]); mean weight, mean length, and sex ratio from commercial landings and surveys
Other information	This stock was benchmarked in 2013 (WKNEPH; ICES, 2013)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. ICES advice and landings. All weights are in tonnes.

Year	ICES advice	Catch advice	The "of which limit" in the TAC regulation*	Recommended landings in divisions 7.b, 7.c, 7.j, and 7.k**	ICES landings
1987					2499
1988					2375
1989					2115
1990					1895
1991					1640
1992				3800	2015
1993				~ 4000	1857
1994				~ 4000	2512
1995				~ 4000	2936
1996				4000	2230
1997				4000	2409
1998				4000	2155
1999				4000	2290
2000				4000	910
2001				4000	1222
2002				4440	1327
2003				4440	1064
2004	Restrict landings to 2000–2002 levels			3300	1406
2005	Restrict landings to 2000–2002 levels			3300	2197

Year	ICES advice	Catch advice	The "of which limit" in the TAC regulation*	Recommended landings in divisions 7.b, 7.c, 7.j, and 7.k**	ICES landings
2006	Restrict landings to 2000–2002 levels			3300	2185
2007	Constrain effort at recent levels			-	2074
2008	Constrain effort at recent levels			-	1000
2009	No increase in effort, and average landings (2000–2003)	< 1000			879
2010	Reduce catches to lowest possible level	0			922
2011	Reduce catches to lowest possible level	0	1260		1278
2012	No increase in catch	-	1260		1258
2013	MSY approach (updated November 2012)	< 1800	1800		1141
2014	MSY approach	< 1848	1848		1189
2015	MSY approach	< 1850	1850		1394
2016	MSY approach	≤ 1850	1850		2154
2017	MSY approach	≤ 3100	3100		2632
2018	MSY approach	≤ 2734	2734		2751
2019	MSY approach	≤ 2645***	2645		2229
2020	Management plan	2637 (range 2127–2637)***	2637		1899
2021	Management plan	3290 (range 2653–3290)***	3290		2476
2022	Management plan	2804 (range 2261–2804)***	2804		
2023	Management plan	3787 (range 3054–3787)***			

* Since 2011, a maximum limit on landings from FU 16 is included in the TAC regulation (the "of which limit").
** Until 2006, ICES gave combined advice for FUs 16, 17, 18, and 19, as well as for "other rectangles" in this area.
*** Assuming zero discards.

History of the catch and landings

Table 7 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings	Discards
Unknown	100% otter trawl	Not quantified
	2476 tonnes	

Table 8 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. ICES estimates of landings by country. All weights are in tonnes.

Year	France	Ireland	Spain	UK (E & W & NI)	UK (Scotland)	Unallocated	Total
1965	514						514
1966	0						0
1967	441						441
1968	441						441
1969	609						609
1970	256						256
1971	500		1444				1944
1972	0		1738				1738
1973	811		2135				2946
1974	900		1894				2794
1975	0		2150				2150
1976	6		1321				1327
1977	0		1545				1545
1978	2		1742				1744
1979	14		2255				2269
1980	21		2904				2925
1981	66		3315				3381
1982	358		3931				4289
1983	615		2811				3426
1984	1067		2504				3571
1985	1181		2738				3919

Year	France	Ireland	Spain	UK (E & W & NI)	UK (Scotland)	Unallocated	Total
1986	1060		1462	69			2591
1987	609		1677	213			2499
1988	600		1555	220			2375
1989	324	350	1417	24			2115
1990	336	169	1349	41			1895
1991	348	170	1021	101			1640
1992	665	311	822	217			2015
1993	799	206	752	100			1857
1994	1088	512	809	103			2512
1995	1234	971	579	152			2936
1996	1069	508	471	182			2230
1997	1028	653	473	255			2409
1998	879	598	405	273			2155
1999	1047	609	448	185			2290
2000	351	227	213	120			910
2001	425	369	270	158			1222
2002	369	543	276	139			1327
2003	131	307	489	108	29		1064
2004	289	494	468	126	28		1406
2005	397	754	681	208	156		2197
2006	462	731	636	201	155		2185
2007	302	1060	384	146	183		2074
2008	26	562	234	41	138		1000
2009	4	356	348	13	159		879
2010	4	579	240	10	90		922
2011	8	643	182	23	122	301	1278
2012	<1	605	198	0	134	320	1258
2013	6	651	132	1	118	234	1141
2014	3	813	129	0	96	148	1189
2015	3	744	84	0	109	454	1394
2016	35	1052	58	1	160	849	2154
2017	63	743	73	249	131	1373	2632
2018	81	2079	158	288	144	0	2751
2019	54	1529	112	332	201	0	2229
2020	41	1516	82	260	< 1	0	1899
2021	49	1611	318	329	169	0	2476

Summary of the assessment

Table 9 Norway lobster in divisions 7.b–c and 7.j–k, Functional Unit 16. Assessment summary.

Year	UWTV abundance estimate	High 95% confidence interval	Low 95% confidence interval	Landings in number	Total discards in number*	Removals in number	Harvest rate (by number)**	Landings	Total discards*	Discard rate (by number)	Dead discard rate (by number)	Mean weight in landings	Mean weight in discards
	millions						%	tonnes		%		grammes	
2012	787	866	708	25	0	25	3.2	1258	0	0	0	50.36	NA
2013	768	829	707	20	0	20	2.6	1141	0	0	0	57.54	NA
2014	722	757	687	17	0	17	2.4	1189	0	0	0	68.54	NA
2015	840	NA	NA	27	0	27	3.3***	1394	0	0	0	50.86	NA
2016	958	1026	890	53	NA	53	5.6	2154	NA	NA	NA	40.29	NA
2017	850	939	760	85	NA	85	10.0	2632	NA	NA	NA	31.01	NA
2018	1117	1208	1025	66	NA	66	5.9	2751	NA	NA	NA	41.55	NA
2019	1010	1111	910	42	NA	42	4.1	2229	NA	NA	NA	53.38	NA
2020	1264	1358	1170	50	NA	50	3.9	1899	NA	NA	NA	38.26	NA
2021	1018	1110	927	58	NA	58	5.7	2476	NA	NA	NA	42.82	NA
2022	1363	1454	1271										

* Discarding up to 2015 was considered to be negligible. Discard estimates are not available since 2016 and are therefore not included in the assessment.

** Values since 2016 onwards may be underestimated owing to insufficient discard data.

*** The harvest rate is estimated based on a linear interpolation of abundance, as no survey was carried out in this year.

NA = not available.

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Download the stock assessment data and figures.

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Nephrops FU17

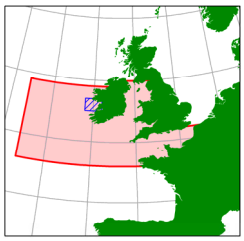
(Aran, Galway Bay and Slyne Head)

Division 7.b

Advice for 2023

ICES advises that when the EU multiannual plan (MAP) for Western Waters and adjacent waters is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 that correspond to the F ranges in the MAP are between 316 t and 363 t.

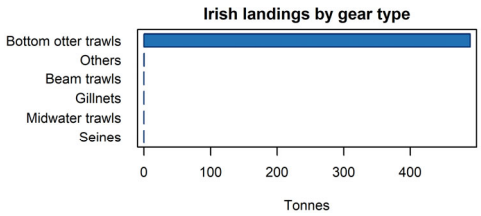
To ensure that the stock in Functional Unit 17 is exploited sustainably, management should be implemented at the Functional Unit level.



Key Points

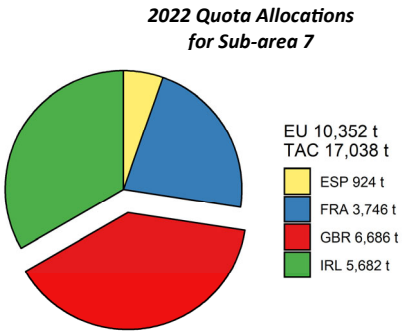
ICES assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target)	
Advice Basis	Management Plan	Catch=363 t
Ranges	F_{MSY} Range Lower	Catch=316 t
	F_{MSY}	Catch=363 t
	F_{MSY} Range Upper	Catch=363 t
Landing Obligation	From 2016	Gear specific high survivability exemption*
MSY $B_{trigger}$ (million individuals)	540	

* Described below under Key Stock Considerations, details in (EU 2020/2015).



Management in 2022

- The current TAC area and stock assessment area do not match.



Key Stock Considerations

- The 2022 UWTV survey was not deemed robust enough for the assessment because of the reduced number of stations completed due to poor weather and considerable vessel downtime. As such, the stock size is unknown for 2022. The assessment and advice is therefore based on the 2021 UWTV survey.
- The advised catch of 363 t results in projected landings advice of 312 t (assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021).
- Abundance estimates from UWTV surveys on the Aran grounds have declined significantly since 2004 and have been at or below MSY $B_{trigger}$ from 2012 to 2021.
- More than 90% of the Irish landings of Aran grounds *Nephrops* come from trips where *Nephrops* was the dominant species, by-catch species include anglerfish, whiting, haddock and megrim.
- Long term average mean weights in landings and discards are used as the most appropriate values to calculate catch options on, to account for the variation seen over time.

- Under the Landing Obligation *Nephrops* fisheries in Sub-area 7 have a high survivability exemption, based on studies which showed a survivability of about 64% (BIM, 2017). This exemption applies to bottom trawls (OTT, OTB, TBS, TBN, TB, PTB, OT, PT, TX) with a mesh size ≥100 mm or with a mesh size 70-99 mm in combination with highly selective gear options such as: square mesh panels, seltra panel, sorting grid or separation panel.
- A high survivability exemption also applies to creel caught *Nephrops* in Sub-area 7.

Published 28 October 2022

Norway lobster (*Nephrops norvegicus*) in Division 7.b, Functional Unit 17 (west of Ireland, Aran grounds)

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) for Western Waters and adjacent waters is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 that correspond to the F ranges in the MAP are between 316 and 363 tonnes.

To ensure that the stock in Functional Unit (FU) 17 is exploited sustainably, management should be implemented at the FU level.

Stock development over time

Fishing pressure on the stock is at F_{MSY}, and stock size unkown for 2022.

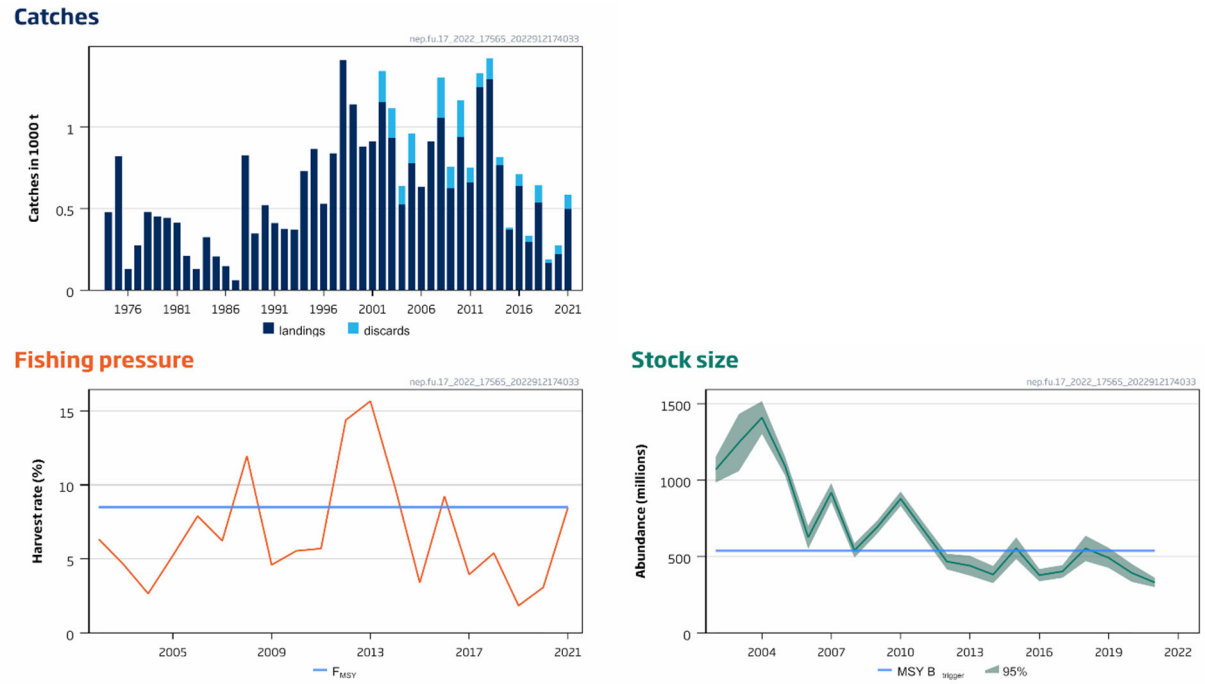


Figure 1 Norway lobster in Division 7.b, Functional Unit 17. Summary of the stock assessment. Catches (discard data are only available since 2002), harvest rate (sum of landings and dead discards in numbers, divided by stock abundance), and stock abundance (underwater TV survey). UWTV survey was not carried out in 2022 and so the 2022 survey estimate is an assumption.

Catch scenarios

The most recent estimate of stock abundance is below MSY $B_{trigger}$ (540 million individuals). ICES maximum sustainable yield (MSY) approach states that under such conditions the F_{MSY} harvest rate (8.5%) for FU 17 should be reduced by multiplying it by the ratio of current abundance to MSY $B_{trigger}$. This corresponds to a harvest rate of 8.5 × (331/540) = 5.2% for the advice in 2023.

Table 1 Norway lobster in Division 7.b, Functional Unit 17. The basis for the catch advice and scenarios.

Variable	Value	Notes
Stock abundance (2023)	331	UWTV survey 2021; individuals in millions
Mean weight in projected landings	22.40	Average 2008–2021; in grammes
Mean weight in projected discards	11.36	Average 2008–2021; in grammes
Projected discard rate	24	Average 2019–2021; percentage by number of the total catch
Discard survival rate	25	Percentage by number of the discards

Table 2 Norway lobster in Division 7.b, Functional Unit 17. Annual catch advice and scenarios. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table. All weights are in tonnes.

Basis	Total catch	Dead removals	Projected landings	Projected dead discards	Projected surviving discards	% harvest rate*	% advice change **
	PL + PDD + PSD	PL + PDD	PL	PDD	PSD	for PL + PDD	
ICES advice basis							
EU MAP^: F_{MSY} × Stock abundance 2023 / MSY $B_{trigger}$	363	350	312	38	13	5.2	0.83
EU MAP^: $F_{MSY\ lower}$ × Stock abundance 2023 / MSY $B_{trigger}$	316	305	272	33	11	4.5	0.96
Other scenarios							
$F_{MSY\ upper}$*** × Stock abundance 2023 / MSY $B_{trigger}$	363	350	312	38	13	5.2	0.83
F_{MSY}	592	571	509	62	21	8.5	64
$F_{MSY\ lower}$	515	497	443	54	18	7.4	43
$F_{MSY\ upper}$***	592	571	509	62	21	8.5	64
F_{2021}	589	568	507	61	20	8.5	64

* By number.

** Advice values for 2023 relative to the corresponding 2022 values (MAP advice of 360 and 313 tonnes, respectively); other option values are relative to 360 tonnes.

*** $F_{MSY\ upper}$ = F_{MSY} for this stock.

^ EU multiannual plan (MAP) for the Western Waters (EU, 2019).

Basis of the advice

Table 3 Norway lobster in Division 7.b, Functional Unit 17. The basis of the advice.

Advice basis	Management plan
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and for making use of the F_{MSY} range for the stock. ICES considers the MAP to be precautionary when implemented at the FU level. Full details of the plan are described in EU (2019)

Quality of the assessment

From 2002 to 2021 a dedicated annual underwater television survey (UWTV) has provided abundance estimates for FU 17 (Figure 2) with high precision. The 2022 UWTV survey was not deemed robust enough for the assessment because of the reduced number of stations completed due to disruption to the survey schedule. As such, the stock size is unknown for 2022. The assessment and advice is therefore based on the 2021 UWTV survey.

Given the low level of landings in recent years, it has been challenging to obtain sufficient samples to provide robust estimates of mean weights. The long-term average (2008–2021) is considered to be appropriate as input for the mean weight in landings and discards in the calculation of catch scenarios.

Issues relevant for the advice

During 2016–2021, the EU landing obligation was applied to all catches of Norway lobster fisheries in ICES Subarea 7 with exemptions for high survival. In 2022, this stock is still under a landing obligation, and there are still exemptions in place.
Observations from the 2019–2021 fishery indicate that some discarding above the minimum conservation reference size (MCRS) continues (Figure 3). Consequently, ICES is providing advice for 2023 assuming average discard rates as observed over the last three years. This is considered to be the most realistic assumption. In a situation where all catch is landed, there would be no surviving discards and the total catch advice and MSY harvest rate would be lower than those given in the catch scenario table (Table 2). However, reducing the catch of smaller Norway lobster would allow an increase in landings above those given in the catch scenario table.

Estimates indicate that trawl discard survival is around 64% (BIM, 2017). As a result, an exemption from the landings obligation based on high survivability has been granted by the European Commission. ICES continues to use the survival rate of 25% (ICES, 2016a), as it has not evaluated the survival rate estimated by BIM (2017).

The observed burrow density has declined, from high (> 0.8 individuals m^{-2}) at the beginning of the series to medium density (~0.3 individuals m^{-2}) towards the end of the time-series. The nature of the fishery has also changed, from a continuous fishery throughout the year to a seasonal fishery concentrated on periods of high catch rates. For these reasons a harvest rate consistent with a combined sex $F_{0.1}$ is considered an appropriate proxy for F_{MSY} (ICES, 2016b).

A single TAC covers the entire ICES Subarea 7. Management should be implemented at the FU level (Figure 2) to avoid local over-exploitation and to ensure that fishing opportunities are in line with the scale of the resource for each of the stocks and consistent with an MSY approach.

Mixed-fisheries considerations

Norway lobster in Functional Unit 17 is is caught as part of a mixed fishery together with other demersal stocks.

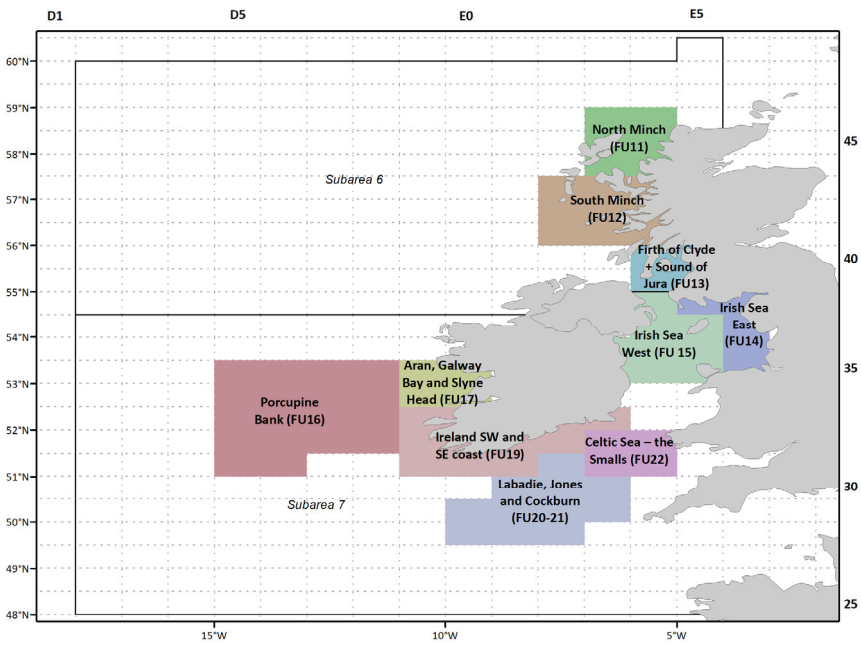


Figure 2 Norway lobster Functional Units in subareas 6 and 7.

Reference points

Table 4 Norway lobster in Division 7.b, Functional Unit 17. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	540	Based on abundance in 2008 from the UWTV survey time-series; individuals in millions	ICES (2016a)
	F_{MSY}	8.5	Proxy harvest rate equivalent to $F_{0.1}$ for combined sexes in 2015, derived from a length-based per recruit analysis	ICES (2016a)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
EU management plan (EU, 2019)	MAP MSY $B_{trigger}$	540	MSY $B_{trigger;}$ individuals in millions	ICES (2016a)
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	8.5	Harvest rate equivalent to F_{MSY}; percentage by numbers	ICES (2016a)
	MAP Lower range of F_{MSY}	7.4–8.5	Harvest rate, consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2016a)
	MAP Upper range of F_{MSY}	8.5–8.5	Harvest rate, $F_{MSY\ upper}$ value capped at F_{MSY} because it has not been possible to evaluate the probability of SSB < B_{lim} as no B_{lim} is defined; percentage by number	ICES (2016a)

Basis of the assessment

Table 5 Norway lobster in Division 7.b, Functional Unit 17. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Underwater TV survey (ICES, 2022b)
Input data	One survey index (UWTV-FU 17 [U5917]); commercial catches (international landings, length frequencies from Irish catch sampling); maturity data (commercial catch and discard sampling, survey sampling); fixed natural mortality; discard survival rate
Discards and bycatch	Included in the assessment since 2001
Indicators	Length distributions by sex of the catches
Other information	This stock went through an inter-benchmark process in 2015 (IBPNeph; ICES, 2016b)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Norway lobster in Division 7.b, Functional Unit 17. ICES advice, landings, and discards. All weights are in tonnes.

Year	ICES advice	Landings advice	Catch advice*	Recommended landings in divisions 7.b, 7.c, 7.j, and 7.k**	ICES landings	Total discards***
1988					828	
1989					347	
1990					519	
1991					410	
1992				3800	374	
1993				~ 4000	372	
1994				~ 4000	729	
1995				~ 4000	867	
1996				4000	528	
1997				4000	841	
1998				4000	1410	

Year	ICES advice	Landings advice	Catch advice*	Recommended landings in divisions 7.b, 7.c, 7.j, and 7.k**	ICES landings	Total discards***
1999				4000	1140	
2000				4000	880	
2001				4000	913	
2002				4440	1154	192
2003				4440	933	183
2004	Restrict landings to 2000–2002 levels			3300	525	112
2005	Restrict landings to 2000–2002 levels			3300	778	182
2006	Restrict landings to 2000–2002 levels			3300	637	
2007	Constrain effort at recent levels			–	913	
2008	Constrain effort at recent levels			–	1057	248
2009	No increase in effort and landings (2007)	< 900			626	129
2010	Harvest ratio no greater than the lower bound of the range of $F_{0.1}$ for similar stocks	< 500			939	224
2011	MSY approach	< 950			659	92
2012	MSY approach	< 1100			1246	86
2013	MSY approach (updated November 2012)	< 590			1295	129
2014	MSY approach	< 590			766	48
2015	MSY approach	< 524			370	15
2016	MSY approach		≤ 991^		641	69
2017	MSY approach		≤ 489		295	38
2018	MSY approach		≤ 551		536	106
2019	MSY approach		≤ 1002		167	21
2020	Management Plan		800 (range 696–800)		222	54
2021	Management Plan		508 (range 443–508)		498	88
2022	Management Plan		360 (range 313–360)			
2023	Management Plan		363 (range 316–363)			

* Assuming recent discard rates from 2017 onwards.
** Until 2006, ICES provided combined advice for FUs 16, 17, 18, and 19, as well as for "other rectangles" in this area.
*** Dead + surviving discards.
^ Assuming all catches are landed.

History of the catch and landings

Table 7 Norway lobster in Division 7.b, Functional Unit 17. Catch distribution by fleet in 2021 as estimated by ICES.

Catch		Landings	Discards	
96% dead	4% surviving	100% otter trawl	75% dead	25% surviving
586 tonnes		498 tonnes	88 tonnes	

Table 8 Norway lobster in Division 7.b, Functional Unit 17. History of ICES estimates of landings by country and discards. All weights are in tonnes.

Year	France	Republic of Ireland	UK	Total landings	Discards*
1974	477	n/a	n/a	477	n/a
1975	822	n/a	n/a	822	n/a
1976	131	n/a	n/a	131	n/a
1977	272	n/a	n/a	272	n/a
1978	481	n/a	n/a	481	n/a
1979	452	n/a	n/a	452	n/a
1980	442	n/a	n/a	442	n/a
1981	414	n/a	n/a	414	n/a
1982	210	n/a	n/a	210	n/a
1983	131	n/a	n/a	131	n/a

Year	France	Republic of Ireland	UK	Total landings	Discards*
1984	324	n/a	n/a	324	n/a
1985	207	n/a	n/a	207	n/a
1986	147	n/a	1	148	n/a
1987	62	n/a	0	62	n/a
1988	14	814	n/a	828	n/a
1989	27	317	3	347	n/a
1990	30	489	n/a	519	n/a
1991	11	399	n/a	410	n/a
1992	11	361	2	374	n/a
1993	11	361	0	372	n/a
1994	18	707	4	729	n/a
1995	91	774	2	867	n/a
1996	2	519	7	528	n/a
1997	2	839	0	841	n/a
1998	9	1401	0	1410	n/a
1999	0	1140	0	1140	n/a
2000	1	879	0	880	n/a
2001	1	912	0	913	n/a
2002	2	1152	0	1154	192
2003	0	933	0	933	183
2004	0	525	0	525	112
2005	0	778	0	778	182
2006	0	637	0	637	n/a
2007	0	913	0	913	n/a
2008	0	1050	7	1057	248
2009	0	626	0	625	129
2010	0	930	9	939	224
2011	0	659	0	659	92
2012	0	1246	0	1246	86
2013	0	1295	0	1295	129
2014	0	766	0	766	48
2015	0	370	0	370	15
2016	0	641	0	641	69
2017	0	295	< 1	295	38
2018	0	494	42	536	106
2019	0	162	4	167	21
2020	0	188	34	222	54
2021	0	490	8	498	88

* Dead + surviving discards.
n/a = not available.

Summary of the assessment

Table 9 Norway lobster in Division 7.b, Functional Unit 17. Assessment summary. High and low refer to 95% confidence intervals.

Year	Low	UWTV abundance estimate	High	Landings (in number)	Total discards (in number)*	Removals (in number)	Harvest rate (by number)	Landings	Total discards*	Discard rate (by number)	Dead discard rate (by number)	Mean weight in landings	Mean weight in discards
	millions						%	tonnes		%		grammes	
2002	986	1070	1154	55	18	68	6.3	1154	192	25	19.6	21.20	10.80
2003	1059	1246	1433	44	18	58	4.6	933	183	29	24	21.20	10.00
2004	1302	1410	1518	29	11	38	2.7	525	112	28	23	18.10	9.90
2005	1030	1092	1154	42	20	57	5.2	778	182	32	26	18.40	9.20
2006	551	627	703	n/a	n/a	50	7.9	637	n/a	n/a	n/a	n/a	n/a
2007	858	920	982	n/a	n/a	57	6.2	913	n/a	n/a	n/a	n/a	n/a
2008	494	541	588	48	22	65	12.0	1057	248	31	26	21.94	11.23
2009	653	696	739	25	9	32	4.6	625	129	28	22	25.12	13.63

Year	Low	UWTV abundance estimate	High	Landings (in number)	Total discards (in number)*	Removals (in number)	Harvest rate (by number)	Landings	Total discards*	Discard rate (by number)	Dead discard rate (by number)	Mean weight in landings	Mean weight in discards
	millions						%	tonnes		%		grammes	
2010	832	879	926	37	15	49	5.6	939	224	29	23	25.16	14.70
2011	624	672	720	32	9	38	5.7	659	92	21	16.7	20.62	10.75
2012	416	468	520	61	8	67	14.4	1246	86	12.0	9.2	20.40	10.39
2013	376	441	506	60	12	69	15.7	1295	129	16.7	13.1	21.59	10.73
2014	326	383	440	34	5	38	9.8	766	48	12.9	10.0	22.62	9.56
2015	485	556	627	18	2	19	3.4	370	15	8.4	6.4	20.91	9.13
2016	338	379	420	30	6	35	9.2	641	69	17.4	13.7	21.21	10.85
2017	363	404	445	13	4	16	4.0	295	38	21	16.9	22.23	10.46
2018	471	554	637	22	10	30	5.4	536	106	32	26	24.33	10.11
2019	427	493	559	8	2	9	1.90	167	21	22	17.2	22.00	9.94
2020	335	394	453	10	4	12	3.1	222	54	27	22	23.31	15.29
2021	300	331	362	23	7	28	8.5	498	88	24	18.9	21.88	12.48
2022		331**											

* Dead + surviving discards.
** 2021 UWTV abundance estimate was used for 2022 UWTV abundance estimate
n/a = not available.

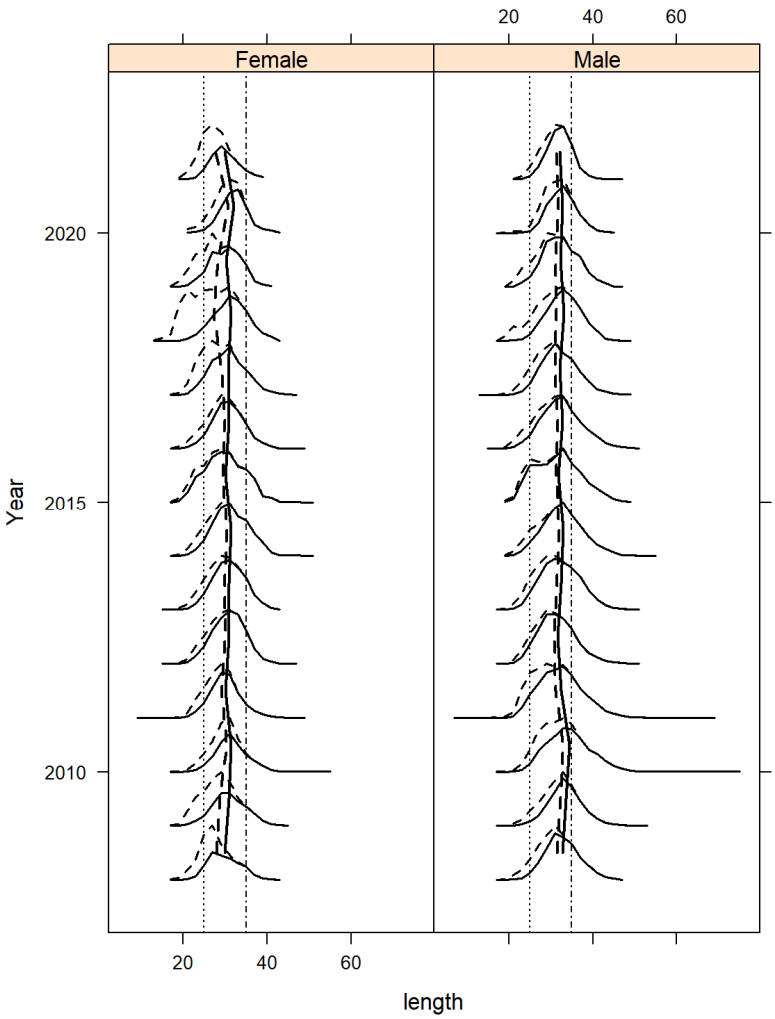


Figure 3 Norway lobster in Division 7.b, Functional Unit 17. The dashed lines represent catches while the solid lines represent landings. Annual length–frequency distributions are shown on the horizontal; the vertical bold lines represent mean lengths. Minimum conservation reference size (25 mm) and 35 mm visual reference levels indicated. All lengths are shown in carapace length (mm).

Sources and references

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Download the stock assessment data and figures

Recommended citation: ICES. 2022. Norway lobster (*Nephrops norvegicus*) in Division 7.b, Functional Unit 17 (west of Ireland, Aran grounds). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, nep.fu.17. https://doi.org/10.17895/ices.advice.19772413

Nephrops FU19

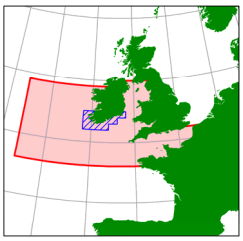
(South East and South West coast of Ireland)

Division 7.a, 7.g, and 7.j.

Advice for 2023

ICES advises that when the EU multiannual plan (MAP) for Western waters and adjacent waters is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 that correspond to the F ranges in the MAP are between 302 t and 338 t.

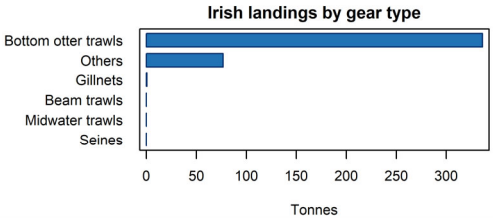
To ensure that the stock in functional unit (FU) 19 is exploited sustainably, management should be implemented at the functional unit level.



Key Points

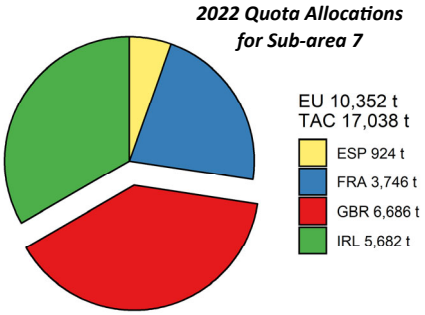
ICES Assessment Category	I (Quantitative Assessment)	
Management Plan	WWMAP (target)	
Advice Basis	Management Plan	Catch=338 t
Ranges	F_{MSY} Range Lower	Catch=302 t
	F_{MSY}	Catch=338 t
	F_{MSY} Range Upper	Catch=338 t
Landing Obligation	From 2016	Gear specific high survivability exemption*
MSY $B_{trigger}$ (million individuals)	430	

* Described below under Key Stock Considerations, details in (EC 2020/2015).



Management in 2022

- The current TAC area and stock assessment area do not match.



Key Stock Considerations

- The advised catch of 338 t results in projected landings advice of 230 t (assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021).
- The decrease in catch advice for 2023 compared to previous years is directly linked to the decreased estimate of stock abundance in 2022.
- Total abundance shows a declining trend since the start of the time series.
- The average discard rate by weight in the trawl fishery for FU 19 over the last three years is 32%. This is high relative to other areas because on-board tailing (keeping only the tail) of the catch is not as prevalent as in other FUs around Ireland.
- Around 60% of the Irish landings of FU 19 *Nephrops* come from trips where *Nephrops* was the dominant species. The remainder are taken in a more mixed fishery and are mainly landed with anglerfish, megrim, whiting and haddock.

- Under the Landing Obligation *Nephrops* fisheries in Sub-area 7 have a high survivability exemption, based on studies which showed a survivability of about 64% (BIM, 2017). This exemption applies to bottom trawls (OTT, OTB, TBS, TBN, TB, PTB, OT, PT, TX) with a mesh size ≥100 mm or with a mesh size 70-99 mm in combination with highly selective gear options such as: square mesh panels, seltra panel, sorting grid or separation panel.
- A high survivability exemption also applies to creel caught *Nephrops* in Sub-area 7.

Published 28 October 2022

Norway lobster (*Nephrops norvegicus*) in divisions 7.a, 7.g, and 7.j, Functional Unit 19 (Irish Sea, Celtic Sea, eastern part of southwest of Ireland)

ICES advice on fishing opportunities

ICES advises that when the EU multiannual plan (MAP) for Western Waters and adjacent waters is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 that correspond to the F ranges in the MAP are between 302 and 338 tonnes.

To ensure that the stock in Functional Unit (FU) 19 is exploited sustainably, management should be implemented at the FU level.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and stock size is below MSY $B_{trigger}$.

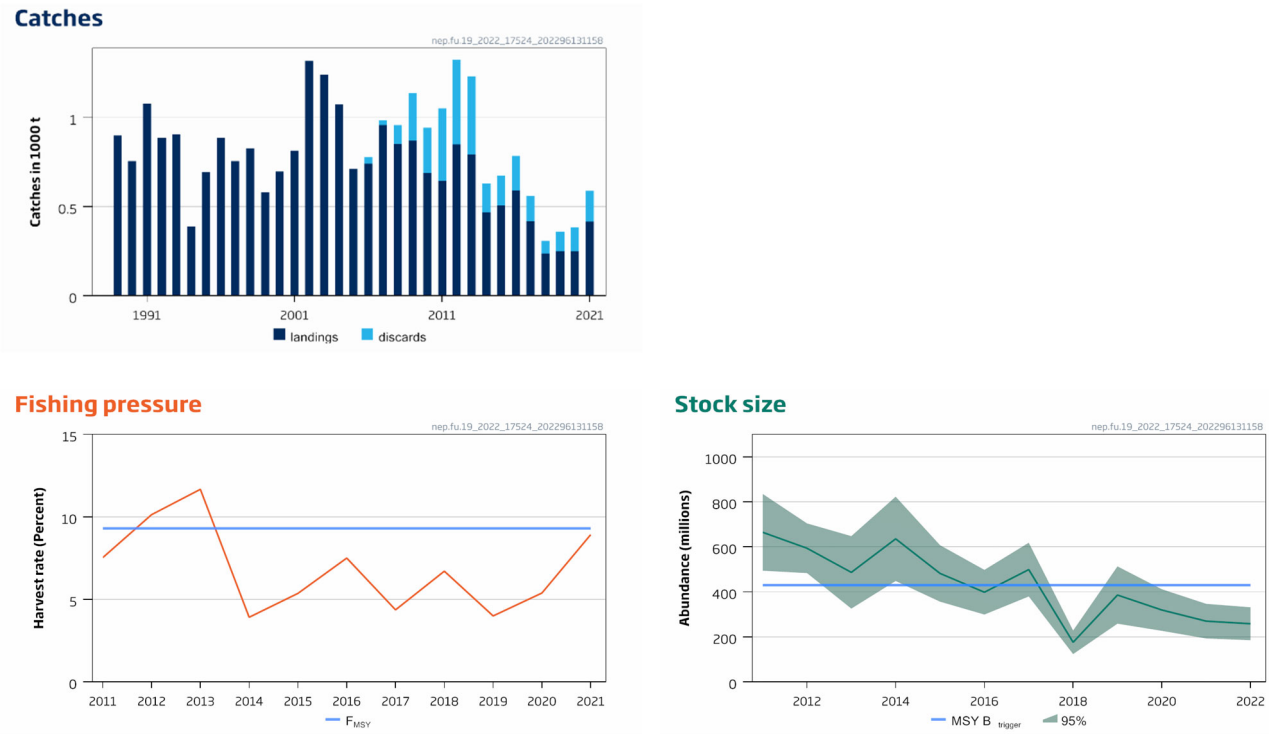


Figure 1 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Summary of the stock assessment. Catches (discards are only available from 2006 onwards), harvest rate (sum of landings and dead discards in numbers divided by stock abundance), and stock abundance (underwater TV survey).

Catch scenarios

The latest estimate of stock abundance is below MSY $B_{trigger}$ (430 million). ICES maximum sustainable yield (MSY) approach states that under such conditions, the F_{MSY} harvest rate (9.3%) for FU 19 should be reduced by multiplying it by the ratio of current abundance to MSY $B_{trigger}$. This corresponds to a harvest rate of 9.3 × (259/430) = 5.6% for the advice in 2023.

Table 1 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. The basis for the catch advice and scenarios.

Variable	Value	Notes
Stock abundance (2023)	259	UWTV survey 2022; individuals in millions
Mean weight in projected landings	27.22	Average 2019–2021; in grammes
Mean weight in projected discards	13.46	Average 2019–2021; in grammes
Projected discard rate	48.6	Average 2019–2021; percentage by number of the total catch
Discard survival rate	25	Percentage by number of the discards

Table 2 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Annual catch scenarios. All weights are in tonnes. The figures in the table are rounded. Calculations were done with unrounded inputs and computed values may not match exactly when calculated using the rounded figures in the table.

Basis	Total catch	Dead removals	Projected landings	Projected dead discards	Projected surviving discards	% harvest rate*	% advice change **
	PL + PDD + PSD	PL + PDD	PL	PDD	PSD	for PL + PDD	
ICES advice basis							
EU MAP^: F_{MSY} × Stock abundance 2023 / MSY $B_{trigger}$	338	311	230	81	27	5.6	−10.6
EU MAP^: $F_{MSY\ lower}$ × Stock abundance 2023 / MSY $B_{trigger}$	302	278	206	72	24	5.0	−10.4
Other scenarios							
$F_{MSY\ upper}$ × Stock abundance 2023 / MSY $B_{trigger}$***	338	311	230	81	27	5.6	−10.6
F_{MSY}	562	517	383	134	45	9.3	−49
$F_{MSY\ lower}$	502	462	342	120	40	8.3	−33
$F_{MSY\ upper}$***	562	517	383	134	45	9.3	−49
F_{2021}	539	496	367	129	43	8.9	−43

* By number.
** Advice values for 2023 relative to the corresponding 2022 values (MAP advice of 378, 337, and 378 tonnes, respectively); other option values are relative to 378 tonnes.
*** $F_{MSY\ upper}$ = F_{MSY} for this stock.
^ EU multiannual plan (MAP) for the Western Waters (EU, 2019).

The decrease in total catch advice is the result of the lower estimated stock abundance and the lower harvest rate used for the advice.

Basis of the advice

Table 3 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. The basis of the advice.

Advice basis	Management plan
Management plan	The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status, and for making use of the F_{MSY} range for the stock. ICES considers the MAP to be precautionary when implemented at the FU level. Full details of the plan are described in EU (2019).

Quality of the assessment

An annual underwater television (UWTV) survey has been carried out since 2011 in FU 19 (Figure 2), with full coverage of all the discrete patches since 2013. The survey gives estimates of burrow densities for the main patches of Norway lobster habitat in FU 19 and an abundance estimate for the entire stock with acceptable precision.

The main quality concern relates to mean weight estimates and discard rates, which are quite variable over the time-series. This partially reflects the difference in mean sizes of patches with different underlying densities. Adequate catch sampling remains difficult for such a heterogeneous area.

Issues relevant for the advice

During 2016–2021, the EU landing obligation was applied to all catches of Norway lobster fisheries in ICES Subarea 7 with exemptions for high survival. In 2022, this stock is still under a landing obligation and there are still exemptions in place.
Observations from the 2019–2021 fishery indicate that some discarding above the minimum conservation reference size (MCRS) continues (Figure 3). Consequently, ICES is providing advice for 2023 assuming average discard rates as observed over the last three years. This is considered to be the most realistic assumption. In a situation where all catch is landed, there would be no surviving discards, and the total catch advice and MSY harvest rate would be lower than those given in the catch scenario table (Table 2). However, reducing the catch of smaller Norway lobster would allow an increase in landings above those given in the catch scenario table.

Estimates indicate that trawl discard survival is around 64% (BIM, 2017). As a result, an exemption from the landings obligation based on high survivability has been granted by the European Commission. ICES continues to use the survival rate of 25% (ICES, 2016) as it has not estimated the survival rates estimated by BIM (2017).

In this FU, vessels tend to be small with limited space and crew, and onboard tailing (keeping only the tail) of the catch is not as prevalent as in other FUs around Ireland. As a result, the proportion of discarded Norway lobster in FU 19 is high relative to other areas.

The density of Norway lobster in FU 19 is considered low (average density 0.2 individuals m^{-2}). Knowledge of biological parameters is poor, and the exploitation rate on males is usually higher than on females. For these reasons, a harvest rate consistent with a combined sex $F_{0.1}$ is considered an appropriate proxy for F_{MSY}.

A single TAC covers the entire ICES Subarea 7. Management should be implemented at the FU level (Figure 2) to avoid local over-exploitation and to ensure that fishing opportunities are in line with the scale of the resource for each of the stocks and consistent with an MSY approach.

Mixed-fisheries considerations

Norway lobster in Functional Unit 19 is caught as part of a mixed fishery together with other demersal stocks.

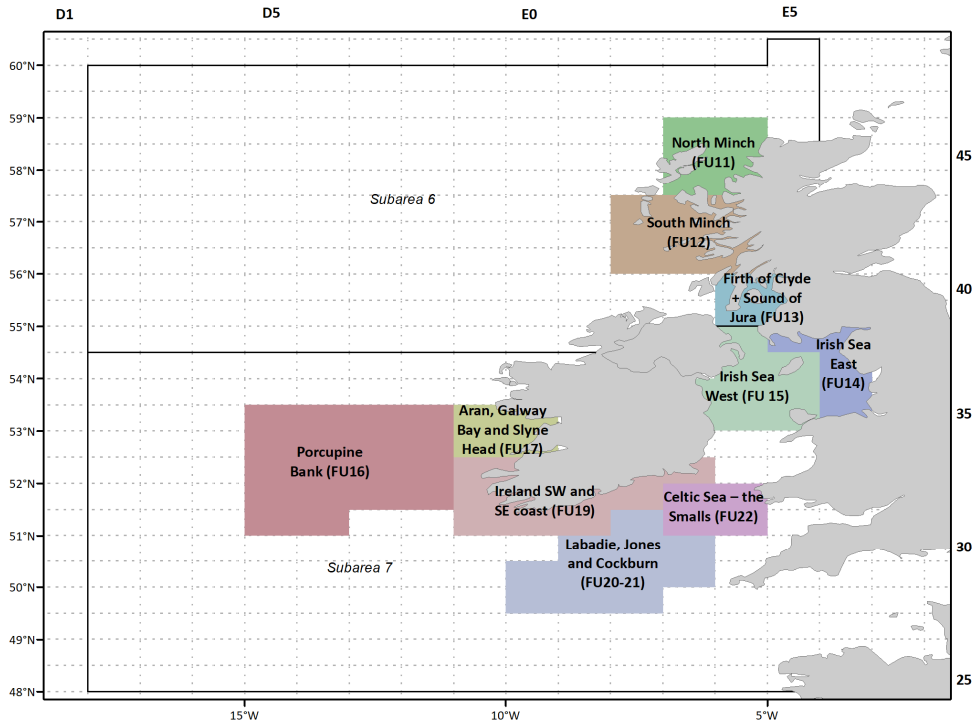


Figure 2 Norway lobster functional units in subareas 6 and 7.

Reference points

Table 4 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	430	Five percent interval on the probability distribution of abundance for the time-series 2011–2015, assuming a normal distribution; individuals in millions	ICES (2016)
	F_{MSY}	9.3	Proxy harvest rate equivalent to $F_{0.1}$ for combined sexes, derived from a length-based per recruit analysis; percentage in number	ICES (2016)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
EU management plan (EU, 2019)	MAP target MSY $B_{trigger}$	430	MSY $B_{trigger}$; individuals in millions	ICES (2016)
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	9.3	Harvest rate equivalent to F_{MSY}; percentage by numbers	ICES (2016)
	MAP Lower range of F_{MSY}	8.3–9.3	Harvest rate, consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY; percentage by number	ICES (2016)
	MAP Upper range of F_{MSY}	9.3–9.3	Harvest rate, $F_{MSY\ upper}$ value capped at F_{MSY} because it has not been possible to evaluate the probability of SSB < B_{lim} as no B_{lim} is defined; percentage by number	ICES (2016)

Basis of the assessment

Table 5 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Underwater TV survey (ICES, 2022b)
Input data	Commercial catches (international landings from Ireland, France, and UK); length frequencies from catch and discard sampling (Ireland); one UWTV survey index (UWTV-FU 19 [U5917]); maturity data from commercial catch and survey sampling; fixed natural mortality. Discard survival rate.
Discards and bycatch	Included in the assessment since 2006
Indicators	Commercial length frequencies by sex. Two bottom trawl surveys (IGFS-WIBTS-Q4 [G7212] and EVHOE-WIBTS-Q4 [G9527]).
Other information	This stock was benchmarked in 2014 (WKCELT; ICES, 2014)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. ICES advice and estimated landings. All weights are in tonnes.

Year	ICES advice	Landings advice*	Catch advice**	ICES landings	Total discards***
1992		3800		888	
1993		~ 4000		905	
1994		~ 4000		390	
1995		~ 4000		694	
1996		4000		888	
1997		4000		756	
1998		4000		827	
1999		4000		579	
2000		4000		696	
2001		4000		815	
2002		4440		1318	
2003		4440		1240	
2004	Restrict landings to 2000–2002 levels	3300		1074	
2005	Restrict landings to 2000–2002 levels	3300		712	
2006	Restrict landings to 2000–2002 levels	3300		741	37
2007	Constrain effort at recent levels	-		957	26
2008	Constrain effort at recent levels	-		851	105
2009	No increase in effort and landings (2007)	< 800	-	868	269
2010	No new advice, same as for 2009	< 800	-	687	257
2011	See scenarios	-		643	409
2012	Reduce catches	-		849	473
2013	MSY approach	< 820		794	436
2014	MSY approach	< 521		468	161
2015	MSY approach	< 715		507	167
2016	MSY approach		≤ 793^	590	193
2017	MSY approach		≤ 838	420	139
2018	MSY approach		≤ 1192	238	71
2019	MSY approach		≤ 173	249	112
2020	Management plan		839 (range 749–839)	249	136
2021	Management plan		595 (range 531–595)	415	173
2022	Management plan		378 (range 337–378)		
2023	Management plan		338 (range 302–338)		

* Prior to 2007, ICES provided combined advice for FUs 16, 17, 18, and 19, as well as for "other rectangles" in this area.
** Assuming recent discard rates.
*** Dead + surviving discards.
^ Assuming all catches are landed.

History of the catch and landings

Table 7 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Catch distribution by fleet in 2021 as estimated by ICES.

Catch		Landings	Discards	
93% dead	7% surviving	100% otter trawl	75% dead	25% surviving
588 tonnes		415 tonnes	173 tonnes	

Table 8 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. History of ICES estimates of landings by country and discards. All weights are in tonnes. The figures in the table are rounded and therefore the total landings by country may not match exactly.

Year	France	Republic of Ireland	UK	Total landings	Discards*
1989	245	652	2	899	
1990	181	569	4	754	
1991	212	860	5	1077	
1992	233	640	15	888	
1993	229	672	4	905	
1994	216	153	21	390	
1995	175	507	12	694	
1996	145	736	7	888	
1997	93	656	7	756	
1998	92	733	2	827	
1999	77	499	3	579	
2000	144	541	11	696	
2001	111	702	2	815	
2002	188	1130	0	1318	
2003	165	1075	0	1240	
2004	76	997	1	1074	
2005	62	648	2	712	
2006	65	675	1	741	37
2007	63	894	0	957	26
2008	46	790	15	851	105
2009	55	798	15	868	269
2010	14	660	13	687	257
2011	23	619	1	643	409
2012	11	837	1	849	473
2013	4	783	6	794	436
2014	6	459	3	468	161
2015	5	502	0	507	167
2016	4	583	3	590	193
2017	4	412	4	420	139
2018	4	229	5	238	71
2019	2	247	1	249	112
2020	1	247	1	249	136
2021	1	413	1	415	173

* Dead + surviving discards.

Summary of the assessment

Table 9 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. Assessment summary. High and low refer to the 95% confidence intervals.

Year	Low	UWTV abundance estimate	High	Landings in number	Total discards in number*	Removals in number	Harvest rate (by number)	Landings	Total discards*	Discard rate (by number)	Dead discard rate (by number)	Mean weight in landings	Mean weight in discards
	millions						%	tonnes		%		grammes	
1989								899					
1990								754					
1991								1077					
1992								888					
1993								905					
1994								390					
1995								694					
1996								888					
1997								756					
1998								827					
1999								579					
2000								696					
2001								815					
2002								1318					
2003								1240					
2004								1074					
2005								712					
2006								741	37				
2007								957	26				
2008				25	5	29		851	105	17.7	13.9	33.74	19.38
2009				28	19	42		868	269	40	33	30.53	14.50
2010				23	19	37		687	257	45	38	29.62	13.50
2011	494	665	836	26	32	50	7.5	643	409	56	49	24.93	12.64
2012	483	594	705	32	37	60	10.1	849	473	54	46	26.32	12.70
2013	326	487	648	29	36	57	11.7	794	436	55	48	26.94	11.95
2014	448	636	824	16	11	25	3.9	468	161	41	34	28.62	14.08
2015	356	482	608	17	12	26	5.4	507	167	41	34	29.84	14.09
2016	300	399	498	20	14	30	7.5	590	193	41	34	29.90	14.22
2017	379	499	619	15	10	22	4.4	420	139	40	33	28.80	14.48
2018	123	176	229	8	4	11	6.7	238	71	35	29	28.22	15.69
2019	259	386	513	9	8	15	4.0	249	112	48	41	27.42	13.26
2020	227	320	413	10	10	17	5.4	249	136	51	44	25.76	13.50
2021	193	270	347	15	13	24	8.9	415	173	46	39	28.47	13.62
2022	186	259	332										

* Dead + surviving discards.

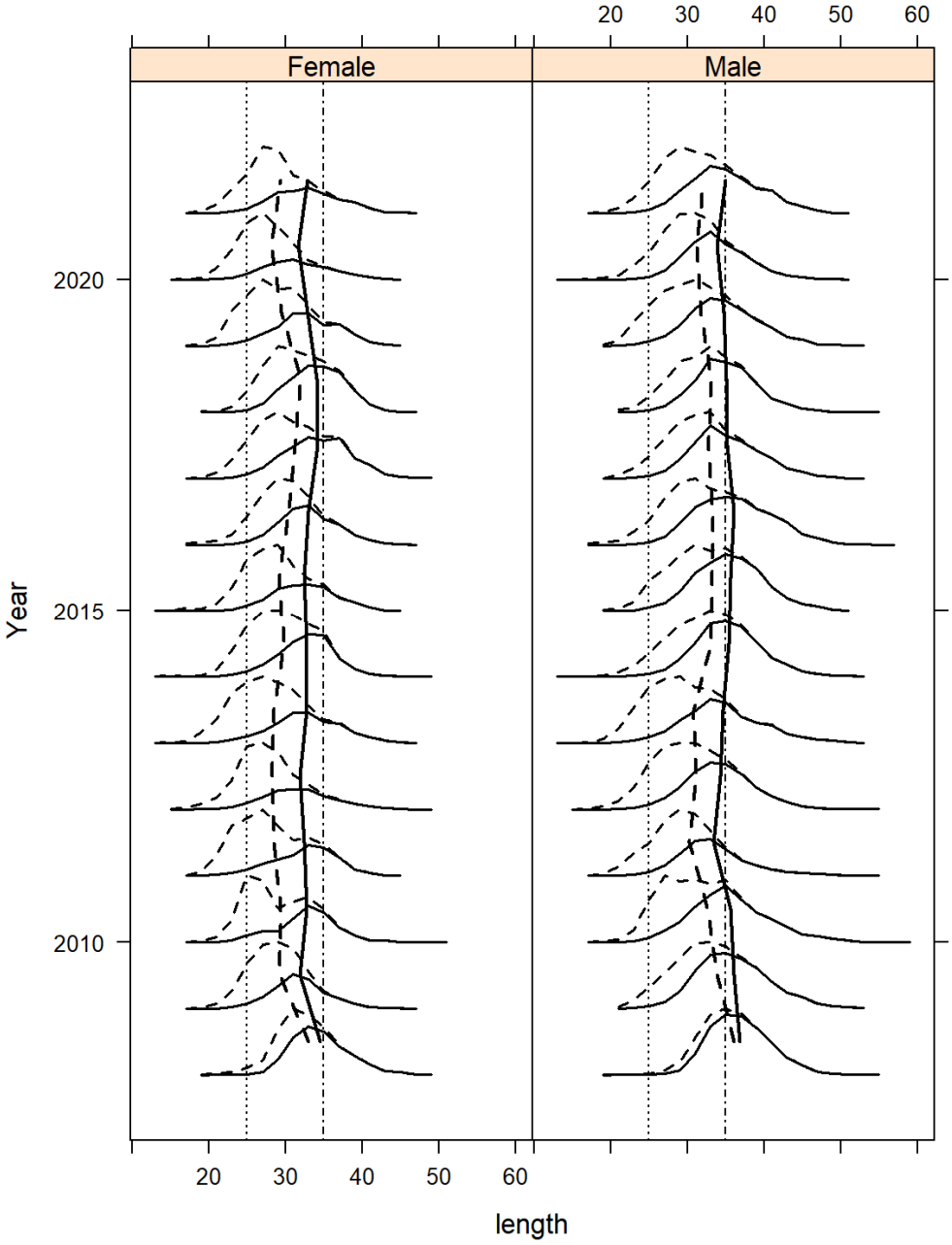


Figure 3 Norway lobster in divisions 7.a, 7.g, and 7.j, Functional Unit 19. The dashed lines represent catches while the solid lines represent landings. Annual length–frequency distributions are shown on the horizontal, the vertical bold lines represent mean lengths. Minimum conservation reference size (25 mm) and 35 mm visual reference levels indicated. All lengths are shown in carapace length (mm).

Sources and references

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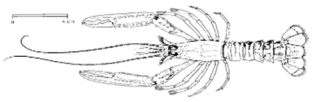
Download the stock assessment data and figures

Recommended citation: ICES. 2022. Norway lobster (*Nephrops norvegicus*) in divisions 7.a, 7.g, and 7.j, Functional Unit 19 (Irish Sea, Celtic Sea, eastern part of southwest of Ireland). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, nep.fu.19. https://doi.org/10.17895/ices.advice.19772416

Nephrops FU20 and 21 (Celtic Sea)



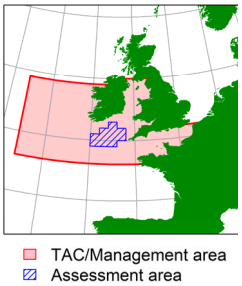
Division 7.g and 7.h.

Advice for 2023

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 should be no more than 1,803 t.

To ensure that the stock in Functional Unit 20 - 21 is exploited sustainably, management should be implemented at the level of the combined Functional Unit 20 - 21.

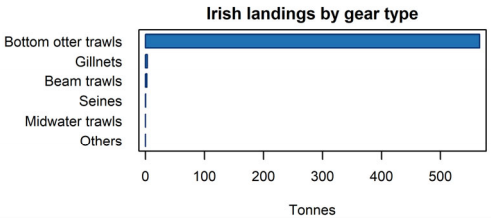
ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for subarea 7. ICES considers this plan to be precautionary when implemented at the Functional Unit level.

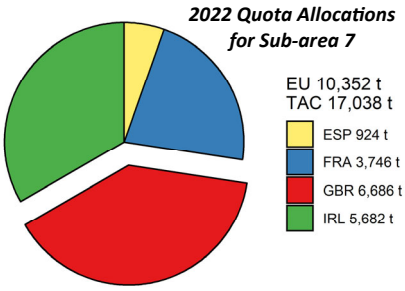


Key Points

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target); No management plan has been agreed between all the relevant management authorities.	
Advice Basis	ICES MSY approach	Catch=1,803 t
Ranges	F_{MSY} Range Lower	Catch=1,773 t
	F_{MSY}	Catch=1,803 t
	F_{MSY} Range Upper	Catch=1,803 t
Landing Obligation	From 2016	Gear specific high survivability exemption*
MSY $B_{trigger}$ (million individuals)	450	

* Described below under Key Stock Considerations, details in (EU 2020/2015).





Management in 2022

- The current TAC area and stock assessment area do not match.

Key Stock Considerations

- The advised catch of 1,803 t results in projected landings advice of 1,620 t (assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021).
- In recent years (2019-2021) Ireland is the main participant in this *Nephrops* fishery accounting for 81% of the landings.
- The decrease in catch advice for 2023 compared to last year is directly linked to the decreased estimate of stock abundance in 2022. The latest estimate of stock abundance is above MSY $B_{trigger}$ and the third lowest observed in the time series.
- In 2020 and also in 2021 there was a notable reduction in the catch and effort by the Irish OTB fleet targeting *Nephrops* in this area. There are various factors contributing to this including market issues related to COVID-19.
- Two-thirds of the Irish landings of Celtic Sea *Nephrops* come from trips where *Nephrops* was the dominant species. The remainder are taken in a more mixed fishery and are mainly landed with megrim, anglerfish, cod and other gadoid species.
- Recent three-year average for mean weight in landings and discards are used as inputs to calculate catch options. Sampling levels for landings and discards in this stock remain low, which is an added source of uncertainty.

- Under the Landing Obligation *Nephrops* fisheries in Sub-area 7 have a high survivability exemption, based on studies which showed a survivability of about 64% (BIM, 2017). This exemption applies to bottom trawls (OTT, OTB, TBS, TBN, TB, PTB, OT, PT, TX) with a mesh size ≥100 mm or with a mesh size 70-99 mm in combination with highly selective gear options such as: square mesh panels, seltra panel, sorting grid or separation panel.
- A high survivability exemption also applies to creel caught *Nephrops* in Sub-area 7.

Published 28 October 2022

Norway lobster (*Nephrops norvegicus*) in divisions 7.g and 7.h, functional units 20 and 21 (Celtic Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 should be no more than 1803 tonnes.

To ensure that the stock in functional units (FUs) 20–21 is exploited sustainably, management should be implemented at the level of the combined FU 20–21.

ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for Subarea 7. ICES considers this plan to be precautionary when implemented at the FU level.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and stock size is above MSY $B_{trigger}$.

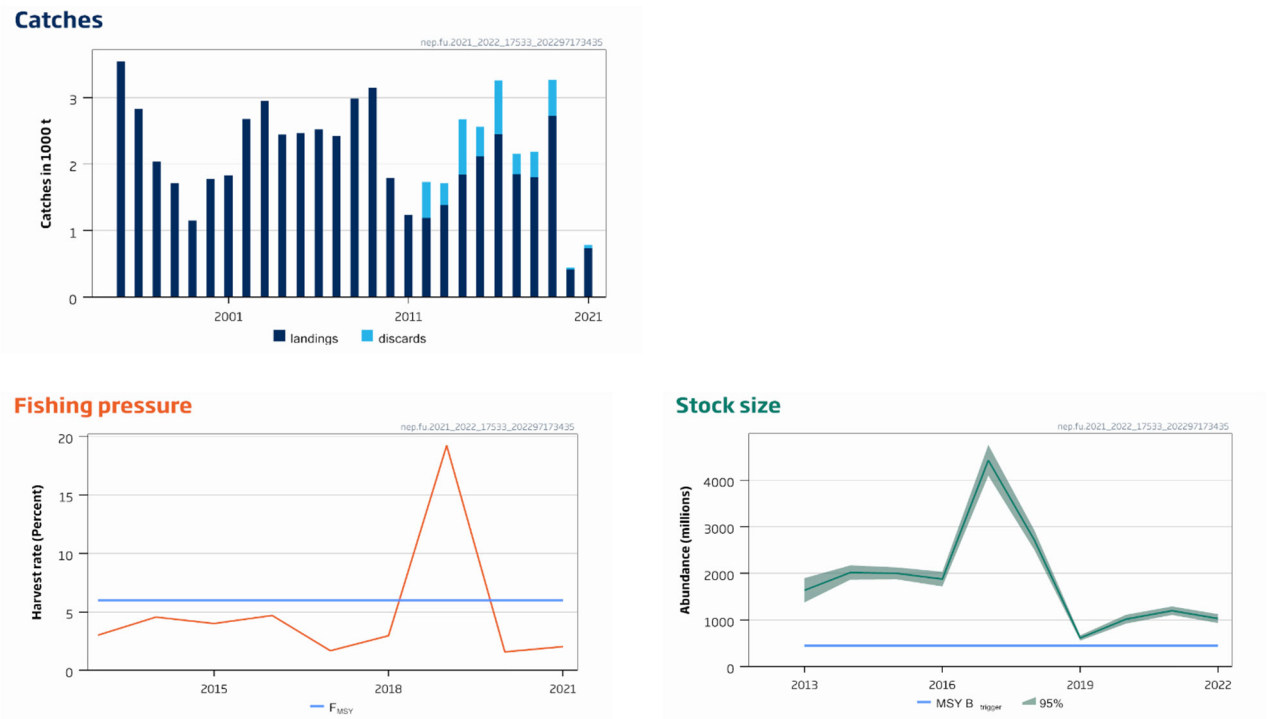


Figure 1 Norway lobster in divisions 7.g and 7.h, functional units 20–21. Summary of the stock assessment. Catches (discard data only available from 2012), harvest rate (sum of landings and dead discards in numbers divided by stock abundance), and stock abundance (underwater TV survey).

Catch scenarios

Table 1 Norway lobster in divisions 7.g and 7.h, functional units 20–21. The basis for the catch advice and scenarios.

Variable	Value	Notes
Stock abundance (2023)	1032	UWTV survey 2022; individuals in millions
Mean weight in projected landings	30.31	Average 2019–2021; in grammes
Mean weight in projected discards	16.23	Average 2019–2021; in grammes
Projected discard rate	17.3	Average 2019–2021; percentage by number of the total catch
Discard survival rate	25	Percentage by number of the discards

Table 2 Norway lobster in divisions 7.g and 7.h, functional units 20–21. Annual catch advice and scenarios. All weights are in tonnes. The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.

Basis	Total catch	Dead removals	Projected landings	Projected dead discards	Projected surviving discards	% harvest rate*	% advice change**
	PL + PDD + PSD	PL + PDD	PL	PDD	PSD	for PL + PDD	
ICES advice basis							
MSY approach	1803	1757	1620	137	46	6.0	−8.8
Other scenarios							
$F_{MSY\ lower}$	1773	1728	1593	135	45	5.9	−10.4
$F_{MSY\ upper}$ ***	1803	1757	1620	137	46	6.0	−8.8
F_{2021}	611	596	549	47	16	2.04	−69

* By number.
** Advice values for 2023 are relative to the 2022 advice (F_{MSY} advice of 1978 tonnes).
*** $F_{MSY\ upper} = F_{MSY}$ for this stock.

The decrease in total catch advice is the result of the decrease in the estimated stock abundance offset by an increase in mean weight estimates.

Basis of the advice

Table 3 Norway lobster in divisions 7.g and 7.h, functional units 20–21. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the EU multiannual management plan (MAP) that has been agreed for this stock (EU, 2019) and considers it to be precautionary when implemented at the FU level. There is no agreement with the UK regarding this plan, and it is not used as the basis of the advice for this stock. ICES provides catch scenarios consistent with the F_{MSY} ranges in the MAP.

Quality of the assessment

Since 2013 a dedicated annual underwater television (UWTV) survey has taken place in FUs 20–21 (Figure 2), which gives abundance estimates with high precision.

Sampling in 2021 continued through a fishers' self-sampling scheme. The levels of sampling are considered acceptable.

A recent comparison showed no significant difference in density estimates between the new camera system and reviewing method to those used prior to 2019. Previous assumptions relating to correction factors are still applied.

Issues relevant for the advice

During 2016–2021, the EU landing obligation was applied to all catches of Norway lobster fisheries in ICES Subarea 7 with exemptions for high survival. In 2022, this stock is still under a landing obligation, and there are still exemptions in place.

Observations from the 2019–2021 fishery indicate that some discarding above the minimum conservation reference size (MCRS) continues (Figure 3). Consequently, ICES is providing advice for 2023 assuming average discard rates as observed over the last three years. This is considered to be the most realistic assumption. In a situation where all catch is landed, there would be no surviving discards, and the total catch advice and MSY harvest rate would be lower than those given in the catch scenario table (Table 2). However, reducing the catch of smaller Norway lobster would allow an increase in landings above those given in the catch scenario table.

Estimates indicate that trawl discard survival is around 64% (BIM, 2017). As a result, an exemption from the landings obligation based on high survivability has been granted by the European Commission. ICES continues to use the survival rate of 25% (ICES, 2016) as it has not evaluated the survival rates estimated by BIM (2017).

The density of Norway lobster in FUs 20–21 is considered medium (average density 0.2 individuals m^{-2}). The knowledge of biological parameters is poor and the exploitation rate on males is usually higher than on females. For these reasons, a harvest rate consistent with a combined sex $F_{0.1}$ is considered an appropriate proxy for F_{MSY}.

A single TAC covers the entire ICES Subarea 7. Management should be implemented at the FU level (Figure 2) to avoid local over-exploitation and to ensure that fishing opportunities are in line with the scale of the resource for each of the stocks and consistent with an MSY approach.

A notable reduction in the catch by the otter trawl fleet targeting Norway lobster was observed in 2020 and 2021.

Mixed-fisheries considerations

Norway lobster in Functional Units 20–21 is caught as part of a mixed fishery together with other demersal stocks.

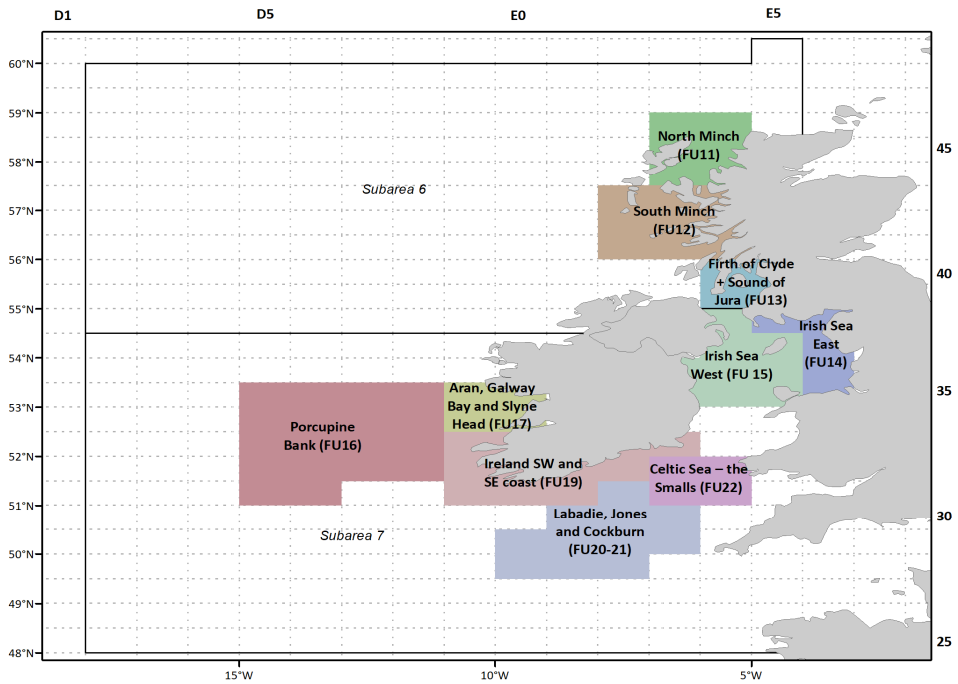


Figure 2 Norway lobster functional units in subareas 6 and 7.

Reference points

Table 4 Norway lobster in divisions 7.g and 7.h, functional units 20–21. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	450	Five percent interval on the probability distribution of abundance for the time-series 2014–2021 excluding year 2017, assuming a normal distribution; individuals in millions	ICES (2021a)
	F_{MSY}	6.0	Proxy harvest rate equivalent to $F_{0.1}$ for combined sexes, derived from length-based per recruit analysis; percent by numbers	ICES (2016)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
EU management plan (EU, 2019)	MAP MSY $B_{trigger}$	Not defined		
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	6.0	Harvest rate equivalent to F_{MSY}; percentage by numbers	ICES (2016)
	MAP Lower range of F_{MSY}	5.9–6.0	Consistent with ranges provided by ICES, (2017), resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2016)
	MAP Upper range of F_{MSY}	6.0–6.0	Harvest rate, $F_{MSY\ upper}$ value capped at F_{MSY} because it has not been possible to evaluate the probability of SSB < B_{lim} as no B_{lim} is defined; percentage by number	ICES (2016)

Basis of the assessment

Table 5 Norway lobster in divisions 7.g and 7.h, functional units 20–21. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Underwater TV survey (ICES, 2022b)
Input data	One survey index (UWTV FU 20-21 [U5917]), commercial catches (international landings (Ireland, France, and UK), length frequencies from Irish and French catch and discard sampling); maturity data (from commercial catch sampling and surveys); fixed natural mortality. Discard survival rate.
Discards and bycatch	Included in the assessment since 2012.
Indicators	Mean sizes in the catches. Two bottom trawl surveys (IGFS-WIBTS-Q4 [G7212] and EVHOE-WIBTS-Q4 [G9527]).
Other information	This stock was last benchmarked in 2014 (WKCELT; ICES, 2014).
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Norway lobster in divisions 7.g and 7.h, Functional Unit 20 - 21. ICES advice, landings, and discards. All weights are in tonnes.

Year	ICES advice*	Landings advice	Catch advice**	ICES landings	ICES discards ***
1992		~ 3800			
1993		3800			
1994		3800			
1995		3800		3536	
1996		3800		2822	
1997		3800		2038	
1998		3800		1713	
1999		3800		1152	
2000		3800		1778	
2001		3800		1833	
2002		3800		2674	
2003		3800		2953	
2004	Adjust TAC in line with landings of most recent ten years	4600		2443	
2005	Adjust TAC in line with landings of most recent ten years	4600		2469	
2006	Recent average landings 2000–2002	4600		2523	
2007	No increase in effort	-		2419	
2008	No increase in effort	< 5300		2980	
2009	No increase in effort	< 5300		3145	
2010	No new advice, same as for 2009	< 5300		1793	
2011	See scenarios; MSY reduce catch or PA < 5.3	-		1237	
2012	Reduce catch	-		1189	542
2013	Average landings (last ten years)	< 2500		1387	327
2014	No new advice, same as for 2013	< 2500		1836	834
2015	Same as for 2013	< 2500		2116	442
2016	Precautionary approach (harvest rate consistent with previous advice)		≤ 3045^	2453	801
2017	MSY approach		≤ 3552	1849	306
2018	MSY approach		≤ 8673	1803	381
2019	MSY approach		≤ 5320	2723	539
2020	Management plan		1150 (range 1131–1150)	413	34
2021	Management plan		1710 (range 1682–1710)	736	49
2022	MSY approach		≤ 1978		
2023	MSY approach		≤ 1803		

* Advice prior to 2013 applies to functional units 20–22.
** Assuming recent discard rates from 2017 onwards.
*** Dead + surviving discards.
^ Assuming all catches are landed.

History of the catch and landings

Table 7 Norway lobster in divisions 7.g and 7.h, functional units 20–21. Catch distribution by fleet in 2021 as estimated by ICES.

Catch		Landings	Discards	
98% dead	2% surviving	100% otter trawl	75% dead	25% surviving
785 tonnes		736 tonnes	49 tonnes	

Table 8 Norway lobster in divisions 7.g and 7.h, functional units 20–21. History of ICES estimates of landings by country and discards. All weights are in tonnes.

Year	France	Rep. of Ireland	UK	Belgium	Total landings	Discards*
1995	3419	117			3536	
1996	2721	101			2822	
1997	1957	81			2038	
1998	1583	130			1713	
1999	1051	83	18		1152	
2000	1661	107	10		1778	
2001	1750	69	14		1833	
2002	2559	104	11		2674	
2003	2796	148	9		2953	
2004	2140	299	4		2443	
2005	2008	455	6		2469	
2006	2066	450	7		2523	
2007	1816	600	3		2419	
2008	2036	937	7		2980	
2009	1930	1202	13		3145	
2010	975	756	62		1793	
2011	566	637	34		1237	
2012	453	708	28		1189	542
2013	486	844	57		1387	327
2014	465	1342	29		1836	834
2015	355	1620	141		2116	442
2016	477	1531	445	0	2453	801
2017	341	1113	395	< 0.5	1849	306
2018	195	1197	411	< 0.5	1803	381
2019	218	2219	286	< 0.5	2723	539
2020	75	336	2	< 0.5	413	34
2021	114	610	9	3	736	49

* Dead + surviving discards.

Summary of the assessment

Table 9 Norway lobster in divisions 7.g and 7.h, functional units 20–21. Assessment summary. High and low refer to the 95% confidence intervals.

Year	Low	UWTV abundance estimate	High	Landings in number	Total discards in number*	Removals in number	Harvest rate by number	Landings	Total discards*	Discard rate (by number)	Dead discard rate (by number)	Mean weight in landings	Mean weight in discards
	millions						%	tonnes		%		grammes	
2012				38.2	36.1	65.3		1189	542	49	41	31.10	15.01
2013	1379	1640	1901	34.8	19.2	49.2	3.0	1387	327	36	29	39.68	17.04
2014	1867	2021	2175	50.6	55.5	92.2	4.6	1836	834	52	45	36.35	15.02
2015	1874	2003	2132	59.4	28.1	80.5	4.0	2116	442	32	26	35.71	15.71
2016	1722	1879	2036	60.2	37.5	88.3	4.7	2453	801	38	32	40.74	21.37
2017	4096	4428	4760	60.1	19.2	74.5	1.70	1849	306	24	19.4	30.78	15.91
2018	2509	2721	2933	64.7	21.5	80.8	3.0	1803	381	25	20	27.88	17.72
2019	559	617	675	91.8	35.8	119	19.2	2723	539	28	23	29.65	15.04
2020	924	1020	1116	14.6	2.0	16.2	1.60	413	34	12.3	9.5	28.24	16.70
2021	1110	1202	1294	22.3	2.9	24.4	2.0	736	49	11.5	8.9	33.03	16.95
2022	936	1032	1128										

* Dead + surviving discards.

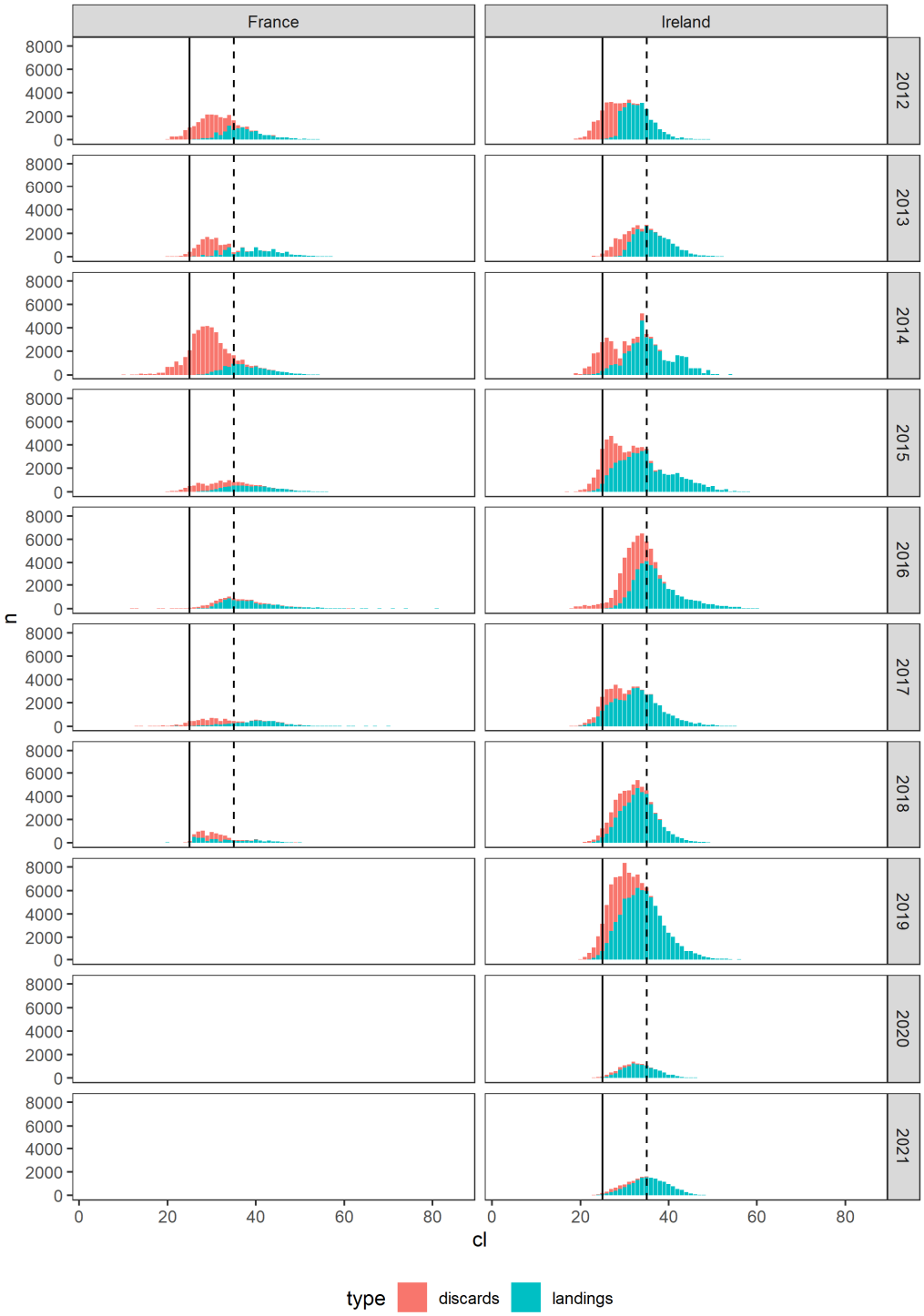


Figure 3 Norway lobster in divisions 7.g and 7.h, functional units 20–21. Commercial length–frequency distribution by country. The solid vertical lines indicate the minimum conservation reference size (MCRS; 25 mm), while the dashed vertical lines indicate the minimum landing size (French MLS; 35 mm). French sampling data for 2019 and 2021 were not representative and were not available in 2020. All lengths are shown in carapace length (mm).

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Norway lobster (*Nephrops norvegicus)* in divisions 7.g and 7.h, functional units 20–21 (Celtic Sea). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, nep.fu.2021, https://doi.org/10.17895/ices.advice.19772419

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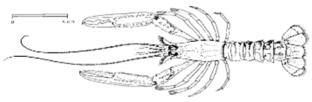
Nephrops FU22 (The Smalls)



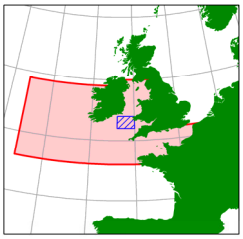
Division 7.g and 7.f.

Advice for 2023

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 should be no more than 2,548 t.

To ensure that the stock in Functional Unit 22 is exploited sustainably, management should be implemented at the Functional Unit level.

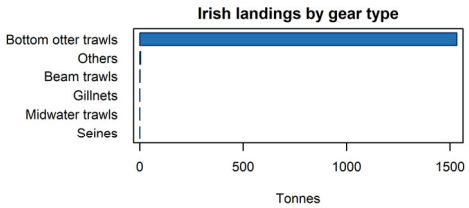
ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for Subarea 7. ICES considers this plan to be precautionary when implemented at the Functional Unit level.



Key Points

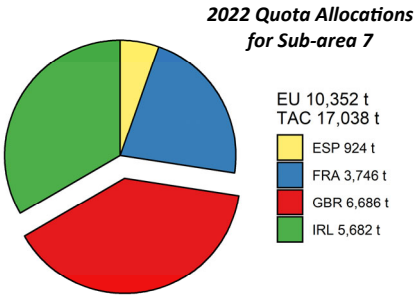
ICES Assessment Category	I (Quantitative Assessment)	
Management Plan	WWMAP (target); No management plan has been agreed between all the relevant management authorities.	
Advice Basis	ICES MSY approach	Catch=2,548 t
Ranges	F_{MSY} Range Lower	Catch=2,025 t
	F_{MSY}	Catch=2,548 t
	F_{MSY} Range Upper**	Catch=2,548 t
Landing Obligation	From 2016	Gear specific high survivability exemption*
MSY $B_{trigger}$ (million individuals)	990	

* Described below under Key Stock Considerations, details in (EU 2020/2015).



Management in 2022

- The current TAC area and stock assessment area do not match.



Key Stock Considerations

- The advised catch of 2,548 t results in projected landings advice of 2,248 t (assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021).
- The increase in catch advice for 2023 compared to last year is directly linked to the increased estimate of stock abundance in 2022. The latest estimate of stock abundance is below MSY $B_{trigger}$ and the fourth lowest observed in the time series.
- In recent years (2019-2021) Ireland is the main participant in this *Nephrops* fishery accounting for 94% of the landings.
- Nearly 90% of Irish landings of the Smalls grounds *Nephrops* come from trips where *Nephrops* was the dominant species. The remainder are taken in a more mixed fishery and are mainly landed with whiting, cod, and anglerfish.
- Under the Landing Obligation *Nephrops* fisheries in Sub-area 7 have a high survivability exemption, based on studies which showed a survivability of about 64% (BIM, 2017). This exemption applies to bottom trawls (OTT, OTB, TBS, TBN, TB, PTB, OT, PT, TX) with a mesh size ≥100 mm or with a mesh size 70-99 mm in combination with highly selective gear options such as: square mesh panels, seltra panel, sorting grid or separation panel.
- A high survivability exemption also applies to creel caught *Nephrops* in Sub-area 7.

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Norway lobster (*Nephrops norvegicus*) in divisions 7.g and 7.f, Functional Unit 22 (Celtic Sea, Bristol Channel)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, catches in 2023 should be no more than 2548 tonnes.

To ensure that the stock in Functional Unit (FU) 22 is exploited sustainably, management should be implemented at the FU level.

ICES notes the existence of a management plan, developed and adopted by one of the relevant management authorities for Subarea 7. ICES considers this plan to be precautionary when implemented at the FU level.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and stock size is below MSY $B_{trigger}$.

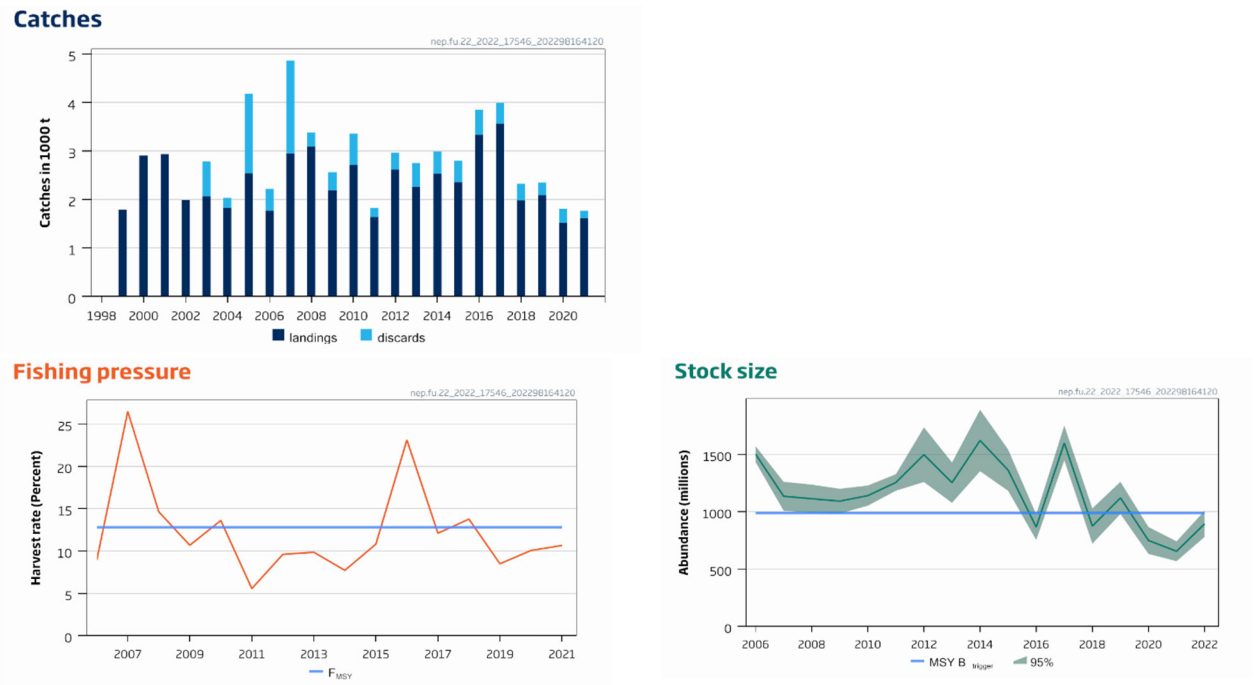

Figure 1 Norway lobster in divisions 7.g and 7.f, Functional Unit 22. Summary of the stock assessment. Catches (discard data only available from 2003), harvest rate (sum of landings and dead discards in numbers, divided by stock abundance), and stock abundance (underwater TV survey).

Catch scenarios

The latest estimate of stock abundance is below MSY $B_{trigger}$ (990 million). ICES maximum sustainable yield (MSY) approach states that under such conditions, the F_{MSY} harvest rate (12.8%) for FU 22 should be reduced by multiplying it by the ratio of current abundance to MSY $B_{trigger}$. This corresponds to a harvest rate of 12.8 × (895/990) = 11.6% for the advice in 2023.

Table 1 Norway lobster in divisions 7.g and 7.f, Functional Unit 22. The basis for the catch advice and scenarios.

Variable	Value	Notes
Stock abundance (2023)	895	UWTV survey 2022; individuals in millions
Mean weight in projected landings	25.88	Average 2019–2021; in grammes
Mean weight in projected discards	13.44	Average 2019–2021; in grammes
Projected discard rate	20	Average 2019–2021; percentage by number of the total catch
Discard survival rate	25	Percentage by number of the discards

Table 2 Norway lobster in divisions 7.g and 7.f, Functional Unit 22. Annual catch advice and scenarios. All weights are in tonnes. The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.

Basis	Total catch	Dead removals	Projected landings	Projected dead discards	Projected surviving discards	% harvest rate*	% advice change **
	PL + PDD + PSD	PL + PDD	PL	PDD	PSD	for PL + PDD	
ICES advice basis							
MSY approach: F_{MSY} × Stock abundance 2023 / MSY $B_{trigger}$	2548	2473	2248	225	75	11.6	103
Other scenarios							
$F_{MSY\ lower}$ × Stock abundance 2023 / MSY $B_{trigger}$	2025	1965	1786	179	60	9.2	61
F_{MSY}	2818	2735	2486	249	83	12.8	124
$F_{MSY\ lower}$	2245	2179	1981	198	66	10.2	79
$F_{MSY\ upper}$***	2818	2735	2486	249	83	12.8	124
F_{2021}	2347	2277	2070	207	69	10.7	87

* By number.
** Advice values for 2023 are relative to the 2022 advice (F_{MSY} advice of 1257 tonnes).
*** $F_{MSY\ upper}$ = F_{MSY} for this stock.

The increase in total catch advice is the result of the higher estimated stock abundance, the increase in harvest rate and mean weights used for the advice.

Basis of the advice

Table 3 Norway lobster in divisions 7.g and 7.f, Functional Unit 22. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the EU multiannual management plan (MAP) that has been agreed for this stock (EU, 2019) and considers it to be precautionary when implemented at the FU level. There is no agreement with the UK regarding this plan, and it is not used as the basis of the advice for this stock. ICES provides catch scenarios consistent with the F_{MSY} ranges in the MAP.

Quality of the assessment

Since 2006 a dedicated annual underwater television (UWTV) survey has taken place in FU 22 (Figure 2), which gives abundance estimates for the stock with high precision.

Sampling in 2021 continued through a fishers' self-sampling scheme. The levels of sampling are considered acceptable.

Issues relevant to the advice

During 2016–2021, the EU landing obligation was applied to all catches of Norway lobster fisheries in ICES Subarea 7 with exemptions for high survival. In 2022, this stock is still under a landing obligation and there are still exemptions in place.

Observations from the 2019–2021 fishery indicate that some discarding above the minimum conservation reference size (MCRS) continues (Figure 3). Consequently, ICES is providing advice for 2023 assuming average discard rates as observed over the last three years. This is considered to be the most realistic assumption. In a situation where all catch is landed, there would be no surviving discards, and the total catch advice and MSY harvest rate would be lower than those given in the catch scenario table (Table 2). However, reducing the catch of smaller Norway lobster would allow an increase in landings above those given in the catch scenario table.

Estimates indicate that trawl discard survival is around 64% (BIM, 2017). As a result, an exemption from the landings obligation based on high survivability has been granted by the European Commission. ICES continues to use the survival rate of 25% (ICES, 2016), as it has not evaluated the survival rates estimated by BIM (2017).

For FU 22, the absolute density observed during the UWTV survey is medium (~ 0.4 individuals m^{-2}). The fishery in this area has been in existence since the 1960s and has been relatively stable for many years. Harvest rates around the $F_{35\%SPR}$ (the fishing mortality that gives 35% spawning potential ratio) are expected to deliver high long-term yield with a low probability of recruitment overfishing and are used as proxy for F_{MSY}.

A single TAC covers the entire ICES Subarea 7. Management should be implemented at the FU level (Figure 2) to avoid local over-exploitation and to ensure that fishing opportunities are in line with the scale of the resource for each of the stocks and consistent with an MSY approach.

Mixed-fisheries considerations

Norway lobster in Functional Unit 22 is caught as part of a mixed fishery together with other demersal stocks.

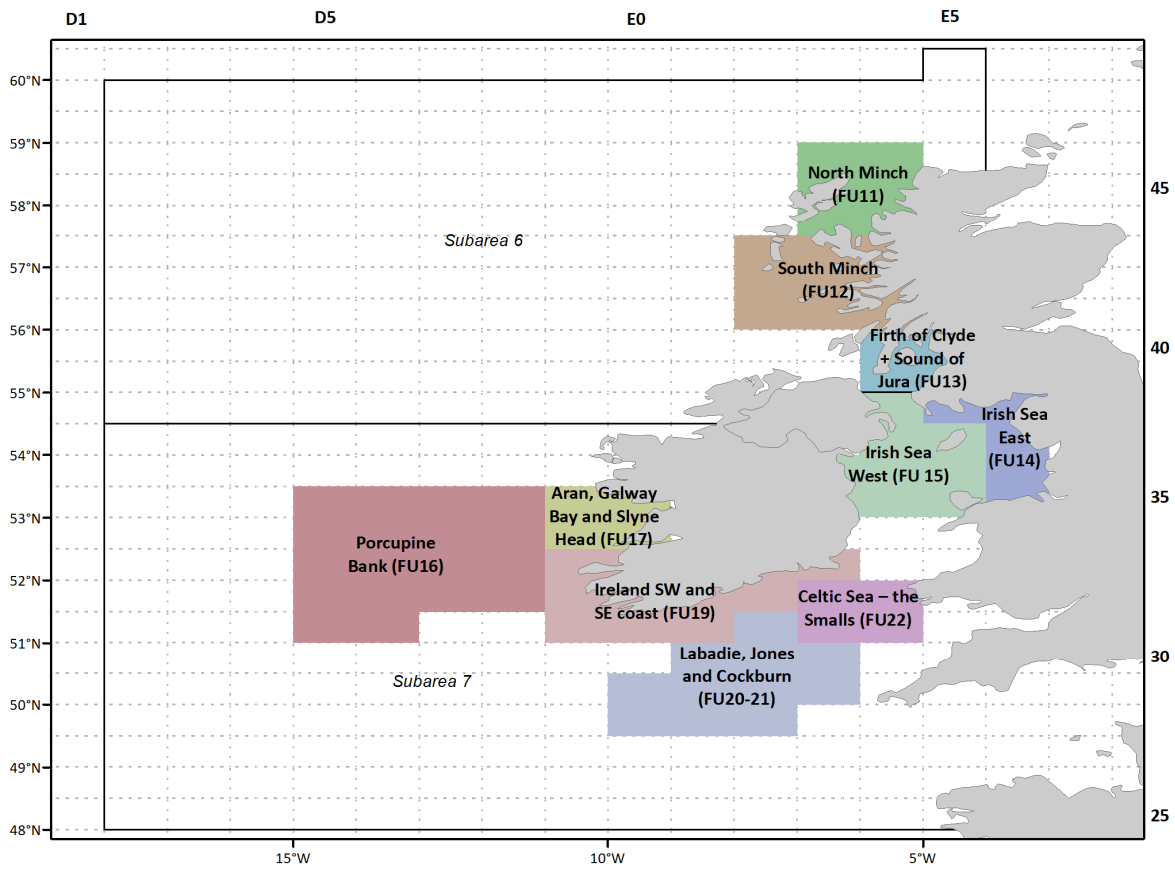

Figure 2 Norway lobster functional units in subareas 6 and 7.

Reference points

Table 4 Norway lobster in divisions 7.g and 7.f, Functional Unit 22. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	990	Five percent interval on the probability distribution of abundance for the time-series 2006–2015, assuming a normal distribution; individuals in millions	ICES (2016)
	F_{MSY}	12.8	Proxy harvest rate equivalent to $F_{35\%SPR}$ for combined sexes, derived from a length-based per recruit analysis; percentage by numbers	ICES (2016)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
EU management plan (EU, 2019)	MAP target MSY $B_{trigger}$	990	MSY $B_{trigger}$; individuals in millions	ICES (2016)
	MAP B_{lim}	Not defined		
	MAP F_{MSY}	12.8	Harvest rate equivalent to F_{MSY}; percentage by numbers	ICES (2016)
	MAP Lower range of F_{MSY}	10.2–12.8	Harvest rate, consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with the maximum sustainable yield (MSY); percentage by number	ICES (2016)
	MAP Upper range of F_{MSY}	12.8–12.8	Harvest rate, $F_{MSY\ upper}$ value capped at F_{MSY} because it has not been possible to evaluate the probability of SSB < B_{lim} as no B_{lim} is defined; percentage by number	ICES (2016)

Basis of the assessment

Table 5 Norway lobster in divisions 7.g and 7.f, Functional Unit 22. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Underwater TV survey (ICES, 2022b)
Input data	One survey index (UWTV-FU 22 [U5917]); commercial catches (international landings); length frequencies (from catch and discard sampling); maturity data (from commercial catch sampling and during surveys); fixed natural mortality and discard survival rate
Discards and bycatch	Included in the assessment since 2003
Indicators	Mean sizes in the catches. One bottom trawl surveys IGFS-WIBTS-Q4 [G7212] survey; length–frequency distributions of the catches by sex.
Other information	This stock follows benchmarked procedures applied to other Norway lobster stocks in Subarea 7 (ICES, 2009, 2014)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Norway lobster in divisions 7.g and 7.f, Functional Unit 22. ICES advice, landings, and discards. All weights are in tonnes.

Year	ICES advice*	Landings advice*	Catch advice**	ICES landings	Total discards***
1992		3800			
1993		3800			
1994		3800			
1995		3800			
1996		3800			
1997		3800			
1998		3800			
1999		3800		1775	
2000		3800		2890	
2001		3800		2938	
2002		3800		1993	
2003		3800		2065	720
2004	Adjust TAC in line with landings of most recent ten years	4600		1828	202
2005	Adjust TAC in line with landings of most recent ten years	4600		2533	1648
2006	Recent average landings 2000–2002	4600		1761	454
2007	No increase in effort	-		2950	1906
2008	No increase in effort	< 5300		3090	289
2009	No increase in effort	< 5300		2185	371
2010	No new advice, same as for 2009	< 5300		2714	636
2011	See scenarios; MSY reduce catch or PA < 5300	-		1636	196
2012	MSY approach	2300		2618	347
2013	MSY approach (updated November 2012)	3100		2257	497
2014	MSY approach	2674		2526	460
2015	MSY approach	3409		2350	450
2016	MSY approach		≤ 3027^	3329	519
2017	MSY approach		≤ 2063	3560	424
2018	MSY approach		≤ 4322	1974	336
2019	MSY approach		≤ 2084	2083	262
2020	Management plan		2820 (range 2247–2820)	1518	288
2021	Management plan		1560 (range 1238–1560)	1616	149
2022	MSY approach		≤ 1257		
2023	MSY approach		≤ 2548		

* Advice prior to 2012 applies to FUs 20, 21 and 22 combined.
** Assuming recent discard rates.
*** Dead + surviving discards.
^ Assuming all catches are landed.

History of the catch and landings

Table 7 Norway lobster in divisions 7.g and 7.f, Functional Unit 22. Catch distribution by fleet in 2021 as estimated by ICES.

Catch		Landings	Discards	
98% dead	2% surviving	100% otter trawl	75% dead	25% surviving
1765 tonnes		1616 tonnes	149 tonnes	

Table 8 Norway lobster in divisions 7.g and 7.f, Functional Unit 22. History of ICES estimates for landings by country and discards. All weights are in tonnes.

Year	France	Republic of Ireland	UK	Belgium	Total landings	Discards*
1999	1034	741	0		1775	
2000	1192	1687	11		2890	
2001	882	2054	2		2938	
2002	598	1392	3		1993	
2003	799	1257	10		2065	720
2004	454	1349	26		1828	202
2005	478	1987	68		2533	1648
2006	293	1442	19	7	1761	454
2007	216	2716	13	5	2950	1906
2008	301	2539	241	9	3090	289
2009	258	1609	306	12	2185	371
2010	129	2219	351	15	2714	636
2011	64	1521	44	7	1636	196
2012	65	2506	41	6	2618	347
2013	83	2054	107	12	2257	497
2014	29	2428	61	8	2526	460
2015	9	2215	121	5	2350	450
2016	5	2967	354	3	3329	519
2017	7	2815	737	1	3560	424
2018	3	1639	331	1	1974	336
2019	9	1884	187	2	2083	262
2020	3	1491	22	2	1518	288
2021	1	1537	69	10	1616	149

* Surviving + dead discards.

Summary of the assessment

Table 9 Norway lobster in divisions 7.g and 7.f, Functional Unit 22. Assessment summary.High and low refer to the 95% confidence intervals.

Year	Low	UWTV abundance estimate	High	Landings in number	Total discards in number*	Removals in number	Harvest rate (by number)	Landings	Total discards*	Discard rate (by number)	Dead discard rate (by number)	Mean weight in landings	Mean weight in discards
	millions						%	tonnes		%		grammes	
2003				95	68	146		206	720	41.5	35	22	10.65
2004				71	13	80		182	202	15.6	12	26	15.39
2005				119	129	216		253	164	51.9	45	21	12.81
2006	1433	1503	1573	100	45	134	8.9	176	454	31.1	25	17.6	10.06
2007	1010	1136	1262	165	181	301	26.5	295	190	52.3	45	17.9	10.54
2008	991	1114	1237	144	26	163	14.6	309	289	15.3	12.0	22	11.11
2009	985	1093	1201	92	33	117	10.7	218	371	26.4	21	24	11.25
2010	1053	1141	1229	122	45	155	13.6	271	636	26.8	22	22	14.28
2011	1184	1256	1328	60	13	70	5.6	163	196	18.0	14.1	27	14.93
2012	1259	1498	1737	120	31	144	9.6	261	347	20.7	16.3	22	11.06
2013	1077	1254	1431	94	40	124	9.9	225	497	30.0	24	24	12.39
2014	1354	1622	1890	100	33	125	7.7	252	460	25.0	20	25	13.78
2015	1183	1363	1543	114	44	147	10.8	235	450	28.0	23	21	10.14
2016	754	866	978	160	54	200	23.1	332	519	25.1	20	21	9.69
2017	1447	1600	1753	164	39	194	12.1	356	424	19.2	15.2	22	10.84
2018	722	876	1030	98	30	121	13.8	197	336	23.7	18.9	20	11.03
2019	980	1121	1262	81	19	95	8.5	208	262	19.2	15.1	26	13.67
2020	632	750	868	59	21	76	10.1	151	288	26.5	21	26	13.43
2021	569	656	743	61	11	70	10.7	161	149	15.6	12.2	26	13.13
2022	780	895	1010										

* Surviving + dead discards.

^ Values updated due to minor revisions in reported landings.

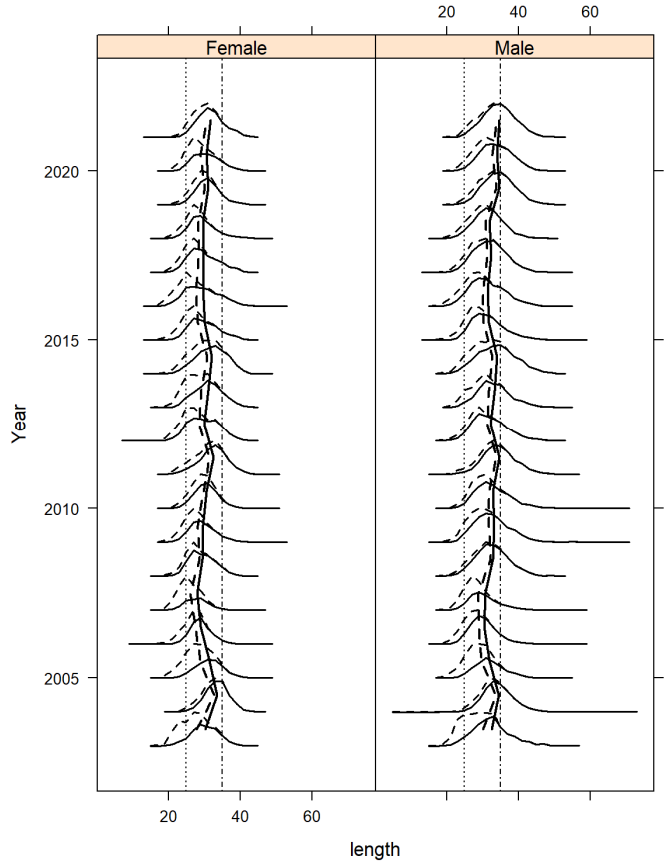

Figure 3 Norway lobster in Division 7.f–g, Functional Unit 22. The dashed lines represent catches while the solid lines represent landings. Annual length–frequency distributions are shown on the horizontal; the vertical bold lines represent mean lengths. Minimum conservation reference size (25 mm) and 35 mm visual reference levels indicated. All lengths are shown in carapace length (mm).

Sources and references

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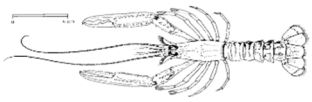
Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Norway lobster (*Nephrops norvegicus*) in divisions 7.f and 7.g, Functional Unit 22 (Celtic Sea, Bristol Channel). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, nep.fu.22. https://doi.org/10.17895/ices.advice.19772422

Nephrops in Sub-area 7, outside the functional units

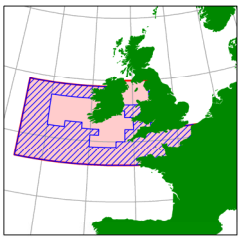


Sub-area 7

Advice for 2023

ICES advises that when the precautionary approach is applied, landings should be no more than 150 t in each of the years 2021, 2022 and 2023.

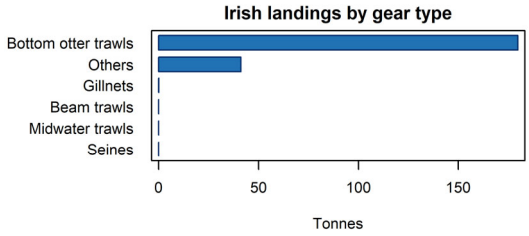
ICES cannot quantify the corresponding total catches.



Key Points

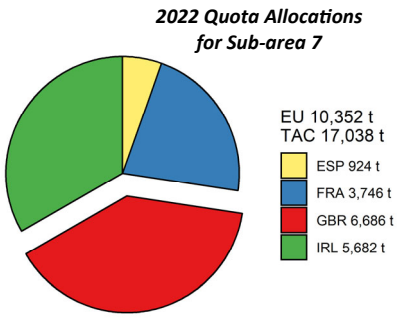
ICES Assessment Category	5 (Landings only)	
Management Plan	WWMAP	
Advice Basis	ICES PA approach	
Ranges	Not available	
Landing Obligation	From 2016	Gear specific high survivability exemption*

* Described below under Key Stock Considerations, details in (EU 2020/2015).



Management in 2022

- The current TAC area and stock assessment area do not match.



Key Stock Considerations

- The ICES advice was based on a precautionary 20% reduction on the advice given previously. Recent landings have been above the advised catch level.
- *Nephrops* outside the current FUs are not considered as separate stocks but represent small populations of *Nephrops* outside the identified stock units (FUs). The level of recruitment to these patches is unknown although it is likely that there is some donation of recruits from the major stock units.
- Under the Landing Obligation *Nephrops* fisheries in Sub-area 7 have a high survivability exemption, based on studies which showed a survivability of about 64% (BIM, 2017). This exemption applies to bottom trawls (OTT, OTB, TBS, TBN, TB, PTB, OT, PT, TX) with a mesh size ≥100 mm or with a mesh size 70-99 mm in combination with highly selective gear options such as: square mesh panels, seltra panel, sorting grid or separation panel.
- A high survivability exemption also applies to creel caught *Nephrops* in Sub-area 7.

Further information on this stock can be found in the 2020 Stock Book.

Table 1 Norway lobster in Subarea 7, outside the functional units. History of landings; ICES estimates of landings by country. All weights are in tonnes.

Year	Belgium	France	Rep. of Ireland	Spain	UK	Total landings
1978				249	0	249
1979				237	0	237
1980				205	0	205
1981				382	0	382
1982				228	6	234
1983				168	6	174
1984				186	1	187
1985				151	43	194
1986				80	33	113
1987				58	49	107
1988				62	78	140
1989				88	46	134
1990				87	15	102
1991				131	38	169
1992				317	92	409
1993			62	323	70	455
1994			220	260	90	570
1995			100	188	109	397
1996			96	404	123	623
1997			112	81	147	340
1998			145	166	203	514
1999		51	136	88	47	322
2000		41	65	107	31	243
2001		26	104	217	21	368
2002		17	119	87	19	243
2003		0	152	34	0	186
2004		0	88	61	12	161
2005		0	125	50	5	180
2006		0	140	26	104	270
2007		0	89	23	94	206
2008		0	76	24	222	322
2009		0	29	209	79	316
2010		0	120	155	84	359
2011		0	92	0	17	110
2012	1.4	1	194	92	37	325
2013	0	38	106	35	15	194
2014	0.2	0	119	31	24	174
2015	0.4	0	65	2	13	80
2016	0.3	25	38	2	54	118
2017	0	23	26	1	87	137
2018*	0	35	115	0.5	50	200
2019*	0.1	38	139	23	16	217
2020*	0.1	17	246	32	8	304
2021*	0.3	23	221	64	38	346

* Preliminary.

Northeast Atlantic Pelagic Sharks

ICES provides advice on the status of pelagic sharks on 2-5 year cycles, depending on species. ICCAT also provides advice on some pelagic sharks, particularly blue shark.

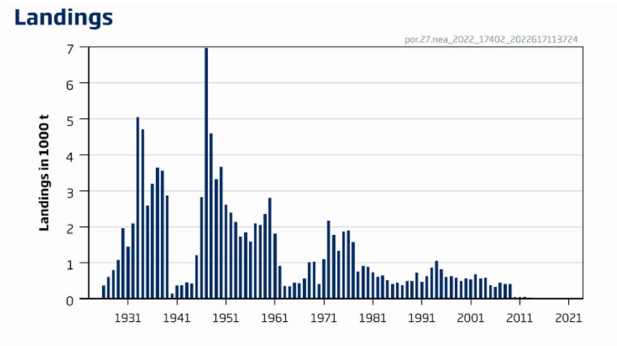
Porbeagle in the Northeast Atlantic

Advice for 2023

ICES advises that when the MSY approach is applied, catches in 2023 and 2024 should be no more than 219 tonnes and 231 tonnes respectively.

Key Points

ICES Assessment Category	2	
Management Plan	WWMAP (Bycatch)	
Advice Basis	MSY approach (percentile of predicted catch distribution under F = F_{MSY} set at 15%)	
MSY Range	F_{MSY} Range Lower	Not Available
	F_{MSY}	632 t
	F_{MSY} Range Upper	Not Available
Landing Obligation	Does not apply	Prohibited Species



Porbeagle in the Northeast Atlantic. Available landings data (tonnes) 1925-2021.

Management in 2022

- Porbeagle shark is on the prohibited species list of EU TAC regulations.
- This stock is not subject to the landing obligation as fishing for this species is prohibited.

Key Stock Considerations

- The stock was benchmarked through a joint ICES-ICCAT process in 2022. The perceived status of the stock has improved and therefore there is non-zero catch advice for the first time since 2009.
- The stock area was extended south to 5°N to be the same as the ICCAT stock area.
- ICCAT also gave separate advice for porbeagle in 2022 (ICCAT, 2022) and this advice was more restrictive than the ICES advice. Considering the underreporting of removals, the current stock status of the NE Atlantic stock B_{2022}/B_{MSY}=0.464 (0.15-1.43), and the lack of reliable projections to build K2SM, the SCRS recommends that total removals (i.e., the sum of landings and estimated dead discards) at the very least shall not exceed the average reported ICCAT catch since the implementation of the zero TAC recommendation (i.e., 2010-2021) which current estimates would be 9.3 tons) to allow for stock recovery. Lower levels of removals will accelerate such recovery.
- By-catches of porbeagle are known to occur in several fisheries, including pelagic trawls and gillnets, in the Celtic Sea and on the shelf edge.

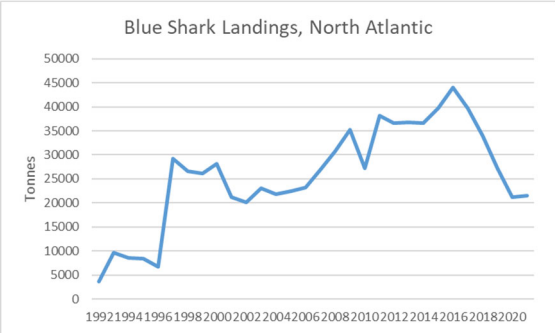
Blue Shark in the North Atlantic

Advice for 2023

ICCAT has responsibility for providing advice for this species. The 2017 blue shark assessment indicates that the stock was not overfished and that overfishing is not occurring, although assessment results are uncertain and should be treated with caution.

Key Points

ICCAT advice basis	Quantitative assessment	
Management Plan	No	
Advice Basis	Precautionary approach	
Ranges	F_{MSY} Range Lower	Not Available
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Available
Landing Obligation	Does Not Apply	Non TAC species



Blue shark in the North Atlantic. Available landings data (tonnes) 1992-2021.

Management in 2022

- There are no management measures in place to regulate outtake from this stock
- There are regulations preventing the removal of fins of sharks, both in the EU and throughout ICCAT and NEAFC regulated fisheries.

Key Stock Considerations

- There is a single north Atlantic stock of blue shark.
- The most recent analytical assessment was carried out (by ICCAT) in 2017 and showed the stock to be above B_{MSY}, and being fished below F_{MSY} lower.
- There is no advice for blue shark from ICES. By agreement with ICES and the EU, ICCAT is responsible for providing advice on this species. The next ICCAT assessment is due in 2023.
- Average annual landings of North Atlantic blue shark are around 40,000 tonnes.
- By-catches of blue shark are known to occur in several fisheries, including the Celtic Sea herring fishery and tuna fisheries. These are now generally discarded, some of the discarded individuals may survive.

SHORTFIN MAKO SHARK IN THE NORTH ATLANTIC

ADVICE FOR 2023

ICCAT has responsibility for providing advice for this species. A 2019 update of the 2017 shortfin mako assessment indicates that the stock was overfished and that overfishing continues. ICCAT advises that there is no retention of catch which will allow the rebuilding of the stock by 2070.

KEY POINTS

ICCAT advice basis	Quantitative assessment	
Management Plan	No	
Advice Basis	Precautionary approach	
Ranges	F_{MSY} Range Lower	Not Available
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Available
Landing Obligation	Does not apply	Non TAC Species

MANAGEMENT IN 2022

- There are no management measures in place to regulate outtake from this stock.
- There are regulations preventing the removal of fins of sharks, both in the EU and throughout ICCAT regulated fisheries.

KEY STOCK CONSIDERATIONS

- There is a single north Atlantic stock of shortfin mako.
- The stock is assessed by ICCAT. ICCAT considers that there is a high probability that the stock is overfished and that overfishing is occurring.
- The last assessment was carried out in 2017, but was considered uncertain. Updated projections were conducted in 2019.
- Average annual catches of north Atlantic shortfin mako are around 3,200 t. Ireland does not generally have landings of this species.
- This is an offshore oceanic species and is rarely encountered in any Irish fishery.

Basking Shark in the Northeast Atlantic

Advice for 2023

ICES advises that when the precautionary approach is applied, there should be zero catches in each of the years 2020– 2023

Key Points

ICES Assessment Category	6 (Bycatch only)	
Management Plan	WWMAP (Bycatch)	
Advice Basis	Precautionary approach	
MSY Range	F_{MSY} Range Lower	Not Available
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Available
Landing Obligation	Does not apply	Prohibited Species

Management in 2022

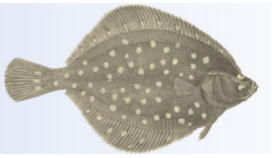
- Basking shark is on the prohibited species list of EU TAC regulations.
- Basking shark is now a protected species in Irish waters under the wildlife act. This make it illegal to interfere with basking sharks or their habitats.
- This stock is not subject to the landing obligation as fishing for this species is prohibited.

Key Stock Considerations

- The most recent advice from ICES was issued in 2019 and applies for four years (2020-2023).
- The low productivity and aggregating nature of this species makes it particularly vulnerable to overexploitation.
- By-catches of basking shark are known to occur in several fisheries, including trawls and gillnets, in the Celtic Sea and on the shelf edge.
- The SeaMonitor programme is tagging basking shark in Irish waters to examine shark hotspots and migratory routes. So far twelve basking sharks were tagged (six with pop-up archival satellite tags and acoustic tags and six with acoustic tags only).

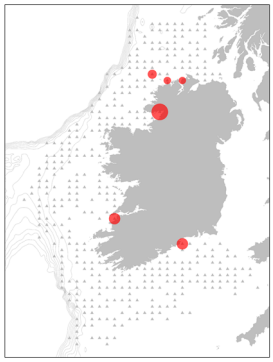
PLAICE

(*PLEURONECTES PLATESSA*)



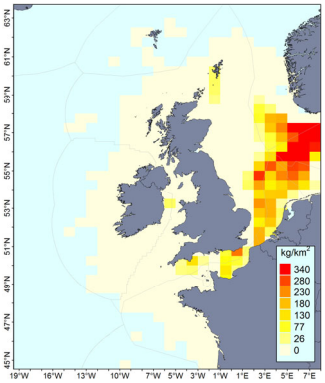
Plaice (*Pleuronectes platessa*) are found throughout the Atlantic coast of Europe and in the western Mediterranean. They are usually found in waters of less than 100m depth. Older fish are found in deeper water. Plaice are most commonly found on sandy, muddy or gravel bottom. Small fish are found in intertidal areas and there is evidence to suggest homing behaviour.

Spawning occurs off the bottom from February to April and is dependent on water temperature. Males reach maturity between 2 and 6 years, and females between 3 and 7 years, with age at maturity again being dependent on water temperature. Young plaice feed on small worms and shrimp. As they grow their diet becomes more varied and they eat small crustaceans, crabs, mussels, scallops and shrimp.

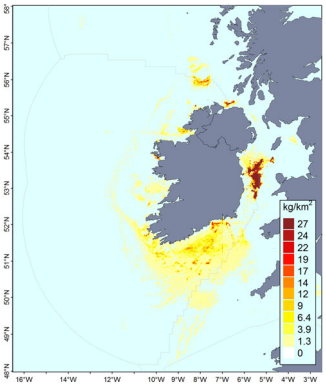


Survey catches of juveniles since 2005

LANDINGS DISTRIBUTION



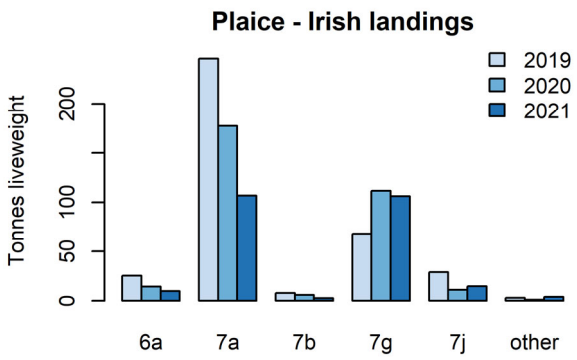
◀ The distribution of international landings of plaice between 2016 and 2020. The vast majority of plaice landings were taken in the North Sea; landings from Irish waters were relatively minor.

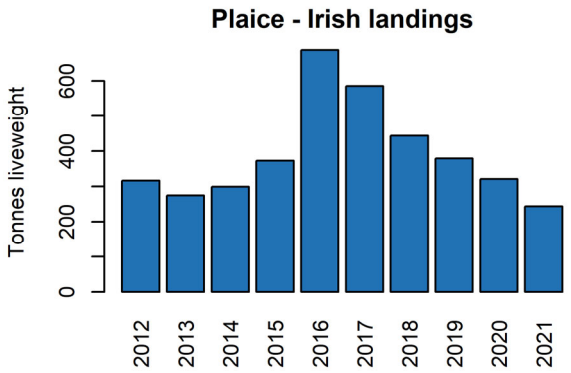


◀ The distribution of plaice landings by Irish vessels between 2016 and 2020. Plaice are caught on localised sandy patches in relatively shallow areas.

IRISH LANDINGS AND VALUE OF TAC

Approximately 300 tonnes of plaice were annually caught and landed in mixed demersal fisheries by Irish vessels between 2019 and 2021, nearly 60% of which was caught in 7.a. In 2021 landings were worth approximately €550,000 for Irish vessels.



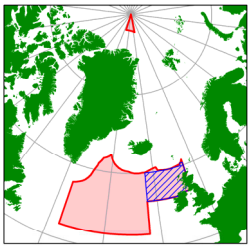


West of Scotland and Rockall Plaice

Sub-area 6

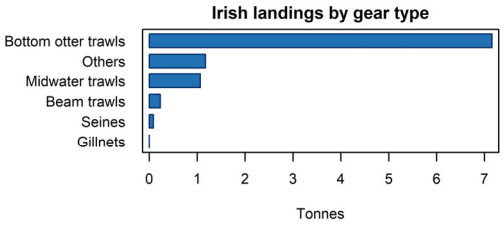
Advice for 2023

The status of this stock is unknown and there is no ICES advice.



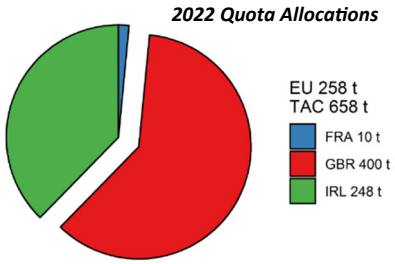
Key Points

ICES Assessment Category	Not Appropriate	
Management Plan	WWMAP (bycatch)	
Advice Basis:	None	Not Appropriate
Ranges	F_{MSY} Range Lower	Not Appropriate
	F_{MSY}	Not Appropriate
	F_{MSY} Range Upper	Not Appropriate
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

- The TAC area covers Sub-areas 6, 12 and 14 and Division 5.b.
- There are no explicit management plans for this stock.



Key Stock Considerations

- Irish landings of plaice in this area are mainly taken as a minor bycatch in mixed fisheries and are mainly landed with anglerfish, whiting and megrim.
- Irish catch rates (LPUE) of plaice declined in the early 2000s and has declined to the lowest observed in 2021 (Figure 1), this is partially due to a change in fishing patterns with less trawling in inshore areas where plaice occur.

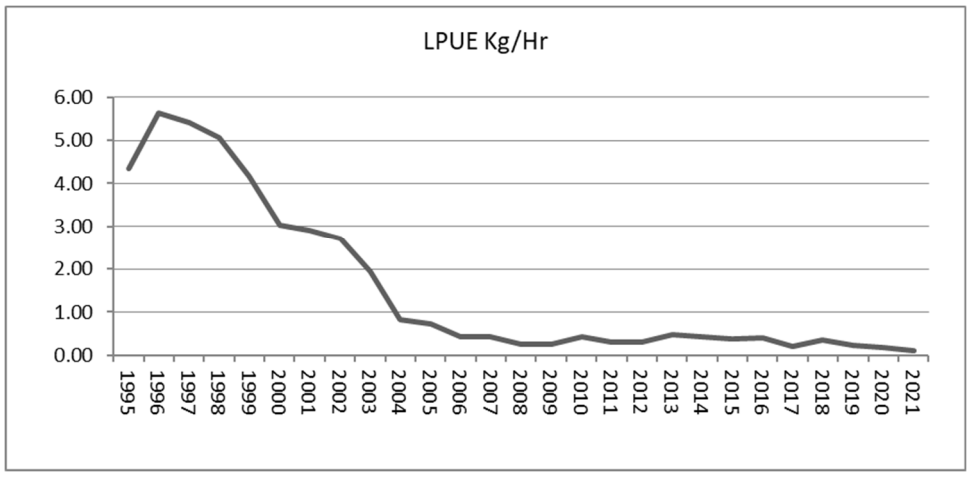


Figure 1. Irish LPUE (Kg/Hour) from ICES Sub-area 6

Table 1. Plaice Division 6.a Landings (Source ICES Official Catch Statistics)

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Belgium	-	-	-	-	-	-	-	-	-	3	1	1	-	-
Denmark	-	-	-	-	-	-	-	-	-	<1	<1	<1	7	<0.5
Faeroe Islands	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France	66	67	58	50	44	55	40	57	57	49	44	24	62	23
Germany	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed. Rep. of	-	-	-	-	-	-	<1	<1	<1	<1	<1	-	-	-
Ireland	352	338	392	464	425	565	649	660	403	516	649	579	670	560
Netherlands	-	1	-	-	-	-	-	-	204	-	-	-	-	-
Norway	<1	-	-	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	1		-	-	-	-	-	-	-
UK - ENG+Wales+N.Irl	-	-	-	-	-	-	-	-	-	-	-	27	11	37
UK - ENG+Wales	123	88	65	58	65	38	41	31	34	19	9	-	-	-
UK - N. Ireland	4	2	1	4	2	2	4		4	7	24	-	-	-
UK - Scotland	731	864	1049	1065	947	967	1070	1065	1046	1149	1000	1185	1097	1433
Un. Sov. Soc. Rep.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1276	1360	1565	1641	1483	1628	1804	1813	1748	1743	1727	1816	1847	2053

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Belgium	-	25	8	30	13	19	19	18	19	9	-	-	-	-
Denmark	<1	-	<1	<1	<1	-	<1	-	-	<1	-	<1	-	-
Faeroe Islands	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France	19	16	4	6	1	2	1	-	1	<1	<1	<1	<1	-
Germany	<1	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed. Rep. of	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	357	339	360	401	499	528	418	309	233	187	146	150	62	46
Netherlands	-	-	-	-	-	19	11	-	-	-	-	-	-	-
Norway	<1	-	-	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UK - ENG+Wales+N.Irl	61	80	135	77	62	67	39	34	18	10	18	6	5	1
UK - ENG+Wales	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UK - N. Ireland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UK - Scotland	1292	1095	1181	1344	1266	1052	973	657	387	491	323	243	130	15
Un. Sov. Soc. Rep.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1729	1555	1688	1858	1841	1687	1461	1018	658	697	487	399	197	62

Table 1. Plaice Division 6.a Landings (Source ICES Official Catch Statistics) continued.

Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Belgium	-	-	-	-	-	-	-	-	-	-	-
Denmark	-	-	-	-	-	-	-	-	-	-	-
Faeroe Islands	<1	<1	-	-	-	-	-	-	-	-	-
France	-	-	-	-	-	-	<1	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-	-
Germany, Fed. Rep. of	-	-	-	-	-	-	-	-	-	-	-
Ireland	28	32	17	13	28	17	13	24	21.2	29.9	29.7
Netherlands	-	-	-	-	-	-	0	-	-	-	-
Norway	-	-	-	-	-	-	0.1	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-
UK - ENG+Wales+N.Irl	1	3	<1	-	-	-	-	-	-	-	-
UK - ENG+Wales	-	-	-	-	-	-	-	-	-	-	-
UK - N. Ireland	-	-	-	-	-	-	-	-	-	-	-
UK - Scotland	44	44	32	34	30	29	39	40	49.8	55.5	70
Un. Sov. Soc. Rep.	-	-	-	-	-	-	-	-	-	-	-
Total	73	79	49	47	58	46	53	64	71	85.4	99.7

Country	2017	2018	2019	2020*	2021*
Belgium	-	-	-	-	-
Denmark	-	-	-	-	-
Faeroe Islands	-	-	-	-	-
France	<1	-	-	-	-
Germany	-	-	-	-	-
Germany, Fed. Rep. of	-	-	-	-	-
Ireland	18	35.2	25.2	14	9
Netherlands	-	-	-	-	-
Norway	-	-	-	-	-
Spain	-	-	-	-	-
UK - ENG+Wales+N.Irl	-	293.9	292.9	91	47
UK - ENG+Wales	-	-	-	-	-
UK - N. Ireland	-	-	-	-	-
UK - Scotland	112	-	-	-	-
Un. Sov. Soc. Rep.	-	-	-	-	-
Total	130	329.1	318.1	105	56

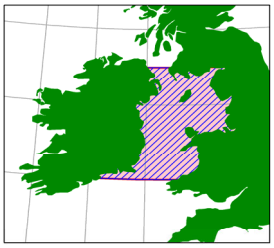
* Data are preliminary for 2020 and 2021

Irish Sea Plaice

Division 7.a

Advice for 2023

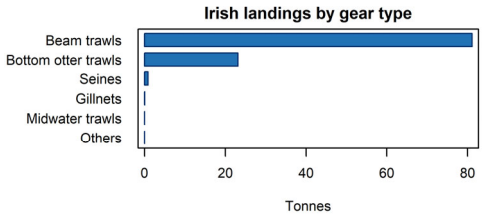
ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, total catches in 2023 should be no more than 2,039 t.



Key Points

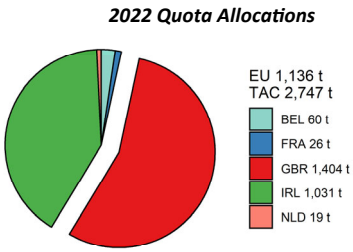
ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (bycatch)	
Advice Basis	ICES MSY approach	Catch 2,039 t
Ranges	F_{MSY} Range Lower	Not Applicable (bycatch)
	F_{MSY}	Catch 2,039 t
	F_{MSY} Range Upper	Not Applicable (bycatch)
Landing Obligation	From 2019	High survivability exemption*

* Described below under Key Stock Considerations, details in (EC 2020/2015).



Management in 2022

- The TAC and the assessment area are the same.



Key Stock Considerations

- Stock size increased after 2013 and is above MSY $B_{trigger}$ with fishing mortality below F_{MSY} since 2011.
- Irish landings of this stock are caught as a minor bycatch in a mixed fishery, and are mainly landed with *Nephrops* and haddock.
- Landings from Irish fleets have decreased in recent years from 315 t in 2018 to 107 t in 2021, well below the quota.
- Discards are high with 58% (by weight) of the catch being discarded in 2021.
- Discards of plaice are considered to have a survivability of about 40%. Under the Landing Obligation Irish Sea plaice have a high survivability exemption. This exemption applies to beam trawls (≤221kW or ≤24 m) within 12nm of the coast, and towing for less than 90 minutes; and beam trawls (>221kW) using flip-up rope or benthic release panel (EC 2020/2015). This is unlikely to affect Irish fisheries as there are few Irish beam trawls operating in this area.

Published 30 June 2022

Plaice (*Pleuronectes platessa*) in Division 7.a (Irish Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, and assuming that discard rates and fishery selection patterns do not change from the average of the years 2019–2021, total catches in 2023 should be no more than 2039 tonnes.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

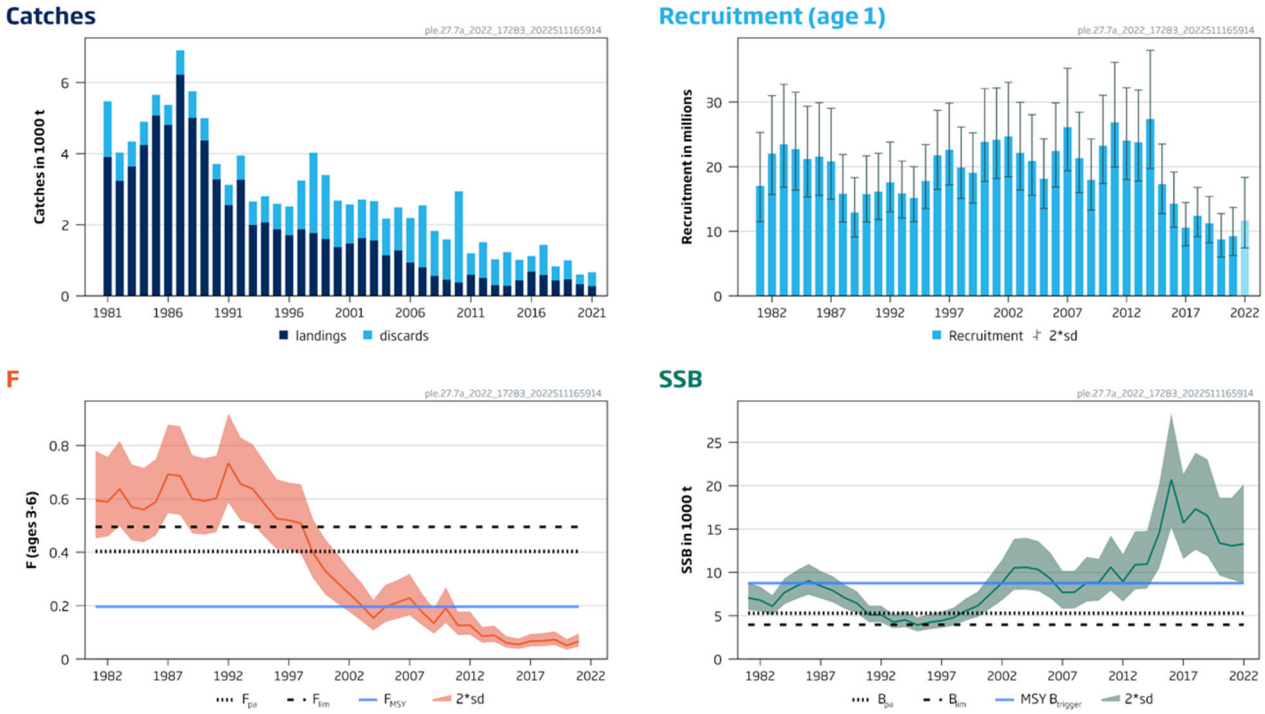


Figure 1 Plaice in Division 7.a. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour.

Catch scenarios

Table 1 Plaice in Division 7.a. Assumptions made for the interim year and the forecast.

Variable	Value	Notes
F_{2022}	0.064	$F_{sq} = F_{average(2019–2021)}$.
SSB_{2023}	13 514	Short-term forecast; in tonnes
$R_{age\ 1}$ (2022 and 2023)	11 245	Median resampled recruitment (2015–2021) as estimated by a stochastic projection; in thousands
Total catch (2022)	680	Short term forecast; in tonnes
Projected landings (2022)	322	Assuming average landings pattern (2019–2021); in tonnes
Projected discards (2022)	357	Assuming average discard pattern (2019–2021); in tonnes
Discard survival rate	40%	Catchpole *et al.* (2015)
Projected surviving discards (2022)	143	Assuming an average discard pattern (2019–2021) where 40% of the discards survive; in tonnes
Projected dead discards (2022)	214	Assuming an average discard pattern (2019–2021) where 60% of the discards die; in tonnes

Table 2 Plaice in Division 7.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings (2023)	Projected Surviving discards (2023)	Projected dead discards (2023)	Total projected discards* (2023)	F_{total} (2023)	$F_{projected\ landings}$ (2023)	$F_{projected\ discards}$** (2023)	SSB (2024)	% SSB change ***	% advice change^
ICES advice basis											
MSY approach: F= F_{MSY}	2039	967	429	643	1072	0.196	0.061	0.135	12629	−6.5	−30
Other scenarios											
F= $F_{MSY\ lower}$	1418	672	298	447	745	0.133	0.042	0.091	13169	−2.5	−52
F= $F_{MSY\ upper}$	2945	1397	620	929	1549	0.29	0.091	0.20	11901	−11.9	0.70
F= F_{pa}	3903	1851	821	1231	2052	0.40	0.126	0.28	11089	-17.9	33
F = 0	0	0	0	0	0	0	0	0	14305	5.9	−100
F = F_{lim}	4649	2205	978	1467	2445	0.50	0.155	0.34	10468	−23	59
$SSB_{2024} = B_{lim}$	13047	6187	2744	4116	6860	2.33	0.73	1.60	3958	−71	350
$SSB_{2024} = B_{pa}$	11370	5391	2391	3587	5978	1.75	0.55	1.21	5294	−61	290
SSB_{2024} = MSY $B_{trigger}$	6895	3269	1450	2175	3625	0.81	0.25	0.56	8757	−35	140
Rollover advice	2925	1387	615	923	1538	0.29	0.091	0.20	11913	−11.8	0.0
F = F_{2022}	696	330	146	220	366	0.064	0.020	0.044	13745	1.70	−76
$SSB_{2024} = SSB_{2023}$	990	469	208	312	520	0.091	0.029	0.063	13514	0	−65

* Dead + surviving projected discards.
** $F_{projected\ discards}$ concerns dead projected discards only.
*** SSB 2024 relative to SSB 2023.
^Advice value for 2023 relative to the revised advice value for 2022 (2925 tonnes).

The advice for 2023 is lower than 2022 because of a downward revision in the stock biomass.

Basis of the advice

Table 3 Plaice in Division 7.a. The basis of the advice.

Advice basis	MSY approach
Management plan	The EU multiannual plan (MAP) for stocks in Western Waters and adjacent waters (EU, 2019) takes into account bycatch of this species. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach.

Quality of the assessment

The assessment indicates that recruitment and fishing pressure have both been decreasing and that the average age of catches has been increasing. An increasing amount of the stock is contained within the modelled plusgroup (47% in the last five years is age 8+). Consequently, the assessment and forecast have increased uncertainty, and a pattern of retrospective downscaling of SSB is seen in the recent history of the assessment

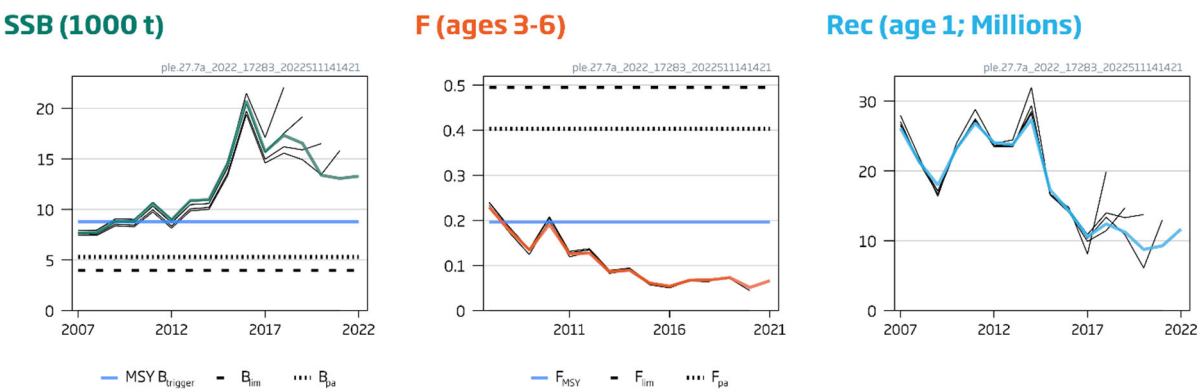


Figure 2 Plaice in Division 7.a. Historical assessment results (final-year SSB estimate and recruitment assumption included).

Issues relevant for the advice

Since 2004, the majority of the catch has been discarded (62% average discard by weight). The assessment only uses the dead portion of the discards (60%; based on Catchpole *et al*. [2015]).

Reference points

Table 4 Plaice in Division 7.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	8757	Lower 5th percentile of B_{MSY}; in tonnes	ICES(2018)
	F_{MSY}	0.196	Stochastic simulations with segmented regression (1981–2017)	ICES(2018)
	$F_{MSY\ lower}$	0.133	F at 95% MSY (below F_{MSY}), based on simulation using a segmented regression stock–recruitment relationship (EqSim)	ICES(2018)
	$F_{MSY\ upper}$	0.293	F at 95% MSY (above F_{MSY}), based on simulation using a segmented regression stock–recruitment relationship (EqSim)	ICES(2018)
Precautionary approach	B_{lim}	3958	B_{loss} = minimum SSB observed; in tonnes	ICES(2018)
	B_{pa}	5294	$B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.177$; in tonnes	ICES(2018)
	F_{lim}	0.50	F with 50% probability of SSB < B_{lim}.	ICES(2018)
	F_{pa}	0.403	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability	ICES(2018, 2021)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 5 Plaice in Division 7.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical assessment (SAM; Nielsen and Berg, 2014; ICES, 2022b) that uses landings and discards in the model and in the forecast.
Input data	Commercial catch-at-age data; three survey indices UK (E&W)-BTS-Q3 (B6596), NIGFS-WIBTS-Q1 (G7144), and NIGFS-WIBTS-Q4 (G7655); fixed maturity ogive; natural mortality constant over the years and different across the ages
Discards and bycatch	Discard values available from 2004. Estimates of modelled discards for 1981–2003 (WKIRISH3; ICES, 2017). Only the dead fraction of discards (estimated to be 0.6) is accounted for in the model.
Indicators	None
Other information	Last benchmark in 2017 (WKIRISH3; ICES, 2017). Reference points updated in 2018 (ICES, 2018).
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Plaice in Division 7.a. History of ICES advice, the agreed TAC, and ICES estimates of landings and discards. Weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards*
1987	F high; no long-term gains in increasing F	-	5000	5000	5600	6220	-
1988	No increase in F	-	4800	5000	4400	5005	-
1989	80% of F (87); TAC	-	5800	5800	4200	4372	-
1990	Halt decline in SSB; TAC	-	5100	5100	4000	3275	-
1991	Rebuild SSB to SSB (90); TAC	-	3300	4500	2800	2554	-
1992	70% of F (90)	-	3000	3800	3200	3267	-
1993	F = 0.55 ~ 2800 tonnes	-	2800	2800	2000	1996	-
1994	Long-term gains in decreasing F	-	< 3700	3100	2100	2066	735
1995	Long-term gains in decreasing F	-	2400	2800	2000	1874	717
1996	No long-term gain in increasing F	-	2500	2450	1900	1707	812
1997	No advice	-	-	2100	2000	1871	1373
1998	No increase in F	-	2400	2400	1800	1765	2263

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards*
1999	Keep F below F_{pa}	-	2400	2400	1600	1600	1796
2000	Keep F below F_{pa}	-	< 2300	2400	1400	1371	1306
2001	Keep F below F_{pa}	-	< 2400	2000	1500	1473	1100
2002	Keep F below F_{pa}	-	< 2800	2400	1500	1623	1085
2003	No increase in F	-	1900	1675	1600	1559	1109
2004	$F < F_{pa}$	-	1600	1340	1100	1143	1031
2005	$F < F_{pa}$	-	2970	1608	1300	1281	1210
2006	$F < F_{pa}$	-	5900	1608	937	934	1254
2007	$F < F_{pa}$	-	6500	1849	802	805	1744
2008	$F < F_{pa}$	-	5200	1849	563	563	1268
2009	No long-term gains in increasing F above $F_{0.1}$	-	1430	1430	458	457	1132
2010	No long-term gains in increasing F above $F_{0.1}$	-	1630	1630	377	378	2561
2011	Effort should be consistent with no increase in catches	-	-	1627	596	595	603
2012	Catches should not increase	-	-	1627	508	503	1010
2013	Landings should be no more than 2% more than recent landings (last three years)	-	< 490	1627	339	303	725
2014	Catches should be no more than 1% more than recent catches (last three years)	< 1827	< 497	1220	282	287	943
2015	Catches should be no more than recent catches (last three years)	< 1244	< 394	1098	439	440	572
2016	Precautionary approach (same advised catch value as given for 2015)	≤ 1244	≤ 343	1098	742	682	414
2017	Precautionary approach	≤ 1493	≤ 436	1098	585	586	852
2018	MSY approach	≤ 3336	≤ 1793	1793	435	435	395
2019	MSY approach	≤ 3503		3075	225†	465	537
2020	Precautionary approach	≤ 5640		2790	333**	330	271
2021	MSY approach	≤ 2846		2846	281**	276	392
2022	MSY approach	≤ 2925***		2747			
2023	MSY approach	≤ 2039					

* Total discards (dead and surviving components).
** Preliminary.
*** updated in 2022 from 2747 tonnes.
† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

History of the catch and landings

Table 7 Plaice in Division 7.a. Catch distribution by fleet in 2021 as estimated by ICES.

Catch		Landings			Discards		
Dead 77%	Surviving 23%	Beam trawl	Otter trawl	Other gears	Beam trawl	Otter trawl	Other gears
668 tonnes		68%	31%	< 1%	20%	80%	< 1%
		276 tonnes			392 tonnes		
					60% dead		40% surviving

Table 8 Plaice in Division 7.a. History of commercial catch and landings for each country participating in the fishery; both the official and ICES estimated values are presented. Weights in tonnes.

Year	Belgium	France	Ireland	Netherlands	UK (NI, E, & W)	UK (Isle of Man)	UK (Scotland)	Total official landings	ICES discards	ICES estimates of catches
1994	332	13	547	-	1082	14	63	2051	863	2801
1995	327	10	557	-	1050	20	60	2024	747	2592
1996	344	11	538	69	878	16	18	1874	832	2518
1997	459	8	543	110	798	11	25	1954	1285	3246
1998	327	8	730	27	679	14	18	1803	1952	4028
1999	275	5	541	30	687	5	23	1566	1657	3397
2000	325	14	420	47	610	6	21	1443	1223	2678
2001	482	9	378	-	607	1	11	1488	1070	2573
2002	636	8	370	-	569	1	7	1591	1135	2708
2003	628	7	490	-	409	1	9	1544	1077	2668
2004	431	2	328	-	369	0	4	1134	1031	2173
2005	566	9	272	-	422	0	1	1270	1210	2492
2006	343	2	179	0	413	0	0	937	1254	2188
2007	194	2	194	0	412	0	0	802	1744	2549
2008	157	2	102	0	300	1	1	563	1268	1830
2009	197	0	73	0	184	1	2	457	1132	1588
2010	138	0	89	0	147	0	3	377	2561	2939
2011	332	0	118	0	146	0	0	596	603	1198
2012	236	0	107	0	164	0	0	507	1010	1511
2013	144	0	103	0	92	0	0	339	725	1028
2014	100	0	123	0	59	0	0	282	943	1230
2015	115	0	244	0	80	0	0	439	572	1012
2016	82	0	541	-	56	-	-	679	414	1096
2017	77	0	446	-	62	1	-	585	852	1438
2018	53	0	316	-	66	0	-	435	395	830
2019	168	0	†	-	57	-	-	225†	537	1002
2020*	84	-	177	-	70	2	-	333	271	601
2021*	103	0	107	-	70	1	-	281	392	668

* Preliminary official landings.

† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

Table 9 Plaice in Division 7.a. Assessment summary. Recruitment is in thousands and weights in tonnes. 'High' and 'Low' refer to 2 × standard deviation.

Year	Recruitment at age 1			SSB			Landings *	Dead discards *	Surviving discards *	Fishing mortality ages 3–6		
	Low	Value	High	Low	Value	High				Low	Value	High
1981	11478	17044	25310	5650	7057	8814	3906	940	627	0.452	0.594	0.78
1982	15679	22045	30995	5521	6792	8356	3237	476	317	0.459	0.589	0.757
1983	16814	23466	32751	5030	6092	7378	3639	422	281	0.497	0.637	0.817
1984	16365	22715	31529	6322	7676	9319	4241	394	263	0.444	0.569	0.729
1985	15322	21205	29348	6924	8417	10232	5075	349	232	0.438	0.56	0.716
1986	15547	21558	29892	7419	9019	10964	4806	340	227	0.463	0.589	0.749
1987	14943	20833	29044	6984	8431	10176	6220	413	275	0.546	0.692	0.878
1988	11429	15812	21876	6533	7901	9556	5005	451	301	0.54	0.686	0.872
1989	9099	12910	18316	5806	7055	8573	4372	377	251	0.471	0.6	0.764
1990	11449	15754	21678	5293	6436	7826	3275	262	174	0.466	0.592	0.752
1991	11815	16149	22074	4247	5125	6185	2554	344	229	0.475	0.602	0.762
1992	12996	17592	23814	4226	5099	6153	3267	409	272	0.586	0.734	0.92
1993	12063	15873	20886	3538	4278	5174	1996	395	264	0.519	0.656	0.83
1994	11477	15159	20024	3682	4508	5519	2066	441	294	0.506	0.638	0.805
1995	13516	17792	23419	3200	3927	4820	1874	430	287	0.457	0.581	0.738
1996	16486	21761	28724	3430	4237	5234	1707	487	325	0.412	0.526	0.673
1997	17177	22635	29828	3597	4435	5469	1871	824	549	0.409	0.52	0.661
1998	15099	19868	26142	3859	4790	5946	1765	1358	905	0.393	0.508	0.655
1999	14368	19050	25258	4435	5565	6982	1600	1078	719	0.303	0.398	0.525
2000	17726	23845	32076	4852	6151	7796	1371	784	523	0.243	0.331	0.45
2001	18163	24174	32175	5808	7467	9602	1473	660	440	0.209	0.287	0.395
2002	18432	24688	33067	6766	8806	11461	1623	651	434	0.177	0.245	0.338
2003	16386	22155	29955	7980	10527	13886	1559	665	443	0.143	0.202	0.287
2004	15564	20893	28048	7999	10579	13990	1143	618	412	0.107	0.154	0.222
2005	13532	18137	24308	7837	10324	13602	1281	726	484	0.139	0.196	0.278
2006	16854	22440	29878	7019	9283	12276	934	752	502	0.151	0.212	0.296
2007	19368	26127	35246	5793	7676	10171	805	1046	698	0.164	0.229	0.319
2008	16000	21325	28422	5839	7714	10192	563	761	507	0.128	0.178	0.247
2009	13288	17967	24293	6619	8830	11778	457	679	453	0.095	0.134	0.189
2010	17379	23232	31057	6732	8828	11577	378	1536	1024	0.135	0.191	0.269
2011	19947	26850	36143	7887	10606	14262	595	362	241	0.09	0.126	0.178
2012	17988	24072	32215	6617	8952	12112	503	606	404	0.091	0.127	0.178
2013	17763	23785	31849	8021	10870	14730	303	435	290	0.061	0.086	0.121
2014	19734	27392	38021	8126	10961	14785	287	566	377	0.064	0.089	0.125
2015	12734	17302	23508	10482	14562	20230	440	343	229	0.043	0.061	0.086
2016	10637	14284	19183	15157	20726	28342	682	249	166	0.038	0.054	0.077
2017	7741	10582	14464	11551	15705	21352	586	511	341	0.047	0.067	0.094
2018	9162	12406	16799	12609	17324	23801	435	237	158	0.048	0.068	0.097
2019	8214	11245	15395	11862	16532	23040	465	322	215	0.052	0.073	0.104
2020	6011	8749	12733	9617	13383	18625	330	162	108	0.035	0.051	0.075
2021	6256	9261	13709	9167	13064	18618	276	235	157	0.046	0.066	0.095
2022	7416	11663**	18344	8744	13282	20173						

*Landings and discards are ICES estimates, which are used as assessment inputs. Discard estimates are available from 2004 prior to 2004, discard values were reconstructed.

** Median resampled recruitment (2015–2021) as estimated by a stochastic projection.

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Download the stock assessment data and figures.

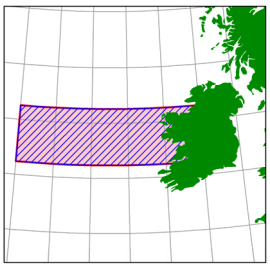
Recommended citation: ICES. 2022. Plaice (*Pleuronectes platessa*) in Division 7.a (Irish Sea). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, ple.27.7a. https://doi.org/10.17895/ices.advice.19453592.

West of Ireland Plaice

Divisions 7.b-c

Advice for 2023

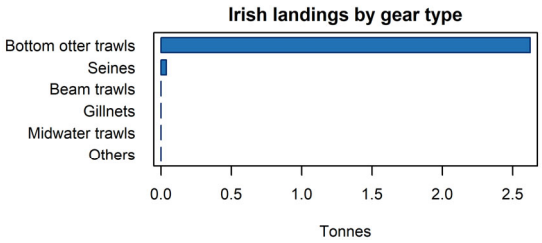
ICES advises that when the precautionary approach is applied, landings should be no more than 19 t in each of the years 2021, 2022, and 2023. ICES cannot quantify the corresponding total catches.



Key Points

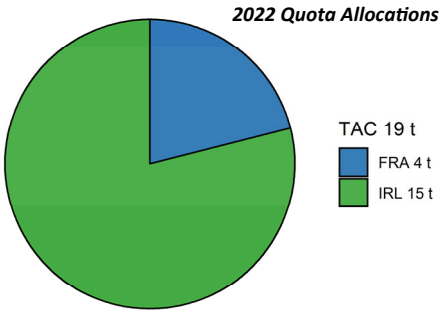
ICES Assessment Category	6 (Bycatch only)	
Management Plan	WWMAP (bycatch)	
Advice Basis	ICES PA approach	Landings=19 t
Ranges	F_{MSY} Range Lower	Not available
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not available
Landing Obligation	From 2019	High survivability exemption*

* Described below under Key Stock Considerations, details in (EC 2020/2015).



Management in 2022

- The TAC and the assessment area are the same.
- Recent landings have been well below the TAC.



Key Stock Considerations

- The reduction in advice for 2021 to 2023 (−20%) is due to the application of the precautionary buffer.
- Historically, Irish landings of this stock are caught by otter trawlers, as a minor bycatch in a mixed fishery.
- Discarded plaice are considered to have a survivability of approximately 40%. An exemption to the Landing Obligation applies to beam trawls (≤221kW or ≤ 24 m) within 12nm of the coast, and towing for less than 90 minutes; and beam trawls (>221kW) using flip-up rope or benthic release panel (EC 2020/2015) in ICES division 7.a to 7.k. There are no Irish beam trawls operating in this area. An exemption to the Landing Obligation also applies to Scottish seines in this area.

Further information on this stock can be found in the 2020 Stock Book.

Plaice in Division 7.b–c Landings by country 1958-2021

Year	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
BEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRA	204	392	197	182	239	471	427	417	0	182	403	281	124	0	110	60
UK	0	5	3	0	0	2	2	2	1	2	0	2	0	1	0	1
IRL	71	54	46	30	42	67	66	99	127	112	89	99	110	89	124	124
OTH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	275	451	246	212	281	540	495	518	128	296	492	382	234	90	234	185

Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
BEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRA	45	10	9	4	16	6	12	9	8	37	2	10	11	13	9	1
UK	1	0	0	0	0	0	0	4	4	0	6	7	5	1	2	14
IRL	106	153	133	135	122	117	142	135	122	108	110	150	114	153	157	159
OTH	0	0	0	0	0	2	65	58	22	7	0	0	0	0	0	0
Total	152	163	142	139	138	125	219	206	156	152	118	167	130	167	168	174

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
BEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRA	11	9	3	2	1	5	1	3	0	0	31	8	17	7	14	12
UK	92	3	9	3	5	2	2	0	1	2	0	0	2	0	0	0
IRL	130	179	180	191	200	239	248	206	160	157	99	70	51	56	39	25
OTH	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0
Total	233	191	192	196	206	246	251	209	161	159	130	78	70	65	54	37
Unalloc.							-11	4	22	13	-22	9	1	7	1	1
WG est.							240	213	183	172	108	87	71	72	55	38

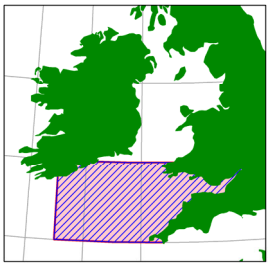
Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
BEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRA	11	12	9	7	6	2	9	3	6	7	11	1	5	<1	0	<0.5
UK	0	0	0	0	0	0	0	0	0	0	0	0	<0.5	0	0	0
IRL	20	23	21	45	27	16	20	15	17	15	17	11	22	8	6	3
OTH	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	<0.5
Total	32	35	31	52	33	18	29	18	23	22	29	12	27	9	6	3
Unalloc.	-2	-1	4	1	0	-2	-3	0	0	0	0	0	0	0	0	1
WG est.	30	34	35	53	33	16	26	18	23	22	29	12	27	9	6	4

Celtic Sea Plaice

Divisions 7.f and 7.g

Advice for 2023

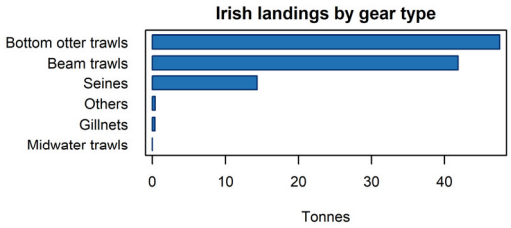
ICES advises that when the MSY approach is applied, catches should be no more than 402 tonnes in each of the years 2023 and 2024.



Key Points

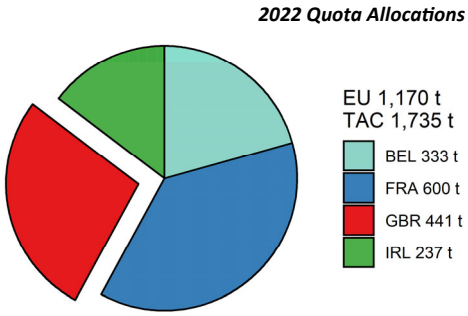
ICES Assessment Category	3 (Survey-Based Assessment)	
Management Plan	WWMAP (bycatch)	
Advice Basis	ICES PA approach	Catch=402 t
Ranges	$F_{MSY\ proxy}$ Range Lower	Not Applicable
	$F_{MSY\ proxy}$	Not Available
	$F_{MSY\ proxy}$ Range Upper	Not Applicable
Landing Obligation	From 2019	High survivability exemption*

* Described below under Key Stock Considerations, details in (EC 2020/2015).



Management in 2022

- The TAC and the assessment area are the same.
- The 2021 TAC was 1,735 t with an Irish quota of 237 t. This TAC has not been restrictive in recent years.



Key Stock Considerations

- Currently fishing pressure is well above $F_{msy\ proxy}$ and SSB has fallen below MSY $B_{trigger\ proxy}$
- Irish landings of Celtic Sea plaice are taken as a minor bycatch in mixed fisheries and are mainly landed with whiting and other gadoids, megrim and anglerfish.
- Discards have increased in recent years, with 38% of the catch discarded (average 2019-2021). The majority of discards for this stock are from beam trawlers. Discards of plaice from Irish otter trawls operating in this area range in size between 20-30cm (MCRS 27cm).
- Discards of plaice are considered to have a survivability of about 40%. Under the Landing Obligation Celtic Sea plaice have a high survivability exemption. This exemption applies to otter trawls; trammel nets; Scottish seines; and beam trawls (≤221kW or ≤24 m) within 12nm of the coast, and towing for less than 90 minutes; and beam trawls (>221kW) using flip-up rope or benthic release panel (EC 2020/2015).

Published 30 June 2022

Plaice (*Pleuronectes platessa*) in divisions 7.f and 7.g (Bristol Channel, Celtic Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches should be no more than 402 tonnes in each of the years 2023 and 2024.

Stock development over time

The fishing pressure proxy on the stock is above $F_{MSY\ proxy}$ (Figure 2), and the stock-size index is below MSY $B_{trigger\ proxy}$ ($I_{trigger}$).

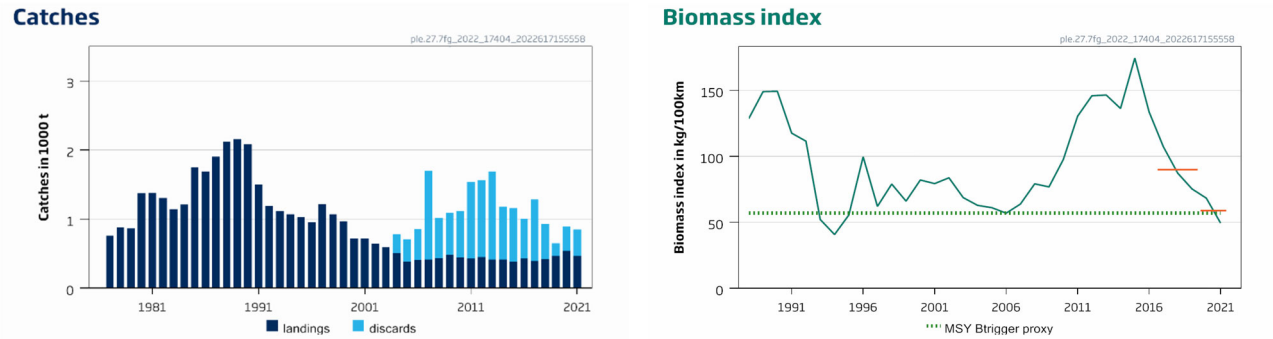


Figure 1 Plaice in divisions 7.f and 7.g. Catches (thousand tonnes) and biomass index. The short orange lines in the biomass index indicate the average values of the respective years (2017 to 2019 and 2020 to 2021).

Catch scenarios

ICES framework for category 3 stocks was applied (rfb rule, method 2.1; ICES, 2022a). A survey biomass index was used as an indicator of stock development. The advice is based on the recent advised catches, multiplied by the ratio of the mean of the last two index values (index A) and the mean of the three preceding values (index B), a ratio of observed mean length in the catch relative to the target mean length, a biomass safeguard, and a precautionary multiplier. Recent catch was used rather than recent advice because catches have been considerably lower than the advice and the advice rule is intended to adjust the realized catches. The stability clause was not applied because the recent biomass index value was below MSY $B_{trigger}$. The discard rate (average 2019–2021) was 38%.

Table 1 Plaice in divisions 7.f and 7.g. The basis for the catch scenarios*.

Mean catch 2019-2021 (C_y)		793 tonnes
Biomass index trend		
Index A (2020–2021)		58.9 kg / 100 km
Index B (2017–2019)		89.9 kg / 100 km
r: Stock biomass trend (index ratio A/B)		0.655
Fishing pressure proxy		
Mean catch length ($L_{mean} = L_{2021}$)		28.3 cm
MSY proxy length ($L_{F=M}$)		30.2 cm
f: Fishing pressure proxy relative to MSY proxy ($L_{2021}/L_{F=M}$)		0.937
Biomass safeguard		
Last index value (I_{2021})		49.3 kg / 100 km
Index trigger value ($I_{trigger} = I_{loss} \times 1.4$)		57.0 kg / 100 km
b: index relative to trigger value, $\min\{I_{2021}/I_{trigger}, 1\}$		0.87
Precautionary multiplier to maintain biomass above B_{lim} with 95% probability		
m: multiplier (generic multiplier based on life history)		0.95
RFB calculation**		402 tonnes
Stability clause (+20%/−30% compared to A_y, only applied if b ≥ 1)	Not applied	
Discard rate		38%
Catch advice for 2023 and 2024 [$C_y \times r \times f \times b \times m$]		402 tonnes
% advice change***		−77%

* The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.

**$A_{y+1} = C_y \times r \times f \times b \times m$, limited by stability clause if applicable.

***Advice value for 2023 relative to the advice value for 2022 (1735 tonnes).

The current advice has decreased by 77% compared to last year's advice because of a change in the advice method and a declining trend in the recent stock biomass.

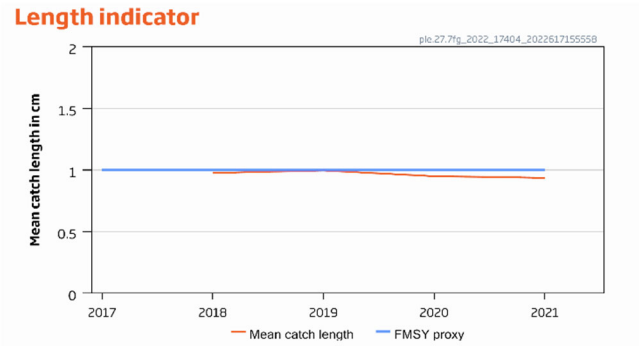


Figure 2 Plaice in divisions 7.f and 7.g. Length indicator (mean length of fish in the catch and MSY proxy reference length $L_{F=M}$). The exploitation status is below the $F_{MSY\ proxy}$ when the indicator ratio value is higher than 1 (shown by the blue line).

Basis of the advice

Table 2 Plaice in divisions 7.f and 7.g. The basis of the advice.

Advice basis	MSY approach
Management plan	The EU multiannual plan (MAP) for stocks in Western Waters and adjacent waters (EU, 2019) takes into account bycatch of this species. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach.

Quality of the assessment

The method for providing advice has changed in 2022 following new ICES guidelines (ICES, 2022a), and advice is now based on the empirical rfb rule (Fischer *et al.*, 2021). The UKBTS survey (1988–2021) alone was used as the index of abundance. This survey covers the main habitiat of the stock and has similar trends as the Irish groundfish survey.

Issues relevant for the advice

Sole and plaice are caught in mixed fisheries, which generates high discards of plaice owing to a combination of the selectivity properties of the gear and the plaice minimum landing size. In addition, the relatively low market value of plaice may contribute to the high and variable discard rates. Catchpole *et al*. (2015) estimate discard survival of plaice at around 40%. Plaice in divisions 7.f and 7.g is primarily a bycatch of the targeted sole fishery, so changes in effort in this fishery will impact fishing mortality on plaice.

There is no quantitative mixed-fishery analysis that includes plaice in this area.

Reference points

Table 3 Plaice in divisions 7.f and 7.g. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger\ proxy}$	57	Biomass index trigger value, defined as $I_{trigger} = I_{loss} \times 1.4$, where I_{loss} is the lowest observed historical biomass index value, kg/100 km.	ICES (2022a; 2022c)
	$F_{MSY\ proxy}$	1	$L_{mean}/L_{F=M}$; mean catch length divided by MSY proxy reference length ($L_{F=M}$ = 30.2 cm)	ICES (2022a; 2022c)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{MGT}	Not applicable		
	F_{MGT}	Not applicable		

Basis of the assessment

Table 4 Plaice in divisions 7.f and 7.g. The basis of the assessment.

ICES stock data category	3 (ICES, 2022b)
Assessment type	Survey biomass trend applying the *rfb* rule for advice (ICES, 2022c)
Input data	Commercial landings and discards, one survey index (UK [E&W]-BTS-Q3 [B6596]), length frequencies of the entire catch (landings + discards)
Discards and bycatch	Discards were raised to get the total international commercial catches. Discard information is available since 2004. Prior 2004 discards were reconstructed from the mean ratio in 2004-2010.
Indicators	IGFS-WIBTS-Q4 [G7212]
Other information	Benchmarked in 2022 (ICES, 2022d)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 5 Plaice in divisions 7.f and 7.g. History of ICES advice, the agreed TAC, and the official and ICES estimates of landings and discards. Weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards *
1987	TAC not to be restrictive on other species	-	-	2000	1912	1901	1027
1988	TAC not to be restrictive on other species	-	-	2500	2194	2116	1143
1989	TAC not to be restrictive on other species	-	-	2500	2583	2151	1162
1990	F likely to be F (88)	-	~ 1900	1900	2219	2082	1124
1991	F likely to be F (89)	-	~ 1700	1900	1827	1501	811
1992	No long-term gains in increasing F	-	-	1500	1362	1188	642
1993	No long-term gains in increasing F	-	-	1400	1303	1114	602
1994	No long-term gains in increasing F	-	-	1400	982	1070	578
1995	No increase in F	-	1290	1400	956	1028	555
1996	20% reduction in F	-	930	1100	978	952	514
1997	20% reduction in F	-	1100	1100	1259	1217	657
1998	20% reduction in F	-	1000	1100	1149	1067	576
1999	35% reduction in F	-	670	905	656	968	523

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards *
2000	30% reduction in F	-	700	800	721	718	388
2001	40% reduction in F	-	600	760	684	714	386
2002	At least 35% reduction in F	-	680	680	618	642	347
2003	At least 40% reduction in F	-	660	660	564	594	321
2004	F < 0.10 or recovery plan	-	< 210	560	489	510	274
2005	70% reduction in F or recovery plan	-	< 250	476	399	386	321
2006	50% reduction in F or recovery plan	-	< 400	476	414	404	453
2007	50% reduction in F or recovery plan	-	< 380	417	417	410	1288
2008	60% reduction in F	-	< 240	491	375	437	583
2009	75% reduction in F	-	< 170	422	481	481	608
2010	50% reduction in F	-	< 330	451	442	442	670
2011	See scenarios	-	-	410	420	427	1107
2012	Reduce catches	-	-	369	450	450	1123
2013	Decrease landings by 19% (1.5% increase followed by 20% PA reduction)	-	< 360	369	412	414	1274
2014	Increase catches by 20%	< 1608	< 519	461	410	410	772
2015	Catches should be no more than recent catches (last three years)	< 1500	< 420	461	381	381	778
2016	Precautionary approach (same catch value as advised for 2015)	≤ 1500	≤ 420	420	443	430	571
2017	Precautionary approach (same catch value as advised for 2016)	≤ 1500	≤ 405	405	389	390	895
2018	Precautionary approach	≤ 1800	≤ 511	511	422	422	508
2019	Precautionary approach	≤ 2160		1662	394 †	463	189
2020	Precautionary approach	≤ 2295		2003	536**	535	357
2021	Precautionary approach	≤ 1911		1911	470**	468	378
2022	Precautionary approach	≤ 1735		1611			
2023	MSY approach	≤ 402					
2024	MSY approach	≤ 402					

* Discard estimates are available from 2004; discard values prior to 2004 are assumed, based on limited sampling information.
† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.
** Preliminary.

History of the catch and landings

Table 6 Plaice in divisions 7.f and 7.g. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings					Discards				
846 tonnes	Otter trawl 28%	Beam trawl 69%	Gillnet < 1%	Seine 3%	Other < 1%	Otter trawl 5%	Beam trawl 94%	Gillnet < 1%	Seine < 1%	Other < 1%
	468 tonnes					378 tonnes				

Table 7 Plaice in divisions 7.f and 7.g. History of official landings by country, ICES estimated landings, and discards. Weights are in tonnes.

Year	Belgium	UK	France	Ireland	Spain	Netherlands	Total reported	ICES discards	ICES landings	ICES catch
1977	214	150	365	28			757	n/a	757	n/a
1978	196	152	527	0			875	n/a	875	n/a
1979	171	176	467	49			863	n/a	863	n/a
1980	372	234	706	61			1373	n/a	1373	n/a
1981	365	251	697	64			1377	n/a	1377	n/a
1982	341	196	568	198			1303	n/a	1303	n/a
1983	314	279	532	48			1173	n/a	1146	n/a
1984	283	366	558	72			1279	n/a	1210	n/a
1985	357	466	493	91			1407	n/a	1752	n/a
1986	665	539	878	302		9	2384	n/a	1691	n/a

Year	Belgium	UK	France	Ireland	Spain	Netherlands	Total reported	ICES discards	ICES landings	ICES catch
1987	581	496	708	127			1912	n/a	1901	n/a
1988	617	630	721	226			2194	n/a	2116	n/a
1989	843	471	1089	180			2583	n/a	2151	n/a
1990	794	498	767	160			2219	n/a	2082	n/a
1991	836	392	444	155			1827	n/a	1501	n/a
1992	371	307	504	180			1362	n/a	1188	n/a
1993	542	299	373	89			1303	n/a	1114	n/a
1994	350	252	298	82			982	n/a	1070	n/a
1995	346	286	254	70			956	n/a	1028	n/a
1996	410	239	246	83			978	n/a	952	n/a
1997	594	258	329	78			1259	n/a	1217	n/a
1998	540	176	298	135			1149	n/a	1067	n/a
1999	371	170	n/a	115			n/a	n/a	968	n/a
2000	224	134	287	76			721	n/a	718	n/a
2001	241	136	262	45			684	n/a	714	n/a
2002	248	105	186	79			618	n/a	642	n/a
2003	221	127	165	51			564	n/a	594	n/a
2004	212	87	145	45			489	274	510	784
2005	168	55	132	44			399	321	386	707
2006	172	88	106	48			414	453	404	857
2007	194	61	104	58			417	1288	410	1698
2008	188	63	70	64			385	583	437	1020
2009	216	56	148	61			481	608	481	1089
2010	188	54	136	63			442	670	442	1112
2011	210	45	98	67			420	1107	427	1534
2012	203	44	126	76			450	1123	450	1573
2013	186	40	106	80			412	1274	414	1688
2014	181	24	155	50			410	772	410	1182
2015	185	25	111	59			380	778	381	1159
2016	244	27	108	64			443	571	430	1001
2017	180	38	108	63			389	895	388	1283
2018	204	40	127	51			422	508	422	930
2019	263	45	84	†	1	< 1	394†	189	463	652
2020*	332	47	47	110	< 1	< 1	536	357	536	893
2021*	263	48	51	105	0.5	<1	468	378	468	846

† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.
*Preliminary.

Summary of the assessment

Table 8 Plaice in divisions 7.f and 7.g. Assessment summary. Weights are in tonnes, length is in centimetres.

Year	Biomass index (kg / 100 km towed)	Length indicator (cm)	ICES landings (tonnes)	ICES discards (tonnes)
1988	129		2116	
1989	149		2151	
1990	149		2082	
1991	118		1501	
1992	111		1188	
1993	52		1114	
1994	41		1070	
1995	56		1028	
1996	100		952	
1997	62		1217	
1998	79		1067	
1999	66		968	
2000	82		718	

Year	Biomass index (kg / 100 km towed)	Length indicator (cm)	ICES landings (tonnes)	ICES discards (tonnes)
2001	79		714	
2002	84		642	
2003	69		594	
2004	63		510	274
2005	61		386	321
2006	57		404	453
2007	64		410	1288
2008	79		437	583
2009	77		481	608
2010	98		442	670
2011	130		427	1107
2012	146		450	1123
2013	146		414	1274
2014	136		410	772
2015	174		381	778
2016	134		430	571
2017	107		388	895
2018	87	0.976	422	508
2019	75	0.996	463	189
2020	68	0.950	536	357
2021	49	0.937	468	378

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Download the stock assessment data and figures.

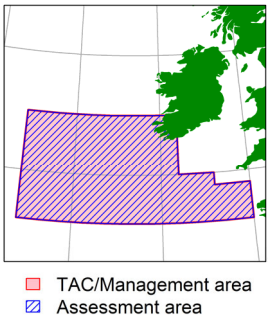
Recommended citation: ICES. 2022. Plaice (*Pleuronectes platessa*) in divisions 7.f and 7.g (Bristol Channel, Celtic Sea). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, ple.27.7fg, https://doi.org/10.17895/ices.advice.19453634.

Southwest of Ireland Plaice

Divisions 7.h-k

Advice for 2023

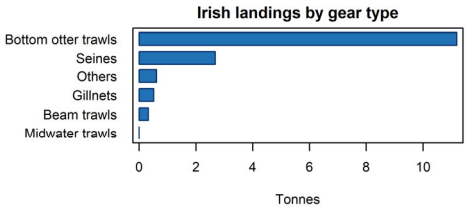
ICES advises that when the MSY approach is applied, catches should be no more than 132 t in each of the years 2023 and 2024.



Key Points

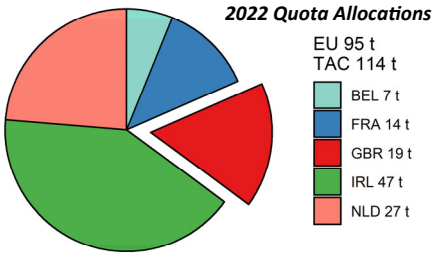
ICES Assessment Category	3 (Trend Based Assessment)	
Management Plan	WWMAP (bycatch)	
Advice Basis	ICES MSY approach	Catch=132 t
Ranges	F_{MSY} Range Lower	Not Applicable
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Applicable
Landing Obligation	From 2019	High survivability exemption*

* Described below under Key Stock Considerations, details in (EC 2020/2015).



Management in 2022

- The TAC and assessment area covers 7.h-k and the TAC is exclusively for by-catch.
- The Irish quota has not been restrictive since 2014.



Key Stock Considerations

- The stock was benchmarked in 2021, and advice is now produced using a trends based assessment using a new combined survey index.
- The fishing pressure is below its F_{MSY} proxy reference point and the stock size is above the MSY $B_{trigger}$ proxy.
- Irish landings of this stock are caught as a minor bycatch in a mixed fishery and are mainly landed with megrim, anglerfish, haddock and whiting.
- As a result of the documented high survivability of discarded plaice, a high survivability exemption is currently-in place. This exemption applies to beam trawls (≤221kW or ≤ 24m) within 12nm of the coast, and towing for less than 90 minutes; and beam trawls (>221kW) using flip-up rope or benthic release panel (EC 2020/2015). This is unlikely to affect Irish fisheries as there are few Irish beam trawls operating in this area. An exemption to the Landing Obligation also applies to Scottish seines in this area.

Published 30 June 2022

Plaice (*Pleuronectes platessa*) in divisions 7.h–k (Celtic Sea South, southwest of Ireland)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches should be no more than 132 tonnes in each of the years 2023 and 2024.

Stock development over time

The fishing pressure proxy on the stock is below $F_{MSY\ proxy}$ (Figure 2), and the stock size index is above MSY $B_{trigger\ proxy}$ ($I_{trigger}$).

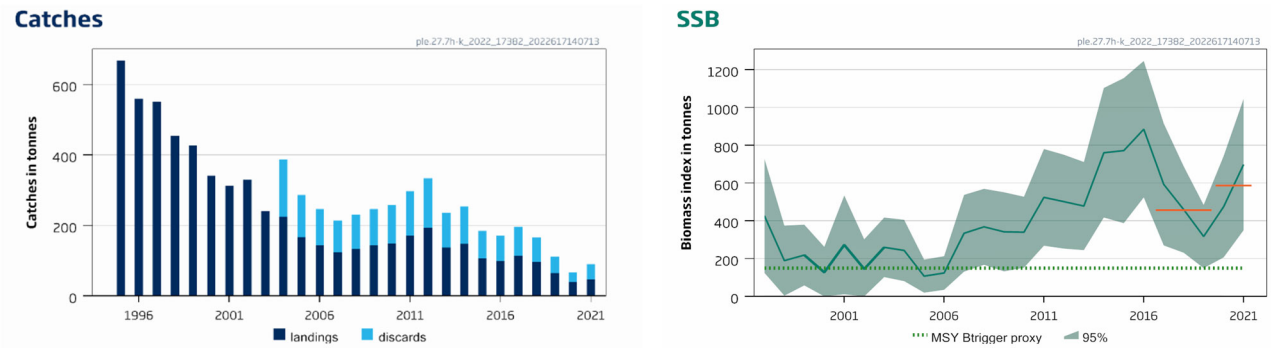


Figure 1 Plaice in divisions 7.h–k. Summary of the stock assessment. Discard estimates are available from 2004; prior to this, discards are unknown because of a lack of sample information. The short orange lines in the biomass plot indicate the average values of the respective years (2017 to 2019 and 2020 to 2021).

Catch scenarios

ICES framework for category 3 stocks was applied (rfb rule, method 2.1, ICES, 2022a). A survey biomass index was used as an indicator of stock development. The advice is based on the recent advised catches, multiplied by the ratio of the mean of the last two index values (index A) and the mean of the three preceding values (index B), a ratio of observed mean length in the catch relative to the target mean length, a biomass safeguard, and a precautionary multiplier. The stability clause was considered and applied to limit the increase in catch advice to 20%. The discard rate (geometric mean 2017–2021) was 48%.

Table 1 Plaice in divisions 7.h-k. The basis for the catch scenarios. Catches are in tonnes.

Previous catch advice Ay		110 tonnes
Stock biomass trend		
Index A (2020, 2021)		587 tonnes
Index B (2017, 2018, 2019)		457 tonnes
r: Index ratio (A/B)		1.28
Fishing pressure proxy		
Mean catch length (Lmean = L2021)		29.7 cm
MSY proxy length (LF = M)		28.9 cm
f: multiplier for relative mean length in catches ($L_{mean}/L_{F = M\ 2020}$)		1.03
Biomass safeguard		
Last index value (I_{2021})		698 tonnes
Index trigger value ($I_{trigger} = I_{loss} \times 1.4$)		150 tonnes
b: multiplier for index relative to trigger min{$I_{2021}/I_{trigger}$, 1}		1
Precautionary multiplier to maintain biomass above Blim with 95% probability		
m: multiplier to maintain the biomass above B_{lim} to with 95% probability		0.95
RFB calculation**		
Stability clause (+20%/−30% compared to Ay, only applied if b≥1)	Applied	1.2
Catch advice for 2023 and 2024 (Ay × stability clause)		132 tonnes
% advice change^		+20 %

* The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.
**Ay+1 = $Ay \times r \times f \times b \times m$, limited by stability clause if applicable.
^ Advice value for 2023 relative to the advice value for 2022 (110 tonnes).

This year's advice is an increase of 20% compared to the previous advice because of an increase in the biomass index.

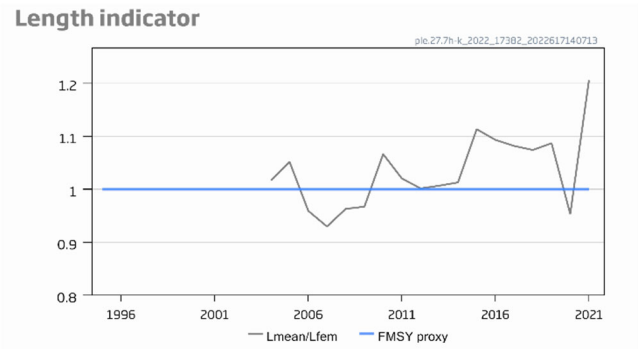


Figure 2 Plaice in divisions 7.h–k. Length indicator (mean length of fish in the catch divided by MSY proxy reference length). The exploitation status is below $F_{MSY\ proxy}$ when the indicator ratio value is higher than 1 (shown by the blue line).

Basis of the advice

Table 2 Plaice in divisions 7.h–k. The basis of the advice.

Advice basis	MSY approach
Management plan	The EU multiannual plan (MAP) for stocks in Western Waters and adjacent waters (EU, 2019) takes into account bycatch of this species. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach.

Quality of the assessment

Owing to limited and variable interannual sampling and discard rates, an average of the last five years (2017–2021) was used (48%) to estimate discards.

There was a decrease in the number of commercial catch samples as a result of COVID-19 in 2021.

Issues relevant for the advice

Plaice in divisions 7.h–k is primarily a bycatch fishery. There is no quantitative mixed-fishery analysis that includes plaice in this area.

Although not incorporated into this assessment, there is some information available on the discard survivability of plaice in this area, which is estimated to range between 10 and 33% in the beam trawl (Uhlmann *et al*., 2018), and 70% in the seine net fishery (Oliver *et al*., 2020).

Reference points

Table 3 Plaice in divisions 7.h–k. Reference points, relative values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger\ proxy}$	150	Biomass index trigger value ($I_{trigger}$), defined as $I_{trigger} = I_{loss} \times 1.4$, where I_{loss} is the lowest observed historical biomass index value from 2005. In estimated metric tonnes from derived form VAST.	ICES (2022a, 2022b)
	$F_{MSY\ proxy}$	1	$L_{mean}/L_{F=M}$; Mean catch length divided by MSY proxy reference length ($L_{F=M}$).	ICES (2020)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not relevant		
	F_{pa}	Not relevant		
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 4 Plaice in divisions 7.h–k. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2022c)
Assessment type	Survey biomass trend applying the *rfb* rule for advice (ICES, 2022b)
Input data	Commercial landings and discards, six surveys combined in VAST (spatial temporal model [Thorson *et al.*, 2019]) index: EVOHE (G9527), IE-IAMS(G3098), IE-IGFS (G7212), UK-WGCFS (G9863), UK-Q4SWIBTS (G9863) and UK-Q1SWBeam (B2732)
Discards and bycatch	Discard estimates are not available for the early part of the time series (1995–2003). ICES discards are derived from estimated discard rates, 42% from 2004–2019 (mean 2004–2019), 41% in 2020 (geometric mean 2016–2020), 48% in 2021 (geometric mean 2017–2021).
Indicators	Length-based indicator
Other information	Benchmarked in 2021 (ICES, 2021)
Working group report	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 5 Plaice in divisions 7.h–k. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Catches corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	Discards	ICES landings
1993	-		-	-	667		
1994	-		-	-	560		
1995	-		-	-	667		
1996	-		-	-	560		
1997	-		-	-	551		
1998	-		-	-	454		
1999	-		-	-	437		
2000	-		-	-	341		
2001	-		-	1215	313		
2002	-		-	1080	330		

Year	ICES advice	Catches corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	Discards	ICES landings
2003	Reduce TAC to recent average (1998–2000)		450	582	241		
2004	Reduce TAC to recent average (2000–2002)		320	466	232	29	224
2005	Reduce TAC to recent average (2001–2003)		271	466	170	45	167
2006	Reduce TAC to recent average (2002–2004)		245	396	143	55	143
2007	Reduce TAC to recent average (2003–2005)		196	337	141	78	124
2008	Reduce TAC to recent average (2004–2006)		177	303	124	53	133
2009	Same advice as last year		177	256	149	56	143
2010	Reduce TAC		-	218	155	168	150
2011	See scenarios		-	185	178	13	172
2012	Reduce catches			176	201	84	193
2013	Decrease catches by 36% (20% decrease, followed by 20% PA reduction)		< 100	141	141	118	137
2014	Decrease landings by 4% (20% increase, followed by 20% PA reduction)		< 135	135	153	116	147
2015	The same landings advice as for 2014		< 135	135	103	166	107
2016	Precautionary approach (same advised value as for 2015)		≤ 135	135	100	22	99
2017	Precautionary approach (36% reduction in advised landings)		≤ 86	128	116	43	114
2018	Precautionary approach	0		128	96	220	96
2019	Precautionary approach	0		109	34†	43	64
2020	Precautionary approach	0		67	39*	36	39
2021	Precautionary approach	0		67	46*	6	48
2022	MSY approach	≤ 110		114			
2023	MSY approach	≤ 132					

* Preliminary.

† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

History of the catch and landings

Table 6 Plaice in divisions 7.h–k. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings			Discards		
54 tonnes	Otter trawl 34%	Beam trawl 9%	Other gears 57%	Otter trawl 34%	Beam trawl 9%	Other gears 57%
	48 tonnes			6 tonnes		

Table 7 Plaice in divisions 7.h–k. History of official landings by country and ICES estimated landings (tonnes).

Year	Belgium	France	Ireland	UK	Other	Official landings	ICES landings
1995	0	60	321	286	0	667	
1996	0	48	305	155	52	560	
1997	0	69	344	138	0	551	
1998	0	49	286	106	13	454	
1999	45	0	299	82	1	437	
2000	4	54	200	76	7	341	
2001	27	50	160	73	3	313	
2002	69	45	155	59	2	330	
2003	20	32	127	56	6	241	
2004	67	32	91	36	6	232	224

Year	Belgium	France	Ireland	UK	Other	Official landings	ICES landings
2005	32	20	90	28	0	170	167
2006	22	36	66	18	1	143	143
2007	7	30	72	20	13	141	124
2008	25	13	73	12	1	124	133
2009	1	44	72	32	0	149	143
2010	< 1	54	66	35	0	155	150
2011	4	58	72	44	0	178	172
2012	2	62	99	38	0	201	193
2013	0	49	52	40	0	141	137
2014	4	52	82	15	0	153	147
2015	0	60	25	18	0	103	107
2016	7	46	32	15	0	100	99
2017	11	53	42	10	0	116	114
2018	17	35	32	0	11	95	96
2019	6	17	†	9	2	34†	64
2020*	7	12	12	7	1	39	39
2021*	9	14	15	8	< 1	46	48

* Preliminary official landings.

† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

Table 8 Plaice in divisions 7.h–k. Assessment summary. High and low refer to 2 × SD (approximately 95% confidence intervals) for biomass index. All weights are in tonnes.

Year	Biomass index			Length indicator	ICES landings	ICES discards*
	Low	Value	High			
1995					667	
1996					560	
1997	125	427	730		551	
1998	4	189	375		454	
1999	58	219	380		427	
2000	0	127	263		341	
2001	11	273	534		313	
2002	0	145	303		330	
2003	102	260	418		241	
2004	81	243	406	1.017	224	162
2005	20	107	195	1.052	167	121
2006	35	124	213	0.959	143	104
2007	131	334	538	0.930	124	90
2008	167	368	570	0.963	133	96
2009	133	342	551	0.967	143	104
2010	152	340	528	1.066	150	108
2011	268	524	780	1.020	172	124
2012	253	502	750	1.002	193	140
2013	245	478	712	1.007	137	100
2014	418	760	1103	1.013	147	107
2015	388	772	1156	1.113	107	77
2016	524	885	1246	1.093	99	72
2017	270	593	916	1.082	114	83
2018	231	460	689	1.074	96	70
2019	150	317	485	1.087	64	47
2020	206	475	743	0.953	39	27
2021	350	698	1046	1.206	48	46

*ICES discards are derived from fishing fleet specific averaged discard rates of 42% from 2004–2019, 50% in 2020, and 49% in 2021.

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Plaice (*Pleuronectes platessa*) in divisions 7.h–k (Celtic Sea South, southwest of Ireland). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, ple.27.7h-k. https://doi.org/10.17895/ices.advice.19453592.

POLLACK

(POLLACHIUS POLLACHIUS)

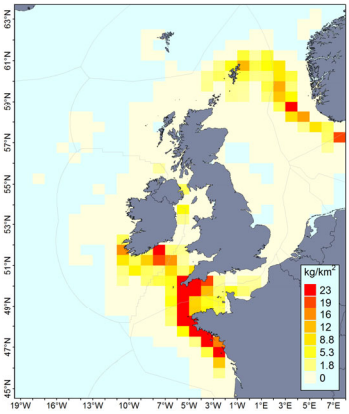
BIOLOGY – SPECIES

Pollack is a benthopelagic gadoid, occuring thoughout the north-east Atlantic, mainly over hard/rocky bottom. Pollack usually occur at 40-100m depth but are found down to 200m. Young pollack occur mostly inshore while older fish move to deeper waters.

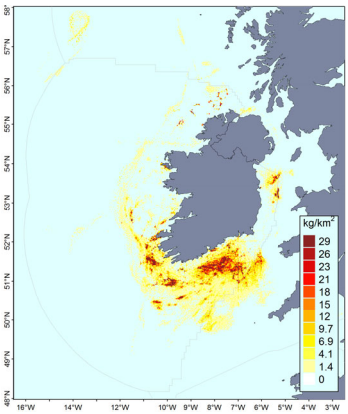
Pollack are fast growing at 10cm or more per year. The maximum reported size is 130cm in length and 18.1kg in weight. The maximum reported age is 15 years. The minimum conservation reference size is 30cm.

Males mature at smaller sizes than females; recent studies suggest that females in the Celtic Sea mature at around 60cm in length. Spawning occurs mainly in the first half of the year, at about 100m depth. Pollack can form dense shoals during spawning time.

LANDINGS DISTRIBUTION



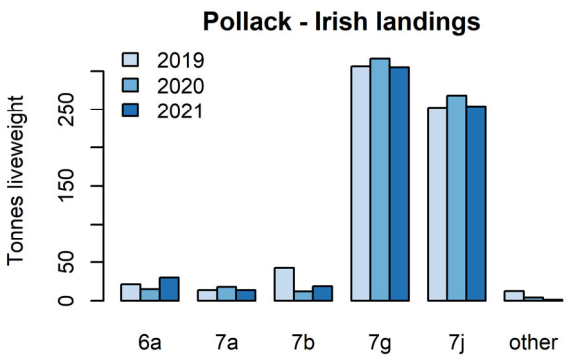
The distribution of international landings of pollack between 2016 and 2020. Highest catches occurred in the western channel, off Brittany and south of Ireland.

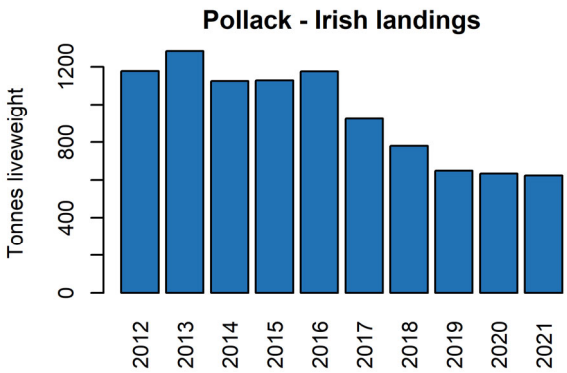


The distribution of pollack landings by Irish vessels between 2016 and 2020. Pollack were mostly caught in the Celtic Sea and off the southwest coast of Ireland.

IRISH LANDINGS AND VALUE OF TAC

On average approximately 635 tonnes of pollack were caught annually and landed in mixed demersal fisheries by Irish vessels between 2019 and 2021, 48% of which were caught in 7.g and 41% in 7.j. In 2021, 623 tonnes were landed which were worth approximately €1.5 million for Irish vessels.



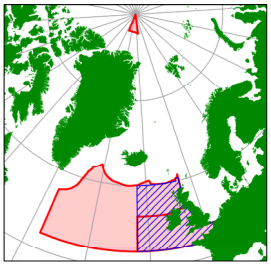


Celtic Sea and West of Scotland Pollack

Sub-areas 6 and 7

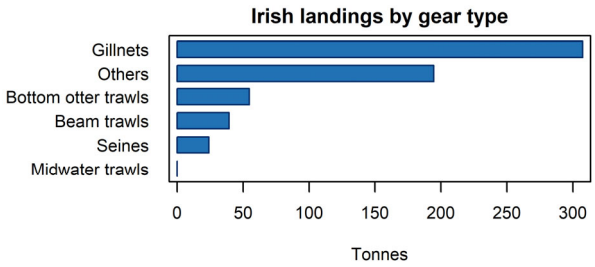
Advice for 2023

ICES advises that when the precautionary approach is applied, commercial catches in 2023 should be no more than 3,360 t.



Key Points

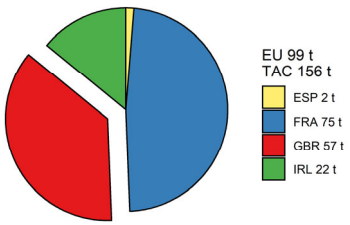
ICES Assessment Category	4 (Catch–based assessment)	
Management Plan	WWMAP (target)	
Advice Basis	ICES PA approach	Catch=3,360 t
Ranges	F_{MSY} Range Lower	Not Available
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Available
Landing Obligation	From 2017	No derogations or exemptions



Management 2022

- There are two TAC areas that cover pollack in this area. Ireland has quota for both. The first TAC area covers Divisions 5.b and Sub-areas 6, 12 and 14. The second TAC area covers Sub-area 7. Up to 2% of the latter TAC may be fished in Divisions 8.a,b,d,e.
- Low quota uptake by some countries means that the current TAC's are well above the reported landings.
- The 2021 quota uptake by Ireland in Sub-areas 5.b, 6, 12 and 14 was 112% (29 t compared to 26 t quota). The 2021 quota uptake by Ireland in Sub-area 7 was lower, with 62% of the quota utilised.

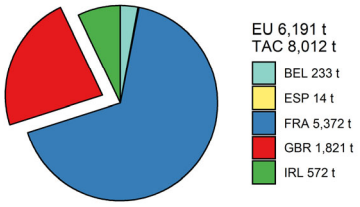
2022 Quota Allocations for Pollack in 5b, 6, 12, 14



Key Stock Considerations

- Fishing mortality is considered to be below possible MSY reference points.
- Irish landings of pollack are mainly taken by gillnets, however, in some years considerable by-catches of pollack are landed with hake, whiting and saithe by OTB fleets.
- Commercial landings may not reflect true pollack catches since recreational fisheries are thought to comprise a significant component of total catch. A recent study estimated that recreational catches are approximately 3,500 t per year from areas 6 and 7.
- Ireland is currently engaged in an EMFAF funded project aiming to improve data on Irish recreational fisheries.
- This stock is currently undergoing a benchmark to improve the evidence base and address concerns about the adequacy of the assessment.

2022 Quota Allocations for Pollack in 7



Published 30 June 2022

Pollack (*Pollachius pollachius*) in subareas 6–7 (Celtic Seas and the English Channel)

ICES advice on fishing opportunities

ICES advises that when the precautionary approach is applied, commercial catches in 2023 should be no more than 3360 tonnes.

Stock development over time

Fishing mortality is considered to be below possible reference points, and the stock size is unknown.

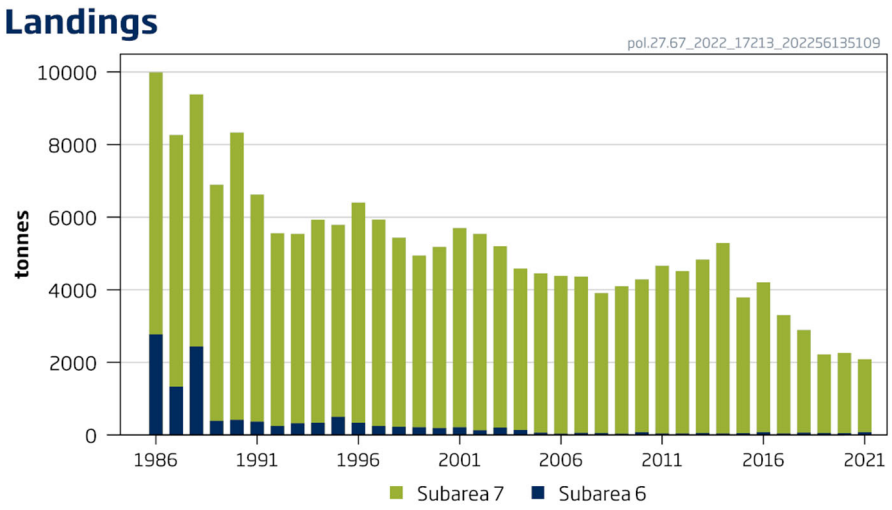


Figure 1 Pollack in subareas 6–7. Commercial landings (in tonnes).

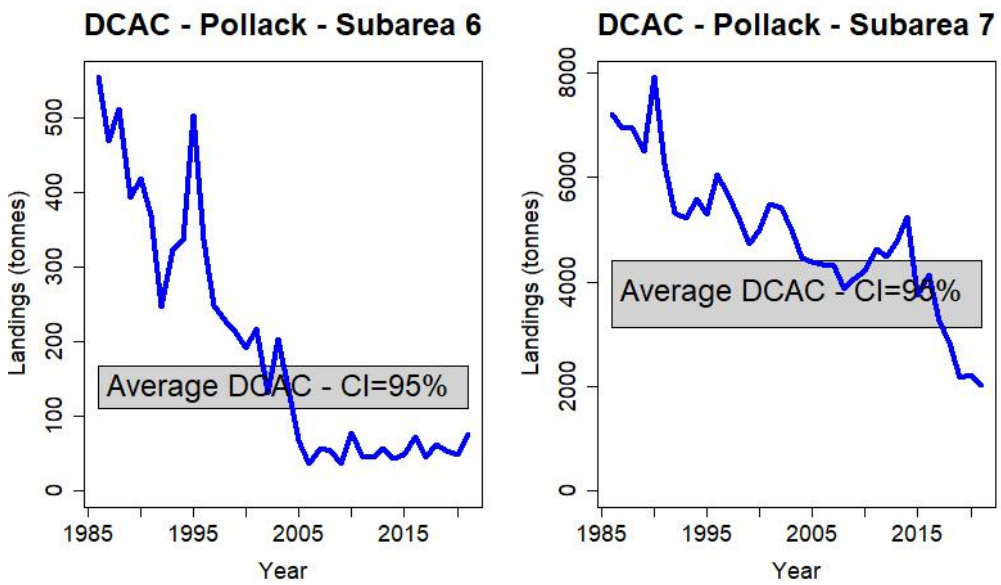


Figure 2 Pollack in subareas 6–7. The results of the depletion-corrected average catch (DCAC) assessment method as applied to commercial landings data since 1986. The grey box indicates the proxy for the maximum sustainable catch ±95% confidence intervals.

Catch scenarios

ICES framework for category 4 stocks was applied (ICES, 2012). The depletion-corrected average catch method (DCAC, which is interpreted as an approximation of the maximum sustainable yield [MSY] approach) was used to provide catch advice for this stock. The 2021 catch is below the DCAC, and the 2023 advised catch is within the DCAC range (3226–4579 tonnes); therefore, the advice remains unchanged.

Table 1 Pollack in subareas 6–7. ICES framework for category 4 applied.

Advised commercial catches for 2022		3360 tonnes
Discard rate		< 1%
Uncertainty cap	Not applied	-
Commercial catches advice for 2023		3360 tonnes
% advice change*		0

* Advice value 2023 relative to the advice value 2022.

Basis of the advice

Table 2 Pollack in subareas 6–7. The basis of the advice.

Advice basis	Precautionary approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. The MAP stipulates that when the F_{MSY} ranges are not available, fishing opportunities should be based on the best available advice. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES precautionary approach.

Quality of the assessment

The current assessment relies solely on commercial landings data. Recreational catch could be a large component of the total catch; recreational fishery catches per year have been estimated at approximately 3500 tonnes (Radford *et al.*, 2018).

During 2020, a review of available data was conducted, and further work on recreational catch is required (ICES, 2021).

The stock structure is unknown.

Issues relevant for the advice

ICES advice applies to commercial landings only.

Reference points

No reference points are defined for this stock.

Basis of the assessment

Table 3 Pollack in subareas 6–7. The basis of the assessment.

ICES stock data category	4 (ICES, 2022a)
Assessment type	DCAC (depletion-corrected average catch [ICES, 2022b])
Input data	Commercial landings
Discards and bycatch	Negligible (Less than 1% of the commercial catch)
Recreational catches	Not used but considered substantial (approximately 3500 tonnes)
Indicators	None
Other information	None
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 4 Pollack in subareas 6–7. History of ICES advice, the agreed TAC, and ICES estimates of commercial landings. Weights are in tonnes.

Year	ICES advice	Commercial catch corresponding to advice	EU TAC Subarea 6*	EU TAC Subarea 7	Total commercial landings Subarea 6	Total commercial landings Subarea 7	Total commercial landings
2000		-	1100	17000	191	5377	5568
2001		-	1100	17000	217	5885	6102
2002		-	1100	17000	131	5922	6053
2003		-	880	17000	203	5348	5551
2004		-	704	17000	136	4786	4922
2005		-	563	17000	67	4725	4792
2006		-	450	15300	37	4661	4698
2007		-	450	15300	58	4611	4669
2008		-	450	15300	53	3861	3914
2009		-	450	15300	37	4063	4100
2010		-	450	13770	79	4209	4288
2011		-	397	13495	46	4619	4666
2012	No increase in catch	-	397	13495	45	4469	4514
2013	Catch should be no more than 1% more than recent catch (last three years)	< 4200	397	13495	57	4468	4525
2014	Same advice as 2013	< 4200	397	13495	44	5359	5403
2015	Same advised values as given for 2013	< 4200	397	13495	48	3740	3788
2016	Precautionary approach (same advised commercial landings value as given for 2015)	≤ 4200	397	13495	74	4206	4280
2017	Precautionary approach (same advised commercial landings value as provided for 2016)	≤ 4200	397	12146	44	3260	3305
2018	Precautionary approach	≤ 4200	397	12163	63	2832	2895
2019	Precautionary approach	≤ 3360	397	12163	54	2165	2219
2020	Precautionary approach	≤ 3360	238	12163	48	2210	2258
2021	Precautionary approach	≤ 3360	184	9426	76	2011	2087
2022	Precautionary approach	≤ 3360	156	8012			
2023	Precautionary approach	≤ 3360					

* Subarea 6, European Union and international waters of Division 5.b (EC until 2020; UK thereafter), and international waters of subareas 12 and 14.

Table 5 Pollack in subareas 6–7. Catch distribution by fleet in 2021 as estimated by ICES.

Total catch	Commercial landings			Commercial discards	Recreational catch
Unknown	Otter trawlers 16.2%	Static nets 52%	Others 32%	< 1%	Estimated to be substantial
	2087 tonnes				

Table 6 Pollack in subareas 6 and 7. History of official commercial landings in **Subarea 6** by country. Weights are in tonnes.

Year	Belgium	Denmark	France	Germany	Ireland	Netherlands	Norway	Portugal	Spain	Sweden	UK	Total Subarea 6
1950	1	-	-	-	-	-	-	-	-	-	295	296
1951	-	-	-	-	-	-	-	-	-	-	484	484
1952	-	-	-	-	-	1	-	-	-	-	503	504
1953	-	-	-	-	-	-	-	-	-	-	422	422
1954	-	-	-	-	-	-	-	-	-	-	452	452
1955	-	-	-	-	-	-	-	-	-	-	566	566
1956	-	-	-	-	-	-	-	-	-	-	528	528
1957	-	-	-	-	-	-	-	-	-	-	547	547
1958	.	-	-	23	-	-	-	-	-	-	710	733
1959	1	-	-	6	-	-	-	-	-	-	607	614
1960	15	-	-	-	-	-	-	-	-	-	441	456
1961	1	-	-	1	125	-	-	-	-	-	259	386
1962	2	-	-	8	197	-	-	-	-	-	235	442
1963	6	-	-	2	204	-	-	-	-	-	320	532
1964	1	-	-	1	130	-	-	-	-	-	368	500
1965	1	-	-	1	402	-	-	-	-	-	496	900
1966	2	-	-	-	200	-	-	-	-	-	428	630
1967	1	-	-	1	263	-	-	-	-	1106	413	1784
1968	5	-	-	2	214	-	148	-	-	1012	500	1881
1969	1	-	-	4	282	-	-	-	-	1224	667	2178
1970	2	-	-	1	398	-	-	-	-	756	447	1604
1971	1	-	-	5	75	-	-	-	-	750	256	1087
1972	1	-	-	1	127	-	-	-	-	779	317	1225
1973	2	-	-	-	-	-	-	-	-	-	503	505
1974	6	-	-	-	-	3	-	-	-	-	359	368
1975	< 0.5	-	-	1	-	1	4	-	-	-	393	399
1976	7	-	-	-	-	1	-	-	-	-	519	527
1977	-	-	196	-	-	1	2	-	-	-	493	692
1978	-	-	196	-	-	-	4	-	-	-	553	753
1979	-	-	310	-	-	-	-	-	-	-	350	660
1980	-	-	36	-	-	-	-	-	-	-	233	269
1981	-	-	342	-	-	-	-	-	55	-	185	582
1982	-	< 0.5	272	-	-	-	-	-	95	-	103	470
1983	-	-	331	-	-	-	-	-	86	-	148	565
1984	-	-	212	-	-	-	-	-	222	-	194	628
1985	< 0.5	-	224	1	-	-	-	-	283	-	328	836
1986	-	-	145	-	223	-	-	-	2217	-	187	2772
1987	-	< 0.5	108	-	103	-	-	-	860	-	259	1330
1988	-	< 0.5	128	-	163	-	-	-	1925	-	221	2437
1989	-	< 0.5	111	1	103	-	-	-	-	-	179	394
1990	-	-	76	-	150	-	1	-	-	-	192	419
1991	-	-	31	-	145	-	-	-	4	-	189	369
1992	-	< 0.5	21	-	23	-	-	-	< 0.5	-	203	247
1993	-	-	39	-	12	-	-	-	-	-	273	324
1994	-	-	34	< 0.5	26	-	< 0.5	-	-	-	276	336
1995	-	-	64	3	83	-	-	-	-	-	354	504
1996	-	< 0.5	29	< 0.5	97	-	1	-	-	-	210	337
1997	-	-	14	1	69	-	2	-	-	-	162	248
1998	-	-	21	-	60	-	-	< 0.5	< 0.5	-	147	228
1999	-	-	-	-	73	-	3	-	< 0.5	-	136	212
2000	-	-	11	2	62	-	-	-	-	-	116	191
2001	-	-	8	-	108	-	-	-	-	-	101	217
2002	-	-	9	-	26	-	-	-	-	-	96	131
2003	< 0.5	-	3	-	88	-	1	-	-	-	111	203
2004	< 0.5	-	2	-	68	-	1	-	-	-	65	136
2005	-	-	23	-	28	-	-	-	-	-	16	67
2006	-	-	3	< 0.5	31	-	< 0.5	-	4	-	5	42
2007	-	-	10	< 0.5	26	-	7	-	-	-	21	64

Year	Belgium	Denmark	France	Germany	Ireland	Netherlands	Norway	Portugal	Spain	Sweden	UK	Total Subarea 6
2008	-	-	8	-	21	-	1	-	-	-	23	54
2009	-	-	7	-	6	-	< 0.5	-	-	-	25	38
2010	-	-	6	-	34	-	< 0.5	-	-	-	39	80
2011	-	-	2	-	12	-	1	-	-	-	36	51
2012	-	-	2	-	10	-	< 0.5	-	2	-	33	48
2013	-	-	1	-	34	-	< 0.5	-	-	-	22	58
2014	-	-	1	-	25	-	< 0.5	-	-	-	18	44
2015	-	-	< 0.5	-	23	-	< 0.5	-	-	-	25	49
2016	-	-	< 0.5	-	44	-	< 0.5	-	-	-	31	76
2017	-	-	< 0.5	-	33	-	< 0.5	-	-	-	14	47
2018	-	-	< 0.5	-	22†	-	< 0.5	-	-	-	29	51†
2019	-	-	3	-	22†	-	< 0.5	-	-	-	27	51†
2020*	-	-	< 0.5	-	13	-	-	-	-	-	32	45
2021*	-	-	2	-	29	-	-	-	< 0.5	-	43	75

* Preliminary official landings

† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

Table 7 Pollack in subareas 6–7. History of official commercial landings in **Subarea 7** by country. Weights are in tonnes.

Year	Belgium	Denmark	France	Germany	Ireland	Netherlands	Norway	Spain	UK	Total Subarea 7
1950	93	-	-	-	-	-	-	-	375	468
1951	74	-	-	2	-	-	-	-	380	456
1952	80	-	-	10	-	-	-	-	336	426
1953	34	-	-	-	-	-	-	-	252	286
1954	17	-	-	4	-	-	-	-	365	386
1955	38	-	-	-	-	-	-	-	247	285
1956	67	-	-	1	-	-	-	-	155	223
1957	219	-	-	6	-	-	-	-	367	592
1958	342	-	-	17	-	-	-	-	233	592
1959	158	-	-	32	-	-	-	-	251	441
1960	317	-	-	-	-	-	-	-	267	584
1961	268	-	-	-	360	-	-	-	210	838
1962	367	-	-	1	369	-	-	-	170	907
1963	95	-	-	-	411	-	-	-	176	682
1964	299	-	-	-	342	-	-	-	194	835
1965	362	-	-	-	335	-	-	-	231	928
1966	456	-	-	-	438	-	-	-	175	1069
1967	417	-	-	-	474	-	-	-	202	1093
1968	214	-	-	-	508	-	-	-	167	889
1969	142	-	-	-	794	-	-	-	161	1097
1970	165	-	-	1	724	-	-	-	120	1010
1971	114	-	-	-	673	-	-	-	116	903
1972	142	-	-	-	1073	-	-	-	123	1338
1973	89	-	-	-	-	3	-	-	127	219
1974	299	-	-	-	-	13	-	-	223	535
1975	295	-	-	-	-	17	-	-	290	602
1976	339	-	-	-	-	4	-	-	421	764
1977	157	1	3569	-	-	1	-	-	465	4193
1978	186	21	5496	14	-	8	-	-	515	6240
1979	151	18	5119	76	-	1	-	-	696	6061
1980	237	7	5242	-	-	1	-	1	769	6257
1981	244	-	5814	-	-	3	-	23	780	6864
1982	154	-	4253	-	-	-	-	32	1022	5461
1983	167	-	6214	-	-	-	-	26	1045	7452
1984	207	-	3927	-	-	-	-	486	1100	5720
1985	269	-	3741	-	-	-	-	20	1022	5052
1986	241	-	4574	-	1335	-	-	17	1795	7962
1987	149	-	5213	-	848	-	-	19	2010	8239
1988	191	-	5211	-	1066	-	-	22	1740	8230

Year	Belgium	Denmark	France	Germany	Ireland	Netherlands	Norway	Spain	UK	Total Subarea 7
1989	145	-	3893	-	994	-	-	18	1487	6537
1990	133	-	4831	-	1066	-	-	26	1914	7970
1991	76	-	3211	-	1045	-	-	22	1962	6316
1992	62	-	2849	-	1014	-	-	19	1889	5833
1993	55	-	2325	-	1137	-	-	7	2135	5659
1994	94	-	2621	-	921	-	-	8	2391	6035
1995	88	2	2315	-	1107	-	-	4	2168	5684
1996	94	-	2684	-	1190	6	-	5	2519	6498
1997	99	-	2443	-	984	4	< 0.5	7	2540	6077
1998	92	-	2375	-	886	1	-	11	2347	5712
1999	86	-	-	-	976	-	3	19	1703	2787
2000	71	-	2422	-	1069	-	-	5	1810	5377
2001	100	-	2515	-	1274	-	-	9	1987	5885
2002	117	-	2481	-	1308	-	-	17	1999	5922
2003	113	-	2284	-	1151	-	-	12	1788	5348
2004	104	-	1914	-	1049	1	-	13	1705	4786
2005	98	-	2198	-	728	1	-	16	1684	4725
2006	78	-	2223	-	1144	1	-	50	1569	5066
2007	90	-	2003	-	1034	3	-	2	1850	4982
2008	76	-	1606	-	1058	1	-	20	1544	4305
2009	41	-	1686	-	1198	4	-	5	1614	4548
2010	35	-	1859	-	1367	2	-	6	1515	4784
2011	37	-	1801	-	1296	2	-	8	1908	5052
2012	43	-	1430	-	1520	1	< 0.5	4	1898	4896
2013	39	-	1813	-	1730	1	-	22	1936	5541
2014	84	-	2068	-	1508	1	-	27	2184	5872
2015	32	-	1176	-	1447	1	-	25	1501	4182
2016	42	-	1257	-	1536	< 0.5	-	23	1958	4817
2017	19	-	960	-	1487	< 0.5	-	23	1398	3887
2018	21	-	819	-	878†	9	-	25	1267	3018†
2019	12	-	550	-	14†	2	-	5	988	1570†
2020 *	17	-	584	-	395	2	-	3	938	1939
2021 *	7	-	584	-	419	2	-	1	802	1816

* Preliminary official landings

† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

The depletion-corrected average catch (DCAC) method has been applied using commercial landings. The estimation of the DCAC (Category 4 - MSY proxy) produced by the method is 142 tonnes (with a 95% confidence interval from 110 to 168 tonnes) for Subarea 6, and 3864 tonnes (with a 95% confidence interval from 3116 to 4411 tonnes) for Subarea 7.

Sources and references

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Pollack (*Pollachius pollachius*) in subareas 6-7 (Celtic Seas and the English Channel). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, pol.27.67. https://doi.org/10.17895/ices.advice.19453655.

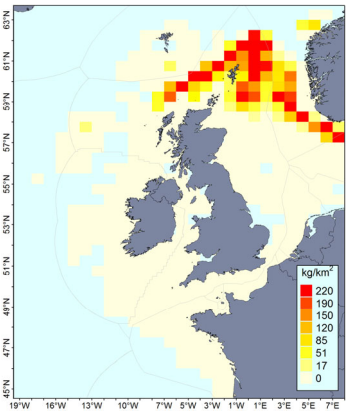
SAITHE

(POLLACHIUS VIRENS)

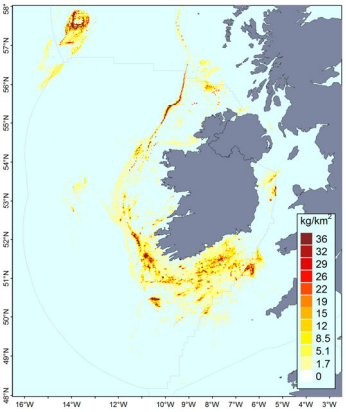
BIOLOGY – SPECIES

Saithe is a large gadoid reaching maximum size of 130cm. It is a cold-water species distributed throughout the northern Atlantic. Saithe live in shoals, with juveniles occurring mostly in coastal waters while older fish move to deeper waters. Tagging experiments have shown that adults can migrate over considerable distances, indicating at least some exchange between the Norwegian coast, Faroe and Iceland. Genetic studies have found Rockall saithe to exhibit genetic differences from the wider North Sea saithe, although they did show spatial mixing with juveniles of the Faroe population. Survey data show that density in the north-eastern North Sea is markedly higher during summer than during winter, suggesting dispersal during the feeding season.

Saithe feed primarily on pelagic organisms. Krill is the most important food for young fish but is also consumed by larger individuals. Larger fish mainly feed on sand eels and other fish species. Growth is quite rapid and saithe reach sexual maturity at the age of 5 or 6 years. The minimum conservation reference size is 35cm.



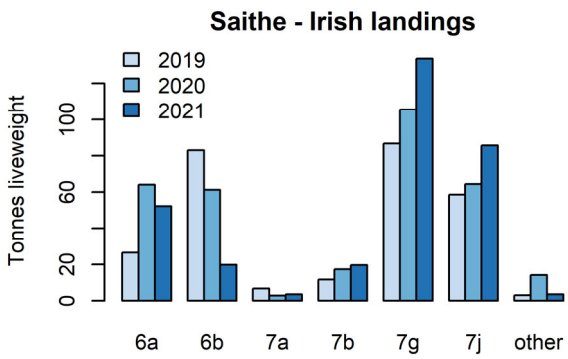
The distribution of EU landings of saithe between 2016 and 2020. The majority of catches were taken in the norther North Sea.

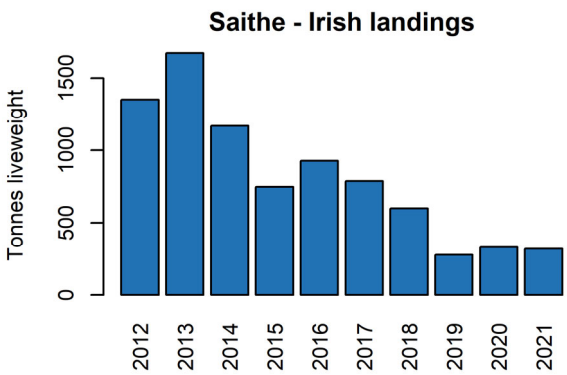


The distribution of saithe landings by Irish vessels between 2016 and 2020. Highest catches were taken along the western shelf edge.

IRISH LANDINGS AND VALUE OF TAC

On average approximately 300 tonnes of saithe were caught annually and landed in mixed demersal fisheries by Irish vessels between 2019 and 2021, 41% of which were caught in 7.g. In 2021, 318 tonnes were landed which were worth approximately €440,000 for Irish vessels.





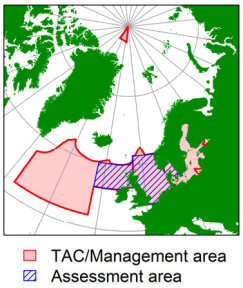
North Sea, Rockall and West of Scotland Saithe

Sub-areas 4 & 6 and Division 3.a

Advice for 2023

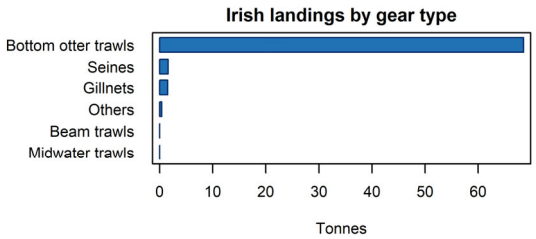
ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 58,912 t.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.



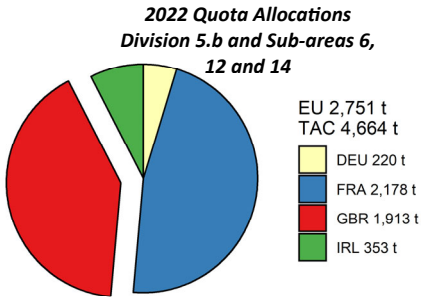
Key Points

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	NSMAP (target); Not agreed between EU, UK & Norway	
Advice Basis	ICES MSY approach	Catch=58,912 t
Ranges	F_{MSY} Range Lower	Catch=37,777 t
	F_{MSY}	Catch=61,507 t
	F_{MSY} Range Upper	Not Applicable
Landing Obligation	From 2016	No derogations or exemptions



Management in 2022

- The assessment area includes two TAC areas; the first TAC area covers Divisions 2.a, 3.a, and Sub-area 4. The second TAC area covers Division 5.b and Sub-areas 6, 12 and 14.
- The advice for 2022 has been split into the two TAC areas based on a fixed percentage agreed by the management authorities (90.6% in Subarea 4 and Subdivision 3.a.20 and 9.4% in Subarea 6).
- Ireland only has a quota for the latter TAC area (5.b, 6, 12 and 14). The TAC for Divisions 5.b and Sub-areas 6, 12 and 14 was reduced in 2022 by 1,511 t.



Key Stock Considerations

- Ireland has not taken its full quota in recent years. The 2021 quota uptake by Ireland in Sub-areas 5.b, 6, 12 and 14 was 20%.
- The advice for 2023 is 58,912 t; an increase of 9,298 t from the 2022 advice (+19%), due to a realised fishing mortality for 2021 that was lower than assumed and a forecasted increase in spawning stock biomass.
- The advised catch for 2023 is less than the F_{MSY} scenario because the stock is below MSY $B_{trigger}$ and the ICES advice rule is applied (where the advised fishing mortality is scaled down by the ratio of stock size in 2023 divided by the biomass trigger level).

Published 30 June 2022

Saithe (*Pollachius virens*) in subareas 4 and 6 and Division 3.a (North Sea, Rockall and West of Scotland, Skagerrak and Kattegat)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 58 912 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is above F_{MSY} but below F_{pa} and F_{lim}; spawning-stock size is below MSY $B_{trigger}$ and between B_{pa} and B_{lim}.

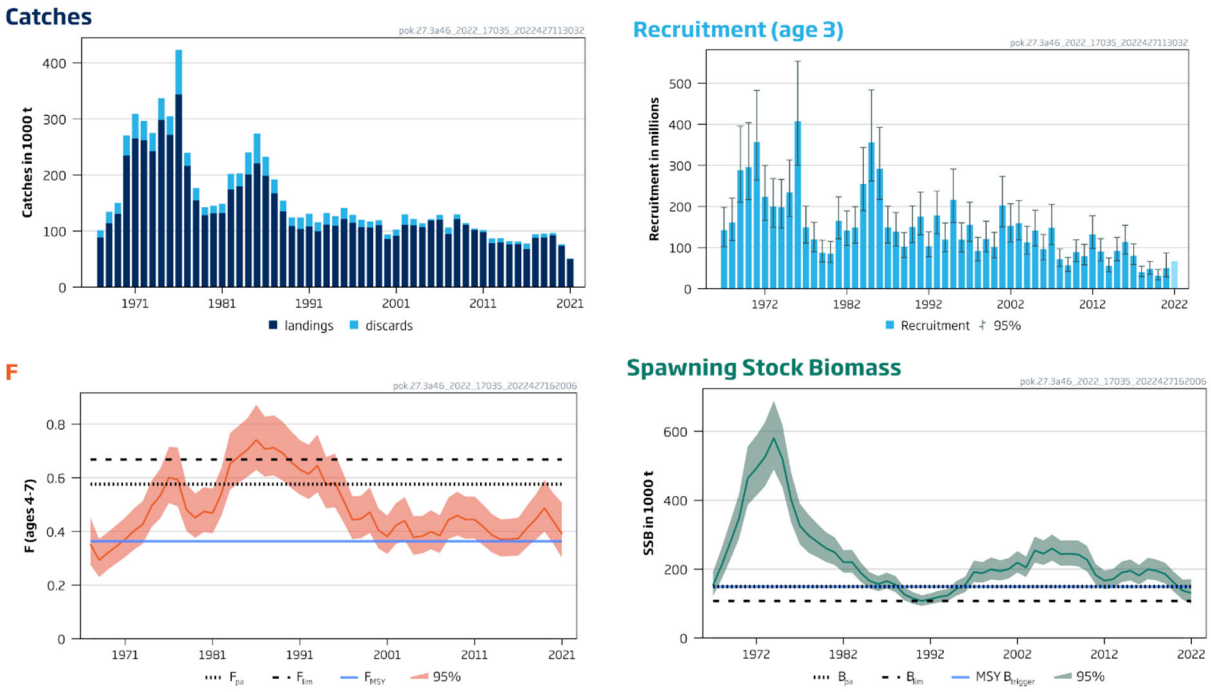


Figure 1 Saithe in subareas 4 and 6, and in Division 3.a. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour. Landings and discards are for ages 3–10+ only, as used in the assessment.

Catch scenarios

Table 1 Saithe in subareas 4 and 6, and in Division 3.a. Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 4–7}$ (2022)	0.34	Based on a catch constraint for 2022. Average exploitation pattern (2019–2021)
SSB (2023)	141 805	Short-term forecast (STF); tonnes
$R_{age\ 3}$ (2022–2023)	66 473	Resampled recruitment from the years 2012–2021 (geometric mean shown); thousands
Total catch (2022)	49 614	TAC 2022; tonnes
Projected landings (2022)	47 738	Assuming 2019–2021 average landings fraction by age; tonnes
Projected discards (2022)	1876	Assuming 2019–2021 average discards fraction by age; tonnes

Table 2 Saithe in subareas 4 and 6, and in Division 3.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards* (2023)	Projected landings ##		F_{total} (ages 4–7) (2023)	$F_{projected\ landings}$ (ages 4–7) (2023)	$F_{projected\ discards}$ (ages 4–7) (2023)	SSB (2024)	% SSB change **	% TAC change #	% advice change ^
				Div. 3.a and Subarea 4	Subarea 6							
ICES advice basis												
MSY approach: F_{MSY} × SSB (2023) /MSY $B_{trigger}$	58 912	56 645	2 267	51 320	5 325	0.35	0.33	0.01	159 133	12.20	18.70	18.70
Other scenarios												
F = $F_{MSY\ lower}$ × SSB (2023) /MSY $B_{trigger}$	36 076	34 673	1 403	31 414	3 259	0.20	0.19	0.01	179 382	26	−27	−27
F_{MSY}	61 507	59 152	2 355	53 592	5 560	0.36	0.35	0.01	156 893	10.60	24	24
F = $F_{MSY\ lower}$	37 777	36 309	1 468	32 896	3 413	0.21	0.20	0.01	177 899	25	−24	−24
F = 0	0	0	0	0	0	0	0	0	211 886	49	−100	−100
F_{pa}	90 144	86 596	3 548	78 456	8 140	0.58	0.56	0.02	132 129	−6.80	82	82
F_{lim}	101 104	97 133	3 971	88 002	9 131	0.67	0.64	0.02	122 762	−13.40	104	104
$SSB_{2024} = B_{lim}$	121 742	116 900	4 842	105 911	10 989	0.85	0.82	0.03	107 297	−24	145	145
$SSB_{2024} = B_{pa}$	72 399	69 563	2 836	63 024	6 539	0.44	0.42	0.01	149 098	5.10	46	46
SSB_{2024} = MSY $B_{trigger}$	72 399	69 563	2 836	63 024	6 539	0.44	0.42	0.01	149 098	5.10	46	46
F = F_{2022}	57 384	55 183	2 201	49 996	5 187	0.34	0.32	0.01	160 486	13.20	15.70	15.70
TAC_{2022}	49 614	47 713	1 901	43 228	4 485	0.28	0.27	0.01	167 290	18.00	0.00	0.00
TAC_{2022} −15%	42 172	40 544	1 628	36 733	3 811	0.24	0.23	0.01	173 992	23	−15.00	−15.00
TAC_{2022} +15%	57 056	54 868	2 188	49 710	5 158	0.33	0.32	0.01	160 787	13.40	15.00	15.00
TAC_{2022} −20%	39 691	38 147	1 544	34 561	3 586	0.22	0.21	0.01	176 170	24	−20	−20
TAC_{2022} +25%	62 016	59 642	2 374	54 036	5 606	0.37	0.35	0.01	156 417	10.30	25	25

* Including BMS landings, assuming recent discard rate.
** SSB 2024 relative to SSB 2023.
# Total catch in 2023 relative to the TAC in 2022 (49 614 tonnes).
Projected landings split according to the average in 1993–1998, as agreed by the relevant management authorities, i.e. 90.6% in Subarea 4 and Subdivision 3.a.20 and 9.4% in Subarea 6.
^ Total catch in 2023 relative to the advice value 2022 (49 614 tonnes).

The change in advice (+18.7%) is mainly due to a realised fishing mortality for 2021 that was lower than assumed in the previous advice and a forecasted increase in spawning stock biomass.

Basis of the advice

Table 3 Saithe in subareas 4 and 6, and in Division 3.a. The basis of the advice.

Advice basis	MSY approach
Management plan	An EU multiannual management plan (MAP) has been agreed by the EU for this stock (EU, 2018). There is no agreement with Norway and UK regarding this plan, and it is not used as the basis of the advice for this shared stock. ICES was requested by EC and UK to provide advice based on ICES MSY approach, and to include F_{MSY} ranges in the catch scenarios.

Quality of the assessment

Conflicting signals between the survey and commercial CPUE index in the previous years contributes to the assessment uncertainty. The two series yield similar signals in the 2022 assessment though.

Assumed recruitment for the intermediate year tends to be revised considerably downward with successive assessments (Figure 2). Assumed recruitment contributes substantially to the landings in 2023.

There has recently been a tendency to overestimate spawning-stock biomass (SSB) and underestimate fishing mortality (F), although this was partly caused by an error in the assessment code impacting assessments prior to 2018. Retrospective biases are getting smaller for the last two years.

The proportion of landings sampled for ages was lower in 2021 (≈ 60%) than in 2020 (< 70%) and 2019 (≈ 90%), likely because of the COVID-19 situation. Weights-at-age in the catch and selectivity patterns, however, did not exhibit unreasonable deviations from the previous years.

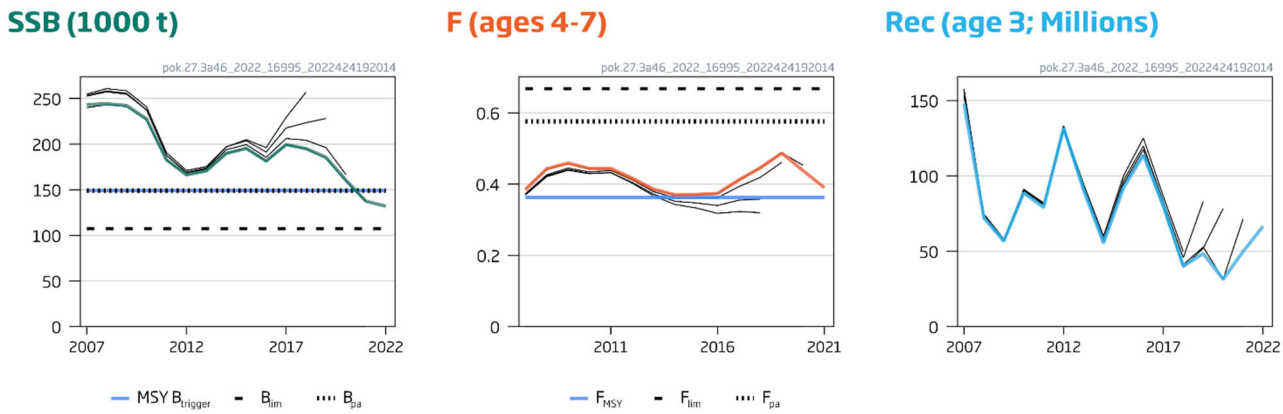


Figure 2 Saithe in subareas 4 and 6, and in Division 3.a. Historical assessment results (final-year recruitment included for each line, corresponding to the forecast recruitment in the interim year).

Issues relevant for the advice

Saithe on the Northern Shelf is under EU landing obligation and Norway and UK national legislation regulating discards. Below minimum size (BMS) landings reported to ICES in 2016–2021 were low. Discarding still continues in Subarea 4, based on observations from sampling programmes, but has decreased since 2018 (865 tonnes for 2021 in Subarea 4 and Division 3.a – i.e. 1.81% of the total catch, down from 7.9% in 2018).

Reference points

Table 4 Saithe in subareas 4 and 6, and in Division 3.a. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	149 098	B_{pa}	ICES (2019)
	F_{MSY}	0.363	EQsim analysis based on the recruitment period 1998–2017	ICES (2019)
Precautionary approach	B_{lim}	107 297	B_{loss}	ICES (2019)
	B_{pa}	149 098	$B_{lim} \times \exp(1.645 \times 0.2) \approx 1.4 \times B_{lim}$	ICES (2019)
	F_{lim}	0.668	EQsim analysis based on the recruitment period 1998–2017	ICES (2019, 2021a)
	F_{pa}	0.576	F_{P05} with advice rule (AR); the F that leads to SSB ≥ B_{lim} with 95% probability.	ICES (2021a, 2021b)
Management plan (MAP) *	MAP MSY $B_{trigger}$	149 098	MSY $B_{trigger}$	ICES (2019)
	MAP B_{lim}	107 297	B_{lim}	ICES (2019)
	MAP F_{MSY}	0.363	F_{MSY}	ICES (2019)
	MAP range F_{lower}	0.210–0.363	Consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2019)
	MAP range F_{upper}	0.363–0.564	Consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2019, 2021a)

* EU multiannual plan (MAP) for the North Sea (EU, 2018).

Basis of the assessment

Table 5 Saithe in subareas 4 and 6, and in Division 3.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical assessment SAM (ICES, 2022b) that uses catches in the model and in the forecast
Input data	Commercial catches (international landings, BMS landings, discards, and age frequencies from catch sampling); survey index (IBTS Q3 [G2829], ages 3–8); combined commercial index scaled to the exploitable biomass (French, German, and Norwegian trawler fleets). Maturity-at-age and natural mortality are assumed to be constant. Stock weights are equal to catch weights.
Discards, BMS landings, and bycatch	Discards were included, and 35% of the landings had associated discarding information; seventy-five percent of the discards were observed and 25% were raised. Of the imported discards, 96% had been sampled for age information. BMS landings for Norway are included with landings in the assessment since 2016; all other BMS landings (less than a tonne in 2021) are included with the discards. Logbook-registered discards were 0 kg.
Indicators	None
Other information	Benchmarked in 2016 (ICES, 2016a) with additional review (ICES, 2016b). An interbenchmark was conducted in 2019 (ICES, 2019).
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

History of the advice, catch, and management

Table 6a Saithe in subareas 4 and 6, and in Division 3.a. **Subarea 4 (North Sea) and Division 3.a (Skagerrak and Kattegat)**. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of official and ICES landings for the period 1987 to 2001 are presented to the nearest thousand tonnes in Subarea 4 and Division 3.a and to the nearest hundred tonnes in Subarea 6. TAC values are presented to the nearest thousand tonnes. Note that before 2000, the advice was provided for two separate areas: Subarea 4 and Division 3.a, and Subarea 6.

Year	Stock			Subarea 4 (North Sea) and Division 3.a (Skagerrak and Kattegat)				
	ICES advice	Total catch corresponding to advice	Landings corresponding to advice	Landings in Subarea 4 and Division 3.a calculated from the advice**	Agreed TAC	Official landings	ICES landings#	ICES discards##
1987	Reduce F		< 198 000		173 000	154 000	149 000	
1988	60% of F (86); TAC		156 000		165 000	113 000	107 000	
1989	No increase in F; TAC		170 000		170 000	92 000	92 000	
1990	No increase in F; TAC		120 000		120 000	85 000	88 000	
1991	No increase in F; TAC		125 000		125 000	93 000	99 000	
1992	No increase in F; TAC		102 000		110 000	92 000	92 000	
1993	70% of F (91) ~ 93000 t		93 000		93 000	99 000	105 000	
1994	Reduce F by 30%		72 000		97 000	90 000	102 000	
1995	No increase in F		107 000		107 000	97 000	113 000	
1996	No increase in F		111 000		111 000	96 000	110 000	
1997	No increase in F		113 000		115 000	86 000	103 000	
1998	Reduce F by 20%		97 000		97 000	88 000	100 000	
1999	Reduce F to F_{pa}		104 000		110 000	108 000	107 000	
2000	Reduce F by 30%		81 000	75 000	85 000	85 000	87 000	
2001	Reduce F by 20%		96 000	87 000	87 000	88 000	90 000	
2002	$F < F_{pa}$		< 148 000	< 135 000	135 000	115 000	105 632	18 394
2003	$F < F_{pa}$		< 193 000	< 175 600	165 000	107 470	106 257	9 916
2004	$F < F_{pa}$ *		< 234 000	< 211 120	190 000	103 608	102 746	7 464
2005	F according to management plan *		< 150 000	< 137 000	145 000	111 970	113 388	6 558
2006	F according to management plan (< F_{pa}) *		< 135 900	< 123 300	123 000	113 354	111 845	6 909
2007	F according to management plan (< F_{pa}) *		< 136 000	< 123 800	123 000	91 778	92 602	11 828
2008	F according to management plan (< F_{pa}) *		< 150 000	< 136 500	136 000	115 414	115 471	7 378
2009	F according to management plan (< F_{pa}) *		< 139 000	≤ 125 900	126 000	103 883	105 973	3 774
2010	F according to management plan (< F_{pa}) *		< 118 000	< 107 100	107 000	90 755	96 767	4 071
2011	See scenarios			-	93 000	89 427	91 528	3 837
2012^	F according to management plan (< F_{pa}) *		< 87 550	< 79 320	79 000	68 241	70 864	6 396
2013	Management plan (TAC +15%) *		< 100 684	< 91 219	91 220	71 516	71 406	6 392
2014	Management plan (TAC−15%) *		< 85 581	< 77 536	77 536	68 695	69 372	5 824
2015	Management plan	< 80 097		< 66 006	66 006	69 796	69 403	4 603
2016	EU-Norway management strategy	≤ 75 049		≤ 62 153	65 696	62 658	62 504	10 693
2017	MSY approach	≤ 140 653		≤ 122 122	100 287	83 594	81 570	6 339
2018	MSY approach	≤ 118 460		≤ 93 980	105 793	80 531	81 866	7 004

Year	Stock			Subarea 4 (North Sea) and Division 3.a (Skagerrak and Kattegat)				
	ICES advice	Total catch corresponding to advice	Landings corresponding to advice	Landings in Subarea 4 and Division 3.a calculated from the advice**	Agreed TAC	Official landings	ICES landings#	ICES discards##
2019	MSY approach	≤ 103 327^		≤ 87 178	93 614	87 476	87 649	4 595
2020	MSY approach	≤ 88 093		≤ 73 092	79 813	69 705	69 858	3 152
2021	MSY approach	≤ 65 687		≤ 55 317	59 512	46 168	46 947	865
2022	MSY approach	≤ 49 614		≤ 42 259	44 950			
2023	MSY approach	≤ 58 912		≤ 51 320				

* Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries.
** Projected landings split according to the average in 1993–1998, as agreed by the relevant management authorities, i.e. 90.6% in Subarea 4 and Subdivision 3.a.20 and 9.4% in Subarea 6.
# Since 2016, landings include the Norwegian component of BMS landings.
Since 2016, discards include all BMS landings except the Norwegian component.
^ Values corrected in February 2019.

Table 6b Saithe in subareas 4 and 6, and in Division 3.a. **Subarea 6 (Rockall and West of Scotland)**. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of official and ICES landings for the period 1987 to 2001 are presented to the nearest thousand tonnes in Subarea 4 and Division 3.a, and to the nearest hundred tonnes in Subarea 6. TAC values are presented to the nearest thousand tonnes. Note that before 2000, the advice was provided for two separate areas: Subarea 4 and Division 3.a, and Subarea 6.

Year	Stock			Subarea 6 (Rockall and West of Scotland)				
	ICES advice	Total catch corresponding to advice	Landings corresponding to advice	Landings in Subarea 6 calculated from the advice**	Agreed TAC	Official landings	ICES landings#	ICES discards##
1987	Reduce F		19 000		27 800	32 500	31 400	
1988	60% of F (86); TAC		35 000		35 000	32 800	34 200	
1989	No increase in F; TAC		20 000		30 000	22 400	25 600	
1990	No increase in F; TAC		24 000		29 000	18 000	19 900	
1991	No increase in F; TAC		21 000		22 000	17 900	17 000	
1992	No increase in F; TAC		< 19 000		17 000	10 800	11 800	
1993	70% of F (91) ~ 93000 t		6300		14 000	14 500	13 900	
1994	Reduce F by 30%				14 000	13 000	12 800	
1995	No increase in F		-		16 000	10 600	11 800	
1996	No increase in F		10 200		13 000	9400	9400	
1997	No increase in F				12 000	8600	9400	
1998	Reduce F by 20%		4800		10 900	7400	8400	
1999	Reduce F to F_{pa}		4800		7500	6800	7300	
2000	Reduce F by 30%		81 000	6 000	7000	6400	5900	
2001	Reduce F by 20%		96 000	9 000	9000	8700	8400	
2002	$F < F_{pa}$		< 148 000	< 13 000	14 000	5600	5519	3150
2003	$F < F_{pa}$		< 193 000	< 17 400	17 100	5220	5789	2242
2004	$F < F_{pa}$*		< 234 000	< 20 880	20 000	4810	4982	620
2005	F according to management plan*		< 150 000	< 14 000	15 000	8700	6456	1637
2006	F according to management plan ($< F_{pa}$)*		< 135 900	< 12 200	13 000	9420	9474	1675
2007	F according to management plan ($< F_{pa}$)*		< 136 000	< 12 200	13 000	6690	6602	584
2008	F according to management plan ($< F_{pa}$)*		< 150 000	< 13 500	14 000	6010	6712	981
2009	F according to management plan ($< F_{pa}$)*		< 139 000	< 13 100	13 000	6170	6294	521
2010	F according to management plan ($< F_{pa}$)*		< 118 000	< 11 100	11 000	6220	6263	412
2011	See scenarios			-	10 000	7310	6917	502
2012^	F according to management plan ($< F_{pa}$)*		< 87 550	< 8230	8000	7560	7549	887
2013	Management plan (TAC +15%)*		< 100 684	< 9464	9464	8470	8653	1397
2014	Management plan (TAC−15%)*		< 85 581	< 8045	8045	6829	7020	512

Year	Stock			Subarea 6 (Rockall and West of Scotland)				
	ICES advice	Total catch corresponding to advice	Landings corresponding to advice	Landings in Subarea 6 calculated from the advice**	Agreed TAC	Official landings	ICES landings#	ICES discards##
2015	Management plan	< 80 097		< 6848	6848	7577	7534	405
2016	EU–Norway management strategy	≤ 75 049		≤ 6448	6816	5852	5573	181
2017	MSY approach	≤ 140 653		≤ 12 670	10 404	7453	7116	139
2018	MSY approach	≤ 118 460		≤ 9751	10 215	7706	6641	322
2019	MSY approach	≤ 103 327^		≤ 9045	9713	4791	4875	59
2020	MSY approach	≤ 88 093		≤ 7584	8280	4074	4081	32
2021	MSY approach	≤ 65 687		≤ 5739	6175	3432	3534	64
2022	MSY approach	≤ 49 614		≤ 4385	4664			
2023	MSY approach	≤ 58 912		≤ 5325				

* Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries.
** Projected landings split according to the average in 1993–1998, as agreed by the relevant management authorities, i.e. 90.6% in Subarea 4 and Subdivision 3.a.20 and 9.4% in Subarea 6.
$ Incomplete data.
$$ *Status quo* catch.
Since 2016, landings include the Norwegian component of BMS landings.
Since 2016, discards include all BMS landings except the Norwegian component.
^ Values corrected in February 2019.

History of the catch and landings

Table 7 Saithe in subareas 4 and 6, and in Division 3.a. Catch distribution by fleet in 2021 as estimated by ICES for ages 3–10+ only, as used in the assessment.

Catch	Landings			Discards
50 951 tonnes	Bottom otter trawl 87%	Gillnet 3%	Other 10%	827 tonnes**
	50 124 tonnes*			

* Landings include the Norwegian component of BMS landings.
** Discards include BMS landings from EU and UK fleets.

Table 8 Saithe in subareas 4 and 6, and in Division 3.a. History of commercial landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes and over all age groups.

Subarea 4 and Division 3.a

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*	2021*
Belgium	22	28	15	18	7	27	15	2	2	3	5	6	16	15	14	6	5	11
Denmark	7991	7498	7471	5443	8068	802	8018	6331	171	5695	4913	4512	4084	5690	7017	5275	3777	2947
Faroe Isl.	558	463	60	15	108	841	146	2	8	3	1	0	18	16	4	14	28	0
France	13 628	11 830	16 953	15 083	15 881	7 203	4582*	13856*	14093*	8475	7910	11 574	10 794	10 334	12 598	11 361	9487	9146
Germany	9589	12 401	14 397	12 791	14 140	13 410	11 193	10 234	8052	9690	8602	7954	6279	7943	7952	7055	6853	4444
Greenland	403	1042	924	564	888	927	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	<1	4	0
Lithuania	0	149	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Netherlands	3	40	28	5	3	16	3	24	34	168	43	75	112	191	267	178	181	140
Norway	62 783	68 122	61 318	45 396	61 464	57 708	52 712	46 809	33 288	35 701	37 519	35 631	31 596	49 580	38 787	50 306	39 630	20 442
Poland	0	1100	1084	1384	1407	988	654	584	0	0	0	0	0	0	0	0	0	0
Portugal	0	0	228	68	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Russia	0	35	2	5	5	13	0	0	0	0	0	0	0	0	0	0	0	0
Sweden	2249	2132	1746	1381	1639	1363	1 545	1335	1306	1402	1329	1156	1198	1186	1316	1413	1181	1001
UK (E/W/NI)	457	960	9128**	9625**	11 804**	12 584**	11 887**	10 250**	7287**	10 379**	687	8888**	8561**	8640**	12 575**	11 868**	8557**	8037**
UK (Scotland)	5924	6170									7686							
Total reported	103 608	111 970	113 354	91 778	115 414	103 883	90 755	89 427	69 241	71 516	68 695	69 796	62 658	83 594	80 531	87 476	69 705	46 168
Unallocated	−862	1418	−1509	824	57	2090	6012	2101	1623	−110	677	−393	−152	−2024	1335	173	153	779
BMS landings														< 1	11	20	10	4
ICES estimate	102 746	113 388	111 845	92 602	115 471	105 973	96 767	91 528	70 864	71 406	69 372	69 403	62 506#	81 570#	81 866#	87 649#	69 858#	46 947#
TAC	190 000	145 000	123 250	135 900	135 900	125 934	107 000	93 600	79 320	91 220	77 536	66 006	65 696	100 287	105 793	93 614	79 813	59 512

* Official values are preliminary.

** Scotland+E/W/NI combined.

Since 2016, landings include the Norwegian component of BMS landings.

Subarea 6

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*	2021*
Denmark	0	0	0	0	0	0	0	0	0	0	20	0	0	5	1	7	0	0
Faroe Islands	34	25	76	32	23	60	24	5	6	25	29	3	7	13	21	7	3	2
France	053	3954	6092	4327	4170	2102	2008	2357	2612	3814	2904	3484	2299	3968	3626	1336	1263	1314
Germany	4	373	532	580	148	298	257	0	9	0	0	0	9	< 1	0	0	0	1
Ireland	95	168	267	322	288	407	520	359	364	313	128	105	185	171	231	109*	125	72
Netherlands	0	0	3	36	1	0	0	0	0	0	0	6	12	3	100	4	< 1	3
Norway	16	20	28	377	78	68	121	240	5	715	442	677	555	633	955	478	1	0
Russia	6	25	7	2	50	4	2	0	0	0	9	1	0	2	0	2	0	0
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Spain	2	3	6	3	4	8	18	31	13	21	9	15	15	4	7	24	15	38
Sweden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UK (E/W/NI)	37	133	2748**	1 424**	2955**	3491**	3168**	4500**	4549**	3 646**	97	3 286**	2 770**	2 652**	2 764**	2 824**	2 666**	2 001**
UK (Scotland)	1563	2922									3 191							
Total	4810	7623	9759	7103	7717	6438	6118	7492	7558	8534	6829	7577	5852	7453	7706	4791	4074	3432
Unallocated	172	−1167	−1 191	−501	−1005	−144	145	−575	−9	119	191	−43	−279	−337	−1 065	84	7	102
BMS landings														0	31	< 1	< 1	<1
ICES estimate	4982	6456	8568	6602	6712	6294	6263	6917	7549	8653	7020	7534	5573#	7116#	6641#	4875#	081#	3534#
TAC	20 000	15 044	12 787	14 100	14 100	13 066	11 000	9570	8230	9464	8045	6848	6816	10 404	10 215	9713	8280	6175

*Official values are preliminary.

**Scotland+E/W/NI combined.

Does not include BMS landings.

Subareas 4 and 6 and Division 3.a

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
ICES	107 72	119 844	121 32	99 204	122 184	112 26	103 030	98 446	78 414	80 059	76 392	76 936	68 709#	88 686#	88 507#	92 524#	73 938#	50 482#
TAC	210 00	160 044	136 03	150 000	150 000	139 00	118 000	103 170	87 550	100 684	85 581	72 854	72 512	110 691	116 00	103 327	88 093	65 687

Since 2016, landings include Norwegian component of BMS landings.

Summary of the assessment

Table 9 Saithe in subareas 4 and 6, and in Division 3.a. Assessment summary. Recruitment is in thousands, weights are in tonnes. High and Low indicate 95% confidence intervals.

Year	Recruitment (Age 3)			Spawning-stock biomass			Landings^	Discards^	Fishing Pressure (Ages 4–7)		
	R	High	Low	SSB	High	Low			F	High	Low
	thousands			tonnes			tonnes				
1967	142 300	198 068	102 234	152 326	191 151	121 387	88 339	12 992	0.35	0.45	0.28
1968	160 741	220 533	117 160	211 063	261 094	170 619	113 741	20 818	0.29	0.37	0.23
1969	288 405	395 667	210 221	277 547	339 122	227 153	130 580	19 713	0.32	0.40	0.26
1970	295 841	403 661	216 820	347 234	417 755	288 618	235 012	35 817	0.35	0.42	0.28
1971	357 119	482 618	264 255	463 449	556 064	386 260	265 356	43 821	0.37	0.45	0.31
1972	223 262	299 706	166 316	493 122	588 044	413 522	261 914	34 567	0.40	0.49	0.33
1973	200 110	268 342	149 228	526 082	627 242	441 237	242 513	32 651	0.43	0.51	0.35
1974	198 212	266 140	147 622	580 796	689 389	489 308	298 347	38 674	0.49	0.59	0.42
1975	234 233	313 138	175 210	519 493	618 078	436 633	271 610	33 035	0.53	0.63	0.45
1976	407 671	553 706	300 151	400 607	479 538	334 668	343 898	79 449	0.60	0.72	0.51
1977	149 479	201 231	111 036	325 517	390 113	271 618	216 393	23 520	0.59	0.71	0.49
1978	120 095	161 185	89 480	297 697	358 100	247 482	155 124	21 727	0.48	0.58	0.40
1979	87 537	117 896	64 995	278 895	331 683	234 509	128 352	14 295	0.45	0.54	0.38
1980	85 500	115 152	63 484	260 493	307 374	220 762	131 897	13 392	0.47	0.57	0.40
1981	164 775	223 432	121 516	248 809	292 160	211 891	132 273	15 971	0.47	0.56	0.39
1982	141 145	189 375	105 198	220 138	255 201	189 893	174 336	27 775	0.54	0.64	0.46
1983	148 680	199 648	110 723	220 172	255 975	189 376	180 040	22 978	0.65	0.77	0.56
1984	255 285	343 502	189 723	189 034	218 911	163 236	200 843	39 723	0.68	0.79	0.58
1985	355 869	483 515	261 921	166 175	191 526	144 180	220 870	52 802	0.71	0.82	0.60
1986	292 033	392 822	217 104	156 393	179 908	135 952	198 605	34 190	0.74	0.87	0.63
1987	149 344	200 731	111 112	165 104	189 963	143 499	167 503	24 877	0.71	0.83	0.60
1988	138 595	185 604	103 492	154 493	179 576	132 913	135 176	19 076	0.71	0.83	0.61
1989	101 911	136 623	76 019	126 511	146 590	109 183	108 892	15 707	0.69	0.81	0.59
1990	150 317	201 816	111 960	114 785	133 304	98 838	103 831	20 619	0.66	0.77	0.56
1991	175 572	234 965	131 192	107 476	124 168	93 028	108 071	22 902	0.63	0.74	0.54
1992	103 646	138 134	77 768	112 762	129 534	98 162	99 745	15 792	0.61	0.72	0.52
1993	178 040	237 385	133 531	119 117	137 620	103 102	111 499	21 119	0.65	0.76	0.55
1994	119 769	159 598	89 880	123 531	142 475	107 107	109 621	17 138	0.57	0.68	0.49
1995	216 503	291 463	160 822	142 702	165 458	123 076	121 795	19 395	0.58	0.69	0.49
1996	119 415	160 457	88 871	153 856	178 055	132 945	114 968	13 928	0.52	0.61	0.43
1997	155 443	210 191	114 956	191 026	224 560	162 499	107 348	12 755	0.44	0.53	0.37
1998	91 899	124 807	67 668	188 351	220 502	160 887	106 126	11 096	0.45	0.53	0.38
1999	121 062	164 245	89 232	199 207	233 976	169 605	110 531	8 936	0.47	0.56	0.39
2000	101 516	137 399	75 005	194 074	225 706	166 875	85 781	8 014	0.40	0.49	0.34
2001	202 624	272 991	150 395	200 010	231 858	172 537	91 741	11 118	0.38	0.46	0.32
2002	153 036	206 646	113 334	218 903	252 234	189 976	110 911	18 936	0.42	0.51	0.35
2003	159 472	214 481	118 571	204 854	236 799	177 218	110 282	11 374	0.44	0.53	0.37
2004	112 684	151 367	83 886	254 008	294 598	219 012	107 356	6 436	0.38	0.46	0.31
2005	141 072	190 644	104 390	245 029	283 108	212 072	118 625	2 592	0.38	0.46	0.32
2006	96 133	131 833	70 100	259 805	300 577	224 564	120 414	8 297	0.40	0.48	0.33
2007	148 095	205 427	106 764	243 334	282 602	209 523	94 958	11 375	0.38	0.46	0.32
2008	72 017	96 754	53 604	244 265	283 420	210 520	121 618	8 269	0.44	0.53	0.37
2009	56 618	76 005	42 176	242 360	282 807	207 697	110 972	3 548	0.46	0.55	0.39
2010	88 646	119 087	65 986	227 659	267 723	193 591	102 128	2 595	0.44	0.53	0.37
2011	79 044	107 913	57 898	182 842	214 948	155 532	98 034	3 972	0.44	0.53	0.37
2012	131 860	177 132	98 159	166 341	195 694	141 391	78 144	8 905	0.42	0.50	0.35

Year	Recruitment (Age 3)			Spawning-stock biomass			Landings^	Discards^	Fishing Pressure (Ages 4–7)		
	R	High	Low	SSB	High	Low			F	High	Low
	thousands			tonnes			tonnes				
2013	90 536	121 687	67 359	170 520	200 226	145 222	79 859	7 412	0.39	0.46	0.32
2014	55 300	74 787	40 890	189 849	222 125	162 263	76 057	6 115	0.37	0.45	0.31
2015	91 980	124 793	67 795	195 259	228 311	166 992	76 748	4 697	0.37	0.45	0.31
2016	113 926	154 414	84 055	181 437	212 322	155 044	67 620*	10 052**	0.37	0.45	0.31
2017	80 142	108 921	58 968	199 442	232 972	170 738	88 010*	6 572**	0.41	0.50	0.34
2018	40 065	54 573	29 414	195 111	227 834	167 087	88 328*	7 118**	0.45	0.54	0.37
2019	48 437	66 543	35 257	185 595	218 060	157 964	92 390*	4 244**	0.49	0.59	0.40
2020	31 416	46 511	21 220	160 486	191 960	134 172	73 791*	3 029**	0.44	0.54	0.35
2021	49 833	86 961	28 557	137 451	169 761	111 291	50 124*	827**	0.39	0.51	0.30
2022	66 473***			130 482	170 732	98 563					

^ ICES estimates; landings, and discards for ages 3–10+ only, as used in the assessment.
* Since 2016, landings include the Norwegian component of BMS landings.
** Since 2016, discards include BMS landings from EU and UK fleets.
*** Recruitment in 2022 is the geometric mean of resampled assessment recruitment estimates from 2012 to 2021.

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Download the stock assessment data and figures.

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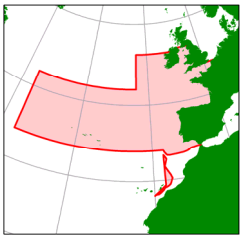
West of Ireland and Celtic Sea Saithe

Sub-area 7–10

Advice for 2023

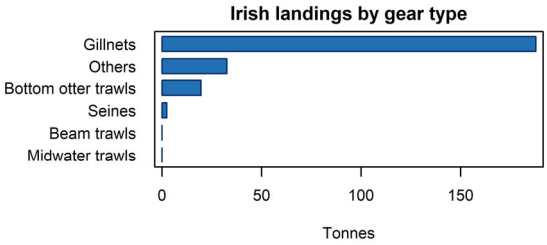
The status of this stock is unknown and there is no ICES advice.

There is no basis to give advice for this stock at present. However, FEAS note that preliminary catch data show international catches average around 297 t over the past 3 years, which is well below the TAC.



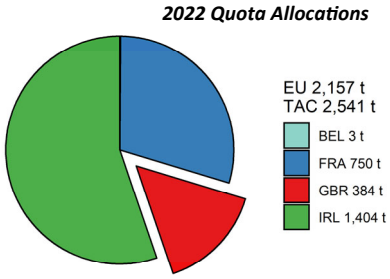
Key Points

ICES Assessment Category	Not Appropriate	
Management Plan	WWMAP (bycatch)	
Advice Basis	None	
Ranges	F_{MSY} Range Lower	Not Applicable
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Applicable
Landing Obligation	From 2016	No derogations or exemptions



Management in 2022

- The TAC for 2022 has decreased by 635 t (20%); Ireland's quota decreased by less than that due to the Hague agreement which can give Ireland an increased share of certain stocks when the TAC is below a threshold value.
- The TAC covers Sub-areas 7, 8, 9 and 10.



Key Stock Considerations

- Irish landings of saithe in Sub-area 7 are mainly taken by gillnets, however, in some years considerable by-catches of saithe are landed with hake, whiting and pollack by bottom trawler fleets.
- Irish landings in 2019 were the lowest observed in the time series with a slight increase in 2020 and 2021 landings (Table 1). There is little discarding of saithe in Irish fisheries.

Table 1. History of commercial landings of Saithe in sub-areas 7, 8, 9 and 10. All weights are in tonnes.

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	9	8	5	9	8	7	4	7	13	3	1	1	-	1
Channel Is.- Guernsey	-	8	-	4	-	2	-	-	-	-	-	-	-	-
Channel Islands (ns)	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Denmark	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Faeroe Islands	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France	3277	2144	2123	1639	1838	-	2720	911	578	457	764	396	278	326
Ireland	1915	2382	2062	1384	1431	1352	1325	1644	1263	754	629	394	393	286
Isle of Man	4	11	11	9	7	2	1	-	4	4	3	-	-	2
Netherlands	-	-	3	2	-	-	-	-	-	-	-	-	-	-
Norway	7	14	13	7	-	5	1	67	3	-	3	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	43	3
Spain	-	13	27	23	68	35	38	18	13	9	3	21	21	4
UK - Eng+Wales+N.Irl.	1059	991	1340	954	594	413	291	-	-	-	-	-	-	-
UK - Scotland	979	861	878	557	382	299	161	-	-	-	-	-	-	-
UK	-	-	-	-	-	-	-	339	292	362	340	210	116	85
Total	7251	6432	6464	4588	4328	2115	4541	2986	2166	1589	1743	1022	851	707
TAC	**14000**	**14000**	**14000**	**12000**	**8800**	**8800**	**6500**	**5600**	**8710**	**8710**	**6968**	**5574**	**4738**	**3790**

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*	2021*
Belgium	1	1	1	1	2	2	2	1	-	1	1	-	1	1
Channel Is.- Guernsey	-	-	-	-	-	-	-	-	-	-	-	-		-
Channel Islands (ns)	-	-	-	-	-	-	-	-	-	-	-	-		-
Denmark	-	-	-	-	-	-	-	-	-	-	-	-		-
Faeroe Islands	-	1	-	-	-	-	-	-	-	-	-	-		-
France	249	231	250	229	338	269	117	93	88	94	62	68	54	41
Ireland	163	254	303	685	981	1359	1037	659	720	588	350	154	180	213
Isle of Man	1	2	7	2	1	1	1	-	-	-	-	-		-
Netherlands	-	-	-	-	-	-	1	1	-	-	-	-		-
Norway	-	-	-	-	1	-	-	-	-	-	-	-		-
Portugal	2	3	2	4	4	7	8	5	5	4	4	4	4	2
Spain	5	3	7	10	1	-	3	1	2	-	-	8	25	-
UK - Eng+Wales+N.Irl.	-	-	-	-	-	-	-	-	-	-	-	-		-
UK - Scotland	-	-	-	-	-	-	-	-	-	-	-	-		-
UK	75	110	84	67	147	233	168	102	119	62	78	60	43	33
Total	496	605	654	998	1475	1871	1337	863	935	749	496	295	306	291
TAC	**3790**	**3790**	**3411**	**3343**	**3343**	**3176**	**3176**	**3176**	**3176**	**3176**	**3176**	**3176**	**3176**	**2541**

*Preliminary data (ICES)

EUROPEAN SEA BASS

(*DICENTRARCHUS LABRAX*)

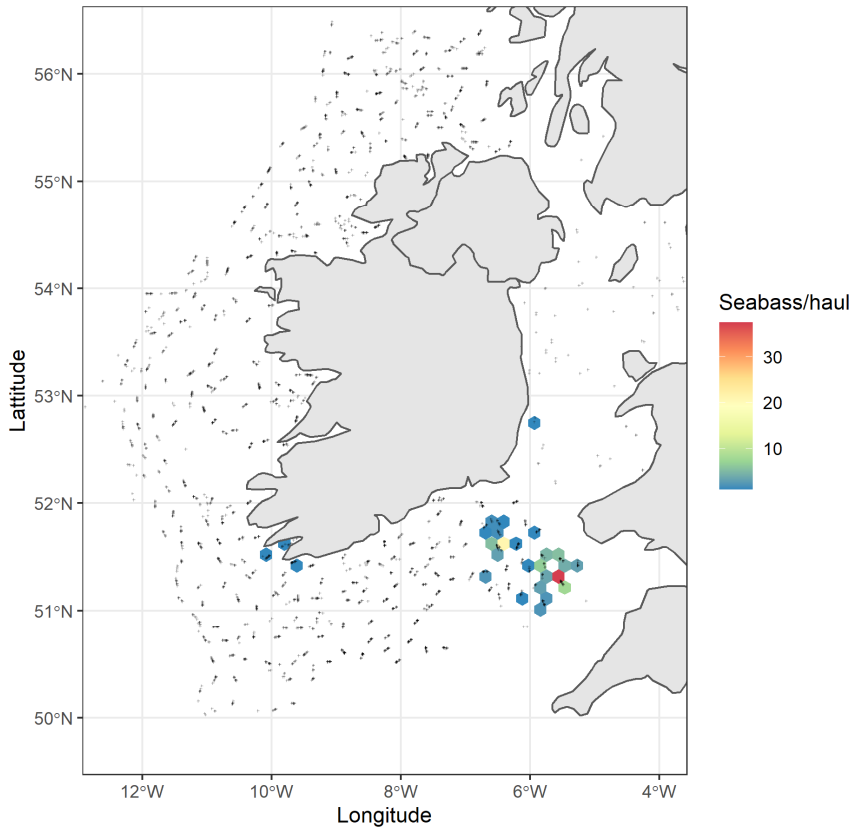
BIOLOGY – SPECIES

European sea bass is a marine member of the Order Perciformes and can be found distributed around the coasts of all countries in the north-west Atlantic region. It is a slow growing species, living to over 25 years and reaching sexual maturation between ages 4 and 7. Juvenile sea bass, commonly found in inshore nurseries such as estuaries, begin shoaling as adolescents at 3 to 4 years of age. Adult sea bass typically spends warmer periods in shallow inshore waters where they feed opportunistically. At the onset of colder periods, some adults may migrate to offshore locations, presumably to spawn, while others have been found to reside in inshore waters, suggesting the potential for local spawning events and recruitment.

Adult sea bass have been found to display high fidelity to inshore feeding areas with fish often present annually at the same locations.

DISTRIBUTION IN IRISH WATERS

Though distributed around the Irish coast, sea bass are primarily concentrated along the southern coast of divisions 7.j, 7.g. and 7.a.During colder periods, adult sea bass aggregate in shoals offshore to feed. Marine Institute research surveys have found a relatively clustered distribution of sea bass in the eastern Celtic Sea, particularly during the late autumn/early winter period.



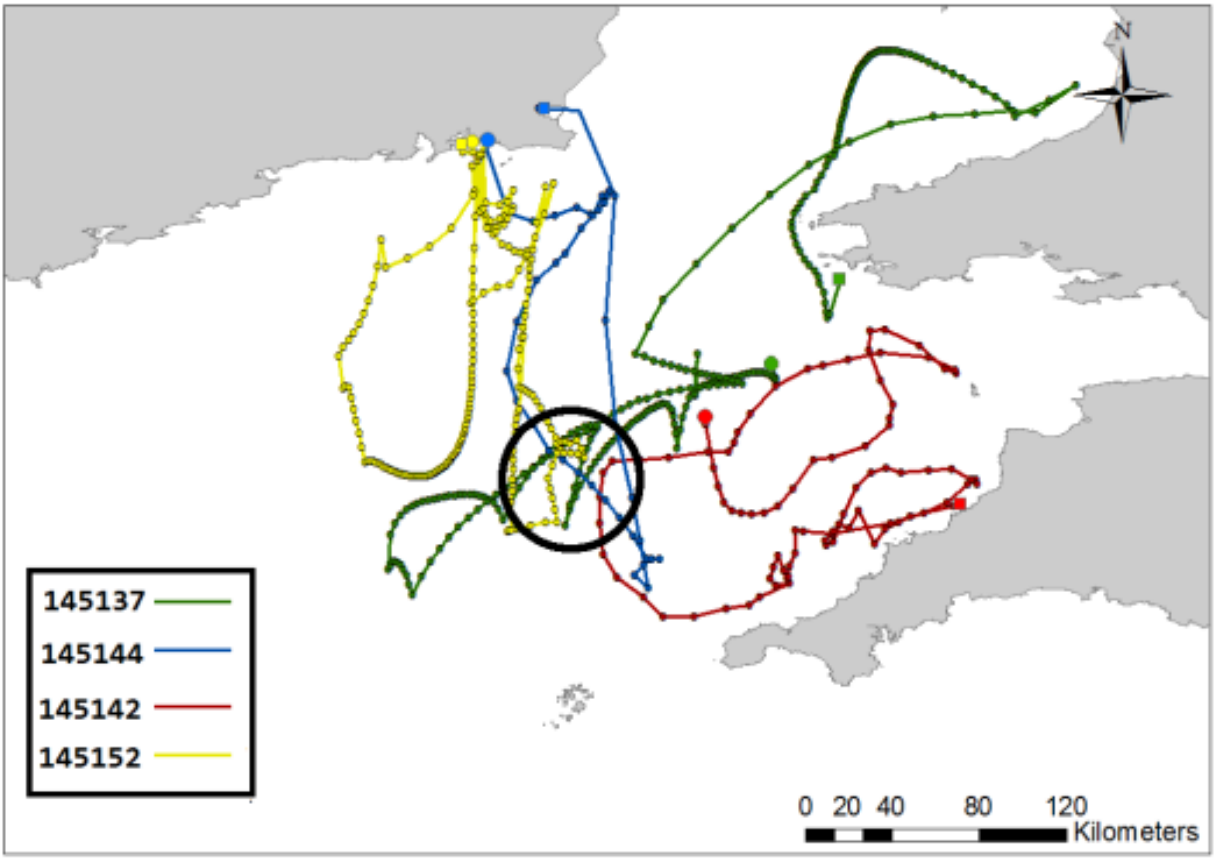
◀ The distribution of sea bass sampled during research surveys (IGFS) in offshore waters shows clustering in the eastern Celtic Sea and Bristol Channel region between 2003 and 2021.

Irish Landings and Fishery

Since 1990, there has been a ban on commercial fishing of sea bass by Irish vessels (Bass Conservation of Stocks Order, 1990). As a result, reported landings from Irish waters are relatively low. Recreational catches of sea bass are also strictly controlled.

Recent Research

The Marine Institute investigated the impact of water temperature and salinity on the behaviour and distribution of European sea bass within the Celtic Sea and Irish Sea regions using of biotelemetry (electronic tags to track fish movements). The Sea bass which were tagged were found to have wide range of movement behaviours along the Irish coastline. While many fish did show evidence of small home ranges (i.e. travelling <10km from where they were originally tagged), some individuals were observed to undertake considerable migrations (>450km).



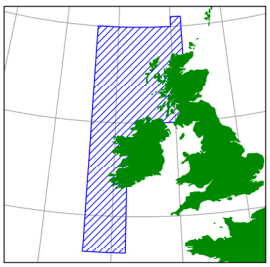
Interpolated satellite tracks from sea bass tagged in the Celtic Sea showing migrations from coastal locations to offshore spawning areas in April-June (as indicated by the circle).

West of Scotland, West of Ireland, eastern part of southwest of Ireland Sea bass

Divisions 6.a, 7.b, and 7.j

Advice for 2023

ICES advises that when the precautionary approach is applied, commercial landings should be no more than 3 t in each of the years 2021, 2022, and 2023. ICES cannot quantify total catches.



Key Points

ICES Assessment Category	6	
Management Plan	WWMAP(target)	
Advice Basis:	ICES PA approach	Catch=3 t
Ranges	F_{MSY} Range Lower	Not available
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not available
Landing Obligation	Does not apply (Not a TAC species)	

Management in 2022

- There is no agreed TAC for sea bass in Divisions 6.a, 7.b, and 7.j.
- A series of measures have been introduced because of the low stock size. The most recent measures on sea bass fisheries are set out in Article 11 of Regulation (EU) 2022/515 (amending Regulation (EU) 2022/109). Only catch and release recreational fisheries are allowed in January, February and December, a bag limit of two fish per day was put in place between March and November.
- The minimum size of European seabass retained by recreational fisheries is 42 cm.
- A prohibition on landings of sea bass by Irish commercial vessels has been in place in Ireland since 1990 (under Irish statute).
- Nationally, the Sea Fisheries Maritime Jurisdiction Act 2006 set out fishing restrictions under two statutory instruments:
    - S.I. No. 230 of 2006, prohibits the fishing, landing, transhipping or retaining of sea bass on board an Irish commercial fishing boat; the use of nets; and prescribes an MCRS of 40 cm.
    - S.I. No. 367 of 2007 prohibits sale or offer for sale of sea bass (other than those imported).

Key Stock Considerations

- The advice provided for 2021-2023 was 3 t; a decrease of 1 t (-25%) from the previous advice (2018-2020), owing to the application of a 20% precautionary buffer. Official reported landings are extremely low and caught solely by French fishing vessels in Division 7.j.
- Sea bass stock identity is poorly understood. There are ongoing tagging experiments led by Inland Fisheries Ireland on the western coast of Ireland.
- Previous tag/recapture studies on sea bass on the western Irish coastline have shown evidence of interconnectivity with the Celtic Sea.

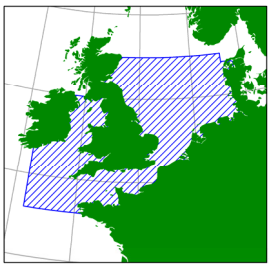
Irish and Celtic Seas, North Sea, English and Bristol Channel Sea Bass

Divisions 4.b-c, 7.a, and 7.d–h

Advice for 2023

ICES advises that when the MSY approach is applied, total removals in 2023 should be no more than 2,542 t.

ICES notes the existence of a precautionary management plan, developed and adopted by some of the relevant management authorities for this stock.



Key Points

ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target)	
Advice Basis:	ICES MSY approach	Catch = 2,542 t
Ranges	F_{MSY} Range Lower	Catch = Not available
	F_{MSY}	Catch = 2,821t
	F_{MSY} Range Upper	Catch = Not available
Landing Obligation	Does not apply (Not a TAC species)	

Management in 2022

- There is no TAC for sea bass in divisions 4.b-c, 7.a, and 7.d–h.
- A series of measures have been introduced because of the low stock size. The most recent measures on sea bass fisheries are set out in Article 11 of Regulation (EU) 2022/515 (amending Regulation (EU) 2022/109). Only catch and release recreational fisheries are allowed in January, February and December, a bag limit of two fish per day was put in place between March and November.
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    - S.I. No. 367 of 2007 prohibits sale or offer for sale of sea bass (other than those imported).

Key Stock Considerations

- The stock is below MSY $B_{trigger}$ in 2023 and the advised fishing mortality for 2023 is below F_{MSY} due to application of the ICES advice rule (see Definition of fisheries technical terms and acronyms).
- The increase in advice for 2023 of 15% relative to 2022 is mainly due to an increase in spawning-stock biomass and the slightly higher fishing mortality implied by the advice rule.
- The stocks around Ireland and Britain are believed to belong to the same genetic population. Tagging research conducted by the Marine Institute has shown that sea bass may undergo long migrations from Irish coasts into the Celtic Sea and Bristol Channel, returning to the Irish coast.

Published 30 June 2022

Sea bass (*Dicentrarchus labrax*) in divisions 4.b–c, 7.a, and 7.d–h (central and southern North Sea, Irish Sea, English Channel, Bristol Channel, and Celtic Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, total removals[†] in 2023 should be no more than 2542 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and spawning-stock size is below MSY $B_{trigger}$ and between B_{pa} and B_{lim}.

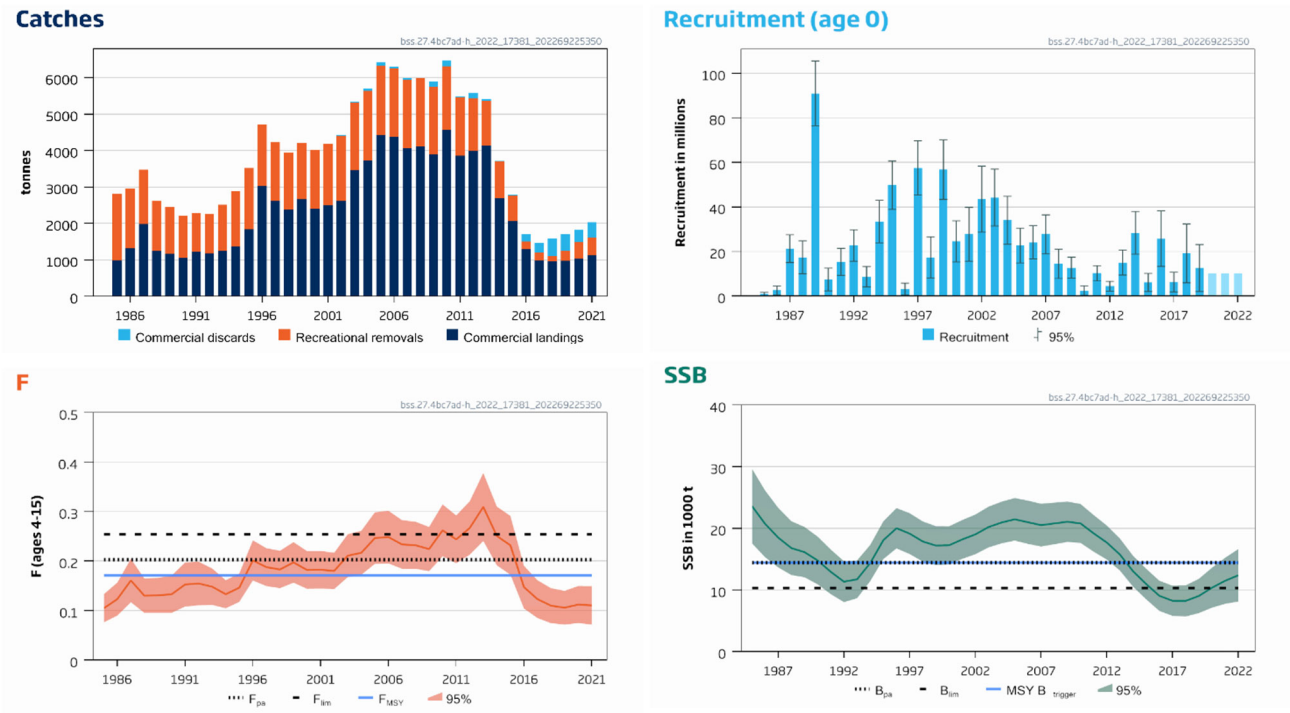

Figure 1 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. Summary of the stock assessment. Recreational removals are model estimates based on a survey in 2012 and implemented management measures. Discard estimates are available since 2002. Fishing mortality (F) is shown for the combined commercial and recreational fisheries. The assumed recruitment values for 2020–2022 are shaded in a lighter colour.

[†]Total removals include both commercial and recreational catches, taking mortality of released fish into account (estimated at approximately 5%).

Catch scenarios

Table 1 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 4–15}$ (2022)	0.113	Total F, $F_{sq} = F_{average\ (2019–2021)}$ (0.081) for commercial fishery, plus F_{rec} = 0.031*, assuming full compliance of recreational fisheries in 2022
SSB (2023)	12899	Short-term forecast; in tonnes
$R_{age\ 0}$ (2020–2023)	10105	Geometric mean (2010–2019); in thousands
Total removals (2022)	1870	Short-term forecast fishing at F = 0.113; in tonnes
Total landings (2022)	1211**	Short-term forecast; in tonnes
Discards (2022)	148**	Short-term forecast; in tonnes
Recreational removals (2022)	511	Short-term forecast assuming an F = 0.031; in tonnes

* Recreational F as estimated in 2012 (0.068, reduced [by 54%]) to account for management measures since 2012.
** The split of total commercial F into commercial landings and commercial discards in the interim year is estimated by the model.

Table 2 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. Annual catch scenarios for 2023. All weights are in tonnes.

Basis	Total removals* (2023)	F_{total} (2023)	SSB (2024)	% SSB change**	% advice change ***
ICES advice basis					
MSY approach: $F = F_{MSY} \times SSB_{2023}/MSY\ B_{trigger}$	2542	0.153	12631	−2.1	14.7
Other scenarios					
EU MAP^: $F_{MSY} \times SSB_{2023}/MSY\ B_{trigger}$	2542	0.153	12631	−2.1	14.7
EU MAP^: $F_{MSY\ upper} \times SSB_{2023}/MSY\ B_{trigger}$	2542	0.153	12631	−2.1	14.7
EU MAP^: $F_{MSY\ lower} \times SSB_{2023}/MSY\ B_{trigger}$	2133	0.127	12964	0.50	−3.7
$F = F_{MSY}$	2821	0.171	12405	−3.8	27
F = 0	0	0	14716	14.1	−100
F_{pa}	3294	0.20	12021	−6.8	49
F_{lim}	4096	0.25	11430	−11.4	85
$SSB_{2024} = B_{lim}$	5422	0.36	10313	-20	145
$SSB_{2024} = B_{pa}$	336	0.0190	14439	11.9	−85
$SSB_{2024} = MSY\ B_{trigger}$	336	0.0190	14439	11.9	−85
$F = F_{2022}$	1906	0.113	13149	1.94	−14.0
$SSB_{2024} = SSB_{2023}$	2213	0.132	12899	0.00	−0.135

* Includes commercial catch and recreational removals (taking mortality of released fish into account, estimated at approximately 5%).
** SSB 2024 relative to SSB 2023.
*** Advice value for 2023 relative to the MSY value for 2022 (2216 tonnes).
^ MAP multiannual plan (EU, 2019).

The increase in advice for 2023 is due to an increase in stock size, with the larger spawning-stock biomass also allowing a higher target fishing mortality.

Basis of the advice

Table 3 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

Limited sampling of the discards and recreational removals, leads to uncertainty in catch data and increases the uncertainty in the assessment. The discard values are estimated from sampling programmes and more recently from a combination of sampling programmes and logbooks, where sampling is variable across fleets and years. Estimates of discards are available only from the early 2000s, but do not cover all fisheries, are imprecise, and are only included for some fleets in the assessment. For the forecast, the discard ratio assumed is the estimate provided by the assessment model. However, this assumed rate is much lower that the recently observed discards.

The estimate of 1440 tonnes of recreational removals (including post-release mortality, estimated 5%) in 2012 is based on multiple surveys covering a range of years. As in previous years, the mortality rate from recreational removals for 1985–2014 (excluding 2012) was assumed to be the same as estimated for 2012. In the assessment, the mortality rate from recreational removals for 2015–2021 was derived by scaling down the F from 2012 to account for the management measures in these years, assuming full compliance.

Fishery sampling rates have been variable over time for all countries. Additional information on recreational removals from all countries is needed in order to improve these estimates and the stock assessment model.

Stock identity is still under investigation.

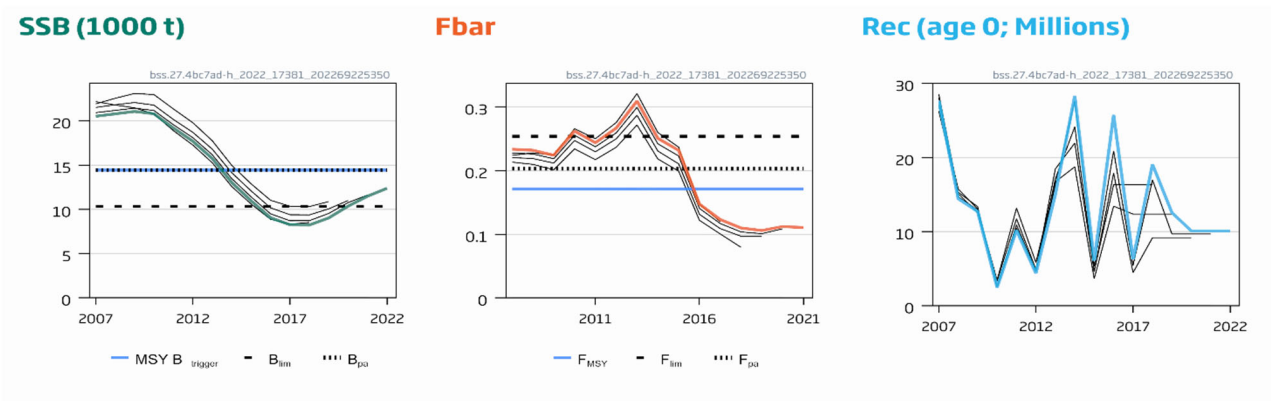

Figure 2 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. Historical assessment results (final-year SSB estimates and final three years of recruitment assumptions are included).

Issues relevant to the advice

Following the prohibition of the directed sea bass fishery in 2015, discarding has increased. Sea bass is still being caught as bycatch.

ICES notes that under the ICES MSY approach scenario, the SSB in 2024 is expected decrease slightly, remaining below MSY $B_{trigger}$.

ICES does not provide any split in the catch scenarios table this year as the recreational fishing pressure cannot be allocated in the absence of known management measures in 2023 (e.g. bag limit) and the limited data on recreational removals.

Reference points

Table 4 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	14439	B_{pa}; in tonnes	ICES (2019)
	F_{MSY}	0.1713	Stochastic simulations (EqSim)	ICES (2019)
Precautionary approach	B_{lim}	10313	B_{loss} (lowest value in the time-series, SSB in 2018 as estimated by the WGCSE 2019 assessment); in tonnes	ICES (2019)
	B_{pa}	14439	$B_{lim} \times 1.4$; in tonnes	ICES (2019)
	F_{lim}	0.254	Stochastic simulations (EqSim)	ICES (2019)
	F_{pa}	0.203	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability	ICES (2019, 2021)
Management plan*	MAP MSY $B_{trigger}$	14439	MSY $B_{trigger}$; in tonnes	EU (2019)
	MAP B_{lim}	10313	B_{lim}; in tonnes	EU (2019)
	MAP F_{MSY}	0.1713	F_{MSY}	EU (2019)
	MAP range F_{lower}	0.142	Consistent with ranges provided by ICES (2019), resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2019) and EU (2019)
	MAP range F_{upper}	0.1713	Consistent with ranges provided by ICES (2019), resulting in no more than 5% reduction in long-term yield compared with MSY	ICES (2019) and EU (2019)

* EU multiannual plan (MAP) for the Western Waters and adjacent waters (EU, 2019).

Basis of the assessment

Table 5 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022b)
Assessment type	Age- and length-based analytical assessment (Stock Synthesis 3; NOAA Toolbox)
Input data	Commercial landings (international landings, ages and length frequencies from catch sampling); commercial discards (UK bottom otter trawl and nets and combined French fleet, length frequencies from catch sampling); one recruit survey (UK Solent autumn survey [G9863], 1986 to present, excluding 2010 and 2012); one bottom trawl survey (Channel Groundfish Survey [G3425], 1988–2014); one commercial tuning fleet (2001 to present); growth and maturity data from sampling of commercial catches and surveys; natural mortality (inferred from life-history parameters and maximum observed ages)
Discards and bycatch	Discards included in the model and forecast for some of the fleets
Recreational	Used in the model and in the forecast
Indicators	None
Other information	Benchmarked in 2018 (ICES, 2018)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. History of ICES advice, and ICES estimates of landings, discards, and official landings. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice*	Official commercial landings	ICES commercial landings	ICES commercial discards^	ICES recreational removals
2000	-	-	2100	2407		
2001	-	-	2200	2500		
2002	No increase in effort or F	-	2400	2622	17	
2003	No increase in effort or F	-	2900	3459	16	
2004	No increase in effort or F	-	3000	3731	59	
2005	-	-	3200	4430	96	
2006	-	-	3396	4377	53	
2007	-	-	3521	4064	50	
2008	-	-	3027	4107	8	
2009	-	-	4288	3889	151	
2010	-	-	4952	4562	148	
2011	-	-	4183	3858	22	
2012	No increase in catch	-	3982	3987	157	1440
2013	20% reduction in catches (average of the last three years)	< 6000**	4243	4137	53	
2014	36% reduction in commercial landings (20% reduction, followed by 20% precautionary reduction)	< 2707**	2816	2682	25	
2015	MSY approach	< 115***	2081	2066	40	
2016	MSY approach	≤ 541***	1300	1295	199	
2017	Precautionary approach	0	1027	984	271	
2018	MSY approach	≤ 880^^^	931	948	482	
2019	MSY approach	≤ 1806^^^	970	972	464	
2020	Management plan	1634–1946^^^	1150^^	1042	325	
2021	Management plan	2000 (range 1680–2000) ^^^	1275^^	1126	412	
2022	MSY approach	≤ 2216^^^				
2023	MSY approach	≤ 2542^^^				

* Advice prior to 2014 was provided for sea bass in the Northeast Atlantic.
** Commercial landings.
*** Total landings (commercial and recreational landings).
^ Incomplete for some fleets 2002-2008.
^^ Preliminary.
^^^ Includes commercial catch and recreational removals (taking mortality of released fish into account, estimated at approximately 5%).

History of the catch and landings

Table 7 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. Catch distribution by fleet in 2021 as estimated by ICES.

Total catch	Commercial landings						Commercial discards	Recreational removals
2027 tonnes	Lines 46%	Bottom trawlers 21%	Other gears 2.9%	Fixed/drift nets 24%	Danish seine 5.4%	Pelagic trawlers < 1%	412 tonnes	489 tonnes
	1126 tonnes							

Table 8 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. History of commercial landings by country and ICES estimates of landings. All weights are in tonnes.

Year	Belgium	Denmark	Germany	France	UK	Netherlands	Channel Is.	Total	Total ICES
1985	0	0	0	620	105	0	18	743	994
1986	0	0	0	841	124	0	15	980	1319
1987	0	0	0	1226	123	0	14	1363	1980
1988	0	18	0	714	173	8	12	925	1239
1989	0	2	0	675	192	2	48	919	1161
1990	0	0	0	609	189	0	25	824	1063
1991	0	0	0	726	239	0	16	982	1227
1992	0	0	0	721	148	0	36	906	1186
1993	0	1	0	718	230	0	45	994	1255
1994	0	1	0	593	535	0	49	1178	1371
1995	0	1	0	801	708	0	69	1579	1835
1996	0	1	0	1703	563	8	56	2331	3022
1997	0	1	0	1429	561	1	74	2066	2620
1998	0	2	0	1363	488	48	79	1980	2390
1999	0	1	0	na	685	32	108	826	2670
2000	0	5	0	1522	407	60	130	2124	2407
2001	0	2	0	1619	458	77	80	2236	2500
2002	0	1	0	1580	627	96	73	2377	2622
2003	154	1	0	1903	586	163	84	2891	3459
2004	159	1	0	1883	617	191	159	3010	3731
2005	206	1	0	1937	512	327	220	3203	4430
2006	211	2	0	2116	736	308	23	3396	4377
2007	178	1	0	2075	873	376	18	3521	4064
2008	187	0	0	1506	934	380	20	3027	4107
2009	174	0	0	2904	801	395	15	4288	3889
2010	216	4	0	3441	879	399	14	4952	4562
2011	152	2	0	2688	928	395	17	4183	3858
2012	154	3	0	2492	946	376	12	3982	3987
2013	146	4	2	2868	841	370	12	4243	4137
2014	148	1	1	1322	1080	253	11	2816	2682
2015	40	0	0	1113	701	218	9	2081	2066
2016	23	0	1	545	551	156	24	1300	1295
2017	22	0	0	423	438	132	12	1027	984
2018	18	0	0	297	432	172	11	931	948
2019	19	0	0	309	411	209	22	970	972
2020*	24	0	0	387	521	218	0	1150	1042
2021*	45	0	0	385	613	231	1	1275	1126

* Preliminary official landings.

Summary of the assessment

Table 9 Sea bass in divisions 4.b–c, 7.a, and 7.d–h. Assessment summary. Weights are in tonnes and recruitment in thousands. 'High' and 'Low' refer to 95% confidence intervals.

Year	Recruitment age 0			SSB			Total $F_{ages\ 4–15}$			F_{bar} commercial catch	F_{bar} recreational removals	Commercial landings	Commercial discards*	Recreational removals**
	Low	Value	High	Low	Value	High	Low	Value	High					
1985	74	855	1635	17572	23629	29686	0.076	0.105	0.133	0.037	0.068	994		1820
1986	442	2490	4538	15315	20735	26155	0.09	0.123	0.157	0.056	0.068	1318		1638
1987	15045	21289	27534	13658	18496	23333	0.117	0.161	0.20	0.093	0.068	1979		1493
1988	9976	17384	24793	12431	16800	21168	0.095	0.130	0.165	0.062	0.068	1239		1384
1989	76439	90994	105549	12061	16146	20231	0.096	0.131	0.166	0.063	0.067	1161		1279
1990	2289	7431	12574	10912	14789	18665	0.095	0.133	0.17	0.066	0.068	1064		1150
1991	9230	15313	21397	9323	12945	16566	0.108	0.153	0.197	0.085	0.068	1226		1056
1992	15613	22686	29758	8027	11350	14673	0.111	0.155	0.199	0.087	0.068	1186		1080
1993	4094	8674	13254	8663	11735	14807	0.111	0.148	0.185	0.08	0.068	1256		1258
1994	23880	33431	42982	11432	14377	17322	0.105	0.133	0.161	0.066	0.067	1370		1508
1995	38898	49741	60583	15017	18087	21156	0.118	0.146	0.175	0.079	0.067	1835		1689
1996	455	3124	5793	16747	20021	23296	0.161	0.20	0.24	0.133	0.068	3022		1696
1997	45330	57526	69722	15828	19147	22467	0.150	0.188	0.23	0.120	0.068	2620		1605
1998	8068	17317	26565	14607	17868	21128	0.145	0.183	0.22	0.115	0.068	2390		1548
1999	43395	56771	70148	14047	17205	20362	0.156	0.197	0.24	0.129	0.068	2670		1548
2000	15298	24547	33797	14165	17255	20346	0.144	0.182	0.22	0.114	0.068	2407		1601
2001	15645	27708	39770	15049	18200	21351	0.145	0.182	0.22	0.114	0.068	2500		1685
2002	28707	43508	58309	15800	19024	22247	0.143	0.18	0.22	0.112	0.068	2622	17	1782
2003	31439	44224	57010	16902	20213	23524	0.168	0.21	0.25	0.143	0.068	3459	16	1863
2004	23245	34018	44791	17568	20953	24337	0.172	0.22	0.26	0.149	0.068	3731	59	1908
2005	14857	22668	30479	18014	21470	24925	0.194	0.25	0.30	0.178	0.068	4430	96	1905
2006	16681	24147	31614	17485	20993	24501	0.195	0.25	0.30	0.180	0.068	4377	53	1874
2007	18925	27697	36469	17050	20524	23998	0.185	0.23	0.28	0.165	0.068	4064	50	1871
2008	7871	14458	21046	17419	20797	24175	0.184	0.23	0.28	0.164	0.068	4107	8	1878
2009	8033	12729	17424	17793	21070	24347	0.180	0.22	0.27	0.156	0.068	3889	151.2	1852
2010	339	2456	4572	17643	20805	23967	0.21	0.26	0.31	0.194	0.068	4562	147.9	1751
2011	6762	10188	13613	16213	19192	22171	0.196	0.24	0.29	0.176	0.068	3858	22	1605

Year	Recruitment age 0			SSB			Total $F_{ages\ 4–15}$			F_{bar} commercial catch	F_{bar} recreational removals	Commercial landings	Commercial discards*	Recreational removals**
	Low	Value	High	Low	Value	High	Low	Value	High					
2012	2163	4378	6593	14932	17702	20471	0.21	0.27	0.32	0.199	0.068	3987	156.6	1440
2013	9443	15034	20624	13144	15749	18355	0.24	0.31	0.38	0.24	0.068	4137	53.4	1222
2014	18802	28374	37947	10524	13040	15557	0.191	0.25	0.31	0.184	0.067	2682	24.7	1008
2015	2030	6095	10161	8483	10967	13451	0.172	0.23	0.29	0.177	0.055	2066	39.5	689
2016	13317	25790	38263	6603	9058	11514	0.104	0.147	0.191	0.128	0.019	1295	198.6	209
2017	1860	6281	10702	5810	8254	10699	0.085	0.123	0.161	0.104	0.0189	984	271.102	206
2018	5906	19116	32326	5706	8231	10756	0.074	0.11	0.145	0.097	0.0131	948	482.4	150
2019	2009	12589	23169	6251	9033	11816	0.072	0.106	0.140	0.085	0.021	972	463.9	274
2020		10105^		7130	10369	13609	0.075	0.112	0.150	0.081	0.032	1042	325	453
2021		10105^		7754	11491	15227	0.072	0.111	0.149	0.079	0.032	1126	411.8	489
2022		10105^		8128	12384	16640								

* Incomplete for some fleets 2002–2008.

** All values were derived from the 2012 survey estimate (1440 tonnes).

^ Geometric mean recruitment (2010–2019).

Sources and references

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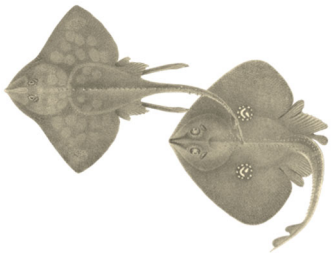
Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Seabass (*Dicentrarchus labrax*) in Divisions 4.b-c, 7.a, and 7.d-h (central and southern North Sea, Irish Sea, English Channel, Bristol Channel, and Celtic Sea). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, bss.27.4bc7ad-h. https://doi.org/10.17895/ices.advice19447796.

Skates and Rays in the Celtic Seas

Sub-areas 6 and 7 excluding Division 7.d



Advice for 2023

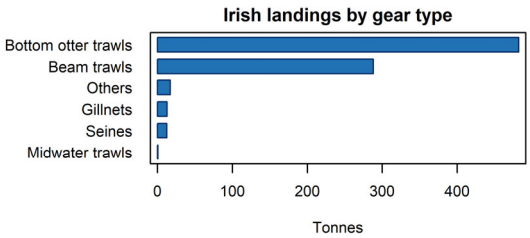
ICES provides individual advice for each stock within this species assemblage. ICES provided advice for most of these stocks in 2022 for 2023 and 2024.

In 2022 cuckoo ray (rjn.27.678abd) and undulate ray in the channel (rju.27.7de) were upgraded to Category 2 stocks from Category 3. The new ICES data limited (rfb) method was applied to the other Category 3 stocks for the first time.

A summary of the ICES advice for all stocks is provided in the table on the following page. ICES also advises that management of the catches of skates and rays under a combined TAC prevents effective control of single-stock exploitation rates and could lead to overexploitation of some species.

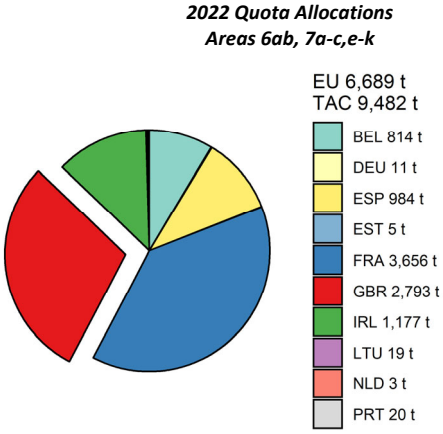
Key Points

ICES Assessment Category	2, 3 and 5 (MSY based assessment, Trend-based assessment and Landings only)	
Management Plan	WWMAP (bycatch)	
Advice Basis	See individual stocks	
Ranges	F_{MSY} Range Lower	Not available
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not available
Landing Obligation	From 2019	A high-survival exemption for all non-zero TAC species is in place from 2019 (EC 2020/2015)



Management in 2022

- Skates and rays in Divisions 6.a, 6. b, 7.a-c and 7.e-k are managed under a single TAC for all species. Catches of white skate, common skate, long-nosed skate, and undulate ray in Subarea 6, are prohibited from landing and must be returned unharmed where possible.
- Accidental bycatches of undulate ray in area Divisions 7.d and 7.e of no more than 234 t may be taken. Similarly, no more than 123 t of small-eyed ray in Divisions 7.fg may be taken.
- Advice is provided biennially for non-zero TAC stocks. For zero TAC stocks, the advice is biennial or triennial.
- There is a requirement to separately report catches of cuckoo, thornback, blonde, spotted, sandy and shagreen ray.
- Most stocks are contained within ICES subareas 6 and 7. Certain stocks, e.g. cuckoo ray, extend into other areas (e.g. Subarea 8).
- The TAC has been restrictive for Irish and French vessels in recent years.



KEY STOCK CONSIDERATIONS

- The ICES rfb method was applied in 2022 to Category 3 stocks. The Precautionary Buffer is no longer used in this method.
- The Precautionary Buffer was applied by ICES in 2020 to most Category 3 stocks.
- The Precautionary Buffer was applied by ICES in 2018 to Category 5 stocks (landings only). The Precautionary Buffer once applied is generally not reapplied for 3 years subsequently.
- A high-survival exemption for all non-zero TAC species is in place from 2019. Following EC 2019/2239 and EC 2020/2015, this has been extended until 2022.

RAJA CLAVATA (Thornback ray) Divisions 7.a,f,g	ICES advises that when the MSY approach is applied, landings should be no more than 1,833 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754425
RAJA CLAVATA (Thornback ray) Sub-area 6	ICES advises that when the MSY approach is applied, landings should be no more than 96 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754422
RAJA CLAVATA (Thornback ray) Division 7.e	ICES advises that when the precautionary approach is applied, landings should be no more than 170 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754428
RAJA MONTAGUI *(Spotted ray)* Divisions 7.a,e,f,g,h	ICES advises that when the MSY approach is applied, landings should be no more than 814 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754461
RAJA MONTAGUI (Spotted ray) Sub-area 6 and Divisions 7.b,j	ICES advises that when the MSY approach is applied, landings should be no more than 36 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754458
RAJA BRACHYURA (Blonde ray) Divisions 7.a,f,g	ICES advises that when the precautionary approach is applied, landings should be no more than 573 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754446
RAJA BRACHYURA (Blonde ray) Sub-area 6 and Division 4.a	ICES advises that when the precautionary approach is applied, landings should be no more than 7 t in each of the years 2022 and 2023. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.7844

RAJA BRACHYURA (Blonde ray) Division 7.e	ICES advises that when the precautionary approach is applied, landings should be no more than 213 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754449
LEUCORAJA NAEVUS (cuckoo ray) Sub-areas 6, 7, and Divisions 8.a,b,d	ICES advises that when the MSY approach is applied, landings in 2023 and 2024 should be no more than 7,826 t and 8,064 t respectively. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754470
LEUCORAJA CIRCULARIS (Sandy ray) Sub-areas 6 and 7	ICES advises that when the precautionary approach is applied, landings should be no more than 27 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754455
LEUCORAJA FULLONICA (Shagreen ray) Sub-areas 6 and 7	ICES advises that when the precautionary approach is applied, landings should be no more than 134 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754443
OTHER SKATES *Sub-areas 6 and 7*	ICES cannot provide catch advice for this advice unit due to a lack of reliable survey and catch data. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754410
RAJA MICROOCELLATA (Small-eyed ray) Divisions 7.f,g	ICES advises that when the MSY approach is applied, landings should be no more than 86 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754440
RAJA MICROOCELLATA (Small-eyed ray) Divisions 7.d,e	ICES advises that when the precautionary approach is applied, landings should be no more than 32 t in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches. A high-survival exemption is in place for this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754437
RAJA UNDULATA (Undulate ray) Divisions 7.b,j	ICES advises that when the precautionary approach is applied, there should be zero catches on this stock in each of the years 2023 and 2024. The Landing Obligation does not apply to this stock. Full ICES advice available here: https://doi.org/10.17895/ices.advice.19754479
RAJA UNDULATA (Undulate ray) Divisions 7.d,e	ICES advises that when the MSY approach is applied, catches should be no more than 4,836 t and 4,675 t in 2023 respectively. The discard rate at this catch level cannot be quantified. The Landing Obligation does not apply to this stock. Full ICES advice available here: . https://doi.org/10.17895/ices.advice.19754482

DIPTURUS (Skate) Species Sub-areas 6 and 7	ICES has not been requested to provide advice on fishing opportunities for these stocks. The Landing Obligation does not apply to this stock.
ROSTRORAJA ALBA (White skate) In the Northeast Atlantic.	ICES advises that when the precautionary approach is applied, there should be zero catches of this species in each of the years 2020–2023. The Landing Obligation does not apply to this stock.

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Thornback ray (*Raja clavata*) in divisions 7.a and 7.f–g (Irish Sea, Bristol Channel, Celtic Sea North)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, landings should be no more than 1833 tonnes in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches.

Management of the catches of skates and rays under a combined TAC prevents effective control of single-stock exploitation rates and could lead to overexploitation of some species.

Stock development over time

Stock size is above MSY $B_{trigger\ proxy}$ ($I_{trigger}$), and the fishing pressure is below $F_{MSY\ proxy}$ (Table 1).

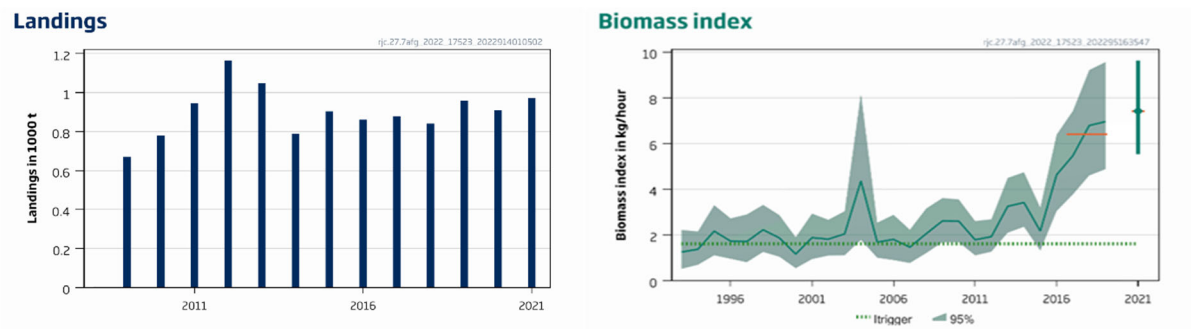

Figure 1 Thornback ray in divisions 7.a and 7.f–g. Summary of the stock assessment. ICES estimated landings (in tonnes). UK (E&W)–BTS–Q3 survey index [B6596] (kg h^{-1}, individuals of ≥ 50 cm total length). Solid horizontal lines show the mean stock-size indicators for 2021 and 2017–2019.

Catch scenarios

ICES framework for category 3 stocks was applied (rfb rule, method 2.1; ICES, 2022a). A survey biomass index was used as an indicator of stock development. The advice is based on the recent advised landings, multiplied by the ratio of the 2021 index value (index A) and the mean of the three preceding values (index B), a ratio of observed mean length in the catch relative to the target mean length, a biomass safeguard, and a precautionary multiplier. The stability clause was not applied because the advised landings have increased by less than 20%.

Discarding is known to take place, but ICES cannot estimate the quantity or the corresponding dead catch.

Table 1 Thornback ray in divisions 7.a and 7.f–g. The basis for the catch scenarios*. Landings are in tonnes.

Previous landings advice A_y		1596 tonnes
Stock biomass trend		
Index A (2021)		7.41 kg h^{-1}
Index B (2017, 2018, 2019)		6.40 kg h^{-1}
r: stock biomass trend (index ratio A/B)		1.15
Fishing pressure proxy		
Mean catch length ($L_{mean} = L_{2019–2021}$)		60.1 cm
MSY proxy length ($L_{F = M}$)		54.3 cm
f: fishing pressure proxy relative to MSY proxy ($L_{mean}/L_{F = M}$)		1.11
Biomass safeguard		
Last index value (I_{2021})		7.41 kg h^{-1}
Index trigger value ($I_{trigger} = I_{loss} \times 1.4$)		1.62 kg h^{-1}
b: index relative to trigger value, $\min\{I_{2021}/I_{trigger}, 1\}$		1
Precautionary multiplier to maintain biomass above B_{lim} with 95% probability		
m: multiplier (generic multiplier based on life history)		0.90
Stability clause (+20%/−30% compared to A_y, only applied $I_{2021} \geq I_{trigger}$)	Not applied	-
Discard rate		Unquantified
Landings advice for 2023/24 **		1833 tonnes
% advice change ***		+15 %

* The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.
** Formula [$A_y \times r \times f \times b \times m$], limited by stability clause if applicable.
*** Advice value for 2023/2024 relative to the advice value for 2021/2022 (1596 tonnes).

The advised landings are higher than advised for 2021 and 2022 because the biomass index has increased.

Basis of the advice

Table 2 Thornback ray in divisions 7.a and 7.f–g. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for thornback ray in this area

Quality of the assessment

In 2020 the area coverage of the UK(E&W)-BTS-Q3 survey was reduced due to COVID-19 restrictions, and Division 7.a was not sampled. Therefore, the 2020 survey data were not used in this assessment.

The survey used in the assessment covers a representative proportion of the stock area, but the gear has a lower catchability for larger fish (above ~75 cm).

Despite improvement in recent years, some misidentification at species level is still possible, but it is unlikely to occur in significant amounts for this well-known and commercially important species. Stock-specific landings data prior to 2009 are not available.

Issues relevant for the advice

Thornback ray is a coastal and shelf species that is a bycatch of trawl and gillnet fisheries. It is also targeted in some local, seasonal fisheries with trawls and static nets.

Catches of Skates and rays are managed under a common TAC. However, most landings are reported by species (ICES, 2022b). ICES considers that management of the catches of several stocks under a combined TAC prevents effective control of single-stock exploitation rates and could lead to overexploitation of some stocks.

Reference points

Table 3 Thornback ray in divisions 7.a and 7.f–g. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis *	Source
MSY approach	MSY $B_{trigger\ proxy}$	1.62	Biomass index trigger value ($I_{trigger}$), defined as $I_{trigger} = I_{loss}$ X 1.4, where I_{loss} is the lowest observed historical biomass index value (year 2000). In kg per hour.	(ICES, 2022c)
	$F_{MSY\ proxy}$	1	$L_{mean}/L_{F=M}$; Mean catch length divided by MSY proxy reference length ($L_{F=M}$ = 54.25 cm).	(ICES, 2022c)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

* No reference points are defined for this stock in terms of absolute values. The LBI-estimated values the ratio $L_{mean}/L_{F=M}$ are used to estimate exploitation status relative to the proxy MSY reference point.

Basis of the assessment

Table 4 Thornback ray in divisions 7.a and 7.f–g. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2022a).
Assessment type	Trends from biomass index and length-based indicators (ICES, 2022b).
Input data	Survey: UK (E&W)–BTS–Q3 (B6596), length composition data from commercial fisheries.
Discards and bycatch	Discarding is known to take place but has not been quantified.
Indicators	None.
Other information	None.
Working group	Working Group on Elasmobranch Fishes (WGEF)

History of the advice, catch, and management

Table 5 Thornback ray in divisions 7.a and 7.f–g. History of ICES advice and ICES estimates of landings *. All weights are in tonnes.

Year	ICES advice	Landings corresp. to advice	ICES species-specific landings: minimum estimate based on reported landings **
2011	No specific advice		944
2012	No specific advice		1165
2013	No TAC, species-specific measures needed, catch could be increased by up to 20%	-	1048
2014	No new advice, same as 2013		790
2015	Increase by up to 20% from the average of the last three years	1235	903
2016	No new advice, same as 2015	1235	861
2017	Precautionary approach	≤ 1386	878
2018	Precautionary approach (same value as advised catches for 2017)	≤ 1386	840
2019	Precautionary approach	≤ 1663	960
2020	Precautionary approach	≤ 1663	909
2021	Precautionary approach	≤ 1596	971
2022	Precautionary approach	≤ 1596	
2023	MSY approach	≤ 1833	
2024	MSY approach	≤ 1833	

* There is no specific TAC for this stock. Fishing opportunities are managed through an overall TAC by management unit, which includes all species of skates and rays.
** In 2020, landings data were revised.

History of the catch and landings

The distribution of this stock does not extend into the NEAFC Regulatory Area.

Table 6 Thornback ray in divisions 7.a and 7.f–g. Catch distribution by fleet in 2021 as estimated by ICES.

Catch (2021)	Landings			Discards
Unknown	Beam trawl 38%	Other bottom trawls 58%	Other gears 4%	Unquantified
	971 tonnes			

Table 7 Thornback ray in divisions 7.a and 7.f–g. History of landings *. ICES estimates of landings by country (in tonnes). Blank cell = no data reported; 0 = value less than 0.5.

Year	Belgium	UK	Ireland	France	Spain	Total landings
2009	216	300	8	147		671
2010	197	371	80	131		780
2011	302	384	126	133		944
2012	441	483	134	106		1165
2013	391	416	146	95		1048
2014	240	252	191	107		790
2015	350	309	169	70	5	903
2016	241	274	220	121	6	861
2017	212	276	232	147	9	878
2018	197	324	219	101	0	840
2019	339	322	182	117	0	960
2020	314	322	192	80	0	909
2021	265	449	149	106	2	971

* The figures in the table are rounded. Total landings were calculated using unrounded inputs and computed values may not match exactly when calculated using the rounded figures in the table.

Summary of the assessment

Table 8 Thornback ray in divisions 7.a and 7.f–g. Assessment summary. Index of biomass from trawl survey UK (E&W)–BTS–Q3 in kg h^{-1} of individuals ≥ 50 cm total length.

Year	Biomass index (kg h^{-1})	Upper 95% CI	Lower 95% CI
1993	1.26	2.1	0.41
1994	1.38	2.1	0.64
1995	2.2	3.3	1.02
1996	1.74	2.6	0.89
1997	1.72	2.8	0.67
1998	2.2	3.3	1.19
1999	1.87	2.8	0.96
2000	1.17	1.85	0.49
2001	1.89	2.9	0.87
2002	1.82	2.6	1.02
2003	2	3	1.09
2004	4.4	7.8	0.88
2005	1.69	2.5	0.89
2006	1.81	2.8	0.81
2007	1.47	2.2	0.74
2008	2.1	3.1	1.05
2009	2.6	3.6	1.62
2010	2.6	3.5	1.62
2011	1.79	2.5	1.05
2012	1.93	2.6	1.23
2013	3.3	4.4	2.1
2014	3.4	4.7	2.1
2015	2.2	3.1	1.26

Year	Biomass index (kg h^{-1})	Upper 95% CI	Lower 95% CI
2016	4.6	6.3	3
2017	5.5	7.2	3.7
2018	6.8	9.2	4.4
2019	7	9.2	4.8
2020 *			
2021	7.4	9.6	5.5

* 2020 survey not used in the assessment.

Sources and references

ICES. 2022a. Advice on fishing opportunities. *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, Section 1.1.1. https://doi.org/10.17895/ices.advice.19928060

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Thornback ray (*Raja clavata*) in divisions 7.a and 7.f–g (Irish Sea, Bristol Channel, Celtic Sea North). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, rjc.27.7afg. https://doi.org/10.17895/ices.advice.19754425

Published 4 October 2022

Spotted ray (*Raja montagui*) in divisions 7.a and 7.e–h (southern Celtic Seas and western English Channel)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, landings should be no more than 814 tonnes in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches.

Management of the catches of skates and rays under a combined TAC prevents effective control of single-stock exploitation rates and could lead to overexploitation of some species.

Stock development over time

Stock size is above MSY $B_{trigger\ proxy}$ ($I_{trigger}$), and the fishing pressure is at $F_{MSY\ proxy}$ (Table 1).

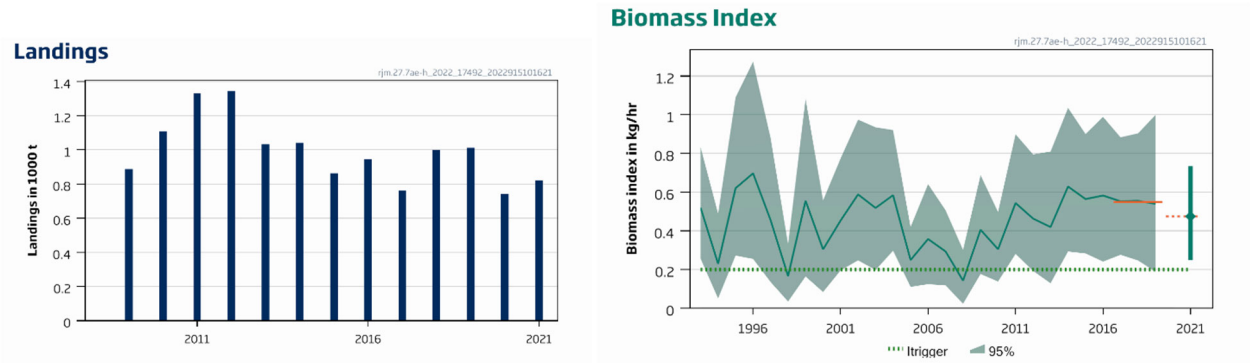

Figure 1 Spotted ray in divisions 7.a and 7.e–h. ICES estimated landings (in tonnes). UK (E&W)-BTS-Q3 [B6596] survey index (individuals ≥ 50 cm total length). The solid horizontal lines show the mean stock indicators for 2017–2019 and 2021.

Catch scenarios

ICES framework for category 3 stocks was applied (rfb rule, method 2.1; ICES, 2022a). A survey biomass index was used as an indicator of stock development. The advice is based on the ratio of the 2021 index value (index A) and the mean of the three preceding values (index B), multiplied by the previous advised catches, a ratio of observed mean length in the catch relative to the target mean length, a biomass safeguard, and a precautionary multiplier. The stability clause was not applied because the advised landings have decreased by less than 30%.

Discarding is known to take place, but ICES cannot estimate the quantity or the corresponding dead catch.

Table 1 Spotted ray in divisions 7.a and 7.e–h. The basis for the catch scenarios. Landings are in tonnes. *

Previous landings advice A_y	1041 tonnes	
Stock biomass trend		
Index A (2021) **	0.48 kg h^{-1}	
Index B (2017, 2018, 2019)	0.55 kg h^{-1}	
r: stock biomass trend (index ratio A/B)	0.86	
Fishing pressure proxy		
Mean catch length ($L_{mean} = L_{2019\text{-}2021}$)	60.2 cm	
MSY proxy length ($L_{F=M}$)	59.4 cm	
f: fishing pressure proxy relative to MSY proxy ($L_{mean}/L_{F=M}$)	1.01	
Biomass safeguard		
Last index value (I_{2021})	0.48 kg h^{-1}	
Index trigger value ($I_{trigger} = I_{loss} \times 1.4$)	0.20 kg h^{-1}	
b: index relative to trigger value, min{$I_{2021}/I_{trigger}$, 1}	1	
Precautionary multiplier to maintain biomass above B_{lim} with 95% probability		
m: multiplier (generic multiplier based on life history)	0.90	
Stability clause (+20%/−30% compared to A_y, only applied $I_{2021} \geq I_{trigger}$)	Not Applied	
Discard rate	Unquantified	
Landings advice for 2023/24 ***	814 tonnes	
% advice change ^	−22%	

* The figures in the table are rounded. Calculations were done with unrounded inputs, and computed values may not match exactly when calculated using the rounded figures in the table.
** Survey data from 2020 were excluded.
*** Formula [$A_y \times r \times f \times b \times m$], limited by stability clause if applicable.
^ Advice value for 2023–2024 relative to the advice value for 2021/2022 (1041 tonnes).

The advised landings are lower than the advice for 2021 and 2022 because of a decrease in the biomass index.

Basis of the advice

Table 2 Spotted ray in divisions 7.a and 7.e–h. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for spotted ray in this area

Quality of the assessment

The UK (E&W)-BTS-Q3 covers a representative portion of the stock area and the survey gear samples the full size range of the species. In 2020, the area surveyed by UK(E&W)-BTS-Q3 was reduced due to COVID-19 restrictions (Division 7.a was not sampled). Therefore the 2020 survey data were not used in this assessment.

The Irish groundfish survey (IGFS-WIBTS-Q4) and the (UK-Q1-SWBeam) both cover a part of the stock area, and both show a similar trend to the stock size indicator used (ICES, 2022b).

Despite improvements in species-specific reporting in recent years, misidentification at species level is likely still occurring for spotted ray and blonde ray. Hence the accuracy of landings data will be uncertain.

Issues relevant for the advice

Spotted ray is a shelf species that is a bycatch in trawl and gillnet fisheries, including in mixed demersal fisheries for groundfish and fisheries targeting the overall skate complex. As one of the smaller and less valuable species in the skate complex, it is not targeted, and a relatively high proportion of the catch may be discarded.

Catches of Skates and rays are managed under a common TAC. However, most landings are reported by species (ICES, 2022b). ICES considers that management of the catches of several stocks under a combined TAC prevents effective control of single-stock exploitation rates and could lead to overexploitation of some stocks.

Reference points

Table 3 Spotted ray in divisions 7.a, 7.f–g. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis*	Source
MSY approach	MSY $B_{trigger\ proxy}$	0.20	Biomass index trigger value ($I_{trigger}$), defined as $I_{trigger} = I_{loss}$ X 1.4, where I_{loss} is the lowest observed historical biomass index value (year 2008). In kg per hour.	(ICES, 2022c)
	$F_{MSY\ proxy}$	1	$L_{mean}/L_{F=M}$; Mean catch length divided by MSY proxy reference length ($L_{F=M}$ = 59.4 cm).	(ICES, 2022c)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

* No reference points are defined for this stock in terms of absolute values. The LBI-estimated values of the ratio $L_{mean}/L_{F=M}$ are used to estimate exploitation status relative to the proxy MSY reference point.

Basis of the assessment

Table 4 Spotted ray in divisions 7.a and 7.e–h. Basis of assessment and advice.

ICES stock data category	3 (ICES, 2022a)
Assessment type	Trends from biomass index and length-based indicators (ICES, 2022b)
Input data	Survey: UK (E&W)-BTS-Q3 [B6596], length composition from commercial fisheries.
Discards and bycatch	Discarding is known to take place but has not been quantified.
Indicators	None.
Other information	IGFS-WIBTS-Q4 [G7212], UK-Q1-SWBeam [B2732]
Working group	Working Group on Elasmobranch Fishes (WGEF)

History of the advice, catch, and management

Table 5 Spotted ray in divisions 7.a and 7.e–h. History of ICES advice and ICES estimates of landings *. All weights are in tonnes.

Year	ICES advice	Landings corresp. to advice	ICES estimated landings
2011	No specific advice	-	1332
2012	No specific advice	-	1344
2013	No TAC, species-specific measures needed, catch could increase by up to 20%	-	1032
2014	No new advice, same as 2013	-	1042
2015	4% decrease from the average of the last three years	1118	864
2016	No new advice, same as 2015	1118	947
2017	Precautionary approach	≤ 1197	818**
2018	Precautionary approach (same value as advised catches for 2017)	≤ 1197	1001
2019	Precautionary approach	≤ 1296	1012
2020	Precautionary approach	≤ 1296	741
2021	Precautionary approach	≤ 1041	821
2022	Precautionary approach	≤ 1041	
2023	MSY approach	≤ 814	
2024	MSY approach	≤ 814	

* There is no specific TAC for this stock. Fishing opportunities are managed through an overall TAC by management unit, which includes all species of skates and rays.
** Updated in 2022.

History of the catch and landings

The distribution of this stock does not extend into the NEAFC Regulatory Area.

Table 6 Spotted ray in divisions 7.a and 7.e–h. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings			Discards
Unknown	Beam trawl 20%	Otter trawl 56%	Other gears 24%	Unquantified
	821 tonnes			

Table 7 Spotted ray in divisions 7.a and 7.e–h. ICES estimates of landings by country (in tonnes). Data revised in 2022. Blank cell = no data reported; 0 = value less than 0.5 tonnes.

Year	Belgium	Spain	UK	Ireland	Netherlands	France	Total
2009	63		38	0	0	785	887
2010	55	0	102	19		934	1110
2011	120		88	63	0	1062	1332
2012	70		85	53		1135	1344
2013	3		90	40	0	899	1032
2014	0	0	80	49		912	1042
2015	1	0	70	48		745	864
2016	7		80	41	0	819	947
2017	2		89	10		717	818
2018	16		93	58		834	1001
2019	15		118	64	0	814	1012
2020	44		82	41	0	576	741
2021	124	0	95	46	0	556	821

Summary of the assessment

Table 8 Spotted ray in divisions 7.a and 7.e–h. Time-series of the UK (E&W)-BTS-Q3 [B6596] survey (kg h^{-1}) (individuals ≥ 50 cm total length) used for the advice.

Year	Biomass index	High 95% CI	Low 95% CI
1993	0.52	0.83	0.26
1994	0.23	0.49	0.051
1995	0.62	1.09	0.27
1996	0.70	1.27	0.26
1997	0.46	0.88	0.136
1998	0.166	0.33	0.035
1999	0.56	1.08	0.164
2000	0.30	0.56	0.084
2001	0.45	0.77	0.196
2002	0.59	0.98	0.25
2003	0.52	0.94	0.198
2004	0.58	0.92	0.30
2005	0.25	0.42	0.111
2006	0.36	0.64	0.125
2007	0.29	0.51	0.118
2008	0.143	0.30	0.023
2009	0.41	0.69	0.177
2010	0.31	0.50	0.138
2011	0.54	0.90	0.28
2012	0.46	0.80	0.193
2013	0.42	0.81	0.129
2014	0.63	1.04	0.29
2015	0.56	0.90	0.28
2016	0.58	0.99	0.24
2017	0.55	0.88	0.28
2018	0.56	0.90	0.25
2019	0.54	1.00	0.189
2020*			
2021	0.48	0.74	0.25

* 2020 survey not used in assessment

Sources and references

ICES. 2022a. Advice on fishing opportunities. *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, section 1.1.1. https://doi.org/10.17895/ices.advice.19928060

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Spotted ray (*Raja montagui*) in divisions 7.a and 7.e–h (southern Celtic Seas and western English Channel). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, rjm.27.7ae-h. https://doi.org/10.17895/ices.advice.19754461

Published 4 October 2022

Blonde ray (*Raja brachyura*) in divisions 7.a and 7.f–g (Irish Sea, Bristol Channel, Celtic Sea North)

ICES advice on fishing opportunities

ICES advises that when the precautionary approach is applied, landings should be no more than 573 tonnes in each of the years 2023 and 2024. ICES cannot quantify the corresponding catches.

Management of the catches of skates and rays under a combined TAC prevents effective control of single-stock exploitation rates and could lead to overexploitation of some species.

Stock development over time

ICES cannot assess the stock and exploitation status relative to maximum sustainable yield (MSY) and precautionary approach (PA) reference points because information to define reference points is not available.

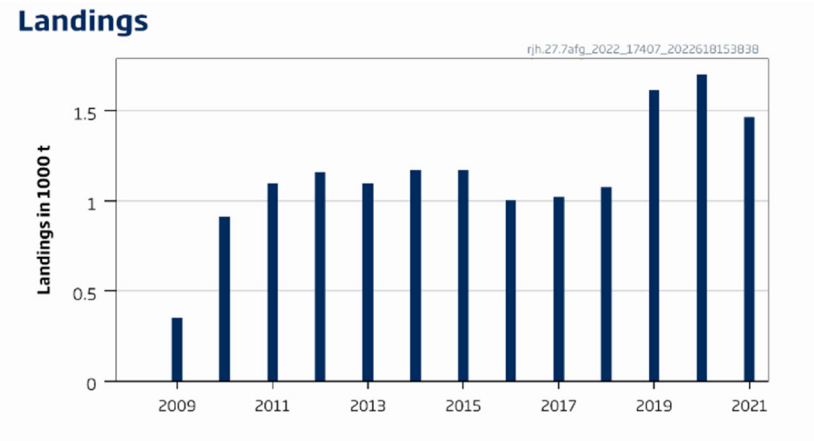

Figure 1 Blonde ray in divisions 7.a and 7.f–g. ICES estimated species-specific landings.

Catch scenarios

CES framework for category 5 stocks was applied (ICES, 2012). For stocks without information on abundance or exploitation, ICES considers that a precautionary reduction of catches should be implemented where there is no ancillary information clearly indicating that the current level of exploitation is appropriate for the stock.

The precautionary buffer was last applied in 2018 and has therefore been considered in 2022. The stock status relative to reference points is unknown; therefore, the precautionary buffer was applied in the advice.

Discarding is known to take place, but ICES cannot estimate the quantity or the corresponding dead catch.

Table 1 Blonde ray in divisions 7.a and 7.f–g. The basis for the catch scenarios.

Advised landings for 2021–2022 (issued in 2020)		716 tonnes
Discard rate		Unknown
Precautionary buffer	Applied	0.8
Landings advice *		573 tonnes
% advice change **		−20 %

* Advised landings for 2023–2024.
** Advice value for 2023 and 2024 relative to the advice value for 2021 and 2022.

The advised landings for 2023 and 2024 are 20% lower than advised for 2021 and 2022 because the precautionary buffer has been applied.

Basis of the advice

Table 2 Blonde ray in divisions 7.a and 7.f–g. The basis of the advice.

Advice basis	Precautionary approach
Management plan	ICES is not aware of any agreed precautionary management plan for blonde ray in this area

Quality of the assessment

Despite improvements in species-specific reporting in recent years, misidentification at species level is likely still occurring for spotted ray and blonde ray. Hence the accuracy of landings data will be uncertain.

In the UK (E&W)-BTS-Q3 survey, the species is caught most regularly in the Bristol Channel and off the east coast of Ireland. Catch rates for blonde ray in this survey have increased (ICES, 2022b); however, the survey is not considered a reliable stock size indicator for quantitative advice, as it has limited coverage in areas of local abundance and larger individuals are not sampled effectively by this survey gear.

Issues relevant for the advice

Blonde ray is a coastal and inner shelf species that has a patchy distribution and is often found in greater abundance on sandbanks.

Blonde ray is an important commercial species in this area. It is taken in trawl fisheries targeting the overall skate complex and is a bycatch in various demersal fisheries. It may also be targeted in areas of high local abundance, due to its large size and high market value.

Catches of Skates and rays are managed under a common TAC.However, most landings are reported by species (ICES, 2022b). ICES considers that management of the catches of several stocks under a combined TAC prevents effective control of single-stock exploitation rates and could lead to overexploitation of some stocks.

Reference points

No reference points are defined for this stock.

Basis of the assessment

Table 3 Blonde ray in divisions 7.a and 7.f–g. The basis of the assessment.

ICES stock data category	5 (ICES, 2022a).
Assessment type	No assessment (ICES, 2022b).
Input data	Landings data 2009–2021.
Discards and bycatch	Discarding is known to take place but has not been quantified.
Indicators	None.
Other information	UK (E&W)-BTS-Q3 [B6596].
Working group	Working Group on Elasmobranch Fishes (WGEF)

History of the advice, catch, and management

Table 4 Blonde ray in divisions 7.a and 7.f–g. History of ICES advice and ICES estimates of landings.* All weights are in tonnes.

Year	ICES advice	Landings corresp. to advice	ICES landings
2011	No specific advice		1099
2012	No specific advice		1160
2013	No TAC, species-specific measures needed, catch to decrease by at least 20%	-	1097
2014	No new advice, same as 2013	-	1170
2015	Decrease at least 20% from the average of the last three years	897	1172
2016	No new advice, same as 2015	897	1004
2017	Precautionary approach	≤ 895	1020
2018	Precautionary approach (same value as advised catches for 2017)	≤ 895	1077
2019	Precautionary approach	≤ 716	1616
2020	Precautionary approach	≤ 716	1703
2021	Precautionary approach	≤ 716	1464
2022	Precautionary approach	≤ 716	
2023	Precautionary approach	≤ 573	
2024	Precautionary approach	≤ 573	

* There is no specific TAC for this stock. Fishing opportunities are managed through an overall TAC by management unit, which includes all species of skates and rays.

History of the catch and landings

The distribution of this stock does not extend into the NEAFC Regulatory Area.

Table 5 Blonde ray in divisions 7.a and 7.f–g. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings			Discards
Unknown	Beam trawl 47%	Other trawls 51%	Nets 2%	Unquantified
	1464 tonnes			

Table 6 Blonde ray in divisions 7.a and 7.f–g. History of landings; ICES estimates of landings by country (in tonnes).

Year	Belgium	UK	Ireland	France	Total
2009	170	138	5	36	350
2010	210	226	402	73	910
2011	313	273	382	131	1099
2012	404	261	407	87	1160
2013	406	262	377	52	1097
2014	351	229	420	170	1170
2015	359	245	351	218	1172
2016	313	245	171	275	1004
2017	338	270	154	257	1020
2018	348	328	228	172	1077
2019	520	404	396	295	1616
2020	721	322	383	277	1703
2021	442	405	353	264	1464

Summary of the assessment

There is no assessment for blonde ray in this area.

Sources and references

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Blonde ray (*Raja brachyura*) in divisions 7.a and 7.f-g (Irish Sea, Bristol Channel, Celtic Sea North). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, rjh.27.7afg. https://doi.org/10.17895/ices.advice.19754446

Published 26 October 2022

Cuckoo ray (*Leucoraja naevus*) in subareas 6 and 7, and in divisions 8.a–b and 8.d (West of Scotland, southern Celtic Seas, and western English Channel, Bay of Biscay)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, landings in 2023 and 2024 should be no more than 7826 and 8064 tonnes respectively. ICES cannot quantify the corresponding catches.

Management of the catches of skates and rays under a combined TAC prevents effective control of single-stock exploitation rates and could lead to the overexploitation of some species.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and biomass is above MSY $B_{trigger}$ and B_{lim}.

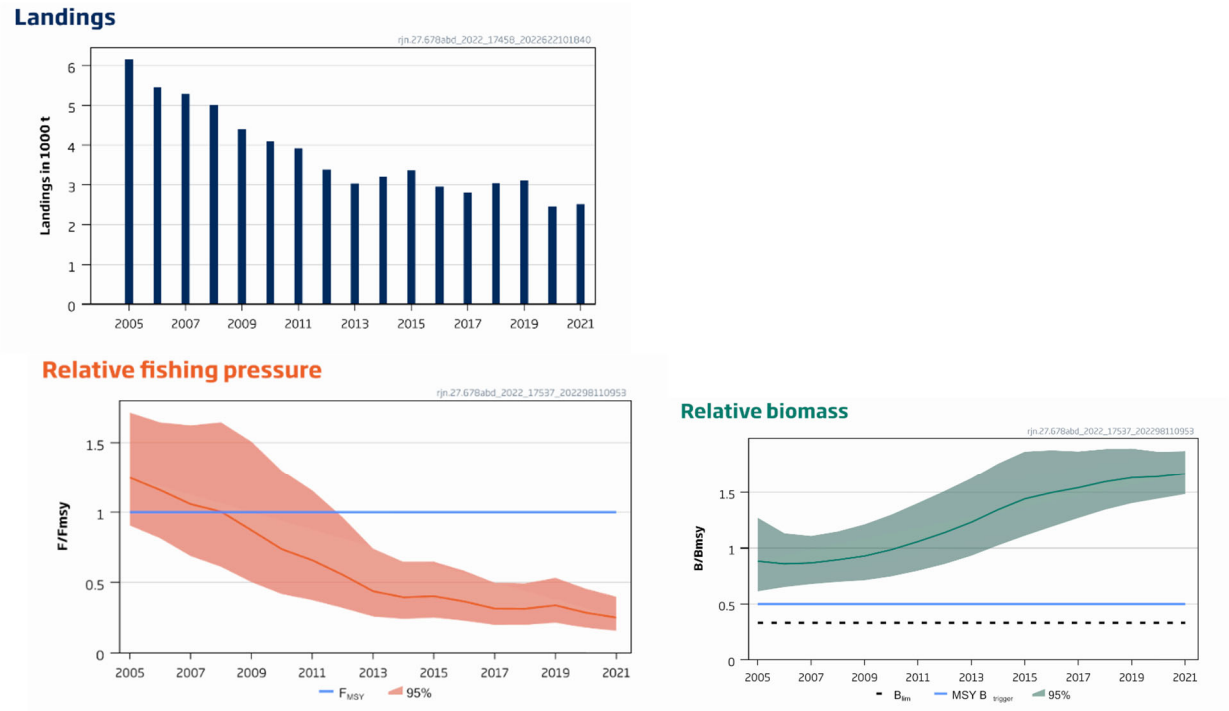

Figure 1 Cuckoo ray in subareas 6 and 7, and in divisions 8.a–b and 8.d. Summary of the stock assessment. ICES landings for the period 2005–2021, relative biomass, and relative fishing pressure.

Catch scenarios

Table 1 Cuckoo ray in subareas 6 and 7, and in divisions 8.a–b and 8.d. The basis for the catch scenarios.

Variable	Value	Notes
$F(2022)/F_{MSY}$	0.42	*Status quo* F/F_{MSY}.
$B(2023)/B_{MSY}$	1.65	Short-term forecast (STF)
Projected landings (2022)	4035	STF (in tonnes)

Table 2a Cuckoo ray in subareas 6 and 7, and in divisions 8.a–b and 8.d. Annual landings scenarios. All weights are in tonnes.

Basis	Total landings (2023)	Fishing mortality F_{2023}/F_{MSY}	Stock size B_{2024}/B_{MSY}	% biomass change^	% advice change^^
ICES advice basis					
MSY approach (15th percentile of predicted landings distribution under $F = F_{MSY}$)	7826	0.85	1.50	−9.1	+148
Other scenarios					
$F = F_{MSY}$	9035	1.00	1.45	−13.8	+187
$F = F_{2021} = F_{sq}$	4035	0.42	1.65	−2.2	+28
F = 0	0	0	1.80	7.0	-100
$F = F_{MSY}$ fractile 10	7563	0.82	1.51	−8.5	+140
$F = F_{MSY}$ fractile 20	8040	0.88	1.49	−9.7	+155
$F = F_{MSY}$ fractile 35	8565	0.94	1.47	−13.7	+171

^ Biomass 2024 relative to biomass 2023.
^^ Advice value for 2023 relative to the advice value for 2021 and 2022 (3150 tonnes).

Table 2b Cuckoo ray in subareas 6 and 7, and in divisions 8.a–b and 8.d. Annual catch scenarios for 2024 assuming that catch in 2023 corresponds to the 15th percentile of the predicted catch distribution under $F_{2023} = F_{MSY}$. All weights are in tonnes.

Basis	Total landings (2024)	Fishing mortality F_{2024}/F_{MSY}	Stock size B_{2025}/B_{MSY}	% biomass change^	% advice change^^
ICES advice basis					
MSY approach (15th percentile of predicted landings distribution under $F = F_{MSY}$)	8064	0.85	1.54	2.7	+156
Other scenarios					
$F = F_{MSY}$	9372	1.00	1.49	−0.7	+197
$F = F_{2021} = F_{sq}$	1753	0.17	1.79	19.3	−45
F = 0	0	0	1.85	23.3	−100
$F = F_{MSY}$ fractile 10	7783	0.81	1.56	4	+147
$F = F_{MSY}$ fractile 20	8295	0.87	1.51	0.7	+163
$F = F_{MSY}$ fractile 35	8863	0.94	1.91	27.3	+181

^ Biomass 2025 relative to biomass 2024.
^^ Advice value for 2023 relative to the advice value for 2021 and 2022 (3150 tonnes).

Basis of the advice

Table 3 Cuckoo ray in subareas 6 and 7 and Divisions 8.a–b and 8.d. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for cuckoo ray in this area

Quality of the assessment

This stock was benchmarked in 2022 (ICES, 2022a) and is now in category 2. The number of surveys used for the biomass index increased from two to eight thus covering nearly all of the stock area.

The assessment uses a stock indicator derived from a swept-area biomass index from eight surveys: EVHOE (Q4 [G9527]), IGFS-WIBTS-Q4 (G7212), NIGFS (Q1 and Q4 [G7144 and G7655]), SP-PORC (Q3 [G5768]), SCOWCGFS (Q1 and Q4 [G4748 and G4815]), and UK-Q1-SWBeam (B2732) , covering nearly all of the stock area. The data were normalized to the long-term mean.

Despite improvement in recent years, some misidentification at species level is still possible, but it is unlikely to occur in significant amounts for this well-known and commercially important species. Stock-specific landings data are not available before 2009. Landings 2005–2009 were estimated based on the proportion of cuckoo ray in the total ray catch in subsequent years.

Discarding is known to take place but ICES cannot quantify the corresponding dead catch.

Issues relevant for the advice

ICES catch advice is based on the 15th percentile of predicted catch distribution, which was considered more precautionary than the 35th percentile. The advice is substantially larger than the previous advice, and it cannot be quantified how this increase will impact discard rates for this species.

This is a common offshore species of varying commercial value. This species is a bycatch in demersal fisheries, especially for offshore trawl and gillnet fisheries targeting gadoids, anglerfish, megrim, and *Nephrops*. As one of the smaller and less valuable species in the skate complex, it is not targeted, but total landings of the complex represent a high monetary value. There can be high levels of discarding of cuckoo rays. Discard survival is variable.

Data from the French on-board observation programme (2007–2015) indicated that cuckoo ray occurs in about 80% of the hauls for twin-rig trawlers targeting demersal fish, with no apparent variation.

In 2017 a minimum landing size of 45 cm (total length) was implemented for Rajiformes in France.

Reference points

Table 4 Cuckoo ray in subareas 6 and 7 and Divisions 8.a–b and 8.d. Reference points, values, and their technical basis.

Framework	Reference point*	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	$0.5 \times B_{MSY} = 0.25 \times K$*	Relative value. B_{MSY} is estimated directly from the Bayesian surplus production assessment model and changes when the assessment is updated.	ICES (2022a)
	F_{MSY}	1*	Relative value. F_{MSY} is estimated directly from the assessment model and changes when the assessment is updated.	ICES (2022a)
Precautionary approach	B_{lim}	$0.3 \times B_{MSY}$	Relative value (equilibrium yield at this biomass is 50% of MSY)	ICES (2022a)
	B_{pa}**	Not defined		
	F_{lim}	$1.7 \times F_{MSY}$	Relative value (the F that drives the stock to B_{lim}).	ICES (2022a)
	F_{pa}**	Not defined		
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

* No reference points are defined for this stock in terms of absolute values. The SPiCT-estimated values of the ratios F/F_{MSY} and B/B_{MSY} are used to estimate stock status relative to the MSY reference points.

** B_{pa} and F_{pa} are not defined. The assessment provides probability distributions for B and F, so it is possible to directly estimate the probabilities of $B < B_{lim}$ and of $F > F_{lim}$.

Basis of the assessment

Table 5 Cuckoo ray in subareas 6 and 7 and divisions 8.a–b and 8.d. The basis of the assessment.

ICES stock data category	2 (ICES, 2022b)
Assessment type	Surplus Production Model in Continuous Time (SPiCT; ICES, 2022a, 2022c)
Input data	Commercial landings. Surveys (EVHOE (Q4; [G9527]), IGFS-WIBTS-Q4 [G7212], NIGFS (Q1 and Q4) [G7144 and G7655] , SP-PORC (Q3) [G5768[and SCOWCGFS (Q1 and Q4) [G4748 and G4815])
Discards and bycatch	Discarding is known to take place but cannot be quantified
Indicators	None
Other information	A benchmark assessment was carried out in 2022 (ICES, 2022a)
Working group	Working Group on Elasmobranch Fishes (WGEF)

History of the advice, catch, and management

Table 6 Cuckoo ray in subareas 6 and 7, and in divisions 8.a–b and 8.d. History of ICES advice and ICES estimates of landings*. All weights are in tonnes.

Year	ICES advice	Landings corresp. to advice	ICES landings
2009	No specific advice		4408
2010	No specific advice		4096
2011	No specific advice		3916
2012	No specific advice		3388
2013	Decrease catch by at least 36%	-	3028
2014	No new advice, same as 2013	-	3209
2015	Decrease landings by 34%	1998	3360
2016	No new advice, same as 2015	1998	2955
2017	Precautionary approach	≤ 2734	2804
2018	Precautionary approach (same value as advised catches for 2017)	≤ 2734	3037
2019	Precautionary approach	≤ 3281	3111
2020	Precautionary approach	≤ 3281	2453
2021	Precautionary approach	≤ 3150	2517
2022	Precautionary approach	≤ 3150	
2023	MSY approach	≤ 7826	
2024	MSY approach	≤ 8064	

* There is no specific TAC for this stock. Fishing opportunities are managed through an overall TAC across each of the two management units (Subarea 6 and divisions 7.a–c and 7.e–k; and subareas 8–9), which includes all species of skates and rays.

History of the catch and landings

This stock is distributed primarily in EU waters, and while catches from the NEAFC Regulatory Area are not quantified, they are assumed negligible.

Table 7 Cuckoo ray in subareas 6 and 7 and divisions 8.a–b and 8.d. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings			Discards
Unknown	Bottom trawl 90%	Beam trawl 2%	Other gears 8%	Unquantified
	2517 tonnes			

Table 8 Cuckoo ray in subareas 6 and 7 and divisions 8.a–b and 8.d. ICES estimates of landings by country (in tonnes). Data revised in 2016 (ICES, 2016) and 2018 (ICES, 2018). Blank cell = no data reported; 0 = value less than 0.5.

Year	Belgium	Spain	UK	Ireland	Netherlands	France	Total
2009	81	778	321	12		3217	4408
2010	70	480	421	55	0	3069	4096
2011	112	387	402	106		2909	3916
2012	93	311	306	108		2571	3388
2013	97	374	269	93	0	2195	3028
2014	48	300	262	83	0	2515	3209
2015	51	659	266	79		2621	3360
2016	27	688	254	69		2233	2955
2017	26	305	260	69	0	2144	2804
2018	28	345	272	114		2288	3037
2019	25	295	289	103		2398	3111
2020	18	192	186	73		1984	2453
2021	0	145	166	55		2151	2517

Summary of the assessment

Table 9 Cuckoo ray in subareas 6–7, and in divisions 8.a–b and 8.d. Assessment summary. Biomass is relative to B_{MSY} at the end of the year and fishing mortality relative to F_{MSY}. High and low values are 90% probability intervals of the posterior distribution. Catches are in tonnes.

Year	Relative biomass			Landings (tonnes)	Relative fishing pressure		
	Relative B	High	Low		Relative F	High	Low
2005	0.88	1.27	0.61	6149	1.25	1.72	0.91
2006	0.86	1.13	0.65	5455	1.16	1.65	0.81
2007	0.87	1.11	0.68	5283	1.06	1.63	0.69
2008	0.90	1.15	0.70	5010	1.00	1.65	0.61
2009	0.93	1.21	0.71	4408	0.87	1.51	0.50
2010	0.99	1.30	0.75	4096	0.74	1.30	0.42
2011	1.06	1.40	0.80	3916	0.66	1.16	0.38
2012	1.14	1.51	0.86	3388	0.56	0.96	0.32
2013	1.23	1.63	0.93	3028	0.44	0.74	0.26
2014	1.35	1.76	1.03	3209	0.40	0.65	0.24
2015	1.44	1.87	1.11	3360	0.40	0.65	0.25
2016	1.50	1.88	1.19	2955	0.37	0.58	0.23
2017	1.54	1.87	1.27	2804	0.32	0.50	0.20
2018	1.60	1.90	1.34	3037	0.31	0.49	0.20
2019	1.63	1.90	1.40	3111	0.34	0.53	0.21
2020	1.64	1.87	1.44	2453	0.29	0.46	0.18
2021	1.67	1.88	1.49	2516	0.25	0.40	0.16

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Cuckoo ray (*Leucoraja naevus*) in subareas 6 and 7, and in divisions 8.a–b and 8.d (West of Scotland, southern Celtic Seas, and western English Channel, Bay of Biscay). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, rjn.27.678abd. https://doi.org/10.17895/ices.advice.19754470

Published 26 October 2022

Undulate ray (*Raja undulata*) in divisions 7.d–e (English Channel)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, landings in 2023 and 2024 should be no more than 4836 and 4675 tonnes respectively.

Stock development over time

Fishing pressure on the stock is below F_{MSY} and biomass is above MSY $B_{trigger}$ and B_{lim}.

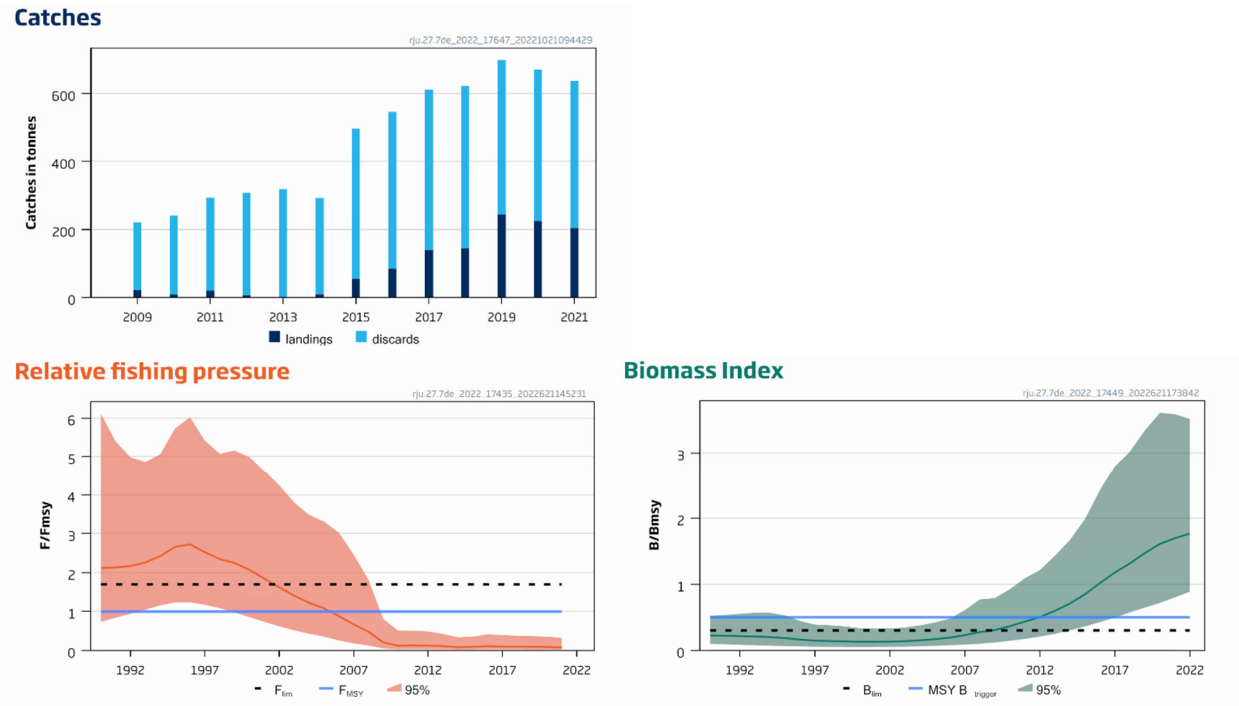

Figure 1 Undulate ray in divisions 7.d–e. Summary of the stock assessment. Catches, relative fishing pressure, and relative biomass. Discards are the dead discards of individuals > 50 cm.

Catch scenarios

Table 1 Undulate ray in divisions 7.d–e. The basis for the catch scenarios.

Variable	Value	Notes
$F(2022)/F_{MSY}$	0.077	*Status quo* F/F_{MSY}.
$B(2023)/B_{MSY}$	1.806	Short-term forecast (STF)
Projected catch (2022)	649	STF; all catches are assumed to be landed (in tonnes)

Table 2a Undulate ray in divisions 7.d–e. Annual catch scenarios for 2023. All weights are in tonnes.

Basis	Total catch (2023)	Fishing mortality F_{2023}/F_{MSY}	Stock size B_{2024}/MSY_{MSY}	% biomass change^	% advice change^^
ICES advice basis					
MSY approach (15th percentile of predicted catch distribution under $F = F_{MSY}$)	4836	0.58	1.74	−3.6	89
Other scenarios					
$F = F_{MSY}$	8175	1	1.66	−8.0	220
$F = F_{2021} = F_{sq}$	662	0.077	1.84	1.82	−74
F = 0	0	0	1.86	2.7	−100
$F = F_{MSY}$ fractile 10	4278	0.51	1.76	−2.9	68
$F = F_{MSY}$ fractile 20	5333	0.64	1.73	−4.3	109
$F = F_{MSY}$ fractile 35	6716	0.81	1.70	−6.1	163

^ Biomass 2024 relative to biomass 2023.

^^ Advice value for 2023 relative to the advice value for each of the years 2021 and 2022 (2552 tonnes). Note that the previous advice included surviving discards.

Table 2b Undulate ray in divisions 7.d–e. Annual catch scenarios for 2024 assuming that catch in 2023 corresponds to the 15th percentile of the predicted catch distribution under $F_{2023} = F_{MSY}$. All weights are in tonnes.

Basis	Total catch (2024)	Fishing mortality F_{2024}/F_{MSY}	Stock size B_{2025}/B_{MSY}	% biomass change^	% advice change^^
ICES advice basis					
MSY approach (15th percentile of predicted catch distribution under $F = F_{MSY}$)	4675	0.58	1.69	−2.9	83
Other scenarios					
$F = F_{MSY}$	7571	1	1.55	−10.9	197
$F = F_{2021} = F_{sq}$	673	0.077	1.8	3.4	−74
F = 0	0	0	1.90	9.2	−100
$F = F_{MSY}$ fractile 10	4164	0.51	1.71	−2.3	63
$F = F_{MSY}$ fractile 20	5123	0.64	1.67	−4.0	101
$F = F_{MSY}$ fractile 35	6339	0.81	1.61	−7.5	148

^ Biomass 2025 relative to biomass 2024.

^^ Advice value for 2024 relative to the advice value for each of the years 2021 and 2022 (2552 tonnes). Note that the previous advice included surviving discards.

Basis of the advice

Table 3 Undulate ray in divisions 7.d–e. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for undulate ray in this area

Quality of the assessment

This stock was benchmarked in 2022 (ICES, 2022a).

Landings of undulate ray (2005–2008) were estimated based on the reduction in landings of unsorted 'skates and rays' following the landing ban on the species in 2009 and the trend in landings of 'skates and rays' (ICES, 2022a, 2022b). The uncertainty associated with this reconstructed series of undulate ray landings was accounted for by specifying a higher observation error for the estimated catches in the years 2005–2008.

Discards were estimated for relevant fishing nations and fleets (ICES, 2022a, 2022b). Where annual discard estimates were lacking for any combination of country, division, and gear, these were infilled based on the most relevant data available (ICES, 2022a, 2022b). The gear-specific survival rates of discards, based on the data available for undulate ray and thornback ray caught in the stock area (Van Bogaert *et al*., 2020), have been used to estimate quantities of dead discards.

The FR-CGFS-Q4 (G3425) and UK-Q1-SWBeam (B2732) surveys operate over the main parts of the stock area in divisions 7.d and 7.e, respectively. While shallow waters (where the species is also common) cannot be sampled, the surveys allow for a representative proportion of the adult stock range to be monitored.

Whereas total biomass was considered during the benchmark assessment, this assessment is based on exploitable biomass (individuals ≥ 50 cm total length).

Owing to reduced coverage of the sampling area in 2020, a higher observation error was specified for the FR-CGFS biomass index in the assessment. Data from the UK-Q1-SWBeam in 2020 were excluded, as there had been a delay in the timing of the survey, and this seasonal shift in timing may have influenced the catch rates.

Issues relevant for the advice

ICES catch advice is based on the 15th percentile of predicted catch distribution, which was considered more precautionary than the 35th percentile. The advice is substantially larger than the previous advice, and it cannot be quantified how this increase will impact discard rates for this species.

Small fish (less than 50 cm) are not included in the assessment or in the advice. Any catch of small fish would continue to be discarded with a high survival rate. The recent discard rate was very high due to very restrictive landings opportunity. The higher advised TAC is not expected to generate discards of undulate ray in the exploitable fraction of the stock. Therefore, the advice (on removals) given this year can be considered as a landing advice since the discards of fish greater than 50 cm are expected to be negligible.

Reference points

Table 4 Undulate ray in divisions 7.d and 7.e. Reference points, values, and their technical basis.

Framework	Reference point*	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	$0.5 \times B_{MSY} = 0.25 \times K$*	Relative value (B/B_{MSY}) from the SPiCT assessment model. B_{MSY} is estimated directly from the SPiCT model and changes when the assessment is updated.	ICES (2022a)
	F_{MSY}	1*	Relative value (F/F_{MSY}) from the SPiCT assessment model. F_{MSY} is estimated directly from the SPiCT model and changes when the assessment is updated.	ICES (2022a)
Precautionary approach	B_{lim}	$0.3 \times B_{MSY}$	Relative value (equilibrium yield at this biomass is 50% of MSY).	ICES (2022a)
	B_{pa}**	Not defined		
	F_{lim}	$1.7 \times F_{MSY}$	Relative value (the F that drives the stock to B_{lim}).	ICES (2022a)
	F_{pa}**	Not defined		
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

* No reference points are defined for this stock in terms of absolute values. The SPiCT-estimated values of the ratios F/F_{MSY} and B/B_{MSY} are used to estimate stock status relative to the MSY reference points.

** B_{pa} and F_{pa} are not defined. The assessment provides probability distributions for B and F, so it is possible to directly estimate the probabilities of $B < B_{lim}$ and of $F > F_{lim}$.

Basis of the assessment

Table 5 Undulate ray in divisions 7.d–e. Basis of assessment and advice.

ICES stock data category	2 (ICES, 2022c)
Assessment type	Surplus Production Model in Continuous Time ([SPiCT] ICES, 2022a, 2022b).
Input data	Commercial landings and estimates of discards; FR-CGFS-Q4 [G3425] and UK-Q1-SWBeam [B2732] surveys
Discards and bycatch	DCmap on-board observation programmes, discards (> 50 cm) used in the model
Indicators	None
Other information	BTS-ENG-Q3 [B2453] survey
Working group	Working Group on Elasmobranch Fishes (WGEF)

History of the advice, catch, and management

Table 6 Undulate ray in divisions 7.d–e (English Channel). History of ICES advice and ICES estimates of landings and discards. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Predicted landings corresp. to advice	TAC in 7.d***	TAC in 7.e***	ICES total discards**	ICES landings*
2009	No targeted fishery		0			1246	21
2010	No new advice, same as 2009		0			1611	9
2011	No targeted fishery		0			2045	20
2012	No new advice, same as 2011		0			2339	6
2013	No targeted fishery, minimize bycatch		0			2514	3
2014	No targeted fishery, minimize bycatch		0			2181	10
2015	No targeted fishery, management plan for bycatch		0	11	100	2869	55
2016	No targeted fishery, management plan for bycatch		0	12	100	3128	84
2017	Precautionary approach		≤ 65	19	161	3256	139
2018	Precautionary approach		≤ 115 ^	19	161	3338	143
2019	Precautionary approach	≤ 2127	≤ 115	234***		3082	244
2020	Precautionary approach	≤ 2127	≤ 115	234***		2920	225
2021	Precautionary approach	≤ 2552	≤ 183	234***		2754	205
2022	Precautionary approach	≤ 2552	≤ 183	234***			
2023	MSY approach		≤ 4836				
2024	MSY approach		≤ 4675				

* Fishing opportunities are managed through a TAC for each part of the stock within the relevant TAC for divisions 7.d–e by management unit, which includes all species of skates and rays. Since 2016, there has been a specified TAC for this species in the management unit.
** Discard estimates revised (ICES, 2022a).
*** From 2019 the previously distinct TACs for divisions 7.d and 7.e were merged into a single TAC.
^ Updated in 2018; the original advice value was 65 tonnes (ICES, 2016).
^^ From 2023, catch corresponding to advice does not include discards expected to survive.

History of the catch and landings

The distribution of this stock does not extend into the NEAFC Regulatory Area.

Table 7 Undulate ray in divisions 7.d–e. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings					Total discards
2959 tonnes	Beam trawl 6%	Bottom trawls 56%	Nets 28%	Lines 1%	Other gears 9%	2754 tonnes
	205 tonnes					

Table 8 Undulate ray in divisions 7.d–e History of landings. ICES estimates of landings by country (in tonnes). Blank cell = no data reported; 0 = value less than 0.5.

Year	Belgium	UK	France	Total
2009		2	19	21
2010			9	9
2011			20	20
2012		0	6	6
2013			3	3
2014			10	10
2015		5	50	55
2016	5	22	58	84
2017	24	36	79	139
2018	15	43	86	143
2019	0	63	181	244
2020	0	66	159	225
2021		52	152	205

Table 9 Undulate ray in divisions 7.d–e History of discards. ICES estimates of discards (in tonnes). Data were revised during the 2022 benchmark assessment (ICES, 2022a).

Year	Total discards	Total exploitable discards	Dead exploitable discards
2009	1246	770	200
2010	1611	951	231
2011	2045	1093	274
2012	2339	1211	302
2013	2514	1291	317
2014	2181	1149	283
2015	2869	1891	442
2016	3128	1992	463
2017	3256	2037	473
2018	3338	2062	480
2019	3082	1985	456
2020	2920	1904	446
2021	2754	1824	433

Summary of the assessment

Table 10 Undulate ray in divisions 7.d–e. Assessment summary. Biomass is relative to B_{MSY} at the beginning of the year and fishing mortality relative to F_{MSY}. High and low values are 95% probability intervals of the posterior distribution. Catches are model estimates of dead removals (landings + dead discards) from individuals > 50 cm, in tonnes.

Year	Relative biomass			Catches (tonnes)	Relative fishing pressure		
	Relative B	High	Low		Relative F	High	Low
1990	0.23	0.52	0.099	2252	2.1	6.1	0.73
1991	0.22	0.54	0.092	2215	2.1	5.4	0.84
1992	0.22	0.55	0.084	2217	2.2	5.0	0.94
1993	0.21	0.57	0.077	2264	2.3	4.9	1.05
1994	0.20	0.57	0.071	2329	2.4	5.1	1.16
1995	0.186	0.53	0.065	2245	2.7	5.7	1.23
1996	0.164	0.45	0.060	1932	2.7	6.0	1.23
1997	0.147	0.39	0.055	1653	2.5	5.4	1.18
1998	0.141	0.38	0.053	1507	2.3	5.1	1.08
1999	0.136	0.36	0.051	1362	2.2	5.2	0.98
2000	0.130	0.34	0.050	1201	2.1	5.0	0.86
2001	0.130	0.33	0.051	1074	1.84	4.6	0.74

Year	Relative biomass			Catches (tonnes)	Relative fishing pressure		
	Relative B	High	Low		Relative F	High	Low
2002	0.133	0.33	0.053	969	1.62	4.2	0.62
2003	0.139	0.35	0.056	901	1.41	3.8	0.52
2004	0.152	0.38	0.061	874	1.23	3.5	0.43
2005	0.170	0.42	0.069	853	1.09	3.3	0.36
2006	0.193	0.48	0.078	770	0.88	3.0	0.26
2007	0.23	0.61	0.088	695	0.67	2.5	0.184
2008	0.28	0.77	0.100	485	0.48	1.82	0.128
2009	0.31	0.79	0.120	233	0.21	0.81	0.052
2010	0.37	0.93	0.145	240	0.125	0.51	0.031
2011	0.44	1.09	0.174	292	0.133	0.51	0.034
2012	0.50	1.21	0.21	309	0.128	0.49	0.033
2013	0.60	1.43	0.25	316	0.113	0.43	0.030
2014	0.71	1.67	0.30	304	0.087	0.34	0.022
2015	0.85	1.98	0.36	483	0.095	0.36	0.025
2016	1.02	2.4	0.43	551	0.113	0.42	0.030
2017	1.18	2.8	0.50	608	0.105	0.40	0.028
2018	1.32	3.0	0.57	628	0.099	0.38	0.026
2019	1.47	3.3	0.65	694	0.096	0.37	0.025
2020	1.61	3.6	0.72	672	0.092	0.36	0.023
2021	1.70	3.6	0.80	641	0.081	0.32	0.020
2022	1.77	3.5	0.89				

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Undulate ray (*Raja undulata*) in divisions 7.d and 7.e (English Channel). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, rju.27.7de. https://doi.org/10.17895/ices.advice.19754482

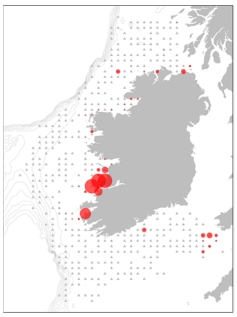
SOLE

(SOLEA SOLEA)

BIOLOGY – SPECIES

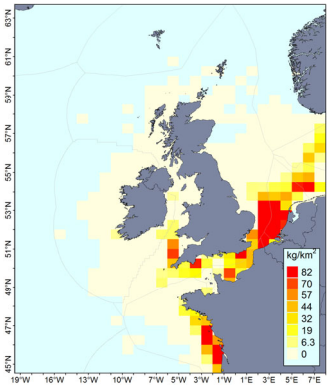
Black sole (also called Dover sole) are flat fish which lie buried on sandy or muddy seabed. They feed primarily at night on small crustaceans, worms and bivalve molluscs. In common with many flatfish, sole are fast growing as juveniles, slowing down as they mature. Females grow larger than the males. They can reach lengths of up to 70cm or weights of up to 3kg. Sole are quite solitary marine and estuarine fish, and the local environment may contribute to variable growth rates.

Females reach maturity at around 3 years when they are around 25-30cm in length. An average mature female can produce in the region of 150,000 – 200,000 eggs a year. They spawn in spring and early summer. Juveniles (<3 years) are found in coastal nurseries before they move in to deeper waters.

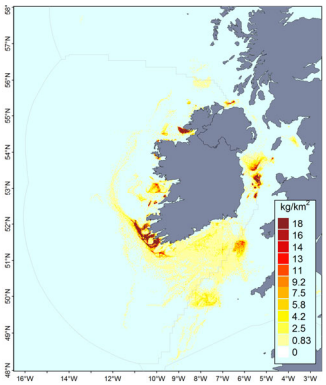


Survey catches of juveniles since 2005

LANDINGS DISTRIBUTION



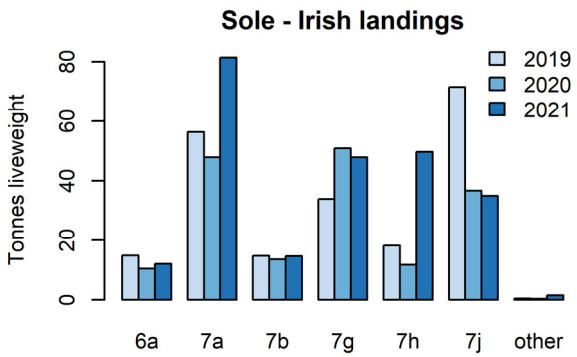
◀ The distribution of international landings of sole between 2016 and 2020. Most sole landings were taken from the southern North Sea, Bay of Biscay and the Celtic Sea.

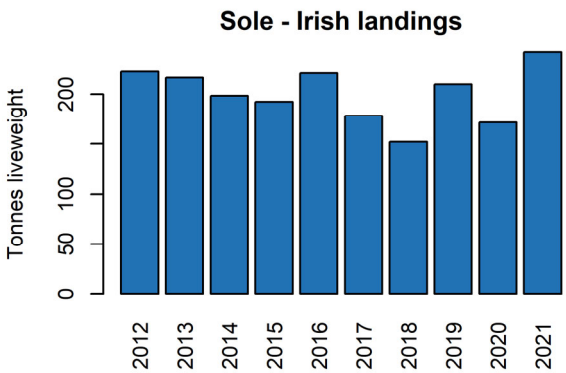


◀ The distribution of sole landings by Irish vessels between 2016 and 2020. Landings were mainly taken in the southwest, Donegal bay and Irish Sea.

IRISH LANDINGS AND VALUE OF TAC

The annual landings of sole by Irish vessels were approximately 208 tonnes in the last 3 years, 30% of which were caught in 7.a. In 2021 landings were worth around €3.2 million for Irish vessels.





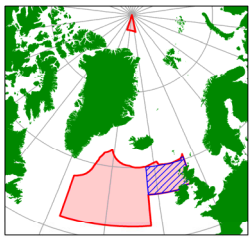
West of Scotland and Rockall Sole

Sub-area 6

ADVICE FOR 2023

The status of this stock is unknown and there is no ICES advice.

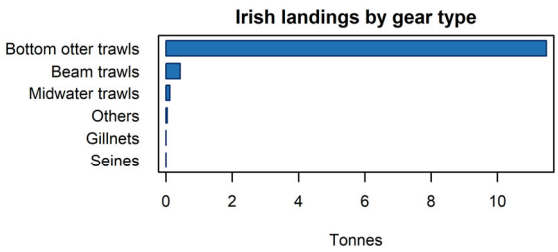
There is no basis to give advice for this stock. However, FEAS note that preliminary catch data show international catches averaging 14 t for the past 3 years, which is well below the TAC.



KEY POINTS

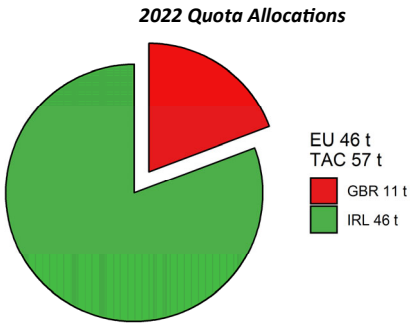
ICES Assessment Category	Not Appropriate	
Management Plan	No*	
Advice Basis	None	Not Appropriate
Ranges	F_{MSY} Range Lower	Not Appropriate
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Appropriate
Landing Obligation	From 2017	No derogations or exemptions

*Sole 6.a is not specifically mentioned in WWMAP, which lists sole 5, 6.b, 12 & 14.



MANAGEMENT IN 2022

- The TAC area covers Sub-areas 6, 12, 14 and EU, UK and international waters of Division 5.b.



KEY STOCK CONSIDERATIONS

- The minimum mesh size of bottom trawls (TR1) and seines is >120 mm which is too large to target sole effectively.

Table 1. Landings of Sole in Sub-area 6 as reported to ICES

Country	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Belgium	-	-	-	-	-	-	-	-	-	-	-	-	-
Denmark	-	-	-	-	-	-	-	-	-	-	-	-	-
France	7	<0.5	1	1	1	-	-	1	-	-	-	-	-
Ireland	20	24	23	35	57	54	48	39	33	42	71	89	80
Netherlands	1	-	-	-	-	-	-	-	1	-	-	-	-
UK - Eng+Wales+N.Irl.	.	.	.	.	.	.	.	.	.	.	.	2	1
UK - England & Wales	2	1	1	1	2	1	9	13	4	2	-	.	.
UK - N. Ireland	-	-	-	-	-	2	<0.5	-	<0.5	<0.5	1	.	.
UK - Scotland	8	9	10	10	12	8	7	9	14	17	18	17	11
Total	**38**	**34**	**35**	**47**	**72**	**65**	**64**	**62**	**52**	**61**	**90**	**108**	**92**

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Belgium	-	-	1	4	11	2	9	8	3	3	1	-	-
Denmark	-	<0.5	-	-	-	-	-	-	-	-	-	-	-
France	-	-	1	-	1	-	-	-	.	1	-	-	<0.5
Ireland	53	40	40	65	63	74	71	79	45	36	27	26	26
Netherlands	-	-	-	-	-	-	7	-	-	-	-	-	-
UK - Eng+Wales+N.Irl.	4	20	22	19	21	20	19	13	12	6	5	4	6
UK - England & Wales	.	.	.	.	.	.	.	.	.	.	.	.	.
UK - N. Ireland	.	.	.	.	.	.	.	.	.	.	.	.	.
UK - Scotland	15	15	13	10	8	8	7	9	4	3	3	2	2
Total	**72**	**75**	**77**	**98**	**104**	**104**	**113**	**109**	**64**	**49**	**36**	**32**	**34**
TAC	**130**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**140**	**125**	**106**

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Belgium	-	-	-	-	-	.	.	.	.	.	.	.	.
Denmark	-	-	-	.	.	.	.	.	.	.	.	.	.
France	<0.5	-	-	-	-	.	.	0	0	.	.	.	.
Ireland	22	15	12	19	15	4	23	12	9.2	17.6	13.7	16.1	30
Netherlands	-	-	-	-	-	.	.	.	.	.	.	.	.
UK - Eng+Wales+N.Irl.	2	-	<0.5	1	<0.5	-	1	3	4.2	2	3.4	4.05	2
UK - England & Wales	.	.	.	.	.	.	.	.	.	.	.	.	.
UK - N. Ireland	.	.	.	.	.	.	.	.	.	.	.	.	.
UK - Scotland	2	1	1	1	2	2	1	.	.	.	.	.	.
Total	**26**	**16**	**13**	**21**	**17**	**6**	**25**	**15**	**13.4**	**19.6**	**17.1**	**20.15**	**32**
TAC	**85**	**68**	**68**	**68**	**68**	**68**	**61**	**60**	**60**	**57**	**57**	**57**	**57**

Country	2017	2018	2019	2020	2021*
Belgium	.	.	.	.	.
Denmark	.	.	.	.	.
France	<0.5	<0.5	<0.5	.	.
Ireland	11.9	16.4	14.81	10.1	12
Netherlands	.	.			
UK - Eng+Wales+N.Irl.	2.1	3.2	2.36	1.5	1.7
UK - England & Wales	.	.	.	.	.
UK - N. Ireland	.	.	.	.	.
UK - Scotland	.	.	.	.	.
Total	**14.02**	**20**	**17**	**12**	**13.7**
TAC	**57**	**57**	**57**	**57**	**57**

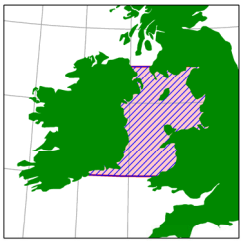
* Data are preliminary for 2021.

IRISH SEA SOLE

Division 7.a

ADVICE FOR 2023

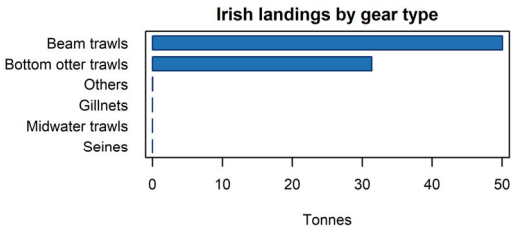
ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 605 t.



KEY POINTS

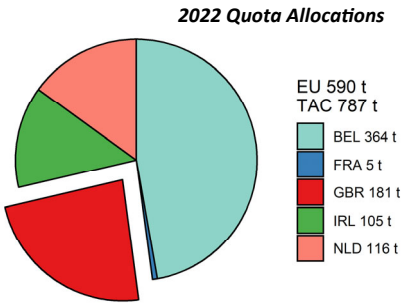
ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (bycatch)	
Advice Basis	ICES MSY approach	Catch=605 t
Ranges	F_{MSY} Range Lower	Not Appropriate (bycatch)
	F_{MSY}	Catch=605 t
	F_{MSY} Range Upper	Not Appropriate (bycatch)
Landing Obligation	From 2019	*De minimis* up to 3%*

* Beam trawlers using mesh size 80-119mm with increased selectivity (EC 2020/2015)



MANAGEMENT IN 2022

- The stock and management units are both ICES Division 7.a.
- The TAC is set at 787 t. The EU component is 590 t and the Irish quota allocation is 105 t.



KEY STOCK CONSIDERATIONS

- The stock is now estimated to be above MSY $B_{trigger}$ after a period of better recruitment and low fishing mortality.
- Discard data is not included in the assessment but shows an increase in recent years from 3.6% (2016-2018) to 11.5% (2019-2021). If this increase in discarding continues, it might be recommended to include discards in the assessment.
- Irish landings of Irish Sea sole are mainly taken as a minor bycatch in mixed fisheries targeting rays and plaice in the St. George's Channel and to a lesser extent also in the *Nephrops* fishery. Most landings are from beam trawlers but an increasing proportion of landings are from the otter trawl fleets.

Published 30 June 2022

Sole (*Solea solea*) in Division 7.a (Irish Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 605 tonnes.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and between F_{pa} and F_{lim}; spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

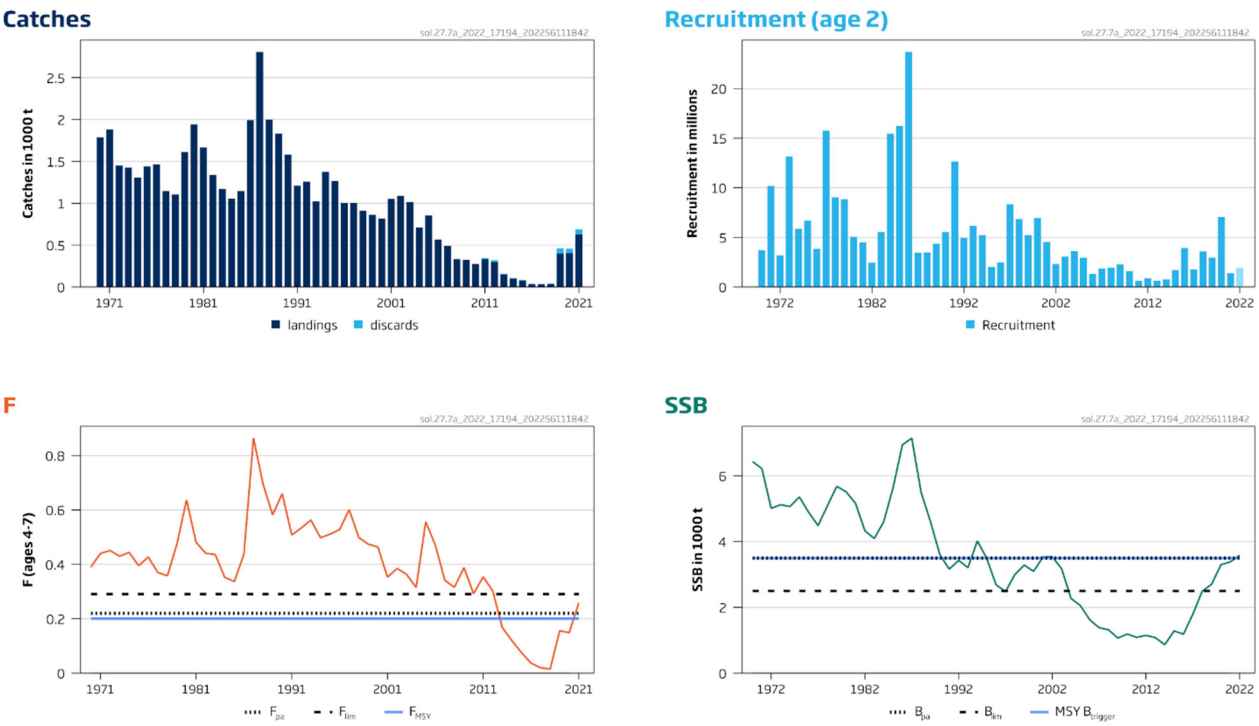


Figure 1 Sole in Division 7.a. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour. Discard values have only been available since 2011.

Catch scenarios

Table 1 Sole in Division 7.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 4–7}$ (2022)	0.22	Based on landings of 696 tonnes for 2022
SSB_{2023}	3299	Short-term forecast; tonnes
$R_{age\ 2}$ (2022, 2023)	1937	Geometric mean of recruitment (GM, 2012–2020); thousands
Total catch (2022)	787	TAC for 2022; tonnes
Projected landings (2022)	696	Assuming average landings rate by age 2019–2021; tonnes
Projected discards (2022)	91	Assuming average discard rate by age 2019–2021; tonnes

Table 2 Sole in Division 7.a. Annual catch scenarios. Weights are in tonnes.

Basis	Total catch * (2023)	Projected landings (2023)	Projected discards* (2023)	$F_{projected\ landings}$ (2023)	SSB (2024)	% SSB change**	% TAC change***	% advice change^
ICES advice basis								
MSY approach: $F = F_{MSY} \times SSB_{2023}/MSY\ B_{trigger}$	605	535	70	0.189	3129	−5.2	−23	−23
Other scenarios								
$F = F_{MSY\ lower} \times SSB_{2023}/MSY\ B_{trigger}$	492	435	57	0.151	3230	−2.1	−37	−37
F = 0	0	0	0	0	3674	11.4	−100	−100
$F = F_{pa}$	695	615	81	0.22	3047	−7.6	−11.6	−11.6
$F = F_{lim}$	888	786	103	0.29	2874	−12.9	12.9	12.9
$SSB_{2024} = B_{lim}$	1305	1154	151	0.46	2500	−24	66	66
$SSB_{2024} = B_{pa} = MSY\ B_{trigger}$	192	170	22	0.056	3500	6.1	−76	−76
$SSB_{2024} = SSB_{2023}$	415	367	48	0.126	3299	0	−47	−47
$F = F_{2022}$	687	608	80	0.22	3054	−7.4	−12.7	−12.7
$F = F_{MSY\ lower}$	520	460	60	0.16	3205	−2.9	−34	−34
$F = F_{MSY}$	638	564	74	0.20	3099	−6.1	−18.9	−18.9
$F = F_{MSY\ upper}$	752	665	87	0.24	2996	−9.2	−4.5	−4.5

* Total catches and projected discards are calculated from projected landings based on the average discard rate in 2019–2021 (11.6% in weight).
** SSB 2024 relative to SSB 2023.
*** Total catch in 2023 relative to TAC 2022 (787 tonnes).
^ Advice value for 2023 relative to the corresponding 2022 value (787 tonnes).

The reduction in catch advice is caused by a combination of a downward revision of stock size and a further projected decline because of low incoming recruitments. In addition, the target F is reduced since SSB is estimated to be below MSY $B_{trigger}$ in 2023.

Basis of the advice

Table 3 Sole in Division 7.a. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for sole in this area

Quality of the assessment

The UK (E & W)-BTS-Q3 survey was unable to cover Division 7.a in 2020 because of COVID-19 restrictions. As a result, in last year's assessment the 2020 recruitment was assumed. This year's assessment resulted in a substantial higher estimate of the 2020 recruitment compared to last year's assumption.

Last year's advice was derived using a shorter time series for the recruitment assumption. However, this year with the decrease in recruitment in 2021 the longer time period recommended was considered more representative of present recruitment.

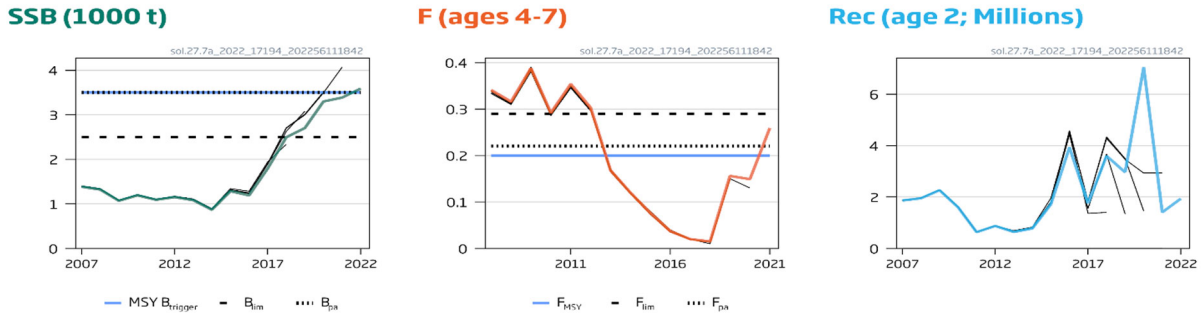


Figure 2 Sole in Division 7.a. Historical assessment results (final-year recruitment assumption and SSB estimate included).

Issues relevant for the advice

Discards have increased recently from 3.5% (average 2016–2018) to 12% (average 2019–2021), but are not currently included in the assessment. Discards are, however, taken into account in the calculation of the advice.

Reference points

Table 4 Sole in Division 7.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	3500	B_{pa}; in tonnes	ICES (2016)
	F_{MSY}	0.20	Stochastic simulations with a segmented regression stock–recruitment relationship	ICES (2016)
	$F_{MSY\ lower}$	0.16	The minimum F which produces at least 95% of maximum yield	ICES (2016)
	$F_{MSY\ upper}$	0.24	The maximum F which produces at least 95% of maximum yield	ICES (2016)
Precautionary approach	B_{lim}	2500	The lowest value with above-average recruitment (1997); in tonnes	ICES (2017)
	B_{pa}	3500	$B_{pa} \sim B_{lim} \times 1.4$; in tonnes	ICES (2017)
	F_{lim}	0.29	Based on simulated recruitment to give median biomass = B_{lim}	ICES (2017)
	F_{pa}	0.22	F_{P05}; F that leads to SSB ≥ B_{lim} with 95% probability	ICES (2017, 2021a)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 5 Sole in Division 7.a. The basis of the assessment.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical assessment (XSA) that uses landings in the model (ICES, 2022b)
Input data	International landings, age and length frequencies from catch sampling; one survey index (UK [E & W]-BTS-Q3 [B6596]); fixed maturity data from UK survey information; natural mortality is assumed to be constant
Discards and bycatch	Not included in the assessment, but used to provide catch advice
Indicators	None
Other information	This stock was benchmarked in 2011 (ICES, 2011)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Sole in Division 7.a. History of ICES advice, the agreed TAC, official landings, and ICES estimates of landings and discards. Weights are in tonnes.

Year	ICES advice	Landings corresponding to advice	Catch corresponding to advice	Agreed TAC	Official landings	ICES discards	ICES landings
1987	No increase in F	1900		2100	2041	-	2808
1988	80% of F (86); TAC	1600		1750	1885	-	1999
1989	80% of F (87); TAC	< 1480		1480	1823	-	1833
1990	Interim advice	1050*		1500	1576	-	1583
1991	90% of F (89); TAC	1300		1500	1223	-	1212
1992	No long-term gains in increased F	1200**		1350	1234	-	1259
1993	F = F (91) ~ 920 tonnes	920		1000	971	-	1023
1994	No long-term gains in increased F	1510**		1500	1367	-	1374
1995	20% reduction in F	800		1300	1300	-	1266
1996	20% reduction in F	800		1000	1023	-	1002
1997	20% reduction in F	800		1000	1027	-	1003
1998	20% reduction in F	850		900	895	-	911
1999	Reduce F below F_{pa}	830		900	810	-	863
2000	Reduce F below F_{pa}	< 1080		1080	833	-	818
2001	Reduce F below F_{pa}	< 930		1100	1012	-	1053
2002	Keep F below F_{pa}	< 1100		1100	1085	-	1090
2003	Keep F below F_{pa}	< 1010		1010	1014	-	1014
2004	Maintain SSB above B_{pa}	< 790		800	712	-	709
2005	F < F_{pa}	< 1000		960	854	-	855
2006	Recent catch levels (2002–2004)	< 930		960	576	-	569
2007	Maintain SSB above B_{pa}	0		820	492	-	492
2008	Zero catch	0		669	320	-	332
2009	Zero catch and recovery plan	0		502	325	-	325
2010	Zero catch and recovery plan	0		402	277	-	277
2011	See scenarios	-		390	330	14	330
2012	MSY transition	< 200		300	297	23	298
2013	No directed fisheries, bycatch and discards should be minimized	0		140	148	12	148
2014	No directed fisheries, bycatch and discards should be minimized	0		95	96	9	99
2015	No directed fisheries, bycatch and discards should be minimized	0		90	75	7	76
2016	MSY approach (minimize all catches)	0		40	35	1	35
2017	MSY approach		0	40	34	1	34
2018	MSY approach		0	40	36	2	36
2019	MSY approach		≤ 414	414	345†	63	400
2020	MSY approach		≤ 561	457	398***	56	404
2021	MSY approach		≤ 768	768	633***	61	629
2022	MSY approach		≤ 787	787			
2023	MSY approach		≤ 605				

* Revised to 1500 tonnes in 1990.
** Catch at *status quo* F.
*** Preliminary.
† Incomplete/missing due to part of the data being unavailable under data confidentiality clauses.

History of the catch and landings

Table 7 Sole in Division 7.a. Catch distribution by fleet in 2021 as estimated by ICES.

Total catch	Landings			Discards
	Beam trawlers	Otter trawlers	Other gears	
690 tonnes	87%	12%	< 1%	61 tonnes
	629 tonnes			

Table 8 Sole in Division 7.a. History of official and ICES estimated landings. Weights are in tonnes.

Year	Belgium	France	Ireland	Netherlands	UK (E + W)	UK (Isle of Man)	UK (NI)*	UK (Scotland)	Officially reported	ICES landings
1973	793	12	27	281	258	-	46	11	1428	1428
1974	664	54	28	320	218	-	23	-	1307	1307
1975	805	59	24	234	281	-	24	15	1442	1441
1976	674	72	74	381	195	-	49	18	1463	1463
1977	566	39	84	227	160	-	49	21	1146	1147
1978	453	65	127	177	189	-	57	30	1098	1106
1979	779	48	134	247	290	-	47	42	1587	1614
1980	1002	41	229	169	367	-	44	68	1920	1941
1981	884	13	167	186	311	-	41	45	1647	1667
1982	669	9	161	138	277	-	31	44	1329	1338
1983	544	3	203	224	219	-	33	29	1255	1169
1984	425	10	187	113	230	-	38	17	1020	1058
1985	589	9	180	546	269	-	36	28	1657	1146
1986	930	17	235	-	637	1	50	46	1916	1995
1987	987	5	312	-	599	3	72	63	2041	2808
1988	915	11	366	-	507	1	47	38	1885	1999
1989	1010	5	155	-	613	2	-	38	1823	1833
1990	786	2	170	-	569	10	-	39	1576	1583
1991	371	3	198	-	581	44	-	26	1223	1212
1992	531	11	164	-	477	14	-	37	1234	1259
1993	495	8	98	-	338	4	-	28	971	1023
1994	706	7	226	-	409	5	-	14	1367	1374
1995	675	5	176	-	424	12	-	8	1300	1266
1996	533	5	133	149	194	4	-	5	1023	1002
1997	570	3	130	123	189	5	-	7	1027	1003
1998	525	3	134	60	161	3	-	9	895	911
1999	469	< 1	120	46	165	1	-	8	810	863
2000	493	3	135	60	133	1	-	8	833	818
2001	674	4	135	-	195	-	-	4	1012	1053
2002	817	4	96	-	165	-	-	3	1085	1090
2003	687	4	103	-	217	-	-	3	1014	1014
2004	527	1	77	-	106	-	-	1	712	709
2005	662	3	85	-	103	-	-	1	854	855
2006	419	1	85	-	71	-	-	2	576	569
2007	306	1	115	-	70	-	-	4	492	492
2008	216	1	66	-	37	-	-	-	320	332
2009	257	-	47	-	20	1	-	1	325	325
2010	217	--	47	-	12	-	-	-	277	277
2011	250	< 1	49	-	31	-	-	-	330	330
2012	222	< 1	51	-	23	-	-	-	297	298
2013	96	< 1	40	-	12	-	-	-	148	148
2014	43	-	43	-	10	-	-	-	96	99
2015	36	< 1	32	-	7	-	-	-	75	76
2016	14	-	15	-	6	-	-	-	35	35
2017	14	< 1	14	-	4	2	-	-	34	34
2018	14	-	16	-	6	< 1	-	-	36	36
2019	329	< 1	†	-	15	< 1	-	-	345†	400
2020**	284	< 1	48	-	65	< 1	-	-	398	404
2021**	477	< 1	81	-	74	< 1	-	-	633	629

* 1989 onwards: N. Ireland included with England & Wales.

** Preliminary.

† Incomplete/missing due to part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

Table 9 Sole in Division 7.a. Assessment summary. Weights are in tonnes and recruitment in thousands.

Year	Recruitment age 2	SSB	Landings	Fishing mortality ages 4–7
1970	3695	6436	1785	0.39
1971	10177	6222	1882	0.44
1972	3186	5011	1450	0.45
1973	13133	5123	1428	0.43
1974	5870	5068	1307	0.44
1975	6679	5359	1441	0.40
1976	3857	4889	1463	0.43
1977	15772	4490	1147	0.37
1978	9040	5092	1106	0.36
1979	8847	5684	1614	0.48
1980	5070	5513	1941	0.64
1981	4496	5165	1667	0.48
1982	2460	4330	1338	0.44
1983	5556	4095	1169	0.44
1984	15457	4601	1058	0.35
1985	16223	5635	1146	0.34
1986	23690	6944	1995	0.44
1987	3454	7148	2808	0.86
1988	3490	5498	1999	0.70
1989	4366	4609	1833	0.58
1990	5547	3603	1583	0.66
1991	12650	3165	1212	0.51
1992	4943	3430	1259	0.53
1993	6174	3212	1023	0.56
1994	5230	4023	1374	0.50
1995	2004	3493	1266	0.51
1996	2493	2689	1002	0.53
1997	8338	2480	1003	0.60
1998	6849	2998	911	0.50
1999	5230	3288	863	0.47
2000	6943	3097	818	0.46
2001	4543	3531	1053	0.35
2002	2328	3539	1090	0.39
2003	3052	3174	1014	0.36
2004	3632	2274	709	0.32
2005	2945	2055	855	0.56
2006	1318	1623	569	0.47
2007	1863	1383	492	0.34
2008	1949	1320	332	0.32
2009	2263	1069	325	0.39
2010	1602	1190	277	0.29
2011	633	1091	330	0.35
2012	872	1150	298	0.30
2013	639	1081	148	0.168
2014	775	866	99	0.120
2015	1714	1284	76	0.076
2016	3931	1189	35	0.037
2017	1755	1794	34	0.020
2018	3596	2494	36	0.0150
2019	2964	2703	400	0.156
2020	7051	3298	404	0.149
2021	1405	3385	629	0.26
2022	1937*	3588		

* Geometric mean (2012–2020).

Sources and references

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Download the stock assessment data and figures.

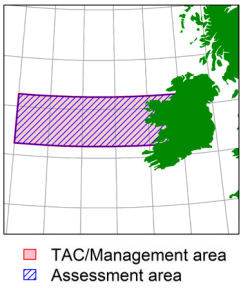
Recommended citation: ICES. 2022. Sole (*Solea solea*) in Division 7.a (Irish Sea). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, sol.27.7a. https://doi.org/10.17895/ices.advice.19453817

West of Ireland Sole

Divisions 7.b and 7.c

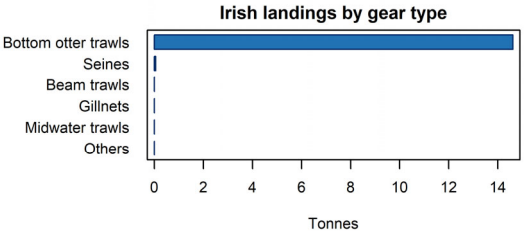
ADVICE FOR 2023

ICES advises that when the precautionary approach is applied, catches should be no more than 19 t in each of the years 2021, 2022 and 2023.



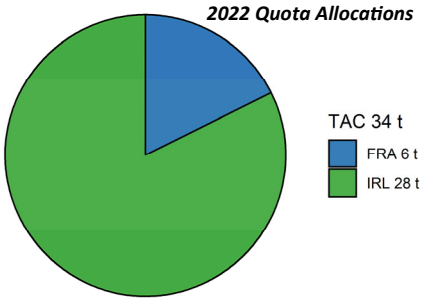
Key Points

ICES Assessment Category	6 (Bycatch only assessment)	
Management Plan	WWMAP (bycatch)	
Advice Basis	ICES PA approach	Catch=19 t
Ranges	F_{MSY} Range Lower	Not Appropriate (bycatch)
	F_{MSY}	Not Appropriate (bycatch)
	F_{MSY} Range Upper	Not Appropriate (bycatch)
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

- The stock and management units are both ICES Divisions 7.b and 7.c.
- The recent landings have been below the TAC.



Key Stock Considerations

- Irish landings of West of Ireland sole are mainly taken as a bycatch in mixed fisheries targeting *Nephrops* and the other bottom trawl fisheries that occur in relatively shallow water (less than 200m) of area 7.b.

Further information on this stock can be found in the 2020 Stock Book.

Table 1. Sole in Division 7b.c. Landings by country 2000-2021

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
France	31	8	17	7	14	12	12	7	6	5
Ireland	99	70	51	56	39	25	31	34	31	46
Spain	0.5	0.5	0	2	1	0	0	0	0	0
UK (all)	1	0	2	0.5	0.5	0	0	0	0	0
Total	132	79	70	66	55	37	43	41	37	51

Country	2010	2011	2012	2013	2014	20015	2016	2017	2018	2019
France	8	5	7	3	3	12	6	5	5	3
Ireland	35	22	38	30	24	31	36	22	22	15
Spain	0	0	0	0	0	0				
UK (all)	0	0	0	0	0	9	0.5	0.5	<0.5	<0.5
Total	43	27	45	33	27	52	43	28	27	18

Country	2020	2021
France	<0.5	2.0
Ireland	5.8	14.3
Spain	0.5	<0.5
UK (all)		<0.5
Total	6	16.5

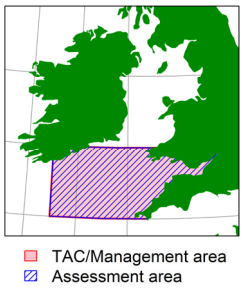
CELTIC SEA SOLE

Divisions 7.f and 7.g

ADVICE FOR 2023

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 1,338 t.

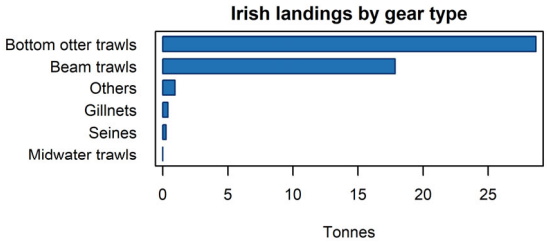
ICES notes the existence of a precautionary management plan, developed and adopted by some of the relevant management authorities for this stock.



KEY POINTS

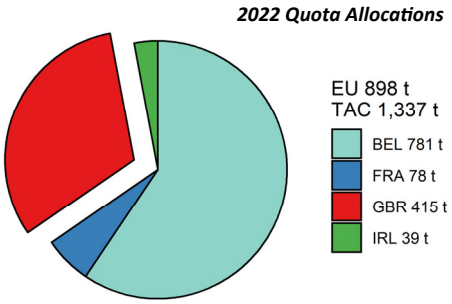
ICES Assessment Category	1 (Quantitative Assessment)	
Management Plan	WWMAP (target)	
Advice Basis	ICES MSY approach	Catch=1,338 t
Ranges	F_{MSY} Range Lower	Catch=765 t
	F_{MSY}	Catch=1,338 t
	F_{MSY} Range Upper	Catch=2,232 t
Landing Obligation	From 2016	*De minimis* up to 3%*

* Beam trawlers using mesh size 80-119mm with increased selectivity and trammel and gill nets (EC 2020/2015)



MANAGEMENT IN 2022

- The stock and management units are both ICES Division 7.f and 7.g.
- The Irish quota is very restrictive; Ireland applies minimal quotas for sole during most months.



KEY STOCK CONSIDERATIONS

- Discarding is estimated to be 62 t in 2021 which accounts for 4% of overall catch, a reduction from 7% last year.
- Irish landings of Celtic Sea sole are mainly taken as a minor bycatch in mixed fisheries targeting *Nephrops* and in mixed beam trawl fisheries off the south coast.

Published 30 June 2022

Sole (*Solea solea*) in divisions 7.f and 7.g (Bristol Channel, Celtic Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 1338 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

Fishing pressure on the stock is at F_{MSY}; spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

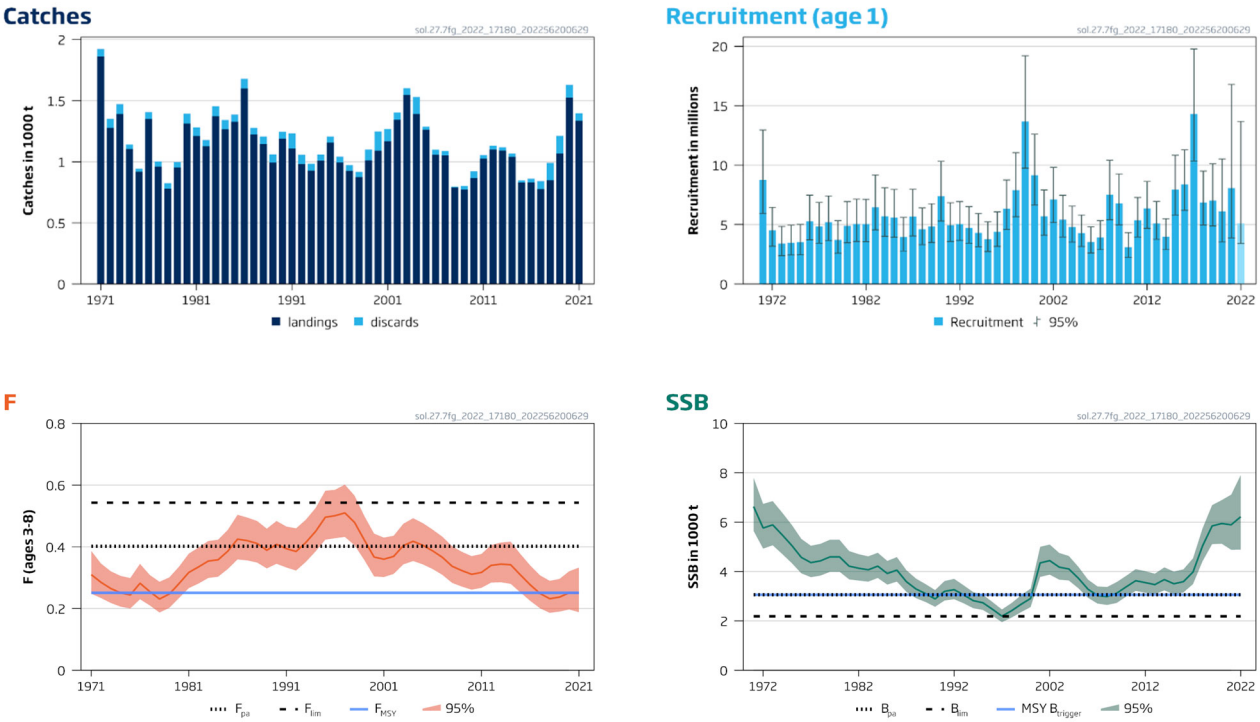


Figure 1 Sole in divisions 7.f and 7.g. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour.

Catch scenarios

Table 1 Sole in divisions 7.f and 7.g. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 3–8}$ (2022)	0.246	Based on a catch of 1337 tonnes for 2022
SSB_{2023}	6120	Short-term forecast; in tonnes.
$Rage_{1}$ (2022-2023)	5111	Median recruitment, resampled from the years 1971–2019; in thousands.
Catch (2022)	1337	TAC for 2022; in tonnes.
Projected landings (2022)	1258	Assuming average landings ratio by age 2019-2021; in tonnes.
Projected discards (2022)	79	Assuming average discard ratio by age 2019-2021; in tonnes.

Table 2 Sole in divisions 7.f and 7.g. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings* (2023)	Projected discards** (2023)	F_{total} (2023)	$F_{projected\ landings}$ (2023)	$F_{projected\ discards}$ (2023)	SSB (2024)	% SSB change ***	% TAC change ^	% advice change^^
ICES advice basis										
MSY approach: F = F_{MSY}	1338	1258	80	0.251	0.23	0.0180	5903	−3.5	0.075	0.075
Other scenarios										
EU MAP^^^: F_{MSY}	1338	1258	80	0.251	0.23	0.0180	5903	−3.5	0.075	0.075
EU MAP^^^: $F_{MSY\ lower}$	765	720	45	0.136	0.126	0.0097	6504	6.3	−43	−43
EU MAP^^^ : $F_{MSY\ upper}$	2232	2097	135	0.462	0.43	0.033	4963	−18.9	67	67
F = 0	0	0	0	0	0	0	7307	19.4	−100	−100
F= F_{pa}	1996	1877	119	0.402	0.37	0.029	5212	−14.8	49	49
F= F_{lim}	2531	2377	154	0.543	0.50	0.039	4647	−24	89	89
SSB_{2024} = B_{lim}	4919	4572	347	1.59	1.48	0.114	2184	−64	268	268
SSB_{2024} = B_{pa} = MSY $B_{trigger}$	4063	3797	266	1.10	1.02	0.078	3057	−50	204	204
F = F_{2022}	1312	1234	78	0.246	0.23	0.0175	5930	−3.1	−1.87	−1.87
SSB_{2024} = SSB_{2023}	1130	1064	66	0.21	0.193	0.0148	6120	0	−15.5	−15.5

* Marketable landings, assuming recent discard rate.
** Including BMS landings (EU stocks), assuming recent discard rate.
*** SSB 2024 relative to SSB 2023.
^ Total catch in 2023 relative to TAC 2022 (1337 tonnes).
^^ Advice value for 2023 relative to the advice value for 2022 (1337 tonnes).
^^^ EU multiannual plan (MAP) for the Western Waters and adjacent waters (EU, 2019).

Basis of the advice

Table 3 Sole in divisions 7.f and 7.g. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

Discard estimates are based on incomplete sampling of the fisheries in recent years. However, the main fleet is considered to be represented and therefore this is considered to have minimal impact on the assessment.

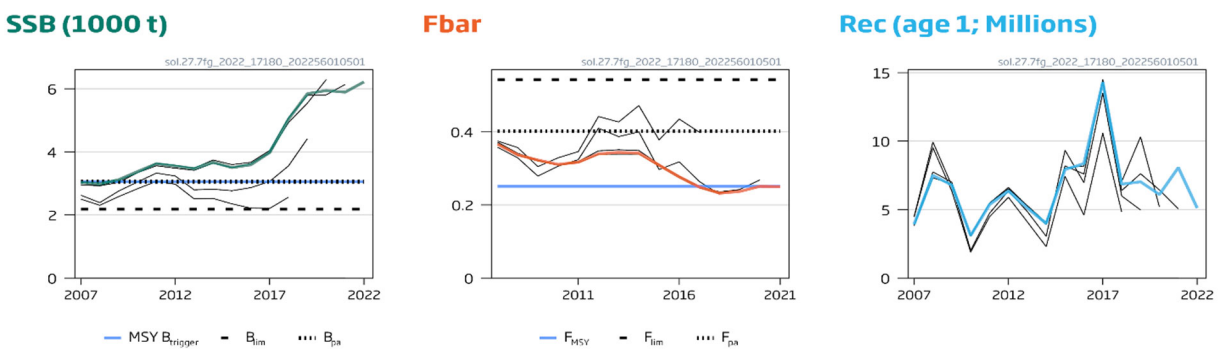


Figure 2 Sole in divisions 7.f and 7.g. Historical assessment results (final-year SSB estimate and recruitment assumption included for each line). This stock was benchmarked in 2020 (ICES, 2020a) the reference points were revised and at which point the F_{bar} was changed from $F_{4–8}$ to $F_{3–8}$. Therefore, only assessment results from the last three years should be compared to the reference points indicated.

Issues relevant for the advice

There is no information to present for this stock.

Reference points

Table 4 Sole in divisions 7.f and 7.g. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	3057	B_{pa}; in tonnes.	ICES (2020b)
	F_{MSY}	0.251	Eqsim analysis based on the recruitment period 1971–2018.	ICES (2020b)
Precautionary approach	B_{lim}	2184	B_{loss} estimated in 2020, corresponding to SSB in 1997; in tonnes.	ICES (2020b)
	B_{pa}	3057	$B_{lim} \times 1.4$; in tonnes	ICES (2020b)
	F_{lim}	0.543	Eqsim analysis, based on the recruitment period 1971–2018	ICES (2020b)
	F_{pa}	0.402	F_{P05} ; F that leads to SSB ≥ B_{lim} with 95% probability	ICES (2020b)
Management plan*	MAP MSY $B_{trigger}$	3057	MSY $B_{trigger}$; in tonnes	EU (2019), ICES (2020b)
	MAP B_{pa}	3057	B_{pa}; in tonnes	EU (2019), ICES (2020b)
	MAP B_{lim}	2184	B_{lim}; in tonnes	EU (2019), ICES (2020b)
	MAP F_{MSY}	0. 251	F_{MSY}	EU (2019), ICES (2020b)
	MAP range F_{lower}	0.136–0.251	Consistent with ranges provided by ICES (2020b), resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2020b)
	MAP range F_{upper}	0.251–0.462	Consistent with ranges provided by ICES (2020b), resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2020b)

* EU multiannual plan (MAP) for the Western Waters and adjacent waters (EU, 2019).

Basis of the assessment

Table 5 Sole in divisions 7.f and 7.g. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-based analytical assessment (SAM; Nielsen and Berg, 2014; ICES, 2022b) that uses landings and discards in the model and in the forecast
Input data	Total international landings, ages and length frequencies from catch sampling by métier; one survey index (UK[E&W]-BTS-Q3 (B6596) 1988–2021); five commercial biomass indices (BE-CBT [1971–1983 and 1984–1996], BE-CBT3 [2006–2021], and UK(E & W)-CBT [1984–2005 and 2006–2021]); maturity data (ICES, 2020a); natural mortality is assumed to be constant. Catch numbers for age 1 and 2 prior to 2004 are not used in the assessment model.
Discards and bycatch	Discard numbers available from 2004 onwards. Discards prior to 2004 are calculated using a constant ratio of discards to landings by age based on data from 2004–2018 (ICES, 2020a).
Indicators	None
Other information	Last benchmark in 2020 (ICES, 2020a)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 6 Sole in divisions 7.f and 7.g. History of ICES advice, agreed TAC, official landings, and ICES estimates for landings and discards. All weights are in tonnes.

Year	ICES advice	Catches corresponding to advice	Landings corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards
1987	*Status quo* F; TAC		1600	1600	1264	1222	
1988	F = F (pre-86); TAC		900	1100	1204	1146	
1989	F at F (81–85); TAC		1000	1000	992	992	
1990	No increase in F		1200	1200	1239	1189	
1991	No increase in F		1100	1200	1496	1107	
1992	No long-term gains in increasing F		1100	1200	1060	981	
1993	No long-term gains in increasing F		-	1100	1030	928	
1994	No long-term gains in increasing F		-	1100	1018	1009	
1995	No increase in F		1000	1100	1165	1157	
1996	20% reduction in F		800	1000	1081	995	
1997	20% reduction in F		800	900	1038	927	
1998	20% reduction in F		700	850	1013	875	
1999	Reduce F below F_{pa}		810	960	947	1012	
2000	Reduce F below F_{pa}		< 1160	1160	1040	1091	
2001	Reduce F below F_{pa}		< 810	1020	1120	1168	
2002	Reduce F below F_{pa}		< 1000	1070	1118	1345	
2003	Reduce F below F_{pa}		< 1240	1240	1207	1547	
2004	Reduce F below F_{pa}		< 1000	1050	1130	1391	140
2005	Reduce F below F_{pa}		< 840	1000	997	1263	23
2006	Reduce F below F_{pa}		< 880	950	921	1058	41
2007	Reduce F below F_{pa}		< 840	893	943	1052	36
2008	Keep F below F_{pa}		< 1000	964	781	790	8
2009	No long-term gains in increasing F		< 940	993	806	772	30
2010	No long-term gains in increasing F		< 920	993	871	867	56
2011	See scenarios		-	1241	1027	1027	28
2012	MSY approach		< 1060	1060	1099	1101	32
2013	MSY approach		< 1100	1100	1085	1093	26
2014	MSY approach		< 920	1001	1042	1041	27
2015	MSY approach		< 652	851	830	831	17
2016	MSY approach	≤ 760	≤ 745	779	830	832	31
2017	MSY approach	≤ 806		845	777	778	65
2018	MSY approach	≤ 931		920	850	850	141
2019	MSY approach	≤ 864		1009	1068	1068	145
2020	Management plan	1686 (range 993–2597)		1652	1507*	1524	106
2021	Management plan	1413 (range 811–2364)		1413	1365*	1336	62
2022	MSY approach	≤ 1337		1337			
2023	MSY approach	≤ 1338					

* Preliminary.

History of the catch and landings

Table 7 Sole in divisions 7.f and 7.g. Catch distribution by fleet in 2021 as estimated by ICES.

Total catch	Landings			Discards		
1398 tonnes	Beam trawlers 87%	Otter trawlers 13%	Other gears < 1%	Beam trawlers 87%	Otter trawlers 13%	Other gears < 1%
	1336 tonnes			62 tonnes		

Table 8 Sole in divisions 7.f and 7.g. History of official and ICES estimated landings (tonnes).

Year	Belgium	Denmark	France	Ireland	UK (E. and W., N.I.)	UK (Scotland)	Other	Total official	ICES landings
1986	1039*	2	146	188	611	-	3	1989	1600
1987	701*	-	117	9	437	-	-	1264	1222
1988	705*	-	110	72	317	-	-	1204	1146
1989	684*	-	87	18	203	-	-	992	992
1990	716*	-	130	40	353	0	-	1239	1189
1991	982*	-	80	32	402	0	-	1496	1107
1992	543*	-	141	45	325	6	-	1060	981
1993	575*	-	108	51	285	11	-	1030	928
1994	619*	-	90	37	264	8	-	1018	1009
1995	763*	-	88	20	294	-	-	1165	1157
1996	695*	-	102	19	265	0	-	1081	995
1997	660*	-	99	28	251	0	-	1038	927
1998	675*	-	98	42	198	-	-	1013	875
1999	604	-	61	51	231	0	-	947	1012
2000	694	-	74	29	243	-	-	1040	1091
2001	720	-	77	35	288	-	-	1120	1168
2002	703	-	65	32	318	-	-	1118	1345
2003	715	-	124	26	342	-	-	1207	1547
2004	735	-	79	33	283	-	-	1130	1391
2005	645	-	101	34	217	-	-	997	1263
2006	576	-	75	38	232	-	-	921	1058
2007	582	-	85	32	245	-	-	943	1052
2008	466	-	68	28	218	-	-	781	790
2009	513	-	73	26	195	-	-	806	772
2010	620	-	44	27	180	-	-	871	867
2011	775	-	54	30	168	-	-	1027	1027
2012	843	-	48	33	175	-	-	1099	1101
2013	789	-	49	42	205	-	-	1085	1093
2014	703	-	58	28	252	-	-	1042	1041
2015	674	-	24	27	105	-	-	830	831
2016	563	-	72	21	174	-	-	830	832
2017	551	-	49	28	149	-	-	777	778
2018	607	-	44	27	171	-	-	850	850
2019	800	-	42	33	193	-	< 1	1068	1068
2020**	1121	-	44	51	291	-	< 1	1507	1524
2021**	859	-	61	48	395	-	2	1365	1336

* Including divisions 7.g–k.

**Preliminary official landings.

Summary of the assessment

Table 9 Sole in divisions 7.f and 7.g. Assessment summary. Weights are in tonnes and recruitment in thousands. 'High' and 'Low' refer to 95% confidence intervals.

Year	Recruitment age 1			SSB			Landings**	Discards***	Fishing mortality ages 3-8		
	Low	Value	High	Low	Value	High			Low	Value	High
1971	5929	8764	12954	5642	6636	7805	1861	62	0.25	0.31	0.39
1972	3178	4526	6445	4926	5762	6741	1278	74	0.23	0.28	0.35
1973	2392	3408	4855	5062	5891	6855	1391	81	0.22	0.27	0.32
1974	2439	3476	4953	4709	5484	6387	1105	36	0.21	0.25	0.31
1975	2452	3507	5015	4338	5055	5891	919	26	0.20	0.24	0.30
1976	3726	5278	7475	3925	4571	5323	1350	57	0.23	0.28	0.35
1977	3432	4852	6859	3770	4361	5045	961	41	0.21	0.26	0.31
1978	3660	5208	7409	3833	4431	5123	780	45	0.187	0.23	0.29
1979	2589	3715	5331	3986	4593	5292	954	45	0.20	0.25	0.30
1980	3470	4903	6928	3990	4594	5288	1314	81	0.23	0.28	0.34
1981	3577	5055	7143	3681	4217	4832	1212	70	0.27	0.32	0.38
1982	3561	5038	7127	3633	4134	4704	1128	51	0.28	0.34	0.40
1983	4556	6467	9178	3589	4070	4616	1373	81	0.30	0.35	0.42
1984	4010	5698	8097	3737	4219	4762	1266	77	0.30	0.36	0.42
1985	3941	5600	7957	3468	3920	4431	1328	59	0.33	0.39	0.46
1986	2778	3947	5608	3591	4058	4585	1600	80	0.36	0.43	0.50
1987	4043	5677	7971	3173	3587	4055	1222	56	0.36	0.42	0.50
1988	3312	4605	6404	2919	3293	3715	1146	61	0.35	0.41	0.48
1989	3494	4856	6748	2765	3108	3493	992	70	0.33	0.39	0.46
1990	5296	7394	10324	2570	2890	3250	1189	57	0.35	0.41	0.48
1991	3583	4950	6837	2826	3198	3619	1107	126	0.33	0.39	0.47
1992	3671	5045	6933	2877	3264	3703	981	77	0.32	0.39	0.46
1993	3429	4728	6518	2709	3053	3439	928	56	0.35	0.41	0.49
1994	3137	4313	5931	2512	2820	3167	1009	52	0.39	0.45	0.53
1995	2731	3781	5236	2443	2736	3065	1157	50	0.42	0.50	0.58
1996	3166	4383	6068	2207	2472	2768	995	47	0.43	0.50	0.59
1997	4588	6338	8754	1948	2191	2465	927	46	0.43	0.51	0.60
1998	5663	7907	11041	2131	2409	2723	875	43	0.41	0.48	0.57
1999	9744	13679	19202	2352	2672	3037	1012	89	0.36	0.42	0.50
2000	6648	9156	12610	2558	2909	3309	1091	158	0.30	0.37	0.44
2001	4109	5702	7914	3780	4349	5003	1168	101	0.30	0.36	0.43
2002	5166	7121	9816	3871	4441	5094	1345	58	0.31	0.37	0.44
2003	3954	5429	7453	3668	4176	4753	1547	54	0.34	0.40	0.48
2004	3525	4806	6553	3636	4104	4632	1391	140	0.35	0.42	0.49
2005	3160	4283	5804	3318	3729	4191	1263	23	0.34	0.41	0.48
2006	2607	3544	4818	2936	3286	3678	1058	41	0.33	0.39	0.46
2007	2886	3924	5336	2700	3028	3397	1052	36	0.31	0.37	0.43
2008	5411	7507	10415	2645	2987	3373	790	8	0.28	0.34	0.40
2009	4982	6791	9256	2724	3119	3572	772	30	0.27	0.32	0.38
2010	2236	3110	4326	2982	3378	3827	867	56	0.26	0.31	0.37
2011	3953	5364	7280	3211	3627	4098	1027	28	0.27	0.32	0.38
2012	4690	6362	8630	3139	3551	4017	1101	32	0.28	0.34	0.41
2013	3759	5111	6950	3078	3470	3912	1093	26	0.28	0.34	0.41
2014	2898	3987	5486	3236	3674	4171	1041	27	0.28	0.34	0.42
2015	5799	7926	10833	3070	3503	3998	831	17	0.25	0.31	0.38
2016	6197	8365	11292	3152	3591	4092	832	31	0.23	0.28	0.34
2017	10348	14305	19774	3489	3979	4539	778	65	0.20	0.25	0.31
2018	4956	6861	9498	4415	5040	5754	850	141	0.186	0.23	0.29
2019	4886	7032	10120	5107	5846	6692	1068	145	0.190	0.24	0.30
2020	3542	6104	10519	5126	5945	6894	1524	106	0.197	0.25	0.32
2021	3880	8071	16786	4879	5894	7119	1336	62	0.188	0.250	0.333
2022	3408	5111*	13679	4886	6221	7915					

* Median resampled recruitment (1971–2019) as estimated by a stochastic projection.

** Landings are ICES estimates.

*** ICES discard estimates only available from 2004 to 2021. Discards prior to 2004 are calculated using a discard rate-at-age based on 2004–2018 discard data.

Sources and references

EU. 2019. Regulation (EU) 2019/472 of the European Parliament and of the Council of 19 March 2019 establishing a multiannual plan for stocks fished in the Western Waters and adjacent waters, and for fisheries exploiting those stocks, amending Regulations (EU) 2016/1139 and (EU) 2018/973, and repealing Council Regulations (EC) No 811/2004, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007 and (EC) No 1300/2008. Official Journal of the European Union, L 83: 1–17. http://data.europa.eu/eli/reg/2019/472/oj.

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Download the stock assessment data and figures.

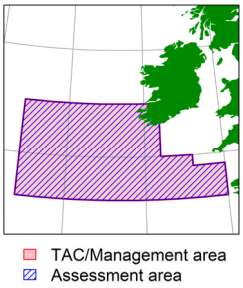
Recommended citation: ICES. 2022. Sole (*Solea solea*) in divisions 7.f and 7.g (Bristol Channel, Celtic Sea). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, sol.27.7fg. https://doi.org/10.17895/ices.advice.19453829.

SOUTHWEST OF IRELAND SOLE

Divisions 7.h-k

ADVICE FOR 2023

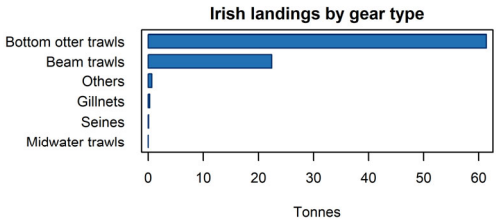
ICES advises that when the precautionary approach is applied, catches in 2023 should be no more than 213 t.

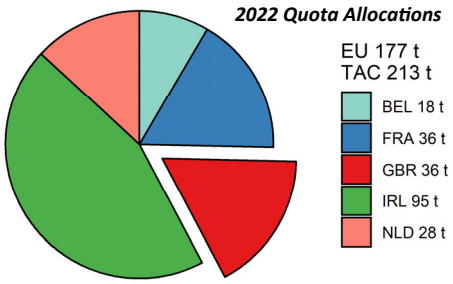


KEY POINTS

ICES Assessment Category	5 (Landings only assessment)	
Management Plan	WWMAP (target)	
Advice Basis	ICES PA approach	Catch=213 t
Ranges	F_{MSY} Range Lower	Not available
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not available
Landing Obligation	From 2019	*De minimis* up to 3%*

* Beam trawlers using mesh size 80-119mm with increased selectivity (EC 2020/2015)





MANAGEMENT IN 2022

- The TAC and assessment area covers Division 7.h-k.
- Recent Irish landings have been below the quota.

KEY STOCK CONSIDERATIONS

- This stock was benchmarked in 2020 and the previous assessment which covered only 7.j was no longer considered an appropriate basis for management advice.
- The stock identity of sole in this area is currently under investigation by the Flanders fisheries institute (ILVO) using genetic techniques and samples provided by the Marine Institute.
- Sole are mainly taken in mixed otter trawl fisheries by Irish vessels off the southwest and are landed with anglerfish, megrim and gadoid species.
- Discarding is considered to be negligible.

Published 30 June 2022

Sole (*Solea solea*) in divisions 7.h–k (Celtic Sea South, southwest of Ireland)

ICES advice on fishing opportunities

ICES advises that when the precautionary approach is applied, catches in 2023 should be no more than 213 tonnes.

Stock development over time

ICES cannot assess the stock and the exploitation status relative to maximum sustainable yield (MSY) and precautionary approach (PA) reference points because the reference points are undefined.

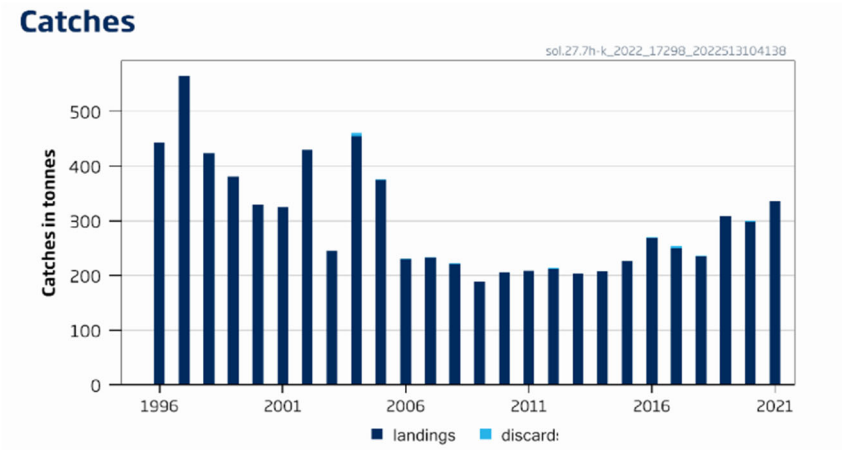


Figure 1 Sole in divisions 7.h–k. ICES estimated catches. Discard estimates are available from 2004.

Catch scenarios

ICES framework for category 5 stocks was applied (ICES, 2012). For stocks without information on abundance or exploitation, ICES considers that a precautionary reduction of catches should be implemented where there is no ancillary information clearly indicating that the current level of exploitation is appropriate for the stock. Discarding is considered negligible. The precautionary buffer was applied in 2020 and its application has therefore not been considered again.

Table 1 Sole in divisions 7.h–k. The basis for the catch options.

Advised catch for 2022 issued in 2021		213 tonnes
Discard rate		Negligible
Precautionary buffer	Not applied	-
Catch advice for 2023		213 tonnes
% advice change		0 %

Basis of the advice

Table 2 Sole in divisions 7.h–k. The basis of the advice.

Advice basis	Precautionary approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. The MAP stipulates that when the F_{MSY} ranges are not available, fishing opportunities should be based on the best available advice. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES precautionary approach.

Quality of the assessment

Area misreporting is considered to be an issue for this stock; however, it remains difficult to fully quantify. The sampling levels in 2020 and 2021 were lower because of the impact of COVID-19; however, discards are still considered negligible.

Issues relevant for the advice

Limited sampling of age and length data in Division 7.h hinders the use of an assessment model for this stock.

There is a lack of reliable information on younger fish and fishery-independent indices.

There is uncertainty in stock identity.

Reference points

No reference points are defined for this stock.

Basis of the assessment

Table 4 Sole in divisions 7.h–k. Basis of the assessment and advice.

ICES stock data category	5 (ICES, 2022a)
Assessment type	No assessment
Input data	ICES estimated catch
Discards and bycatch	Considered negligible
Indicators	None
Other information	Last benchmark in 2020 (ICES, 2020)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

History of the advice, catch, and management

Table 5 Sole in divisions 7.h–k. History of ICES advice, agreed TAC, official landings, and ICES estimated landings and discards (tonnes).

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards **
1996	No advice	-	-	825	443	
1997	No advice	-	-	742	564	
1998	No advice	-	-	759	423	
1999	No advice	-	-	406	381	
2000	No advice	-	-	302	329	
2001	No advice	-	650	347	325	
2002	No advice	-	650	515	430	
2003	Reduce TAC to recent landings	330	390	486	245	
2004	Reduce TAC to recent average (2000–2002)	360	390	449	454	7
2005	Reduce TAC to recent average (2001–2003)	335	650	392	375	1
2006	Reduce TAC to recent average (2002–2004)	380	650	288	230	1
2007	Reduce TAC to recent average (2003–2005)	287	650	278	232	2
2008	Reduce TAC to recent average (2004–2006)	300	650	220	221	1
2009	Same advice as last year	300	553	208	188	0
2010	No advice	-	498	228	206	0
2011	No increase in catches	-	423	224	208	0
2012	No increase in catches	-	423	234	212	1
2013	Decrease catches by 8% (15% increase, followed by 20% PA reduction)	< 200	402	213	204	0
2014	Increase catches by 11%	< 252	382	242	207	0
2015	Average catch (2011–2013)	< 225	382	244	226	0
2016	Precautionary approach (decrease recent advised value by no more than 9%)	≤ 205	382	330	269	1
2017	Precautionary approach (increase recent advised value by no more than 9%)	≤ 223	382	281	250	4

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Official landings	ICES landings	ICES discards **
2018	Precautionary approach (increase recent advised value by no more than 20%)	≤ 268	382	283	235	1
2019	Precautionary approach (decrease recent advised value by no more than 32%)	≤ 311	382	274 [c]	308	1
2020	Precautionary approach	≤ 213	329	284*	299	< 1
2021	Precautionary approach	≤ 213	280	316*	336	0
2022	Precautionary approach	≤ 213	213			
2023	Precautionary approach	≤ 213				

* Preliminary official landings.

** May be an underestimate due to low sampling.

[c] Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

History of the catch and landings

Table 6 Sole in divisions 7.h–k. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings			Discards
336 tonnes	Otter trawl 65 %	Beam trawl 34 %	Other 1 %	Negligible
	336 tonnes			

Table 7 Sole in divisions 7.h–k. History of official landings by country, ICES unallocated and estimated values. All weights are in tonnes.

Year	Official landings						ICES landings
	Belgium	France	UK	Ireland	Other countries	Total	
1951	21	150	91	56	0	318	
1952	37	220	88	44	0	389	
1953	23	227	100	54	0	404	
1954	13	317	167	75	0	572	
1955	125	634	174	65	0	998	
1956	251	511	98	64	0	924	
1957	454	359	86	67	0	966	
1958	397	605	72	88	0	1162	
1959	241	576	61	101	0	979	
1960	0	506	48	96	0	650	
1961	197	525	61	110	0	893	
1962	144	397	31	123	0	695	
1963	149	502	25	127	0	803	
1964	310	578	34	118	0	1040	
1965	335	1128	15	123	0	1601	
1966	123	0	36	118	0	277	
1967	168	474	20	123	0	785	
1968	113	474	29	116	0	732	
1969	175	633	23	120	0	951	
1970	436	537	19	122	0	1114	
1971	394	1382	4	93	0	1873	
1972	203	1011	11	131	7	1363	
1973	406	390	6	108	4	914	
1974	369	143	5	116	15	648	
1975	210	207	24	97	2	540	
1976	638	19	11	152	33	853	
1977	519	103	12	126	140	900	
1978	290	23	11	73	60	457	
1979	384	29	18	109	0	540	
1980	522	27	42	162	0	753	
1981	576	107	83	195	0	961	
1982	471	104	108	172	0	855	
1983	411	176	129	176	51	943	
1984	474	120	151	156	194	1095	

Year	Official landings						ICES landings
	Belgium	France	UK	Ireland	Other countries	Total	
1985	318	25	200	201	280	1024	
1986	442	38	261	188	3	932	
1987	271	44	193	168	0	676	
1988	254	53	166	182	0	655	
1989	252	84	177	206	0	719	
1990	353	66	144	266	0	829	
1991	358	55	234	306	0	953	
1992	312	43	217	255	0	827	
1993	317	44	214	237	0	812	
1994	338	42	174	184	0	738	
1995	433	47	192	243	0	915	
1996	375	50	148	182	70	825	443
1997	368	58	113	203	0	742	564
1998	346	74	111	221	7	759	423
1999	101	0	97	207	1	406	381
2000	8	78	95	111	10	302	329
2001	13	99	111	124	0	347	325
2002	154	108	124	129	0	515	430
2003	170	133	78	105	0	486	245
2004	157	102	79	111	0	449	454
2005	90	93	112	97	0	392	375
2006	36	99	88	63	1	288	230
2007	31	79	91	77	0	278	232
2008	10	58	80	72	0	220	221
2009	11	79	58	61	0	208	188
2010	20	87	51	71	0	228	206
2011	10	95	54	65	0	224	208
2012	18	85	46	85	0	234	212
2013	4	76	47	85	0	213	204
2014	42	61	54	85	0	242	207
2015	40	74	53	77	0	244	226
2016	91	77	63	99	0	330	269
2017	75	81	39	86	0	281	250
2018	96	91	33	63	0	283	235
2019	75	88	48	55[c]	8	274[c]	308
2020*	88	102	50	37	7	284	299
2021*	50	128	47	75	16	316	336

* Preliminary official landings.

[c] Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

There is no assessment for sole in this area.

Sources and references

EU. 2019. Regulation (EU) 2019/472 of the European Parliament and of the Council of 19 March 2019 establishing a multiannual plan for stocks fished in the Western Waters and adjacent waters, and for fisheries exploiting those stocks, amending Regulations (EU) 2016/1139 and (EU) 2018/973, and repealing Council Regulations (EC) No 811/2004, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007 and (EC) No 1300/2008. Official Journal of the European Union, L 83: 1–17. http://data.europa.eu/eli/reg/2019/472/oj.

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Download the stock assessment data and figures.

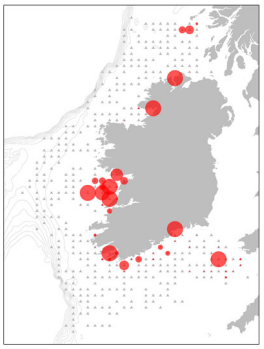
Recommended citation: ICES. 2022. Sole (*Solea solea*) in Divisions 7.h-k (Celtic Sea South, southwest of Ireland). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, sol.27.7h-k. https://doi.org/10.17895/ices.advice.19453832.

EUROPEAN SPRAT

(*SPRATTUS SPRATTUS*)

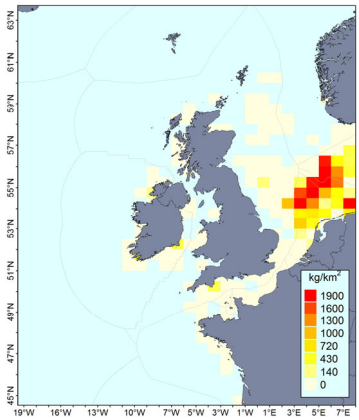
BIOLOGY – SPECIES

Sprat is a pelagic schooling fish usually found inshore, with juveniles sometimes found in estuaries. The species is widely distributed from Morocco to the South of Norway and four different stocks are identified in European waters. ICES has considered sprat in the Celtic Seas Ecoregion (ICES Divisions 6 and 7 excluding 7.d & 7.e) to be one stock since 2011. There is work ongoing to investigate stock structure and dynamics within the area. Sprat perform seasonal migrations between winter–feeding and summer spawning grounds as well as diel vertical migrations. Sprat reach a total length of 18 cm, size–at–maturity has been estimated at 10.1 cm and is highly variable between areas. Spawning occurs in shallow waters (10–20 m) and egg production ranges 6,000–14,000. There is currently no evidence of spawning site fidelity (homing). European sprat is an important species in the trophic web as it links between zooplankton and top predators (fish, birds and marine mammals).

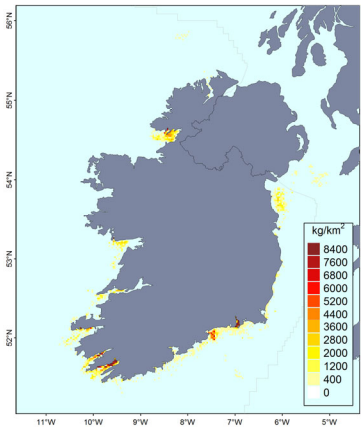


Groundfish Survey catches of juveniles (<10.5cm)

LANDINGS DISTRIBUTION



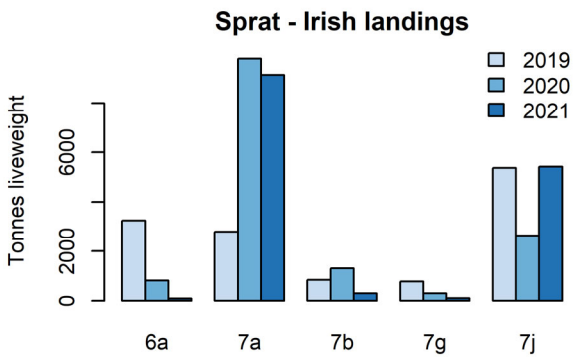
◀ The distribution of international landings of sprat between 2016 - 2020. The biggest fisheries for sprat occur in the North Sea.

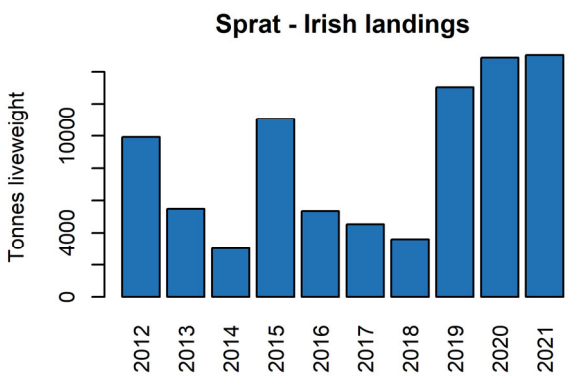


◀ The distribution of sprat landings by Irish vessels between 2016 - 2020. Catches were mainly taken in inshore areas in the south and southwest and Donegal bay.

IRISH LANDINGS AND VALUE OF TAC

The average annual catch of sprat in the past 3 years (2019-2021) was 14,000 t. Irish vessels target sprat using pelagic trawls. Catches primarily come from the southwest and northwest of Ireland and the Irish Sea. The 2021 catches were worth approximately €3.3 million primarily caught in 7.a south.



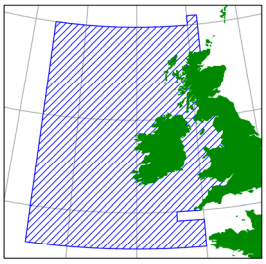


Celtic Sea and West of Scotland Sprat

Sub-area 6 and Divisions 7.a-c and f-k (West of Scotland, southern Celtic Seas)

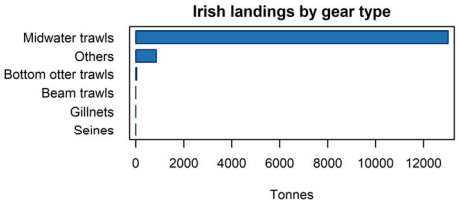
Advice for 2023

ICES advises that when the precautionary approach is applied, catches should be no more than 2,240 t in each of the years 2022 and 2023.



Key Points

ICES Assessment Category	5 (Landings only)	
Management Plan	No	
Advice basis	ICES PA approach	Catch ≤2,240 t
Ranges	F_{MSY} Range Lower	Not appropriate
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not appropriate
Landing Obligation	Does not apply (Not a TAC species)	



Management in 2022

- There is no TAC for sprat in Irish waters. TACs are in place in the English Channel and in the North Sea.
- EU vessels are restricted in the gear they can use to target sprat. Mesh sizes of 16 mm and above are permitted when sprat is the target species.
- Irish vessels are not subject to any quota for sprat. Vessels >36.58 m (120 ft) are excluded from the 12 nautical mile zone. Vessels >27.43 m and <36.58 m (90 – 120 ft) are excluded from the 3 nm zone.
- In recent years DAFM have sought to introduce a policy to excluded trawlers and seiners >18 m LOA from the 6 nm zone, including inside the baselines. However, this policy has been challenged in the courts and vessels >18 m were able to operate in this fishery in 2022.

Key Stock Considerations

- No TAC is set for this stock. Although ICES provides a catch advice, there is insufficient information to evaluate stock trends and exploitation status. MSY and PA reference points have not been defined.
- Irish landings of sprat in this area were 14,145 t in 2021, remaining at an elevated level following an increase in 2019.
- On average 23 vessels over 10 m participated in the Irish sprat fishery annually from 2016-2021. The fishery is primarily prosecuted in Q4. The majority of the catch is taken in 7j (Kerry bays), 7aS (off Dunmore East) and 6aS (Donegal Bay), with smaller fisheries taking place in 7g and 7b. The proportion of catch taken in each area varies between years. In 2021 57% was taken in 7aS.
- Marine Institute research to improve the knowledge, assessment and advice for sprat populations in Irish waters is on-going. The MI hosted an ICES workshop that developed a research road-map for sprat assessments and advice in the Celtic Seas (report in preparation). The MI has also contracted Marine Research Assessment Group (MRAG) to carry out a project on management strategy evaluations (MSEs) for sprat in the Celtic Sea.
- The Marine Institute have undertaken sampler-at-sea trips on the Irish sprat fishery since 2007, averaging 2 trips per year until 2016. The number of trips was increased in 2017–2019 to 12–15 per year; it is hoped this enhanced level of sampling-at-sea will resume shortly following disruption due to COVID restrictions of 2020/2021. The sprat fishery is among the metiers that the Marine Institute plans to target for enhanced bycatch sampling.

Table 1. Official landings of Sprat in Sub-area 6 and Divisions 7.a-c and f-k as reported to ICES

Year	Denmark	Faroe Islands	France	Ireland	Isle of Man	Netherlands	Norway	Spain	UK England & Wales	UK Scotland	Total
1985	538	0	0	4532	1	0	0	0	10	520	5601
1986	269	0	1	2230	0	0	0	0	0	582	3082
1987	364	0	0	853	0	1	0	0	4	3870	5092
1988	0	0	0	1163	0	0	0	0	1	1146	2310
1989	0	0	0	1325	0	0	0	0	0	813	2138
1990	0	0	0	205	0	0	0	0	4	1526	1735
1991	28	0	0	508	0	0	0	0	0	1555	2091
1992	22	0	0	2353	0	0	0	0	0	2230	4605
1993	0	0	0	232	0	0	0	0	2	1491	1725
1994	491	0	0	799	0	0	0	0	30	4124	5444
1995	0	0	0	4214	0	0	0	0	0	2350	6564
1996	0	0	0	2085	0	0	0	0	8	5313	7406
1997	40	0	0	1578	0	0	0	0	54	3467	5139
1998	0	0	0	5826	0	0	0	0	456	8161	14443
1999	0	0	0	6032	0	0	0	0	371	4238	10641
2000	0	0	0	455	0	0	0	0	367	1297	2119
2001	538	0	0	4532	1	0	0	0	10	520	5601
2002	0	0	0	1729	0	0	0	0	306	2657	4692
2003	887	0	0	4948	0	0	0	0	592	2593	9020
2004	0	0	0	4096	0	0	0	0	134	1416	5646
2005	0	252	0	5928	0	0	0	0	604	0	6784
2006	0	0	0	1523	0	0	0	0	563	0	2086
2007	0	0	0	3745	0	0	0	1	2	14	3762
2008	0	0	0	2353	0	0	0	0	2	0	2355
2009	0	0	0	3773	0	0	0	0	1	70	3844
2010	0	0	0	3200	0	0	0	0	7	537	3744
2011	0	0	0	3770	0	0	0	0	261	507	4538
2012	0	0	0	9029	0	0	0	0	2	1688	10719
2013	0	0	0	4916	0	0	0	0	2	968	5887
2014	0	0	0	2852	0	0	0	0	1	1540	4392
2015	0	0	0	9328	0	0	0	0	0	1060	10389
2016	0	0	0	4763	0	0	0	0	1	2177	6941
2017	0	0	0	4318	0	0	0	0	0	1354	5672
2018	10	0	0	3580	0	0	0	0	0	0	3590
2019	0	1	0	13018	0	3	0	0	66	1265	14353
2020*	0	0	0	14446	0	0	0	0	3	724	15173
2021*	0	0	0	14145	0	0	0	0	<1	<1	14146

*Preliminary

Further information on this stock can be found in the 2021 Stock Book.

Spurdog in the Northeast Atlantic

Sub-areas 1-14

Advice for 2023

ICES advises that when the MSY approach is applied, catches in 2023 and 2024 should be no more than 17,353 t and 17,855 t, respectively.

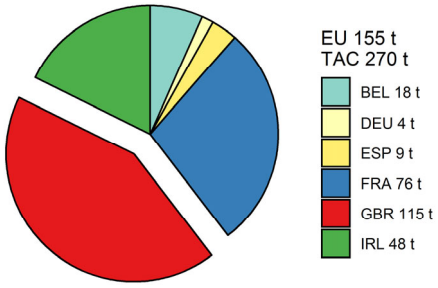
The advice for 2023 and 2024 is a non-zero catch because the recent benchmark has led to a change in the perception of the stock and reference points.

Key Points

ICES Assessment Category	1(Quantitative Assessment)	
ICES advice basis (MSY approach)	HR=HR_{MSY}	Catch=17,353 t
MSY Range	Not applicable	
Management Plan	No	
Landing Obligation	Does not apply	Not applicable (prohibited species*)

* Exemption for permitted bycatch in fisheries implementing an avoidance scheme.

2022 Spurdog Bycatch Avoidance TAC



Management in 2022

- A bycatch TAC of 270 t is only available for countries that have a dedicated spurdog avoidance bycatch programme. Ireland was allocated a quota of 48 t under this TAC but there is no bycatch avoidance in place in Ireland.

Key Stock Considerations

- A new benchmark assessment of spurdog was conducted in 2021. Several improvements were made to the stock assessment model and input data used. The new assessment showed that fishing mortality is currently very low and the stock is recovering. The 2022 spurdog assessment shows the stock has now surpassed the limit reference point B_{lim} and MSY $B_{trigger}$, therefore, ICES has advised a non zero TAC for the first time since 2010.
- Spurdog have low productivity and are vulnerable to fishing because they form dense aggregations that can be easily targeted.
- A maximum landings size of 100cm was in place in 2009 and 2010 before the TAC was set at zero in 2011.

Published 4 October 2022

Spurdog (*Squalus acanthias*) in subareas 1–10, 12, and 14 (the Northeast Atlantic and adjacent waters)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 and 2024 should be no more than 17 353 tonnes and 17 855 tonnes, respectively.

Stock development over time

Fishing pressure on the stock is below HR_{MSY}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

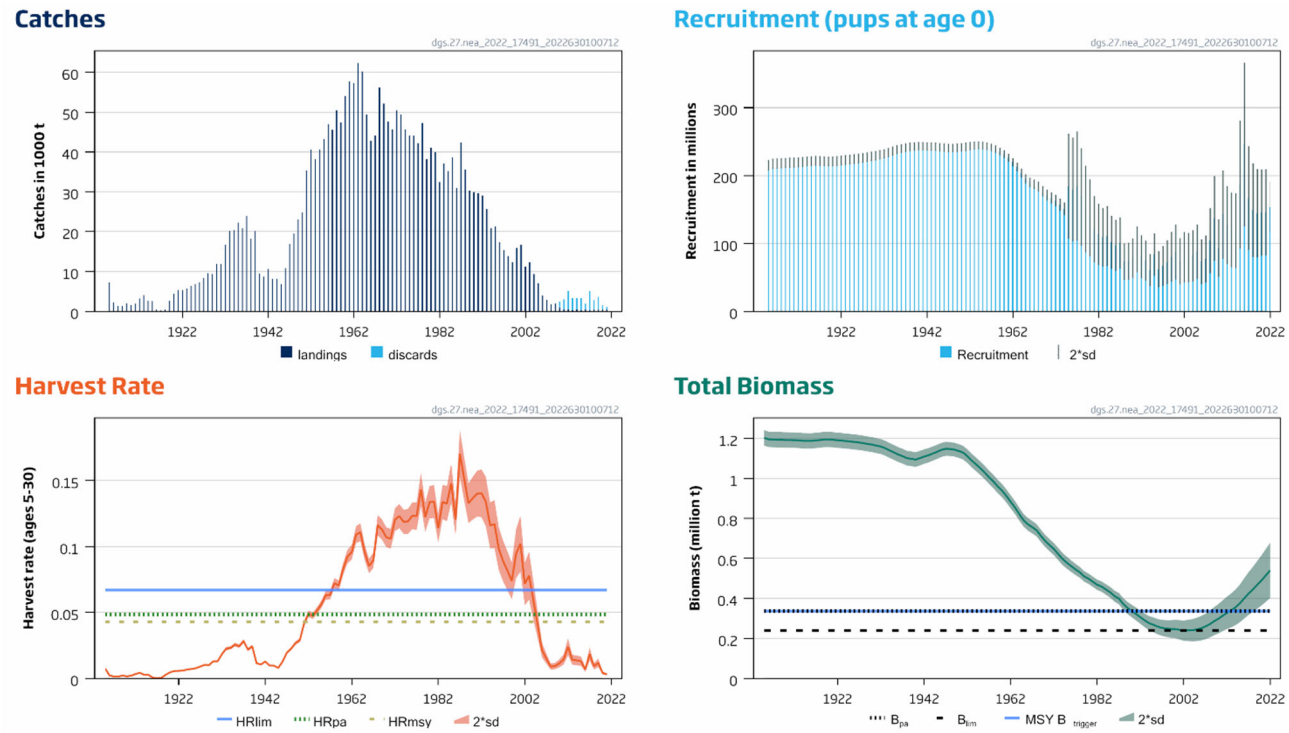


Figure 1 Spurdog in subareas 1–10, 12, and 14. Summary of the stock assessment. Long-term trends in catches (including assumed discards since 2010), mean harvest rate, recruitment, and total biomass. Horizontal lines indicate the associated reference points. The assumed recruitment in 2022 is shaded in a lighter colour.

Catch scenarios

Table 1 Spurdog in subareas 1–10, 12, and 14. Values in the forecast and for the interim year.

Variable	Value	Notes
Harvest rate (2022)	0.003	*Status quo* harvest rate (ages 5–30), assuming same proportional split among fleets as in 2021
B_{tot} (2023)	564 220	Short-term forecast total biomass; in tonnes
Recruitment (2022)	154	Modelled stock–recruitment relationship, based on the number of pregnant females in the population (number of pups in millions)
Recruitment (2023)	161	
Catch (2022)	1240	Short-term forecast catch resulting from status quo harvest rate; in tonnes

Table 2 Spurdog in subareas 1–10, 12, and 14. Annual catch scenarios. All weights are in tonnes.

Basis	Catch		Harvest rate* (ages 5–30)		B_{tot}		% B_{tot} change rel. to 2023		% advice change***
	2023	2024	2023	2024	2023	2024	2024 **	2025 **	
ICES advice basis									
MSY approach, HR = HR_{MSY}	17 353	17 855	0.044	0.044	571 234	577 201	1.24	2.3	-
Other scenarios									
HR = 0	0	0	0	0	588 776	612 807	4.4	8.6	-
HR_{sq}	1315	1399	0.003	0.003	587 446	610 058	4.1	8.1	-
Harvest rate = HR_{pa}	19 663	20 117	0.050	0.049	568 898	572 571	0.83	1.48	-
Harvest rate = HR_{lim}	27 528	27 622	0.069	0.069	560 941	556 990	−0.58	−1.28	-

* Harvest rates differ slightly between years owing to differences in age structure over time.
** Total biomass for 2024 or 2025 relative to the total biomass for 2023.
*** Advice value for 2023 and 2024 relative to advice value for 2021 and 2022 (0 tonnes).

The advice for 2023 and 2024 is a non zero catch because the recent benchmark has led to a change in the perception of the stock and reference points.

Basis of the advice

Table 3 Spurdog in the Northeast Atlantic. The basis of the advice.

Advice basis	ICES MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for spurdog in this area

Quality of the assessment

This stock was benchmarked in 2021 (ICES, 2021). There was a substantial improvement in data available for the assessment, including survey indices and associated length compositions covering a much larger area of the stock distribution, fecundity data spanning a much wider timeframe, fleet-based length data covering more countries than just the UK, and improved catch information since 2005. There remain some concerns about data quality and availability, including uncertainty in the historical level of catches because of misreporting and use of generic landings categories, and lack of data on dead discards.

The increased variance in estimated recruitment from 1975 onwards is due to there being sufficient information (survey indices, survey and fishery length composition data) from that period for its estimation while prior to that a single stock recruit relationship was used.

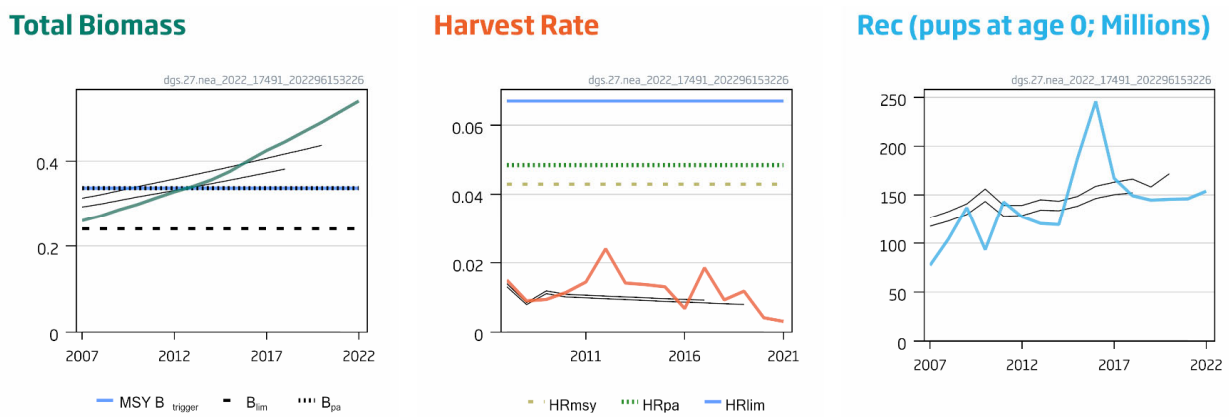


Figure 2 Spurdog in subareas 1–10, 12, and 14. Historical assessment results (final-year recruitment estimates are provisional, taken from the estimated stock–recruitment relationship). The reference points were revised in 2021 (ICES, 2021), and only assessment results from the last year should be compared to the reference points indicated.

Issues relevant for the advice

The harvest rate shown in Table 2 is a weighted average (weighted by population number-at-age) for ages 5–30; therefore, there is a slight difference between the resultant harvest rate for ages 5–30 and the reference point because of the slightly different age structure compared to equilibrium conditions.

While the increase in the stock biomass was already noticed in the previous assessment, the benchmark (and notably the revision of the reference points) have resulted in a changed perception of the stock.

Reference points

Table 4 Spurdog in subareas 1–10, 12, and 14. Reference points, values, and their technical basis. The reference points are estimated as part of the assessment model and reference points are updated with each assessment update.

Framework	Reference point	Value	Technical basis	Source
MSY approach	HR_{MSY} (MSY harvest rate)	0.043	Harvest rate (ages 5–30) that leads to B_{MSY}	ICES (2021); ICES (2022b)
	MSY $B_{trigger}$	336 796 tonnes	B_{pa}	ICES (2021); ICES (2022b)
Precautionary approach	B_{lim}	240 569 tonnes	$0.2 \times B_0$, where B_0 is the virgin total biomass	ICES (2021); ICES (2022b)
	B_{pa}	336 796 tonnes	$1.4 \times B_{lim}$	ICES (2021); ICES (2022b)
	HR_{lim}	0.067	Harvest rate that leads to B_{lim}	ICES (2021); ICES (2022b)
	HR_{pa}	0.049	$HR_{lim}/1.4$	ICES (2021); ICES (2022b)
Management plan	SSB_{MGT}	NA		
	F_{MGT}	NA		

NA = not available.

Basis of the assessment

Table 5 Spurdog in the Northeast Atlantic. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-length and sex-structured model (De Oliveira *et al.*, 2013)
Input data	Three GAM-based delta-lognormal survey biomass indices, combined by quarter: Q1 (IBTSQ1[G1022], NO-shrimp-Q1, SCOWCGFS[G4748], SWC-IBTS[G1179]), Q3 (IBTSQ3[G2829]), Q4 (EVHOE[G9527], IE-IGFS[G7212], NIGFS[G7655], SCOWCGFS[G4815], SWC-IBTS[G4299]); length composition by sex associated with the three combined survey indices; fecundity-at-length; landings; length composition for bottom trawls (Ireland, Sweden, UK-Scotland), and gillnets and trammel nets (UK-England).
Discards and bycatch	Discarding considered negligible up to and including 2004; discards estimates included from 2005 onwards; for the assessment, average UK-England discards (2010, 2012, 2016–2019) assumed to deal with missing years of discards from UK-England (2011, 2013–2015). All discards are assumed to die.
Indicators	None
Other information	A benchmark assessment was carried out in 2021 (ICES, 2021).
Working group	Working Group on Elasmobranch Fishes (WGEF)

History of the advice, catch, and management

Table 6 Spurdog in subareas 1–10, 12, and 14. History of ICES advice, the agreed TAC, and ICES estimates of landings. Weights are in tonnes.

Year	ICES advice	Catch corresp. to advice	Agreed TAC	ICES landings ^^
1999	None		8900 *	12384
2000	None		8900 *	15890
2001	None		8900 *	16693
2002	None		7100 *	11170
2003	None		5600 *	12246
2004	None		4500 *	9365
2005	None		1100 *	7092
2006	F = 0	0	1100 *	3996
2007	No new advice, same as for 2006	0	3699 **	2892
2008	F = 0	0	2635 ***	1791

Year	ICES advice	Catch corresp. to advice	Agreed TAC	ICES landings ^^
2009	No fishery	0	1422**	1968
2010	No new advice, same as for 2009	0	0 ^	886
2011	F = 0	0	0	427
2012	F = 0	0	0	447
2013	F = 0	0	0	331
2014	No new advice, same as for 2013	0	0	381
2015	No target fishery, minimize bycatch	0	0	257
2016	No new advice, same as for 2015	0	0 ^^^	371
2017	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	294
2018	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	362
2019	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	455
2020	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	526
2021	PA approach (no targeted fisheries)	0	0 ^^^	539
2022	PA approach (no targeted fisheries)	0	0 ^^^	
2023	MSY approach	17353		
2024	MSY approach	17855		

* TAC for ICES Subarea 4 and Division 2.a (EC).
** Combined TAC for ICES Subarea 4 and Division 2.a (EC) and for ICES Division 3.a, as well as subareas 1, 5, 6, 7, 8, 12, and 14 (EU and international waters).
*** Combined TAC for ICES Subarea 4 and Division 2.a (EC) and for ICES subareas 1, 5, 6, 7, 8, 12, and 14 (EU and international waters).
^ Landing of bycatch permitted up to 10% of the 2009 quota.
^^ Landings for the total stock area, subareas 1–10, 12, and 14, excluding 8.c, 9.a and 10.a (due to mixed landings with *S. blainville*).
^^^ A bycatch quota of 270 tonnes was made available to those countries taking part in a pilot spurdog avoidance programme.
§ Assumed annual catch.

History of the catch and landings

The quantity of spurdog caught in the NEAFC Regulatory Area is uncertain.

Table 7 Spurdog in the Northeast Atlantic. Catch distribution by fleet in 2021 as estimated by ICES.

Total catch	Landings				Discards
1178 tonnes	Nets 88%	Bottom trawl 5%	Hooks and lines 6%	Other gears 1%	639 tonnes
	539 tonnes				

Table 8a Spurdog in the Northeast Atlantic. History of ICES landings for each country participating in the fishery *. Weights in tonnes. Blank = no data reported; 0 = value less than 0.5 t.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Belgium	1097	1085	1110	1072	1139	920	1048	979	657	750	582	393	447	335	396	391
Denmark	1404	1418	1282	1533	1217	1628	1008	1395	1495	1086	1364	1246	799	486	212	146
Faroe Islands	0	22	0	0	0	0	0	0	0	6	2	3	25	137	203	310
France	17 514	19 067	12 430	12 641	8356	8867	7022	11 174	7872	5993	4570	4370	4908	4831	3329	1978
Germany	43	42	39	25	8	22	41	48	27	24	26	6	55	8	21	100
Iceland	36	22	14	25	5	9	7	5	4	17	15	53	185	108	97	166
Ireland	108	476	1268	4658	6930	8791	5012	8706	5612	3063	1543	1036	1150	2167	3624	3056
Netherlands	217	268	183	315	0	0	0	0	0	0	0	0	0	0	0	0
Norway	5925	3941	3992	4659	4279	3487	2986	3614	4139	5329	8104	9633	7113	6945	4546	3940
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portugal	2	0	0	0	0	0	1	5	3	2	128	188	250	323	190	256
Russia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	8	653	0	0	0	0	0	0	0	0	0	0	0	0
Sweden	399	308	398	300	256	360	471	702	733	613	390	333	230	188	95	104
UK (E&W)	9229	9342	8024	6794	8046	7841	7047	7684	6952	5371	5414	3770	4207	3494	3462	2354
UK (Sc)	4994	3970	3654	4371	4957	6749	6267	8043	8075	8024	7768	8531	9677	6614	4676	8517
Total	40 968	39 961	32 402	37 046	35 193	38 674	30 910	42 355	35 569	30 278	29 906	29 562	29 046	25 636	20 851	21 318

Table 8a (cont.) Spurdog in the Northeast Atlantic. History of ICES landings for each country participating in the fishery *. Weights in tonnes. Blank = no data reported; 0 = value less than 0.5 t.

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Belgium	430	443	382	354	400	410	23	11	13	21	17	11	12	7	1
Denmark	142	196	126	131	146	156	256	232	219	150	121	76	78	82	14
Faroe Islands	51	218	362	486	368	613	340	224	295						
France	1607	1555	1286	998	4342	4304	2569	1705	1062	945	700	504	368	412	164
Germany	38	21	31	54	194	304	121	98	138	140	7	3	5	2	1
Iceland	156	106	80	57	107	199	276	200	142	76	82	43	68	102	62
Ireland	2305	2214	1164	904	905	1227	1214	1416	1076	1022	859	651	137	175	26
Netherlands	0	0	0	0	28	39	27	10	25	31	23	25	18	5	7
Norway	2748	1567	1293	1461	1643	1424	1091	1119	1054	1016	790	615	711	543	540
Poland	0	0	0	0	0	0	0	0	0						
Portugal	120	100	46	21	2	3	4	4	9						
Russia	0	0	0	0	0	0	0	0	0						
Spain	0	0	28	95	372	363	306	135	17	41	40	71	39	14	2
Sweden	154	196	140	114	123	238	0	275	244	169	147	93	75	80	5
UK (E&W)	2670	3066	4480	4461	3654	4516	2823	3109	1729						
UK (Sc)	6873	5665	4501	3248	3606	2897	2120	3708	3342						
GBR										3481	1209	799	280	546	64
Total	17 294	15 347	13 919	12 384	15 890	16 693	11 170	12 246	9365	7092	3996	2892	1791	1968	886

Table 8a (cont.) Spurdog in the Northeast Atlantic. History of ICES landings for each country participating in the fishery *. Weights in tonnes. Blank = no data reported; 0 = value less than 0.5 t.

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Belgium	0	0	0								
Denmark	26	30	19	10	27	24	27	19	21	32	20
France	84	34	13	19	2	1	3	1			
Germany	1	1	0	1	0	2	0	1	0		0
Iceland	53	51	6	19	8	8	4	2	1	3	1
Ireland	13	37	34	18	2	34	1	24	11	3	
Netherlands	1	4	3	0	1	1	1	6	0	0	
Norway	247	285	250	313	217	270	222	271	370	409	367
Spain	2	3	0				0	0		0	
Sweden	0					0	0	0	0		0
UK (E&W)											151
GBR	1	3	6	0		30	37	38	52	79	
Total	427	447	331	381	257	371	294	362	455	526	539

* Landings for the total stock area, subareas 1–10, 12, and 14, excluding 8.c, 9.a, and 10.a (due to mixed landings with *S. blainville*).

Table 8b Spurdog in the Northeast Atlantic. History of ICES discards for each country participating in the fishery *,**. Weights in tonnes. Blank = no data reported; 0 = value less than 0.5 t.

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Denmark	1	2		9	42	23	44	4	232	48	25	705	18	42	37	234	94
Germany	1	0	0	0		0	0	0	1	0	1	1	3	4	3		0
Ireland	11	0	28	31	7	151	53	63	33	39	96	30	291	211	122	181	10
Spain_IEO										1	4	9	2	2	2		
Spain_AZTI		0				1	1		11	6	87		1	36	13		
Spain																28	3
Sweden	2	0	5	4	7	22	8	33	37	132	19	12	142	9	66		
UK (England & Wales)	5	19	0	2	1	1161	***	4472	***	***	***	683	4090	1737	2406	256	59
UK (Scotland)					39	166	66	185	201	264	359	141	235	330	516	174	396
UK (Northern Ireland)																70	76
Total	20	22	34	46	96	1523	173	4757	514	490	591	1580	4781	2371	3165	942	639

* Discards for the total stock area, subareas 1–10, 12, and 14, excluding 8c, 9a, and 10a (due to mixed landings with *S. blainville*)

** Discards are estimated based on raised national data by fleet provided to the datacall of WKNSEA (ICES, 2021) and the WGEF datacall. Discards data prior to 2005 are incomplete and considered neglibible in relation to landings. The increase in discarding from 2005 onwards will have been influenced by the evolution of management measures.

*** Due to missing discards data from UK England & Wales for these years, the average for UK England & Wales for the years 2010, 2012, 2016–2019 (2425 t) was used in the assessment (Table 9) to represent discards from UK England & Wales.

Summary of the assessment

Table 9 Spurdog in subareas 1–10, 12, and 14. Summary table of estimates from the spurdog assessment: recruitment (millions of pups), total biomass (tonnes), harvest rate (assuming average selection over the ages 5–30), and the Working Group estimates of landings and catch (tonnes) used in the assessment. Estimates of precision (±2 standard deviation).

Year	Recruitment (pups at age 0)			Total biomass			Landings*	Discards*	Harvest rate		
	Millions	High	Low	Tonnes	High	Low	Tonnes	Tonnes	Ages 5–30	High	Low
1905	215	222	208	1 202 840	1 241 446	1 164 234	7248		0.0075	0.0080	0.0071
1906	217	224	211	1 195 900	1 234 508	1 157 292	2200		0.0023	0.0024	0.0022
1907	218	225	211	1 194 330	1 232 942	1 155 718	1428		0.00150	0.00158	0.00141
1908	218	225	211	1 193 710	1 232 322	1 155 098	1409		0.00148	0.00156	0.00139
1909	219	225	212	1 193 260	1 231 866	1 154 654	2022		0.0021	0.0022	0.0020
1910	219	226	212	1 192 390	1 230 986	1 153 794	1563		0.00164	0.00174	0.00155
1911	219	226	213	1 192 170	1 230 748	1 153 592	1957		0.0021	0.0022	0.00194
1912	220	226	213	1 191 750	1 230 306	1 153 194	3199		0.0034	0.0036	0.0032
1913	220	227	214	1 190 330	1 228 856	1 151 804	4050		0.0043	0.0045	0.0040
1914	221	228	214	1 188 350	1 226 840	1 149 860	2641		0.0028	0.0030	0.0026
1915	221	228	215	1 188 050	1 226 500	1 149 600	2602		0.0028	0.0029	0.0026
1916	222	228	215	1 188 010	1 226 412	1 149 608	534		0.00057	0.00060	0.00053
1917	222	228	215	1 190 140	1 228 486	1 151 794	339		0.00036	0.00038	0.00034
1918	221	228	215	1 192 500	1 230 782	1 154 218	451		0.00048	0.00050	0.00045
1919	221	227	214	1 194 740	1 232 954	1 156 526	2659		0.0028	0.0030	0.0027
1920	221	228	214	1 194 830	1 232 974	1 156 686	4396		0.0046	0.0049	0.0044
1921	222	228	215	1 193 330	1 231 404	1 155 256	5321		0.0056	0.0059	0.0053
1922	222	229	216	1 191 140	1 229 148	1 153 132	5401		0.0057	0.0060	0.0054
1923	223	230	216	1 189 110	1 227 058	1 151 162	5655		0.0060	0.0063	0.0057
1924	224	230	217	1 187 090	1 224 980	1 149 200	6355		0.0068	0.0072	0.0064
1925	224	231	218	1 184 670	1 222 504	1 146 836	6719		0.0072	0.0076	0.0068
1926	225	232	219	1 182 220	1 220 004	1 144 436	7277		0.0078	0.0082	0.0074
1927	226	233	220	1 179 590	1 217 324	1 141 856	8395		0.0090	0.0095	0.0085
1928	227	234	221	1 176 280	1 213 966	1 138 594	9522		0.0103	0.0109	0.0097
1929	228	235	222	1 172 340	1 209 978	1 134 702	9320		0.0101	0.0107	0.0096
1930	229	236	223	1 169 130	1 206 720	1 131 540	11 914		0.0130	0.0137	0.0123
1931	231	237	225	1 163 950	1 201 488	1 126 412	11 838		0.0130	0.0137	0.0123
1932	232	238	226	1 159 510	1 196 994	1 122 026	16 726		0.0185	0.0195	0.0175
1933	234	240	228	1 151 030	1 188 454	1 113 606	20 244		0.023	0.024	0.021
1934	236	242	230	1 140 090	1 177 448	1 102 732	20 378		0.023	0.024	0.022
1935	238	244	232	1 130 180	1 167 466	1 092 894	22 266		0.026	0.027	0.024
1936	240	246	234	1 119 590	1 156 792	1 082 388	20 925		0.024	0.026	0.023
1937	241	247	236	1 111 510	1 148 612	1 074 408	23 930		0.028	0.030	0.027
1938	242	248	237	1 101 620	1 138 600	1 064 640	18 196		0.022	0.023	0.021
1939	243	248	238	1 098 530	1 135 370	1 061 690	20 119		0.024	0.026	0.023
1940	244	249	238	1 094 410	1 131 082	1 057 738	9428		0.0115	0.0121	0.0109
1941	243	249	238	1 101 560	1 138 038	1 065 082	8740		0.0106	0.0112	0.0100
1942	243	248	238	1 109 620	1 145 876	1 073 364	10 625		0.0128	0.0135	0.0121
1943	243	248	238	1 115 920	1 151 934	1 079 906	8181		0.0098	0.0103	0.0093
1944	243	248	237	1 124 660	1 160 420	1 088 900	8151		0.0097	0.0102	0.0092
1945	242	247	237	1 133 270	1 168 770	1 097 770	6776		0.0080	0.0084	0.0076
1946	241	247	236	1 142 940	1 178 182	1 107 698	10 895		0.0127	0.0134	0.0121
1947	241	246	235	1 148 180	1 183 174	1 113 186	16 893		0.0196	0.0206	0.0186
1948	241	246	235	1 147 300	1 182 070	1 112 530	19 491		0.023	0.024	0.021
1949	241	247	236	1 143 900	1 178 476	1 109 324	23 010		0.027	0.028	0.025
1950	242	247	236	1 137 210	1 171 628	1 102 792	24 750		0.029	0.031	0.028
1951	242	248	237	1 129 140	1 163 432	1 094 848	35 301		0.042	0.044	0.040
1952	244	249	238	1 111 220	1 145 418	1 077 022	40 550		0.049	0.052	0.047
1953	244	250	239	1 089 130	1 123 262	1 054 998	38 206		0.047	0.050	0.045
1954	245	250	240	1 070 560	1 104 642	1 036 478	40 570		0.052	0.054	0.049
1955	244	249	239	1 050 780	1 084 812	1 016 748	43 127		0.056	0.059	0.053
1956	243	248	239	1 029 670	1 063 638	995 702	46 951		0.063	0.066	0.060
1957	242	246	237	1 005 990	1 039 872	972 108	45 570		0.063	0.067	0.060
1958	239	244	234	984 917	1 018 683	951 151	50 394		0.072	0.076	0.068
1959	235	240	231	960 123	993 733	926 513	47 394		0.071	0.074	0.067
1960	232	237	227	939 333	972 747	905 919	53 997		0.083	0.087	0.078
1961	226	232	221	912 755	945 929	879 581	57 721		0.092	0.098	0.087
1962	220	225	214	883 194	916 092	850 296	57 256		0.096	0.101	0.090
1963	213	218	207	854 672	887 264	822 080	62 288		0.109	0.115	0.103

Year	Recruitment (pups at age 0)			Total biomass			Landings*	Discards*	Harvest rate		
	Millions	High	Low	Tonnes	High	Low	Tonnes	Tonnes	Ages 5–30	High	Low
1964	204	210	198	821 452	853 714	789 190	60 146		0.111	0.118	0.104
1965	195	201	189	790 543	822 465	758 621	49 336		0.096	0.102	0.090
1966	190	196	184	770 392	801 978	738 806	42 713		0.085	0.091	0.080
1967	187	194	181	756 521	787 787	725 255	44 116		0.090	0.096	0.084
1968	184	191	177	740 700	771 676	709 724	56 043		0.116	0.124	0.109
1969	177	184	170	712 290	743 026	681 554	52 074		0.113	0.121	0.105
1970	171	178	164	687 337	717 909	656 765	47 557		0.107	0.115	0.100
1971	167	174	160	666 382	696 874	635 890	45 653		0.106	0.114	0.098
1972	163	171	155	646 798	677 306	616 290	50 416		0.120	0.129	0.112
1973	157	165	149	621 857	652 483	591 231	49 412		0.123	0.132	0.114
1974	151	160	143	597 366	628 220	566 512	45 684		0.119	0.128	0.110
1975	185	261	108	578 446	608 418	548 474	44 119		0.119	0.129	0.110
1976	180	255	104	561 313	590 429	532 197	44 064		0.123	0.134	0.113
1977	185	264	105	545 051	573 133	516 969	42 252		0.123	0.134	0.113
1978	168	240	97	530 362	557 574	503 150	47 235		0.143	0.156	0.131
1979	151	214	88	510 246	536 752	483 740	38 201		0.122	0.134	0.111
1980	138	194	82	498 816	524 792	472 840	40 968		0.134	0.146	0.121
1981	121	169	73	483 609	509 343	457 875	39 962		0.134	0.147	0.122
1982	113	158	69	468 454	494 218	442 690	32 402		0.114	0.125	0.103
1983	109	151	67	459 689	485 693	433 685	37 046		0.134	0.147	0.121
1984	111	155	67	445 241	471 675	418 807	35 194		0.133	0.146	0.119
1985	102	140	64	430 989	458 041	403 937	38 674		0.148	0.163	0.133
1986	97	134	61	411 799	439 573	384 025	30 910		0.120	0.133	0.108
1987	101	138	64	399 484	428 042	370 926	42 356		0.170	0.188	0.153
1988	73	100	47	373 256	402 678	343 834	35 569		0.151	0.168	0.135
1989	74	101	47	352 864	383 196	322 532	30 279		0.133	0.148	0.118
1990	79	107	50	337 154	368 430	305 878	29 906		0.137	0.153	0.121
1991	91	125	58	321 947	354 207	289 687	29 563		0.140	0.158	0.123
1992	81	111	50	306 159	339 451	272 867	29 046		0.140	0.159	0.122
1993	75	104	46	290 122	324 522	255 722	25 637		0.134	0.153	0.115
1994	61	84	38	276 352	311 872	240 832	20 851		0.116	0.134	0.099
1995	84	114	53	268 383	305 299	231 467	21 318		0.117	0.135	0.099
1996	62	88	36	258 755	297 085	220 425	17 295		0.098	0.115	0.082
1997	67	96	38	253 052	292 964	213 140	15 348		0.089	0.104	0.074
1998	72	104	41	249 330	291 018	207 642	13 919		0.082	0.096	0.067
1999	80	116	44	247 340	291 024	203 656	12 385		0.074	0.088	0.060
2000	88	127	48	247 396	293 286	201 506	15 891		0.095	0.113	0.076
2001	74	107	41	243 309	291 469	195 149	16 693		0.102	0.123	0.081
2002	80	116	43	238 878	289 480	188 276	11 170		0.072	0.088	0.056
2003	79	115	43	240 236	293 356	187 116	12 247		0.078	0.096	0.060
2004	82	119	45	240 941	296 663	185 219	9366		0.059	0.074	0.045
2005	88	127	49	245 140	303 572	186 708	7092	20	0.040	0.051	0.030
2006	73	106	41	250 868	311 962	189 774	3996	22	0.021	0.027	0.0160
2007	77	111	43	259 705	323 491	195 919	2892	34	0.0150	0.0189	0.0111
2008	104	151	57	271 053	337 839	204 267	1791	46	0.0090	0.0113	0.0067
2009	137	199	75	285 741	355 959	215 523	1968	96	0.0094	0.0119	0.0070
2010	93	135	52	298 310	371 716	224 904	886	1523	0.0115	0.0145	0.0084
2011	143	207	78	313 429	390 587	236 271	427	2597**	0.0145	0.0183	0.0106
2012	127	184	70	328 007	408 999	247 015	447	4757	0.024	0.031	0.0175
2013	120	175	66	340 781	425 765	255 797	331	2939**	0.0142	0.0180	0.0103
2014	119	174	64	356 020	445 200	266 840	381	2915**	0.0137	0.0174	0.0100
2015	187	280	93	375 667	470 107	281 227	257	3016**	0.0131	0.0166	0.0095
2016	246	366	126	400 644	501 504	299 784	371	1580	0.0068	0.0086	0.0050
2017	167	243	91	424 577	531 507	317 647	294	4781	0.0186	0.024	0.0135
2018	149	217	81	445 023	558 055	331 991	362	2371	0.0093	0.0118	0.0068
2019	145	209	80	468 062	587 330	348 794	455	3165	0.0118	0.0150	0.0086
2020	145	208	83	490 739	616 453	365 025	526	942	0.0042	0.0053	0.0030
2021	146	209	83	515 588	647 800	383 376	539	639	0.0031	0.0039	0.0023
2022	154^	190^	118^	540 266	678 732	401 800					

* Landings are considered to represent catch for the years up to and including 2004, with discards considered negligible. Minor discrepancies between these values and those in earlier tables are due to rounding (but see footnote ** for discards).

** Due to missing discards data from UK England & Wales for these years, the average for UK England & Wales for the years 2010, 2012, 2016–2019 (2425 t) was used to represent discards from UK England & Wales.

^ Provisional values taken from the estimated stock–recruitment relationship.

Table 10 Spurdog in subareas 1–10, 12, and 14. Extension of short-term forecasts to the medium- to longer-term (3, 5, 10, and 30 years beyond 2022). Estimates of total biomass relative to the total biomass in 2022 for different future catch scenarios, assuming status quo harvest rate for 2022 (see Table 2 for the 2023 and 2024 catches for the different catch scenarios). Point estimates are shown in the upper third of the table, with corresponding lower and upper values (reflecting ±2 standard deviations) given in the middle and bottom third of the table.

	Medium-term projections				
	HR_{MSY}	Zero	HR_{sq}	HR_{pa}	HR_{lim}
Average catch *	20 296	0	2242	21 747	25 311
Point estimates: total future biomass/total biomass 2022					
+ 3 years	1.07	1.13	1.13	1.06	1.03
+ 5 years	1.09	1.22	1.21	1.07	1.01
+ 10 years	1.13	1.45	1.43	1.10	0.98
+ 30 years	1.31	2.26	2.19	1.20	0.87
Point estimates −2 standard deviations					
+ 3 years	1.04	1.11	1.11	1.03	1.00
+ 5 years	1.05	1.18	1.17	1.03	0.97
+ 10 years	1.05	1.36	1.34	1.02	0.90
+ 30 years	1.11	1.79	1.78	1.01	0.72
Point estimates +2 standard deviations					
+ 3 years	1.09	1.16	1.15	1.08	1.06
+ 5 years	1.13	1.26	1.25	1.11	1.06
+ 10 years	1.21	1.54	1.51	1.18	1.06
+ 30 years	1.50	2.74	2.61	1.38	1.03

* "Average catch" is the average for the projection period 2023–2051.

Sources and references

De Oliveira, J. A. A., Ellis, J. R., and Dobby, H. 2013. Incorporating density dependence in pup production in a stock assessment of NE Atlantic spurdog *Squalus acanthias*. ICES Journal of Marine Science, 70: 1341–1353. https://doi.org/10.1093/icesjms/fst080

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Download the stock assessment data and figures.

Recommended citation: ICES. 2022. Spurdog (*Squalus acanthias*) in subareas 1–10, 12, and 14 (the Northeast Atlantic and adjacent waters). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, dgs.27.nea. https://doi.org/10.17895/ices.advice.19753588

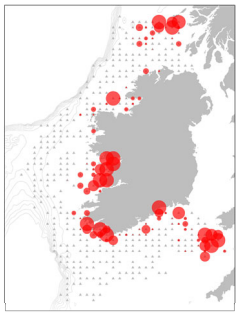
WHITING

(*MERLANGIUS MERLANGUS*)

BIOLOGY – SPECIES

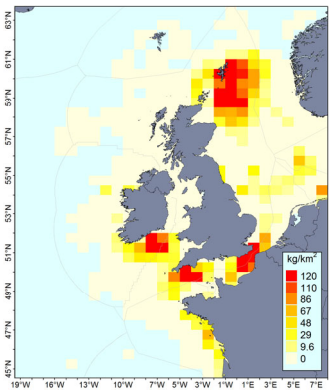
Whiting are widely distributed throughout Irish and European waters from the shallows down to depths of around 200m. Adults are found over sandy/muddy ground. Juveniles are most abundant in coastal waters.

Whiting are voracious feeders appearing in large shoals and feeding largely on crustaceans and small fish. Their fine sharp teeth reflect their predatory diet; hunting mobile prey in the water column. They are fast growing and can grow up to 20cm in their first year at which stage about 60% are sexually mature. At age 2 almost 100% of females and ~ 85% of males are fully mature.

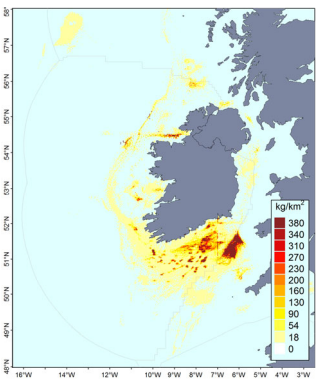


Survey catches of juveniles since 2005

LANDINGS DISTRIBUTION



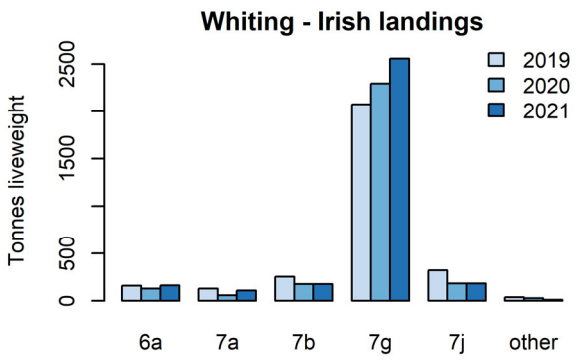
◀ The distribution of international landings of whiting between 2016 and 2020. Most whiting landings were taken from the northern North Sea, Celtic Sea and Channel.

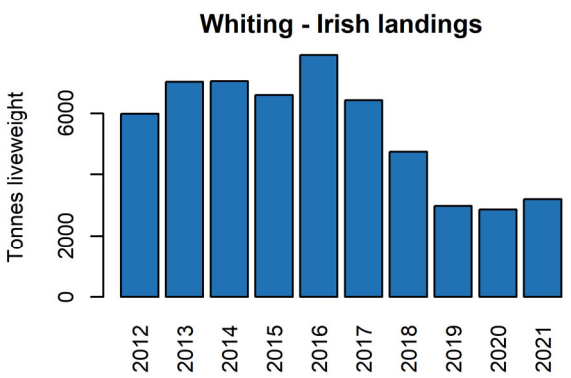


◀ The distribution of whiting landings by Irish vessels between 2016 and 2020. Most whiting were caught around the "Smalls" area in the Celtic Sea.

IRISH LANDINGS AND VALUE OF TAC

On average approximately 3,000 tonnes of whiting were landed in mixed demersal fisheries by Irish vessels between 2019 and 2021, 76% of these were caught in 7g. In 2021 landings were worth approximately €4.9 million for Irish vessels.



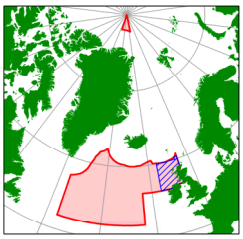


West of Scotland Whiting

Division 6.a

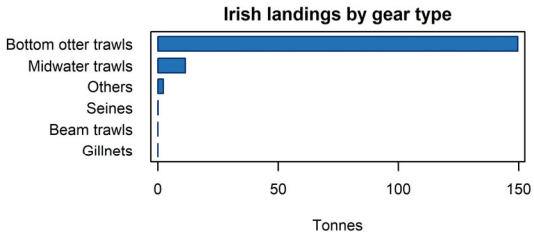
Advice for 2023

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 4,155 t.



Key Points

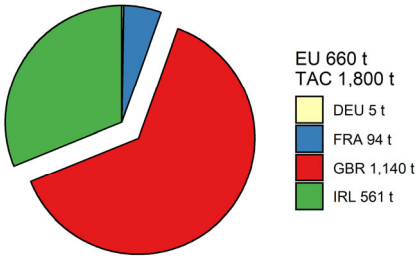
ICES Assessment Category	1 (Quantitative assessment)	
Management Plan	WWMAP (by-catch)	
Advice Basis	ICES MSY approach	Catch=4,155t
Ranges	F_{MSY} Range Lower	Catch=3,472 t
	F_{MSY}	Catch=4,155 t
	F_{MSY} Range Upper	Catch=4,155 t
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

- The assessment area is 6.a while the TAC management area covers ICES sub-area 6 and UK and international waters of 5.b and international waters 12 and 14.
- The 2022 TAC was set at 1,800 t, an EU quota of 660 t, with an associated Irish quota of 561 t, exclusively for bycatches no directed fisheries are allowed. This TAC is well below the ICES advice for 2022 of 4,114 t.

2022 Quota Allocations



Key Stock Considerations

- The assessment was benchmarked in 2021, resulting in the stock being changed from a category 5 stock to a category 1 stock. The assessment includes revised catch and survey data and updated biological parameters and also accounts for changes in fishery selectivity.
- Irish landings of whiting to the west of Scotland are mainly taken as a minor bycatch in mixed fisheries and are mainly landed with haddock and megrim.
- Catches of whiting were mainly discarded up to 2020 but the discard rate declined significantly to 23% by weight in 2021.

Published 30 June 2022

Whiting (Merlangius merlangus) in Division 6.a (West of Scotland)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 4155 tonnes.

Management should be implemented at the stock level.

Stock development over time

Fishing pressure on the stock is below F_{MSY}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

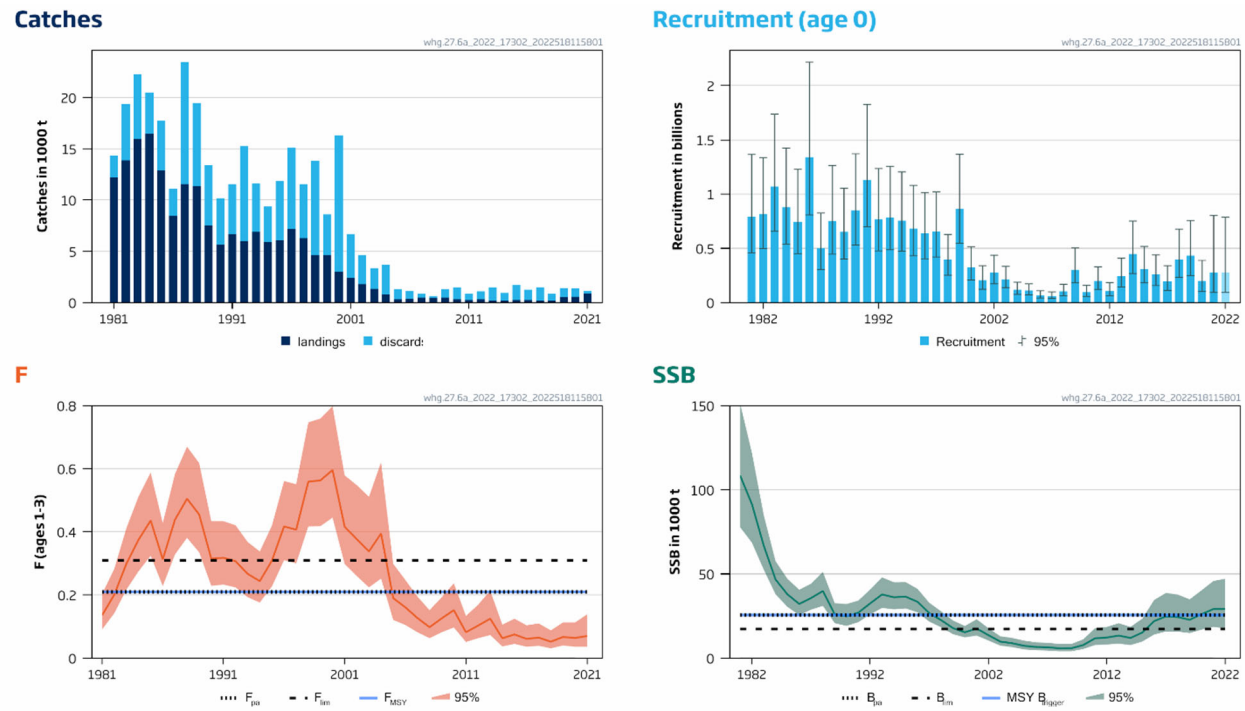


Figure 1 Whiting in Division 6.a. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour.

Catch scenarios

Table 1 Whiting in Division 6.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{ages\ 1–3}$ (2022)	0.07	$F = F_{average\ (2017–2021)}$ rescaled to F_{2021}
SSB (2023)	28 727	Short-term forecast; in tonnes
$R_{age\ 0}$ (2022-2023)	273 676	Median recruitment, resampled from the years 2012–2021; in thousands
Catch (2022)	1484	Short-term forecast; in tonnes
Projected landings (2022)	766	Short-term forecast; assuming average landings ratio by age 2019–2021^; in tonnes
Projected discards (2022)	718	Short-term forecast; assuming average discard ratio by age 2019–2021^; in tonnes

^ Due to inadequate discard sampling coverage of the fishery in 2021, average landings and discards proportions from 2019 –2020 are used for ages 0 and 1.

Table 2 Whiting in Division 6.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings* (2023)	Projected discards** (2023)	F_{total} (2023)	$F_{projected\ landings}$ (2023)	$F_{projected\ discards}$ (2023)	SSB (2024)	% SSB change ***	% advice change^
ICES advice basis									
MSY approach: F_{MSY}	4155	2081	2074	0.21	0.043	0.167	25 692	−10.6	1
Other scenarios									
F = 0	0	0	0	0	0	0	30 665	6.7	−100
F= $F_{MSY\ lower}$	3472	1735	1737	0.173	0.036	0.137	26 463	−7.9	−15.6
F= $F_{MSY\ upper}$	4155	2081	2074	0.21	0.043	0.167	25 692	−10.6	1
F= F_{pa}	4155	2081	2074	0.21	0.043	0.167	25 692	−10.6	1
F= F_{lim}	5907	2978	2929	0.31	0.064	0.25	23 765	−17.3	44
SSB (2024) = B_{lim}	12 447	6432	6015	0.77	0.158	0.61	17 286	−40	200
SSB (2024) = B_{pa} = MSY $B_{trigger}$	4241	2124	2117	0.22	0.044	0.171	25 597	−10.9	3.1
SSB (2024) = SSB (2023)	1547	766	781	0.074	0.0153	0.059	28 727	0	−62
F = F_{2022}	1468	728	740	0.070	0.0145	0.055	28 825	0.34	−64

* Marketable landings, assuming recent discard rate.
** Including BMS landings (EU stocks), assuming recent discard rate.
*** SSB 2024 relative to SSB 2023.
^ Advice value for 2023 relative to the corresponding 2022 value (4114 tonnes).

Basis of the advice

Table 3 Whiting in Division 6.a. The basis of the advice.

Advice basis	MSY approach
Management plan	The EU multiannual plan (MAP) for stocks in Western Waters and adjacent waters (EU, 2019) takes bycatch of this species into account. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach.

Quality of the assessment

Due to vessel breakdown, the UK-SCOGFS-Q1 survey was not carried out in 2022. In addition, a lack of discard sampling from the Nephrops trawl fleet (due to COVID-19 disruption) means that total discards were not adequately sampled for ages 1 and 2 in 2021, therefore catch numbers for ages 1 and 2 for 2021 were estimated by the model. Sensitivity analyses indicate that these issues are likely to have minimal impact on the assessment.

Recent changes in fishery selectivity pattern are accounted for in the fishing mortality assumption in the intermediate year.

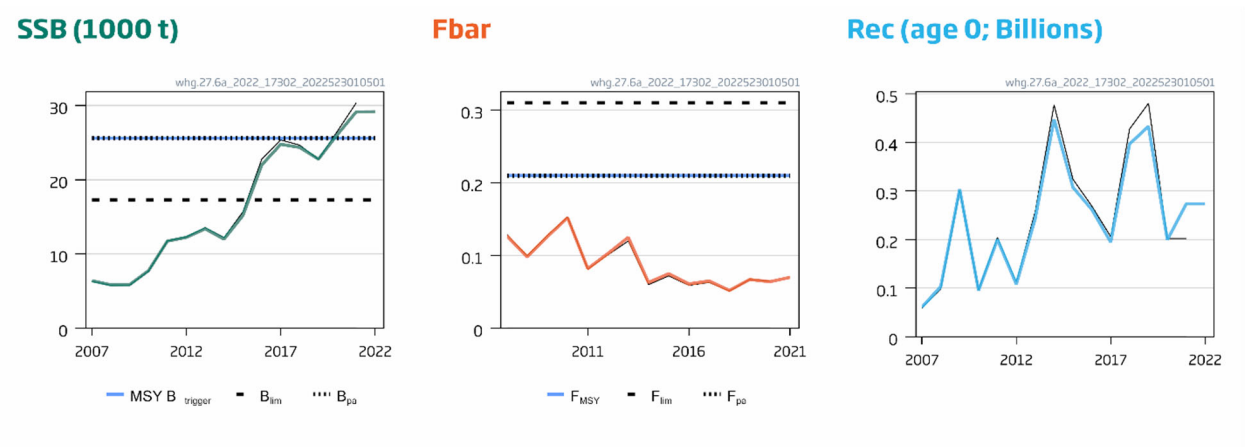


Figure 2 Whiting in Division 6.a. Historical assessment results (final-year SSB and recruitment estimates included). This stock was benchmarked in 2021.

Issues relevant for the advice

The TAC is for ICES Subarea 6 and European Union and international waters of Division 5.b and subareas 12 and 14, which includes Division 6.b, for which advice is given separately. By mixing the biological and TAC areas for different whiting stocks, it will be difficult to fully achieve management objectives for both stock areas. Hence, ICES recommends that the TAC area corresponds to the assessment area.

In 2019–2021, there was a significant decrease in the proportion of discards likely because of an increase in TAC compared to recent years. The partition of catch into projected landings and discards in the forecast is based on the assumption that the discard pattern by age seen in 2019–2021 will continue in 2022 and 2023.

Reference points

Table 4 Whiting in Division 6.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	25 597	B_{pa}; in tonnes	ICES (2021)
	F_{MSY}	0.21	Stochastic simulations (EqSim)	ICES (2021)
Precautionary approach	B_{lim}	17 286	Lowest SSB (1999) within period of high recruitment (pre- 2000); in tonnes	ICES (2021)
	B_{pa}	25 597	$B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.239$ (CV on estimate of SSB 2020); in tonnes	ICES (2021)
	F_{lim}	0.31	F giving 50% probability of SSB < B_{lim} in stochastic simulation (EqSim) uses segmented regression recruitment with breakpoint = B_{lim} (S-R pairs from 1985 onwards)	ICES (2021)
	F_{pa}	0.21	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability	ICES (2021)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 5 Whiting in Division 6.a. The basis of the assessment.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Analytical age-based assessment (SAM) that uses catches in the model and in the forecast (ICES, 2022b)
Input data	Commercial landings, estimated discards, age composition of catches. Three survey indices: ScoGFS-WIBTS-Q1 (G1179), UK-SCOWCGFS-Q1 (G4748) and a modelled Q4 index estimated using ScoGFS-WIBTS-Q4 (G4299), IGFS-WIBTS-Q4 (G7212), and UK-SCOWCGFS-Q4 (G4815). A fixed maturity ogive; natural mortalities-at-age (Lorenzen, 1996); stock weights-at-age from survey and catch data.
Discards and bycatch	Due to lack of discard sampling from the *Nephrops* fleet in 2021 (due to COVID-19 disruption), total discards were underestimated for 2021. Discard and catch numbers at age 0 and 1 for 2021 were estimated by the assessment model.
Indicators	SURBAR analysis
Other information	The stock was last benchmarked in 2021 (WKNSEA; ICES, 2021)
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE).

History of the advice, catch and management

Table 6 Whiting in Division 6.a. History of ICES advice, the agreed TAC, ICES estimates of landings and discards. Weights in tonnes.

Year	ICES advice/ single-stock exploitation boundaries since 2004	Catch corresponding to advice	Agreed TAC*	Official landings	ICES landings	ICES discards^	ICES catch
1987	No increase in F	15 000	16 400	12 399	11 544	11 918	23 462
1988	No increase in F; TAC	15 000	16 400	11 879	11 352	8132	19 458
1989	No increase in F; TAC	13 000	16 400	7669	7531	5876	13 407
1990	No increase in F; TAC	11 000	11 000	6026	5643	4530	10 173
1991	70% of effort (89)	-	9000	6908	6660	4883	11 543
1992	70% of effort (89)	-	7500	6010	6004	9249	15 253
1993	70% of effort (89)	-	8700	6751	6872	4759	11 631
1994	30% reduction in effort	-	6800	5786	5901	3455	9356
1995	Significant reduction in effort	-	6800	6277	6076	5771	11 847
1996	Significant reduction in effort	-	10 000	6642	7156	7940	15 096
1997	Significant reduction in effort	-	13 000	6178	6285	5251	11 536
1998	No increase in F	6500	9000	4657	4631	216	13 847
1999	Reduce F below F_{pa}	4300	6300	4677	4613	3975	8588
2000	Reduce F below F_{pa}	< 4300	4300	3203	3010	13 285	16 295
2001	Reduce F below F_{pa}	< 4200	4000	2543	2438	4263	6701
2002	SSB > B_{pa} in the short term	< 2000	3500	1735	1709	2851	4560
2003	No cod catches	-	2000	1365	1331	1984	3316
2004	SSB > B_{pa} in the short term	< 2100	1600	819	798	2887	3686
2005	Exploitation not allowed to increase	< 1600	1600	289	335	972	1307
2006	Lowest possible level	0	1360	383	378	746	1124
2007	Lowest possible level	0	1020	488	481	366	847
2008	Lowest possible level	0	765	440	441	156	598
2009	Same advice as last year	0	574	482	480	826	1305
2010	Same advice as last year	0	431	349	345	1091	1436
2011	See scenarios	-	323	230	231	630	861
2012	Reduce catches	-	307	301	300	742	1042
2013	Lowest possible catch, improve selectivity	0	292	214	215	1172	1387
2014	Lowest possible catch, improve selectivity	0	292	181	181	745	926
2015	Lowest possible catch	0	263	221	221	1458	1679
2016	Precautionary approach (minimize all catches)	0	213	232	227	1040	1266
2017	MSY approach	0	213	169	168	1331	1498
2018	MSY approach	0	213	180	189	666	855
2019	Precautionary approach	0	1112	327†	484	960	1444
2020	Precautionary approach	0	937	537^^	541	834	1375
2021	Precautionary approach	0	937	851^^	852	261	1113
2022	MSY approach	≤ 4114	1800				
2023	MSY approach	≤ 4155					

* Subarea 6; waters of Division 5.b (EU until 2020; UK thereafter); and international waters of subareas 12 and 14.

^ Pre-2003 discards are estimated for ages 1+ only.

^^ Preliminary official landings.

†Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

History of the catch and landings

Table 7 Whiting in Division 6.a. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings			Discards		
1 113 tonnes*	Finfish directed otter trawl 97%	*Nephrops* directed otter trawl < 1%	Other gear 2%	Finfish directed otter trawl 27%	*Nephrops* directed otter trawl* 73%	Other gear < 1%
	852 tonnes			261 tonnes*		

* Underestimate because of lack of discard sampling from the *Nephrops* fleet.

Table 8 Whiting in Division 6.a. History of official landings by country, and BMS (below minimum size) landings (tonnes).

Year	Belgium	Denmark	Faroe Islands	France	Germany	Ireland	Netherlands	Norway	Spain	UK (E W & NI)	UK (Scot.)	UK (total)	Official BMS landings	Total official landings
1989	1	1	-	199	+	1315	-	-	-	44	6109			7669
1990	-	+	-	180	-	977	-	-	-	50	4819			6026
1991	-	3	-	352	+	1200	-	-	-	218	5135			6908
1992	-	1	-	105	1	1377	-	-	-	196	4330			6010
1993	-	1	-	149	1	1192	-	-	-	184	5224			6751
1994	-	+	-	191	+	1213	-	-	-	233	4149			5786
1995	-	+	-	362	-	1448	-	-	1	204	4263			6277
1996	-	+	-	202	-	1182	-	-	-	237	5021			6642
1997	1	+	-	108	-	977	-	-	1	453	4638			6178
1998	1	-	-	82	-	952	-	-	2	251	3369			4657
1999	+	-	-	300	-	1121	-	-	+	210	3046			4677
2000	-	-	-	48	-	793	-	-	-	104	2258			3203
2001	-	-	-	52	-	764	-	-	2	71	1654			2543
2002	-	-	-	21	-	577	-	-	-	73	1064			1735
2003	-	+	-	11	-	568	-	-	-	35	751			1365
2004	+	+	-	6	-	356	-	-	-	13	444			819
2005	-	-	-	9	-	172	-	-	-	5	103			289
2006	-	-	-	7	-	196	-	-	-	2	178			383
2007	-	-	-	6	1	56	-	-	-	20	405			488
2008	-	-	-	1	-	69	-	-	-	2	368			440
2009	-	-	+	1	-	125	-	2	-	-	354			482
2010	-	-	-	3	-	99	-	-	-	2	245			349
2011	-	-	1	-	-	149	-	-	-	-	-	80		230
2012	-	-	1	-	-	96	-	-	-	-	-	204		301
2013	-	-	-	1	-	97	-	-	-	-	-	116		215
2014	-	-	-	1	-	97	-	-	-	-	-	83		181
2015	-	-	-	+	-	88	11	-	-	-	-	122		221
2016	-	-	-	-	-	77	52	-	-	-	-	98		232
2017	-	-	-	3	-	53	19	-	-	-	-	94		169
2018	-	2	-	2	-	72	2	+	-	-	-	108	2	189
2019	-	56	-	7	-	†	23	-	+	-	-	241	+	327†
2020*	-	10	-	10	-	126	4	-	-	-	-	387	11	548
2021*	-	-	-	35	-	161	+	-	+	-	-	654	+	852

* Preliminary.

\+ Landings < 0.5 tonnes.

† Incomplete/missing as a result part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

Table 9 Whiting in Division 6.a. Assessment summary with weights in tonnes and recruitment in thousands. 'High' and 'Low' refer to 95% confidence intervals.

Year	Recruitment age 0			SSB			Landings*	Discards*	Fishing mortality ages 1–3		
	Low	Value	High	Low	Value	High			Low	Value	High
1981	459 996	792 418	1 365 066	77 786	108 518	151 393	12 194	2132	0.09	0.14	0.20
1982	498 421	816 452	1 337 413	68 579	91 467	121 993	13 880	5485	0.14	0.20	0.28
1983	657 345	1068 364	1 736 379	52 550	66 838	85 011	15 962	6294	0.22	0.30	0.41
1984	539 881	876 855	1 424 156	37 862	46 702	57 605	16 459	4017	0.28	0.38	0.51
1985	451 474	744 978	1 229 290	30 455	37 889	47 137	12 879	4840	0.32	0.44	0.59
1986	807 581	1 338 213	2 217 501	25 504	32 190	40 629	8458	2669	0.23	0.31	0.43
1987	305 224	502 134	826 076	28 783	35 679	44 227	11 542	11 918	0.33	0.44	0.58
1988	446 791	752 010	1 265 733	31 030	39 873	51 236	11 349	8132	0.38	0.51	0.67
1989	402 020	651 153	1 054 675	20 737	26 023	32 657	7523	5876	0.34	0.46	0.62
1990	529 516	852 259	1 371 717	19 138	24 796	32 126	5642	4530	0.23	0.32	0.43
1991	700 276	1 131 396	1 827 931	21 377	27 048	34 224	6657	4883	0.23	0.32	0.43
1992	476 492	767 342	1 235 727	25 955	32 522	40 749	6004	9249	0.22	0.31	0.42
1993	487 073	782 199	1 256 149	29 801	37 808	47 966	6871	4759	0.19	0.27	0.37
1994	474 415	755 541	1 203 255	28 991	36 153	45 084	5900	3455	0.18	0.24	0.34
1995	431 387	682 976	1 081 293	29 491	36 487	45 144	6078	5771	0.23	0.31	0.42
1996	403 631	640 194	1 015 406	27 181	33 447	41 156	7158	7940	0.31	0.42	0.56
1997	419 932	654 177	1 019 088	21 653	26 670	32 849	6291	5251	0.30	0.41	0.55
1998	251 844	398 209	629 639	18 297	22 542	27 771	4628	9216	0.42	0.56	0.75
1999	547 489	865 524	1 368 304	14 208	17 817	22 344	4613	3975	0.42	0.56	0.76
2000	207 196	326 837	515 561	12 326	15 340	19 091	3011	13 285	0.45	0.60	0.80
2001	123 439	204 756	339 642	13 389	17 587	23 100	2439	4263	0.30	0.42	0.58
2002	172 978	274 808	436 584	10 429	13 606	17 752	1768	2851	0.26	0.38	0.55
2003	138 692	214 958	333 162	7411	9806	12 976	1331	1991	0.22	0.34	0.51
2004	75 301	118 957	187 922	6531	8857	12 011	798	2897	0.25	0.40	0.62
2005	69 310	109 455	172 852	5175	7333	10 389	334	975	0.12	0.19	0.30
2006	42 299	68 001	109 321	4684	6631	9386	378	750	0.11	0.16	0.25
2007	37 923	60 957	97 979	4489	6399	9120	481	365	0.08	0.13	0.20
2008	63 495	103 708	169 388	4067	5848	8409	442	156	0.06	0.10	0.15
2009	182 966	303 805	504 451	4093	5870	8419	480	832	0.08	0.13	0.19
2010	56 780	95 360	160 152	5395	7753	11 143	337	1104	0.10	0.15	0.24
2011	121 253	200 140	330 352	7755	11 738	17 766	229	631	0.05	0.08	0.13
2012	63 597	108 065	183 626	8077	12 242	18 557	305	772	0.06	0.10	0.17
2013	143 857	243 043	410 615	8647	13 389	20 730	216	1223	0.07	0.13	0.21
2014	266 623	447 703	751 764	7749	11 995	18 569	181	745	0.04	0.06	0.11
2015	182 614	307 589	518 092	9838	15 192	23 458	224	1459	0.05	0.08	0.13
2016	156 219	261 930	439 172	14 014	22 004	34 551	227	1039	0.04	0.06	0.10
2017	111 597	194 799	340 036	15 845	24 777	38 744	178	1329	0.04	0.07	0.11
2018	232 604	396 956	677 437	15 732	24 363	37 728	191	648	0.03	0.05	0.09
2019	248 326	433 379	756 332	14 861	22 780	34 917	502	929	0.04	0.07	0.11
2020	102 183	199 449	389 299	16 902	26 085	40 258	544	817	0.04	0.06	0.11
2021	93 253	273 676	803 174	18 547	29 141	45 786	875	262***	0.04	0.07	0.14
2022	108 065	273 676**	447 703	17 660	29 167	47 163					

* Calculated using sum of products from the catch numbers-at-age and mean weights-at-age. Pre-2003 discards are estimated for ages 1+ only.

** Median resampled recruitment (2012–2021).

*** Underestimate due to lack of discard sampling from the *Nephrops* fleet.

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Download the stock assessment data and figures.

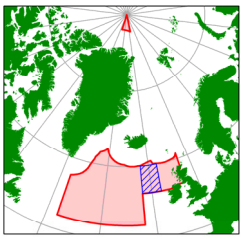
Recommended citation: ICES. 2022. Whiting (*Merlangius merlangus*) in Division 6.a (West of Scotland). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, whg.27.6a. https://doi.org/10.17895/ices.advice.19457426.

Rockall Whiting

Division 6.b

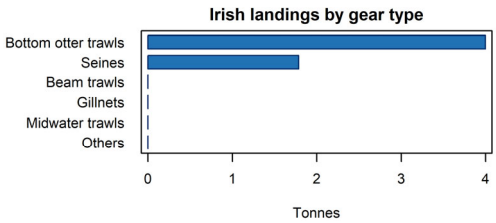
Advice for 2023

ICES advises that when the precautionary approach is applied, landings should be no more than 7 t in each of the years 2022, 2023, 2024. ICES cannot quantify the corresponding total catches.



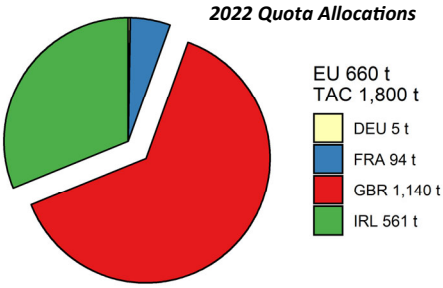
Key Points

ICES Assessment Category	6 (Bycatch only assessment)	
Management Plan	WWMAP (bycatch)	
Advice Basis	ICES PA approach	Recent advised catches minus 20%
Ranges	F_{MSY} Range Lower	Not Appropriate (bycatch)
	F_{MSY}	Not Available
	F_{MSY} Range Upper	Not Appropriate (bycatch)
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

- ICES provides triennial advice for this stock (2022-24).
- TAC covers ICES Sub-areas 6 and UK and international waters of Division 5.b and international waters of 12 and 14. Therefore, the TAC cannot effectively manage catches in Division 6.b (Rockall) specifically.
- TAC is exclusively for bycatches; no targeted fisheries are permitted.



Key Stock Considerations

- Irish landings of whiting at Rockall are taken as a minor bycatch in mixed fisheries and are mainly landed with haddock.
- It is only in recent years that whiting have been recorded in the catches of surveys and commercial fishing. The stock structure and origin of whiting at Rockall is not known, but it is possible that whiting caught at Rockall are vagrants from other areas.

Further information on this stock can be found in the 2021 Stock Book.

Table 1 Official Landings (t) of WHITING in Division 6.b, 1990-2021, as reported to ICES.

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Faroe Is.	-	-	-	-	-	-	-	-	-	-	-
France	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	32	10	4	23	3	1	-	-
Norway	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	+	-
UK (E, W & NI)	6	1	5	10	2	5	26	49	20	-	-
UK (Scotland)	482	459	283	86	68	53	36	65	23	44	58
UK (all)											
Total	488	460	288	128	80	62	85	117	44	44	58

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Faroe Is.	-	-	-	-	-	-	-	-	-	-	-
France	-	-	-	-	-	-	+	-	-	-	-
Ireland	10	-	2	3	3	104	16	23	4	2	3
Norway	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-	-
UK (E, W & NI)	-	-	-	-	-	-	-	-	-	-	-
UK (Scotland)	4	7	11	1	1	1	1	8	12	16	6
UK (all)											
Total	14	7	13	4	4	105	17	31	16	18	9

Country	2012	2013	2014	2015	2016	2017	2018	2019	2020*	2021*
Faroe Is.	-	-	-	-	-	-	-	-	-	-
France	-	-	-	-	-	-	+	+	-	-
Ireland	-	+	6	6	9	7	9	24	13	6
Norway	-	-	-	-	1	+	-	-	-	-
Spain	-	-	-	-	-	-	-	-	-	-
UK (E, W & NI)	-	-	-							
UK (Scotland)	1	3	23							
UK (all)				46	22	32	34	65	25	11
Total	1	3	29	52	33	40	43	89	38	17

Note: * Preliminary; + <0.5 t.

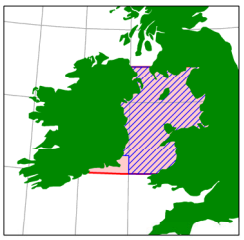
Irish Sea Whiting

Division 7.a

Advice for 2023

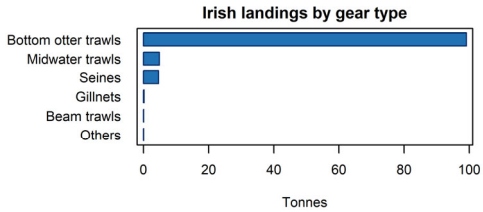
ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catches in 2022 and 2023.

In response to an EC request ICES provided a technical service on unavoidable by-catches which states "forecasted bycatch levels in 2022 are 1,125 t, using a model of whiting bycatch in the *Nephrops* fishery and assuming 8,476 t of *Nephrops* catches in 2023. This is expected to result in a 1% increase in SSB of whiting in 2024".



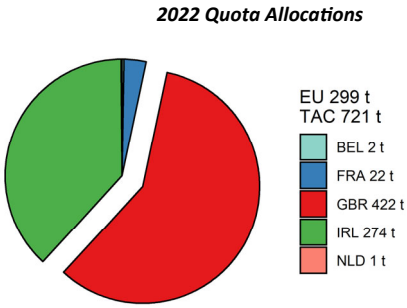
Key Points

ICES Assessment Category	1 (Quantitative assessment)	
Management Plan	WWMAP (bycatch)	
Advice Basis	ICES MSY Approach	Catch=0 t
Ranges	F_{MSY} Range Lower	Not appropriate (bycatch)
	F_{MSY}	Not available
	F_{MSY} Range Upper	Not appropriate (bycatch)
Landing Obligation	From 2019	No derogations or exemptions



Management in 2022

- The stock area does not include landings taken or reported in 33E2 and 33E3, these ICES rectangles accounted for an average of 27% of the ICES Division 7.a landings over the last five years. The TAC management area covers all of Division 7.a.



Key Stock Considerations

- The stock is still well below B_{lim} and shows no signs of recovery.
- The majority of whiting caught are discards in the *Nephrops* fishery and are below MCRS. Despite the introduction of several technical measures to reduce finfish catch and discards in the *Nephrops* fishery, the total discards estimates remain high. In 2021, 95% of the total catch of 1,662 t was discarded (1,571 t).
- Forecasted bycatch levels for 2022 are 1,125 t, using a model of whiting bycatch in the *Nephrops* fishery and assuming 8,476 t of *Nephrops* catches in 2023. This is expected to result in a 1% increase in whiting SSB in 2024.
- Whiting is a potential choke species for *Nephrops* fisheries in the Irish Sea.

Further information on this stock can be found in the 2021 Stock Book.

Table 1 Official Landings (t) of WHITING in Division 7.a, 1988-2021, as reported to ICES.

Year	Belgium	France	Ireland	Netherlands	UK(NI, Engl. & Wales)	Spain	UK (Isle of Man)	UK (Scotland)	UK	Total human consumption
1988	90	1,063	4,394		5,823		15	107		11,492
1989	92	533	3,871		6,652		26	154		11,328
1990	142	528	2,000		5,202		75	236		8,183
1991	53	611	2,200		4,250		74	223		7,411
1992	78	509	2,100		4,089		44	274		7,094
1993	50	255	1,440		3,859		55	318		5,977
1994	80	163	1,418		3,724		44	208		5,637
1995	92	169	1,840		3,125		41	198		5,465
1996	80	78	1,773	17	3,557		28	48		5,581
1997	47	86	1,119	14	3,152		24	30		4,472
1998	52	81	1,260	7	1,900		33	22		3,355
1999	46	150	509	6	1,229		5	44		1,989
2000	30	59	353	1	670		2	15		1,130
2001	27	25	482		506		1	25		1,066
2002	22	33	347		284		1	27		714
2003	13	29	265		130	85	1	31		554
2004	11	8	96		82		1	6		204
2005	10	13	94		47			<0.5		164
2006	4	4	55		22			<0.5		85
2007	3	3	187		3		1	<0.5		197
2008	2	2	68		11		1			84
2009	2		78		20					100
2010	5	3	97		16		<0.5			121
2011	4	3	95		16		<0.5			118
2012	5	1	58		10			1	11	86
2013	2	<0.5	44				<0.1	2	20	68
2014	2	<0.5	60		11		<0.1			73
2,015	1	<0.5	49		8					59
2,016	1	<0.5	44		5		<0.1			50
2,017	2	<0.5	32		17		<0.1			50
2018	1		44		19		<0.5			63
2019	4		129		63		<0.1			196
2020	5	<0.1	56		42		<0.1			102
21	2	<0.1	109		38					149

Celtic Sea and Western Channel Whiting

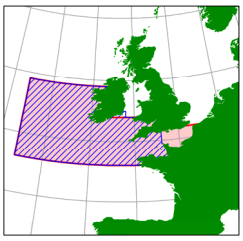
Divisions 7.b-ce-k

Advice for 2023

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 1,715 t.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock. Management should be implemented at the stock level.

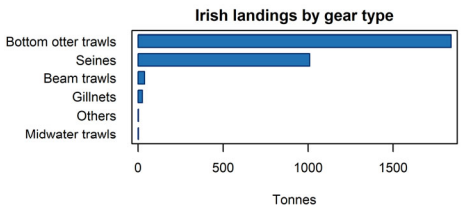
FEAS notes that the TAC includes Division 7.d, which is not part of the Celtic sea whiting assessment. The human consumption catch advice for 7.d (23,953 t) is given as part of the North Sea whiting stock. This implies that the advice for the TAC area is 25,668 t.



Key Points

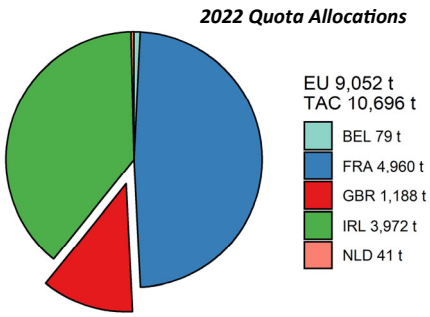
ICES assessment Category	1 (Quantitative assessment)	
Management Plan	WWMAP (target)	
Advice Basis	ICES MSY approach where $SSB_{2024} = B_{lim}$ with 50% probability, catch = 1,715 t	
Ranges	F_{MSY} Range Lower	Not appropriate
	F_{MSY}	Catch = 6,322 t
	F_{MSY} Range Upper	Not appropriate
Landing Obligation	From 2019	*De minimis* up to 5%*

* The *de minimis* exemption, caught using bottom trawls and seines with mesh ≥80mm, pelagic trawls and beam trawls with mesh 80-119 mm and requiring reporting to STECF (EU 2020\2015).



Management in 2022

- The stock area consists of Divisions 7.b-ce-k and two ICES rectangles in the south of Division 7.a (33E2 and 33E3) which are reallocated to Division 7.g. This differs to the TAC area, 7.b-k, 8, 9 and 10.
- ICES division 7.d is not included in the stock assessment area for the whiting 7.b-k stock.
- Whiting in 7.d are assessed with North Sea whiting area 4 and included in the North Sea MAP (EU regulation 2018/973).



Key Stock Considerations

- The stock assessment indicates that the whiting stock is currently below B_{lim}. The ICES advice is based on bringing the stock above B_{lim} by 2024 with 50% probability. This implies a significant reduction in catch and fishing mortality compared to recent levels.
- The advice also indicates that there is a retrospective tendency to overestimate stock size and underestimate fishing mortality. If this pattern continues the forecast will be overly optimistic in terms of SSB and the probabilities of the stock remaining below B_{lim} will be higher.
- Ireland accounts for around 45% of the whiting landings and is the only country with a directed whiting fishery in the Celtic sea. The majority of Irish landings are from trips where whiting was the dominant species. The

remainder are taken in a more mixed fishery and are landed with haddock, hake, megrim, anglerfish and *Nephrops*.

- Mixed-fisheries advice will be provided in the Celtic Seas fisheries overview later in the year.
- Discards have declined in recent years from 35% in 2016 (8,259 t) to 17% (1,224 t) in 2021. The majority of discards occur above the minimum landing size.

Published 30 June 2022

Whiting (*Merlangius merlangus*) in divisions 7.b–c, and 7.e–k (southern Celtic seas and western English Channel)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 should be no more than 1715 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Management should be implemented at the stock level.

Stock development over time

Fishing pressure on the stock is above F_{MSY} and between F_{pa} and F_{lim}, and spawning-stock size is below MSY $B_{trigger}$, B_{pa}, and B_{lim}.

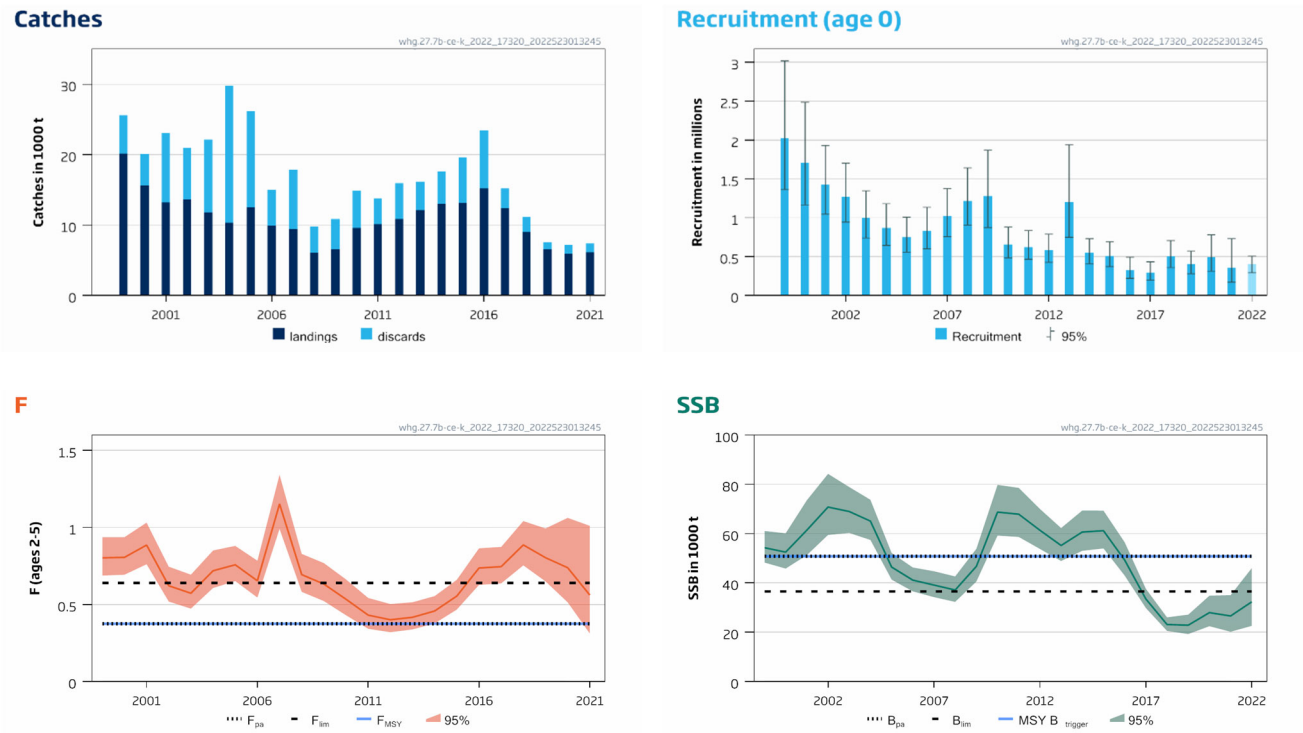


Figure 1 Whiting in divisions 7.b–c and 7.e–k. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour.

Catch scenarios

Table 1 Whiting in divisions 7.b–c and 7.e–k. The basis for the catch scenarios.

Variable	Value	Notes
$F_{ages\ 2–5}$ (2022)	0.701	$F_{sq} = F_{average}$ (2019–2021), unscaled
SSB (2023)	30 343	Short-term forecast; in tonnes.
Recruitment age 0 (2022–2023)	400 108	Median resampled (2015–2021); in thousands
Catch (2022)	10 741	Short-term forecast; in tonnes.
Projected landings (2022)	9228	Short-term forecast assuming average 2019–2021 landings pattern; in tonnes
Projected discards (2022)	1513	Short-term forecast assuming average 2019–2021 discard pattern; in tonnes

Table 2 Whiting in divisions 7.b–c and 7.e–k. Annual catch scenarios. All weights are in tonnes. No information on % TAC change can be shown because the TAC area differs from the stock area.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	F_{total} (2023)	$F_{projected\ landings}$ (2023)	$F_{projected\ discards}$ (2023)	SSB (2024)	% SSB change *	% advice change **	% probability of being below B_{lim} in 2024
ICES advice basis										
$SSB_{2024} = B_{lim}$	1715	1512	203	0.090	0.079	0.011	36571	21	−-61	50
Other options										
MSY and precautionary considerations: F = 0	0	0	0	0.000	0.000	0.000	38109	26	−100	40
MSY approach: $F_{MSY} \times SSB_{2023}/MSY\ B_{trigger}$	4030	3542	488	0.224	0.199	0.025	34568	14	−9.5	62
EU MAP^^: $F_{MSY} \times SSB_{2023}/MSY\ B_{trigger}$	4030	3542	488	0.224	0.199	0.025	34568	14	−9.5	62
EU MAP^^: $F_{MSY\ lower} \times SSB_{2023}/MSY\ B_{trigger}$	3441	3026	415	0.188	0.167	0.021	35065	16	−23	59
$F = F_{MSY} = F_{pa}$	6322	5532	790	0.375	0.333	0.042	32641	8	42	72
$SSB_{2024} = B_{pa} = B_{trigger}$^										
$F = F_{2022}$	10376	9013	1363	0.701	0.622	0.079	29323	−3	133	86
$SSB_{2024} = SSB_{2023}$	9108	7939	1169	0.590	0.523	0.067	30343	0	105	82

* SSB 2024 relative to SSB 2023.
** Advice value for 2023 relative to the advice value for 2022 (4452 tonnes).
^ The B_{pa} and MSY $B_{trigger}$ options were left blank because neither can be achieved in 2024, even with zero catches.
^^ EU multiannual plan (MAP) for the Western Waters and adjacent waters (EU, 2019).

The advice for 2023 is 61% lower than last year because the stock remains below B_{lim}, incoming recruitment remains low, and a larger reduction in fishing mortality is needed to bring the stock above B_{lim} with 50% probability in 2024

Basis of the advice

Table 3 Whiting in divisions 7.b–c and 7.e–k. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

This year's assessment shows an increasing retrospective pattern. There is a tendency for the assessment to result in overestimates of biomass and underestimates of fishing mortality, which may indicate model or data issues. If this pattern continues, the forecast will be overly optimistic in terms of SSB and the probabilities of the stock remaining below B_{lim} will be higher.

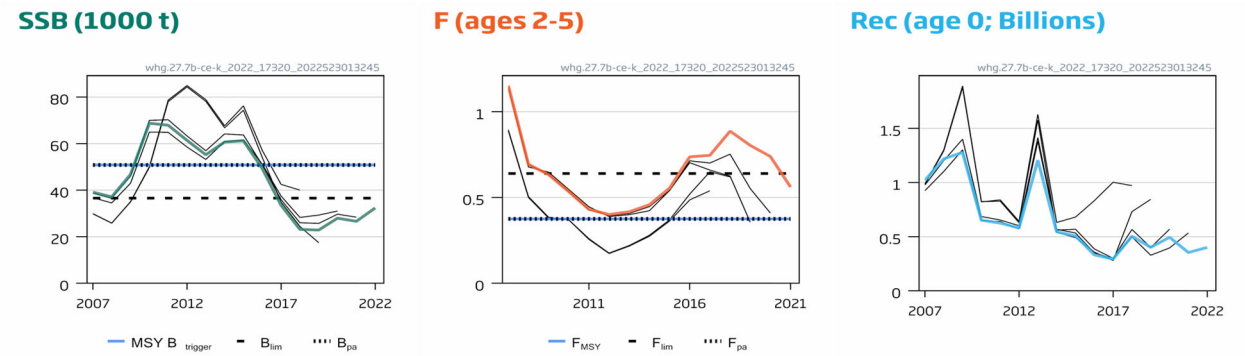


Figure 2 Whiting in divisions 7.b–c and 7.e–k. Historical assessment results (final-year SSB estimate and recruitment assumptions included). The stock was benchmarked in 2020 (ICES, 2020) and an interbenchmark completed in 2021 (ICES, 2021a). The reference points were revised in 2020 (following a benchmark), and only assessment results from the last three years should be compared to the reference points indicated.

Issues relevant for the advice

Distinct changes in recruitment are apparent for this stock, therefore intermediate year assumptions for recruitment were truncated to the recent seven years. The assumed recruitment in 2022 and 2023 used in the forecast constitutes a significant part (56.3%) of the projected SSB in 2024.

The forecast is also highly dependent on the assumption on F (or catch) for the intermediate year (2022). Using the catch assumptions derived from mixed-fishery analysis, under the haddock scenario (as done in 2021), was not considered to be appropriate this year. An average of the last three years' F is more appropriate to account for the tendency to underestimate recent F.

The assessment and advice are for divisions 7.b–c and 7.e–k, including reallocations from rectangles 33E2 and 33E3 of 59 t in Division 7.a.

Whiting in divisions 7.b–c and 7.e–k is fished under a common TAC with whiting in Division 7.d. By mixing the biological and TAC areas for different whiting stocks, it will be difficult to achieve the objective of fishing at maximum sustainable yield (MSY) for both stock areas. Hence, ICES recommends that the TAC area corresponds to the assessment area.

Mixed-fisheries considerations

Whiting in divisions 7.b–c and 7.e–k is caught as part of a mixed fishery. Most whiting are caught by otter trawls targeting fish; these trawls also catch haddock and varying amounts of other benthic and gadoid species (ICES, 2021b).

Reference points

Table 5 Whiting in divisions 7.b–c and 7.e–k. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	50818	B_{pa}; in tonnes	ICES (2021a)
	F_{MSY}	0.375	From EqSim with segmented regression and fixed breakpoint (B_{lim}) capped to F_{P05}.	ICES (2021a)
Precautionary approach	B_{lim}	36571	B_{loss}; lowest observed SSB (2008) from which stock recovery was observed; in tonnes	ICES (2021a)
	B_{pa}	50818	B_{lim} combined with the assessment error; $B_{lim} \times \exp(1.645 \times \sigma)$; $\sigma = 0.20$ (default setting); in tonnes	ICES (2021a)
	F_{lim}	0.64	F with 50% probability of SSB less than B_{lim}	ICES (2021a)
	F_{pa}	0.375	F_{P05}; the F that leads to SSB ≥ B_{lim} with 95% probability	ICES (2021a)
Management plan	MAP MSY $B_{trigger}$	50818	MSY $B_{trigger}$; in tonnes	EU (2019), ICES (2021a)
	MAP B_{lim}	36571	B_{lim}; in tonnes	EU (2019), ICES (2021a)
	MAP F_{MSY}	0. 375	$F_{MSY.}$	EU (2019), ICES (2021a)
	MAP range F_{lower}	0.315	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY	EU (2019), ICES (2021a)
	MAP range F_{upper}	0.375	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY capped to F_{P05}.	EU (2019), ICES (2021a)

Basis of the assessment

Table 6 Whiting in divisions 7.b–c and 7.e–k. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022a).
Assessment type	Analytical age-based assessment (State-space fish stock assessment model; SAM) that uses catches in the model and the forecast (ICES, 2022b).
Input data	Commercial catches (age composition of landings and discards); vector autoregressive spatiotemporal (VAST) standardized survey index (combined IGFS-WIBTS-Q4 [G7212] and EVHOE-WIBTS-Q4 [G9527]); maturity data (surveys and observer data; constant for all years); age-dependent natural mortalities (Lorenzen, 1996)
Discards and bycatch	Included in the assessment for the full time-series. Full observer-based estimates from 2003, partial observer-based estimates from 1999 to 2002.
Indicators	None.
Other information	This stock was benchmarked in 2020 (ICES, 2020) and interbenchmarked in 2021 (ICES, 2021a).
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE).

History of the advice, catch, and management

Table 7 Whiting in divisions 7.b–c and 7.e–k. ICES advice and landings, as used in the assessment. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC^	ICES landings	ICES discards
1987	*Status quo* F; TAC	-	7100*	18500	13720	
1988	Precautionary TAC	-	7000*	18500	15822	
1989	Precautionary TAC	-	7900*	19300	24276	
1990	No increase in F; TAC	-	8400*	24000	24099	
1991	Precautionary TAC	-	8000*	24000	14402	
1992	If required, precautionary TAC	-	8000*	22000	14419	
1993	Within safe biological limits	-	6600*	22000	17904	
1994	Within safe biological limits	-	< 9400*	29000	21659	
1995	20% reduction in F	-	8200**	31000	23559	

Year	ICES advice	Catch corresponding to advice	Landings corresponding to advice	Agreed TAC^	ICES landings	ICES discards
1996	20% reduction in F	-	600**	28000	19539	
1997	At least 20% reduction in F	-	< 7300***	27000	21067	
1998	At least 20% reduction in F	-	< 8200***	27000	19710	
1999	No increase in F	-	12400***	25000	24260	5420
2000	17% reduction in F	-	< 13100***	22200	16030	4400
2001	No increase in F	-	13500***	21000	13832	9877
2002	No increase in F	-	27700***	31700	14295	7336
2003	No increase in F	-	20200***	27000	11788	10337
2004	No increase in F	-	14000***	27000	10321	19522
2005	No increase in F	-	10600***	21600	12575	13598
2006	No increase in F	-	10800***	19940	9908	5098
2007	No increase in F	-	-	19940	9424	8439
2008	Reduction in F	-	-	19940	6080	3760
2009	Same advice as last year	-	-	16949	6574	4281
2010	Same advice as last year	-	-	14407	9570	5346
2011	See scenarios	-	-	16658	10084	3750
2012	No increase catch and improved gear selection	-	-	19053	10834	5116
2013	MSY approach	-	< 17500***	24500	12131	4026
2014	MSY approach	-	< 15562***	19162	12983	4672
2015	MSY approach	< 18501	< 14230	17742	13110	6528
2016	MSY approach	≤ 19076	≤ 15395	22778	15201	8259
2017	MSY approach	≤ 25125	≤ 19825	27500	12377	2791
2018	MSY approach	≤ 19429	≤ 13759	22213	9007	2139
2019	MSY approach	≤ 15841		19184	6588†	970
2020	Management plan	6481 (range 4157–6481)		10863	5931	1266
2021	Management plan	5261 (range 4458–5261)		10259	6153	1224
2022	MSY approach	≤ 4452		8352		
2023	MSY approach	≤ 1715				

^ TAC covers Subarea 7 (except Division 7.a).
* For the divisions 7.f and 7.g stock component.
** For the divisions 7.f–h stock component.
*** For the divisions 7.e–k stock component.
† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

History of the catch and landings

Table 8 Whiting in divisions 7.b–c and 7.e–k. Catch distribution by fleet in 2021, as estimated by ICES.

Catch	Landings					Discards				
7377 tonnes	Otter trawls 76%	Seine nets 18%	Beam trawls 3%	Gillnets 1%	Other gears 2%	Otter trawls 83%	Seine nets 5%	Beam trawls 10%	Gillnets 1%	Other gears 2%
	6153 tonnes					1224 tonnes				

Table 9 Whiting in divisions 7.b –c and 7.e–k. History of commercial landings; the official landings by country and landings in rectangles 33E2 and 33E3. All weights are in tonnes.

Year	Belgium	France	Ireland	UK England and Wales	Others	Rectangles 33E2 and 33E3 **	Total
1998	479	6322	5549	1755	179		19710
1999	448	5119	6013	1354	27		24260
2000	194	5961	5358	1255	39		16032
2001	171	4731	5365	948	31		13832
2002	149	3596	5718	847	35		14297
2003	129	2871	4634	757	75		11788
2004	180	2776	4406	567	49		10321
2005	217	3402	5826	471	101		12575
2006	128	4287	4594	384	72		9908
2007	126	3866	5048	574	80		9424
2008	121	3986	2451	602	36		6080
2009	87	4928	2862	811	38		6574
2010	103	5623	4424	745	896		9570
2011	99	6281	4826	691	181		10084
2012	171	5290	5884	723	191	32	10834
2013	226	3625	6916	741	261	34	12131
2014	222	3221	6929	742	161	49	12983
2015	152	2697	6477	601	257	32	13110
2016	186	6322	7782	801	151	40	15201
2017	102	5119	6338	592	54	20	12377
2018	103	5961	4650	588	40	18	9007
2019	73	3203	2599†	487	125	24	6488 †
2020	80	2697	2669	337	147	14	5931
2021*	81	2681	2973	354	65	59	6153

* Preliminary.

** Included in Irish landings. Landings in the southern part of Division 7.a (rectangles 33E2 and 33E3) are included in the assessment and are considered to be part of the stock.

† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

Table 10 Whiting in divisions 7.b–c and 7.e–k. Assessment summary. All weights are in tonnes and recruitment in thousands. 'Low' and 'High' refer to 95% confidence intervals.

Year	Recruitment age 0			SSB			Landings	Discards	Ages 2–5		
	Low	Value	High	Low	Value	High			Low	Value	High
1999	1362089	2027897	3019160	48260	54302	61100	20180	5420	0.69	0.80	0.94
2000	1163986	1701339	2486760	45815	52501	60164	15644	4400	0.69	0.81	0.94
2001	1046908	1421549	1930257	51288	61432	73583	13196	9877	0.76	0.89	1.03
2002	943722	1267864	1703340	59469	70799	84286	13640	7336	0.52	0.62	0.75
2003	739785	998197	1346874	60286	68985	78939	11788	10337	0.47	0.57	0.69
2004	643630	871785	1180819	57440	65094	73768	10321	19522	0.61	0.72	0.85
2005	557406	749519	1007845	41340	46453	52199	12575	13598	0.65	0.76	0.88
2006	601247	826353	1135740	36574	41147	46292	9908	5098	0.55	0.65	0.79
2007	757667	1020649	1374910	34226	39139	44757	9424	8439	0.99	1.15	1.34
2008	904652	1218297	1640683	32306	37123	42658	6080	3760	0.58	0.69	0.83
2009	873636	1278262	1870293	40539	46729	53865	6574	4281	0.52	0.63	0.77
2010	483184	652585	881377	59205	68742	79815	9570	5346	0.43	0.53	0.66
2011	466120	624387	836391	58664	67898	78585	10084	3750	0.34	0.43	0.54
2012	426262	579921	788972	53784	61381	70051	10834	5116	0.32	0.40	0.50
2013	749170	1205680	1940367	48902	55194	62296	12131	4026	0.34	0.42	0.52
2014	406667	545184	730884	53033	60670	69406	12983	4672	0.38	0.46	0.56
2015	371843	507319	692155	53992	61195	69360	13110	6528	0.47	0.56	0.66
2016	221522	330789	493952	42957	49278	56528	15201	8259	0.63	0.74	0.87
2017	197994	293206	434204	29806	33504	37662	12377	2791	0.64	0.75	0.87
2018	358994	504093	707837	20529	23130	26061	9007	2139	0.75	0.89	1.04

Year	Recruitment age 0			SSB			Landings	Discards	Ages 2–5		
	Low	Value	High	Low	Value	High			Low	Value	High
2019	279923	400108	571894	19251	22862	27150	6588	970	0.65	0.80	0.99
2020	312172	494034	781842	22428	27954	34842	5931	1266	0.51	0.74	1.06
2021	170388	353025	731427	20180	26600	35064	6153	1224	0.31	0.56	1.01
2022	293206	400108*	507319	22581	32346	46048					

* Median resampled (2010–2021).

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ICES. 2019. EU request to provide likely catches in 2020 of specific bycatch / non-targeted stocks that have zero catch advice (cod in divisions 7.e–k and 6.a and in Subdivision 21, whiting in divisions 6.a and 7.a, and plaice in divisions 7.h and 7.j–k). *In* Report of the ICES Advisory Committee, 2019. ICES Advice 2019, sr.2019.23. 11 pp. https://doi.org/10.17895/ices.advice.5646.

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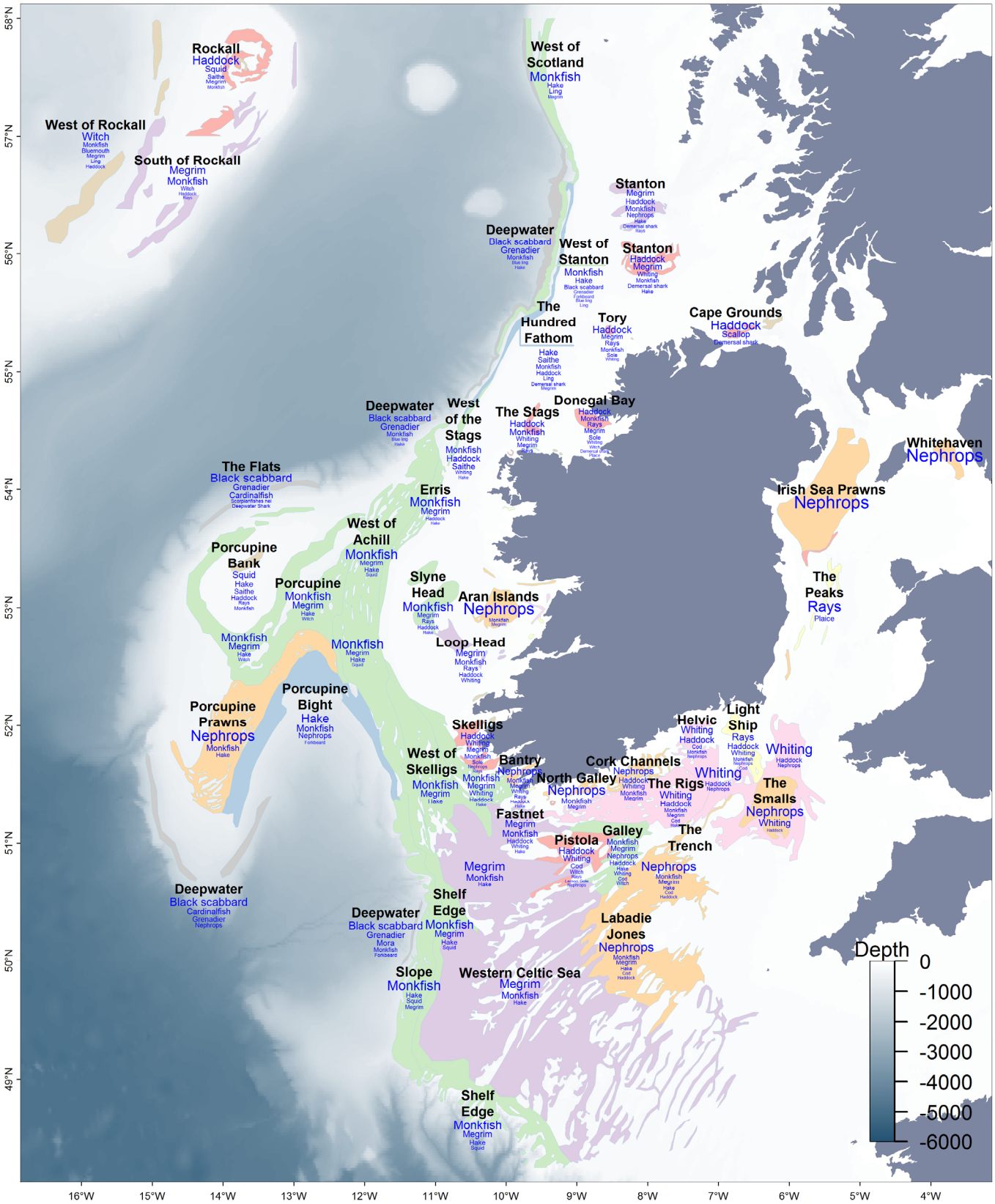
Download the stock assessment data and figures.

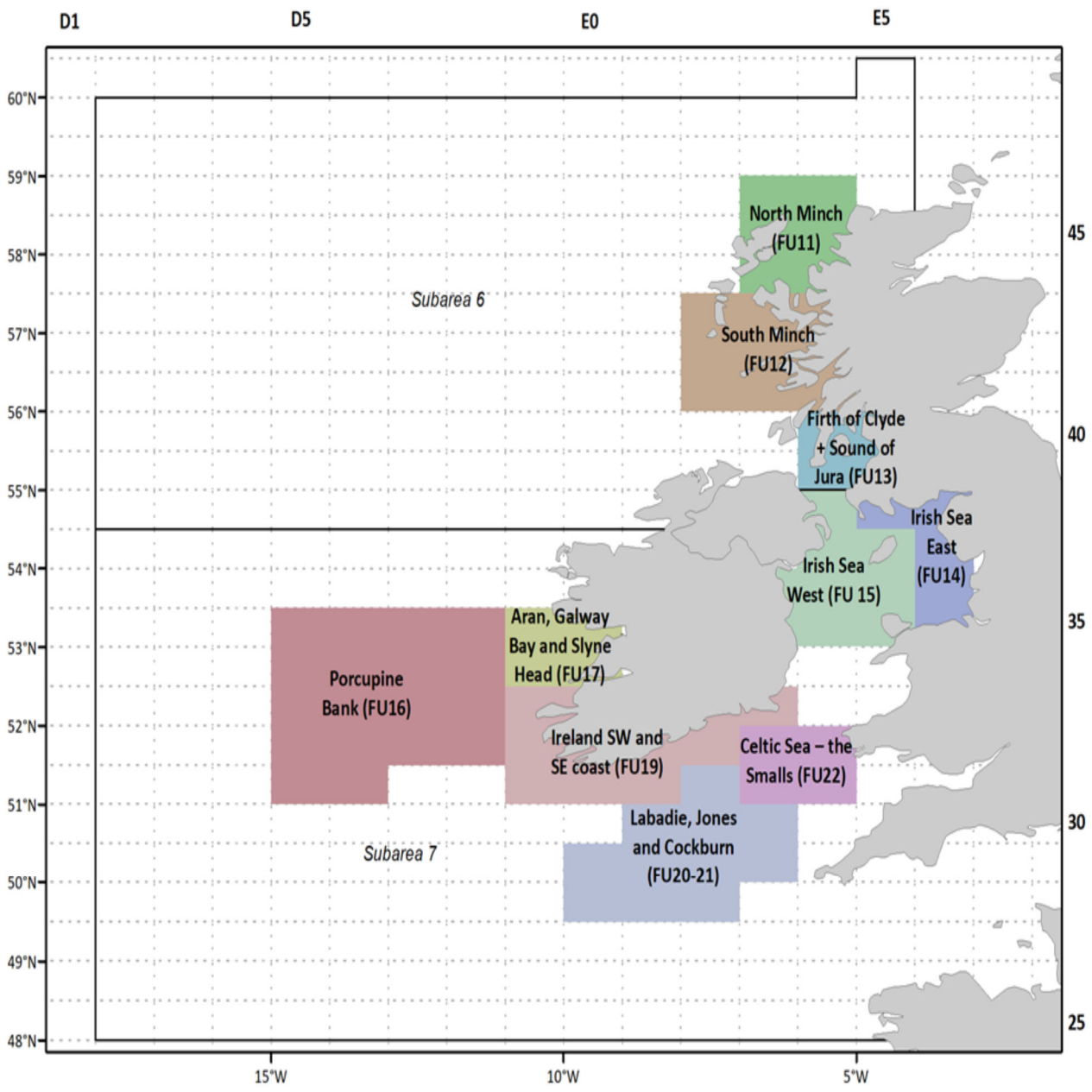
Recommended citation: ICES. 2022. Whiting (*Merlangius merlangus*) in divisions 7.b-c and 7.e-k (southern Celtic Seas and eastern English Channel). *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, whg.27.7b-ce-k, https://doi.org/10.17895/ices.advice.19458416.

Main demersal fishing grounds around Ireland

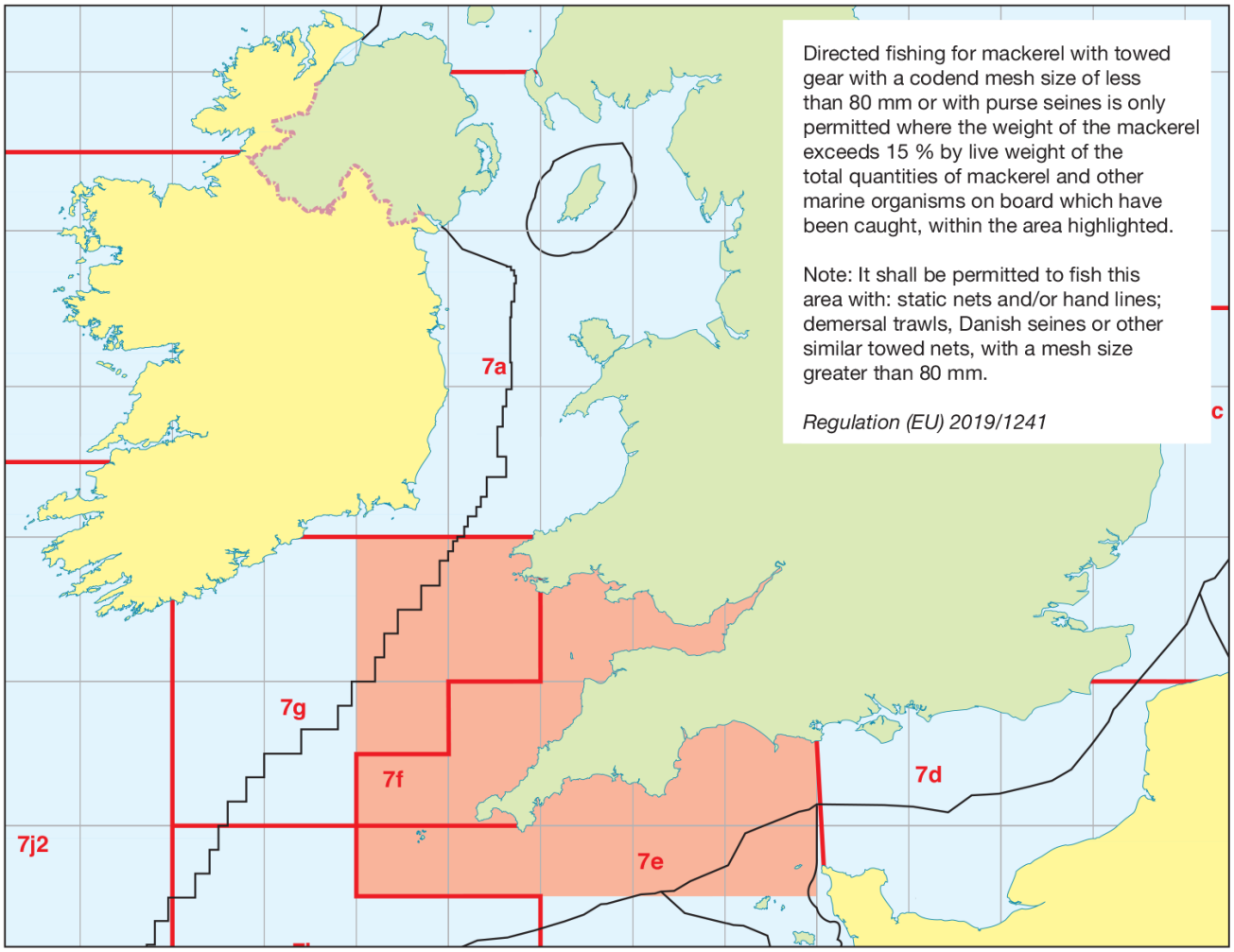


Names of the grounds are based on records from fisheries observers and the outlines are derived from VMS data. Blue text gives an indication of the main species caught on each of the fishing grounds, with the most dominant species in the largest font size. The colour of the background gives an impression of the water depth with darker colours indicating deeper water.

Nephrops Functional Units (FUs) around Ireland

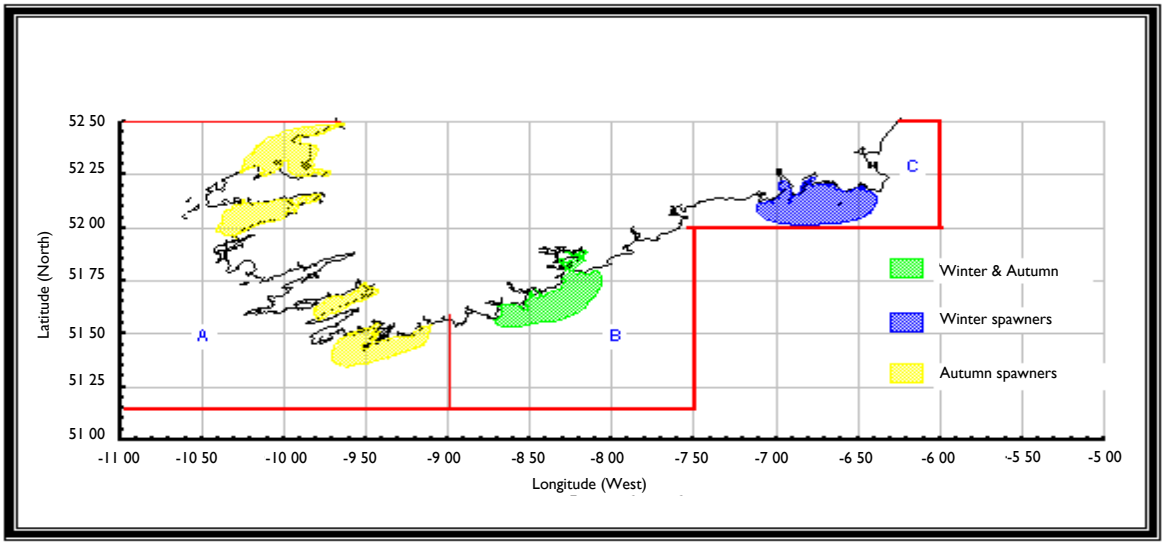


Restrictions on Mackerel

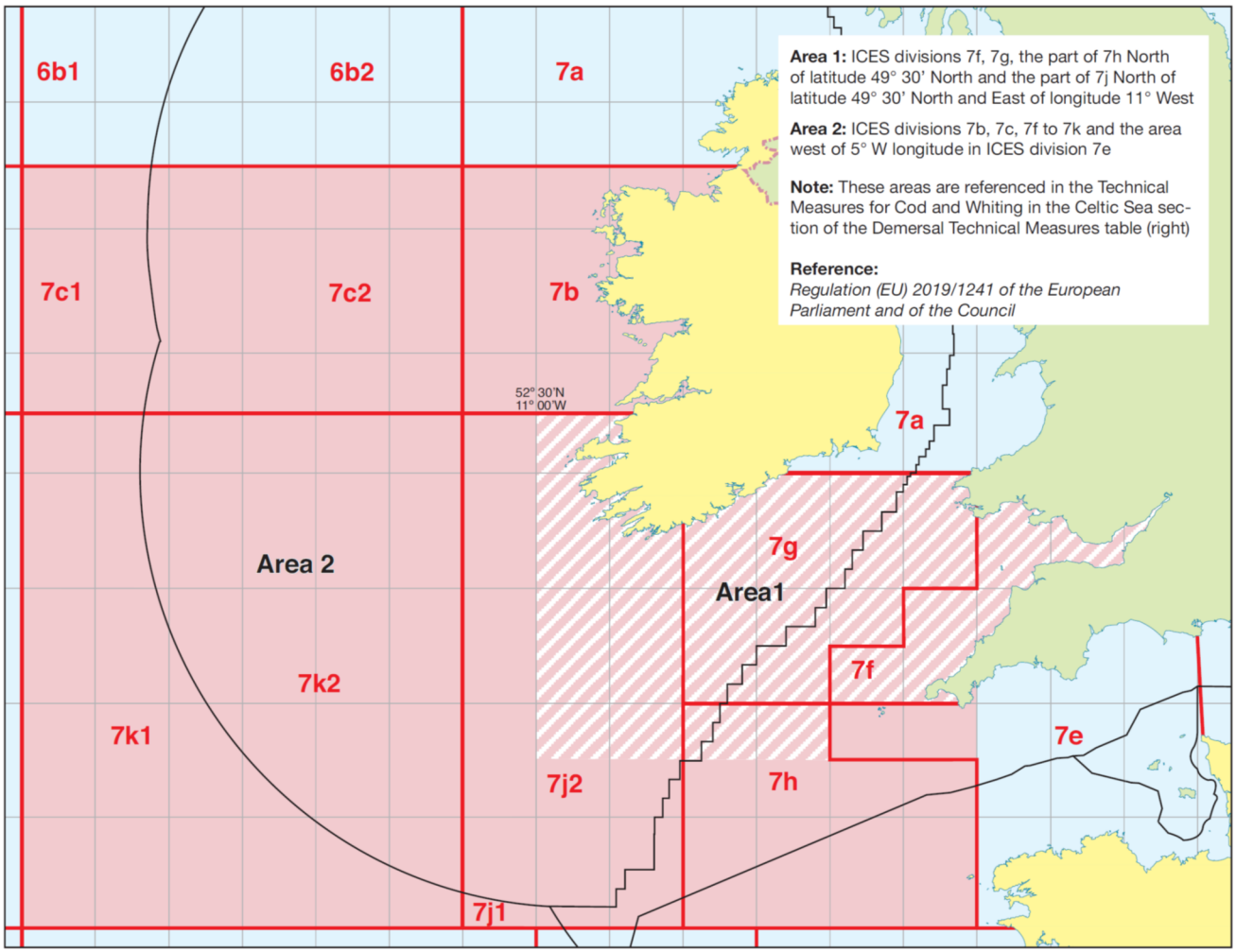


(Map courtesy of B.I.M.)

Herring Spawning Boxes off the South Coast

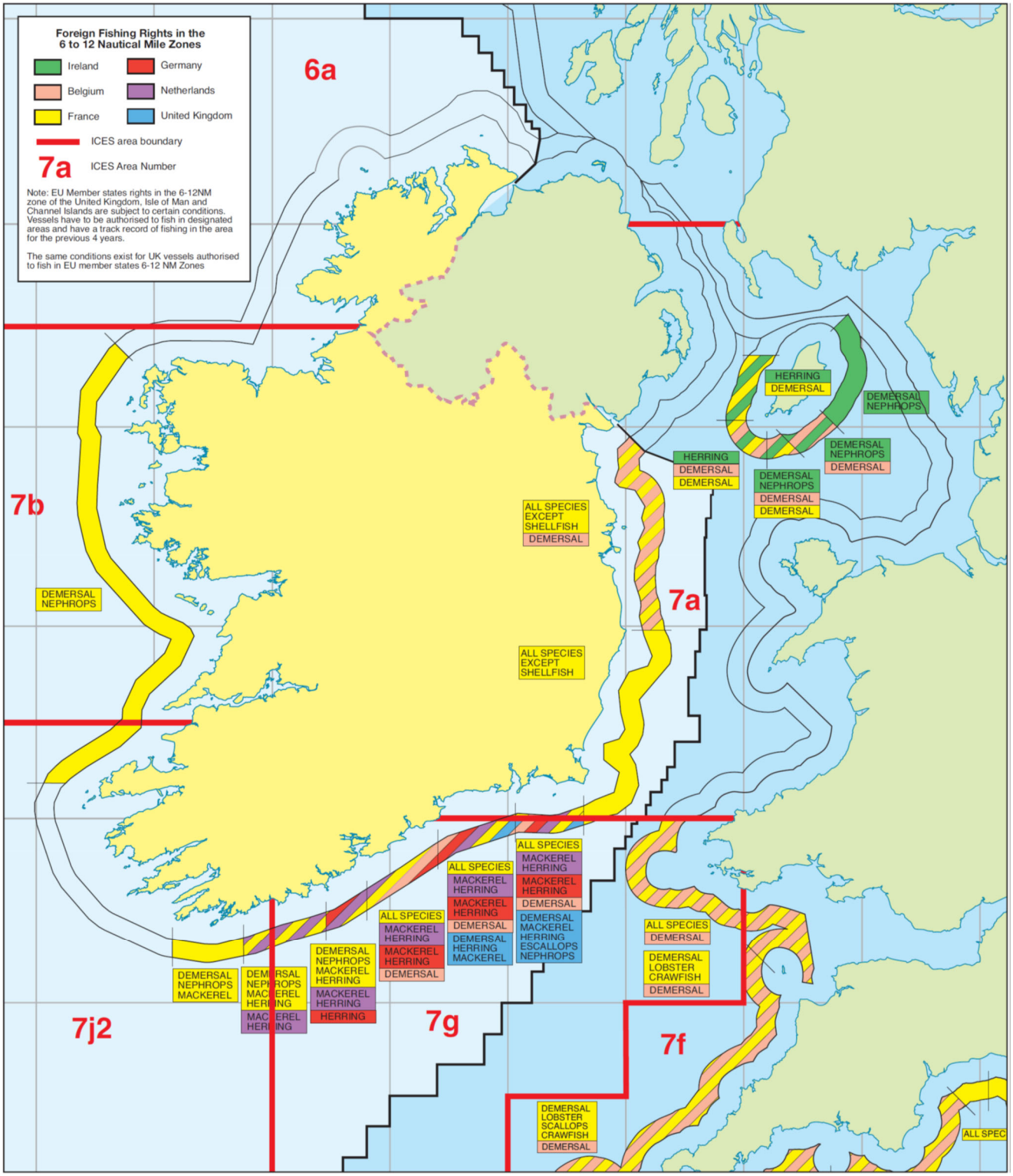


Technical Measures for Cod and Whiting in the Celtic Sea

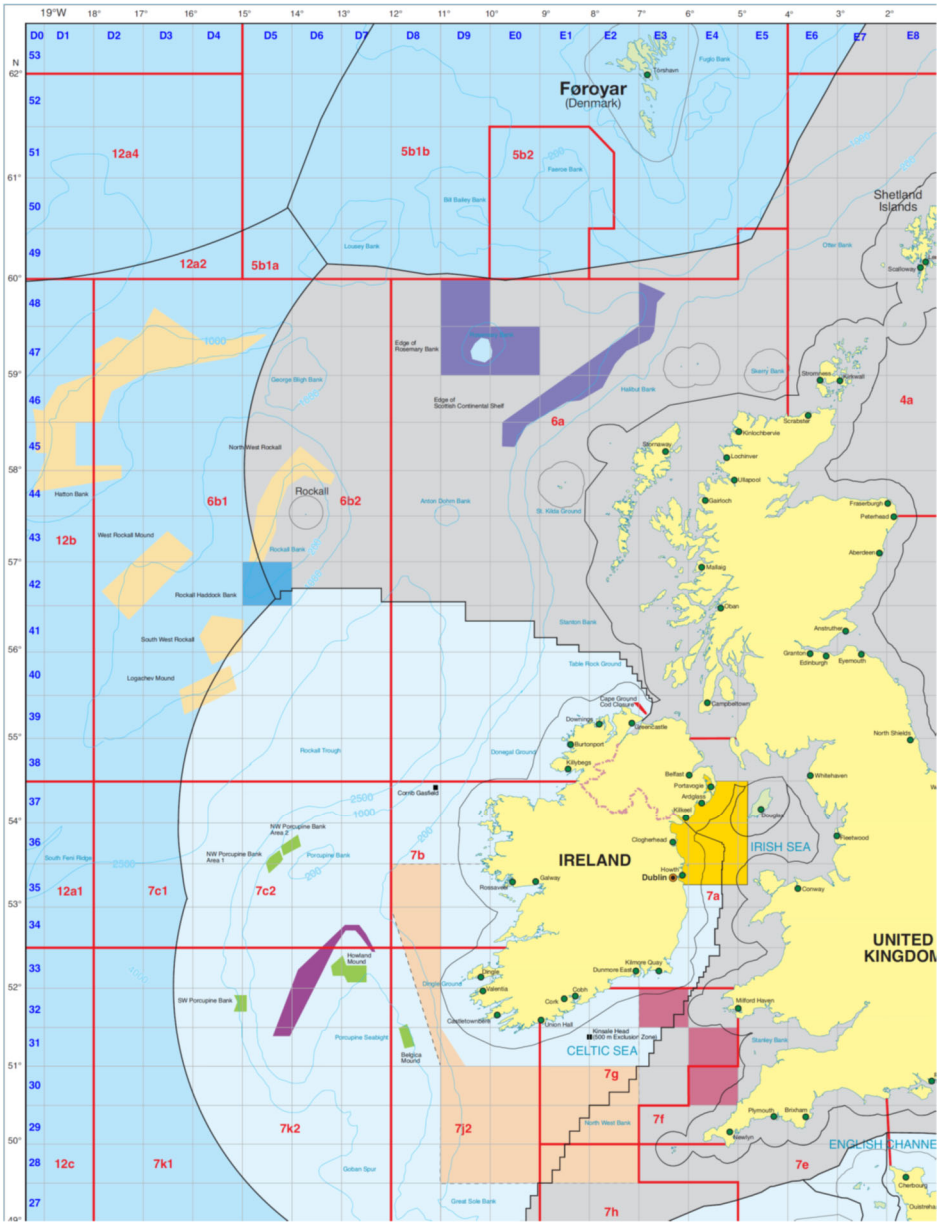


(Map courtesy of B.I.M. & Le Tene Maps)

6 -12 Mile Zone Fishing Rights



Fisheries Management 2022



Legend

IRISH SEA COD BOX

Closed to all fishing with any demersal trawl, seine or similar towed net, any gill net, trammel net or similar static net or any fishing gear incorporating hooks from the 14th of February to 30th April.
Note: fishing is permitted with demersal trawls fitted with STECF assessed selective devices.
Regulation (EU) 2019/1241

CELTIC SEA CONSERVATION AREA

Closed to all fishing activity from 1 February to 31 March each year.
Note:
1. Closure does not apply within 6 nm.
2. Fishing with pots and creels is permitted if no other gears are carried.
3. Towed gears targetting small pelagic species are permitted but mesh size < 55 mm may not be carried; and by-catch of LO species must be landed
Regulation (EU) 2019/1241

HAKE BOX

Within this area a minimum mesh size of 100mm must be used for all towed gears and a minimum mesh size of 120mm used for all gillnets, entangling and trammel nets. Beam trawls of between 55-99mm may be used east of 7° 30' west in the period April to October.
Commission Regulation No. 494/2002

UK WATERS

Deep Sea Closure
- No fishing allowed
Closed to bottom trawling and static gear, including bottom set gillnets and bottom set longlines
Regulation (EU) 2019/1241

Rockall Haddock Closure
No fishing allowed except longlines
Regulation (EU) 2019/1241

Porcupine Bank Nephrops Closure
Directed fishing for Nephrops and associated species prohibited from 1 May to 31 May each year
Regulation (EU) 2019/1241

Blue Ling Protection Area
Blue ling fishing prohibited 1 March to 31 May each year.
Note: bycatch of blue ling must be retained and landed up to a maximum of 6 tonnes then vessel must exit the area.
Regulation (EU) 2019/1241

Coral Protection Area
Fishing prohibited with bottom trawls or similar towed nets, bottom set gillnets, entangling nets or trammel nets and bottom set longlines. Authorised pelagic vessels may fish in the area if they have a fully functioning and compliant VMS, carry only pelagic gear and notify the Irish fisheries monitoring centre 4 hours in advance of entry and on departure.
Regulation (EU) 2019/1241

Cape Ground Cod Closure
Closed to towed gear or static nets from 1 January to 31 March, and from 1 October to 31 December, each year.
Regulation (EU) 2019/1241

(Map courtesy of B.I.M. & Le Tene Maps)

Gear, Species and Country Code Acronyms

Gear Codes

Gear Code	Type of gear
OTB	Bottom Otter Trawl
OTT	Otter Twin Trawls
OT	Otter Trawls (Not Specified)
OTM	Midwater Otter Trawl
PTB	Bottom Pair Trawl
PT	Pair Trawls (Not Specified)
PTM	Midwater Pair Trawl
TBN	Nephrops Trawl
TBS	Shrimp Trawl
TX	Other Trawls (Not Specified)
SDN	Danish Anchor Seine
SSC	Scottish Seine (Fly Dragging)
SPR	Scottish Pair Seine (Fly Dragging)
TB	Bottom Trawls (Not Specified)
SX	Seine Nets (Not Specified)
SV	Boat or Vessel Seine
TBB	Beam Trawl

Gear Code	Type of gear
GN	Gillnets (Not Specified)
GNS	Gillnets Anchored (Set)
GND	Gillnets (Drift)
GNC	Gillnets (Circling)
GTN	Combined Gillnets-Trammel Nets
GTR	Trammel Net
GEN	Gillnets and Entangling Nets (Not Specified)
LLS	Set Longlines
LLD	Drifting Longlines
LL	Longlines Not Specified
LTL	Trolling Lines
LX	Hooks and Lines (not specified)
LHP	Handlines and Pole Lines (Hand Operated)
LHM	Handlines and Pole Lines (Mechanised)
FPO	Pots
FIX	Traps (Not Specified)

TR1: Classification of fishing gear that includes bottom trawls, Danish seines, and similar towed gear, excluding beam trawls, of codend mesh size ≥100 mm.

TR2: Classification of fishing gear that includes bottom trawls, Danish seines, and similar towed gear (excluding beam trawls) of codend mesh size ≥ 70 mm and < 100 mm.

EC. 2009. Council Regulation (EC) No 43/2009.

Fish Species

Code	Fish Species
ALB	Albacore Tuna
ANF	Anglerfish
BFT	Bluefin Tuna
BOR	Boarfish
COD	Cod
DGS	Spurdog
HAD	Haddock
HER	Herring
HKE	Hake
JAX	Horse Mackerel
LEZ	Megrim
LIN	Ling
MAC	Mackerel
NEP	Nephrops
PLE	Plaice

Code	Fish Species
POK	Saithe
POL	Pollack
RJC	Ray (thornback)
RJE	Ray (small-eyed)
RJF	Ray (shagreen)
RJH	Ray (blonde)
RJI	Ray (sandy)
RJM	Ray (spotted)
RJN	Ray (cuckoo)
RJU	Ray (undulate)
SOL	Sole
SRX	Ray (other)
SWO	Swordfish
WHB	Blue whiting
WHG	Whiting

Country Codes

Code	Country
BEL	Belgium
DEU	Germany
DNK	Denmark
ESP	Spain
FRA	France
FRO	Faroe Islands
IRL	Ireland
ISL	Iceland
NLD	Netherlands
NOR	Norway
OTH	Other
PRT	Portugal
RUS	Russia
SWE	Sweden
UK	UK

Appendix IX

List of Stocks in Western Waters MAP

Extract from COUNCIL REGULATION (EU) 2019/472 - Article 1

1. This Regulation establishes a multiannual plan ('the plan') for the demersal stocks listed below, including deep-sea stocks, in the Western Waters, and, where those stocks extend beyond the Western Waters, in their adjacent waters, and for the fisheries exploiting those stocks:

(1) black scabbardfish (*Aphanopus carbo*) in ICES subareas 1, 2, 4, 6–8, 10 and 14 and divisions 3a, 5a, 5b, 9a and 12b;

(2) roundnose grenadier (*Coryphaenoides rupestris*) in ICES subareas 6 and 7 and division 5b;

(3) seabass (*Dicentrarchus labrax*) in ICES divisions 4b, 4c, 7a, 7d–h, 8a and 8b;

(4) seabass (*Dicentrarchus labrax*) in ICES divisions 6a, 7b and 7j;

(5) seabass (*Dicentrarchus labrax*) in ICES divisions 8c and 9a;

(6) cod (*Gadus morhua*) in ICES division 7a;

(7) cod (*Gadus morhua*) in ICES divisions 7e–k;

(8) megrims (*Lepidorhombus* spp.) in ICES divisions 4a and 6a;

(9) megrims (*Lepidorhombus* spp.) in ICES division 6b;

(10) megrims (*Lepidorhombus* spp.) in ICES divisions 7b–k, 8a, 8b and 8d;

(11) megrims (*Lepidorhombus* spp.) in ICES divisions 8c and 9a;

(12) anglerfish (*Lophiidae*) in ICES divisions 7b–k, 8a, 8b and 8d;

(13) anglerfish (*Lophiidae*) in ICES divisions 8c and 9a;

(14) haddock (*Melanogrammus aeglefinus*) in ICES division 6b;

(15) haddock (*Melanogrammus aeglefinus*) in ICES division 7a;

(16) haddock (*Melanogrammus aeglefinus*) in ICES divisions 7b–k;

(17) whiting (*Merlangius merlangus*) in ICES divisions 7b, 7c and 7e–k;

(18) whiting (*Merlangius merlangus*) in ICES subarea 8 and division 9a;

(19) hake (*Merluccius merluccius*) in ICES subareas 4, 6 and 7 and divisions 3a, 8a, 8b and 8d

(20) hake (*Merluccius merluccius*) in ICES divisions 8c and 9a

(21) blue ling (*Molva dypterygia*) in ICES subareas 6 and 7 and division 5b;

(22) Norway lobster (*Nephrops norvegicus*) by functional unit in ICES subarea 6 and division 5b:

- in North Minch (FU 11);
- in South Minch (FU 12);
- in Firth of Clyde (FU 13);
- in division 6a, outside the functional units (West of Scotland);

(23) Norway lobster (*Nephrops norvegicus*) by functional unit in ICES subarea 7:

- in Irish Sea East (FU 14);
- in Irish Sea West (FU 15);
- in Porcupine Banks (FU 16);
- in Aran grounds (FU 17);
- in the Irish Sea (FU 19);
- in the Celtic Sea (FU 20-21);
- in the Bristol Channel (FU 22);
- outside the functional units (Southern Celtic Sea, Southwest of Ireland);

(24) Norway lobster (*Nephrops norvegicus*) by functional unit in ICES divisions 8a, 8b, 8d and 8e:

- in Northern and Central Bay of Biscay (FU 23-24);

(25) Norway lobster (*Nephrops norvegicus*) by functional unit in ICES subareas 9 and 10, and CECAF zone 34.1.1:

- in Atlantic Iberian waters East, Western Galicia and Northern Portugal (FU 26-27);
- in Atlantic Iberian waters East and Southwestern and Southern Portugal (FU 28-29);
- in Atlantic Iberian waters East and the Gulf of Cádiz (FU 30);

(26) red seabream (*Pagellus bogaraveo*) in ICES subarea 9;

(27) plaice (*Pleuronectes platessa*) in ICES division 7d;
(28) plaice (*Pleuronectes platessa*) in ICES division 7e;
(29) pollack (*Pollachius pollachius*) in ICES subareas *6 and* 7;
(30) common sole (*Solea solea*) in ICES subareas 5, 12 and 14 and division 6b;
(31) common sole (*Solea solea*) in ICES division 7d;
(32) common sole (*Solea solea*) in ICES division 7e;
(33) common sole (*Solea solea*) in ICES divisions 7f and 7g;
(34) common sole (*Solea solea*) in ICES divisions 7h, 7j and 7k;
(35) common sole (*Solea solea*) in ICES divisions 8a and 8b;
(36) common sole (*Solea solea*) in ICES divisions 8c and 9a.

This Regulation also applies to by-catches caught in the Western Waters when fishing for the stocks listed in paragraph 1. However, where ranges of F_{MSY} and safeguards linked to biomass for those stocks are established under other Union legal acts establishing multiannual plans, those ranges and safeguards shall apply.

List of Stocks in the North Sea MAP of relevance to Ireland

Extract from COUNCIL REGULATION (EU) 2018/973- Article 1

1. This Regulation establishes a multiannual plan ('the plan') for the following demersal stocks in Union waters of the North Sea (ICES divisions 2a, 3a and subarea 4), including the fisheries exploiting those stocks, and, where those stocks extend beyond the North Sea, in its adjacent waters:

(b) Haddock (Melanogrammus aeglefinus) in subarea 4 (North Sea) and divisions 6a (West of Scotland) and 3a.20 (Skagerrak);

(d) Saithe (Pollachius virens) in subareas 4 (North Sea) and 6 (Rockall and West of Scotland) and division 3a (Skagerrak and Kattegat);

(h) Anglerfish (Lophius piscatorius) in division 3a (Skagerrak and Kattegat) and subareas 4 (North Sea) and 6 (Rockall and West of Scotland);

Definition of fisheries technical terms and acronyms

Abundance Index Relative measure of the size of a stock (in numbers or weight)

AC Advisory Councils are stakeholder-led organisations established by the Commission in order to deepen stakeholder participation in policy making. e.g. Pelagic AC.
(see https://ec.europa.eu/fisheries/partners/advisory-councils_en)

ACOM Advisory Committee. This is the sole competent body for ICES for scientific advice in support of the management of coastal and ocean resources and ecosystems.

Acoustic surveys Acoustic surveys use sound waves emitted from a "transducer" to estimate the density of plankton and fish shoals. The survey vessel tows the transducer under water, which is linked to an echo sounder in the vessel which records the shoals of fish as "marks" on a screen. The density of these marks is used to calculate total biomass of a stock.

Age group The number of years of life completed, often (but not always) assuming a birth date of 1 January. Older age groups may be combined into a "plus group", so age 5+ indicates fish aged 5 years and older.

Bayesian method Assessment method that quantifies uncertainties and formulates advice on the basis of probabilities of reaching a limit or target point.

Benthic Organisms living on, or in, the sea floor.

Benchmark This is the ICES process which reviews relevant data, establishes the agreed methodology to assess as stock (i.e. the stock annex) and defines the reference points for management. Benchmarks are carried out periodically and are prioritised based on specific criteria by ICES.

BIM An Bord Iascaigh Mhara, The Irish Sea Fisheries Board, charged with responsibility for development of the fishing and aquaculture industries in Ireland. (see http://www.bim.ie)

Biomass Measure of the quantity, usually by weight in metric tons, of a stock at a given time.

Biological reference points Management target or a management trigger point . Examples include fishing mortality reference points F_{MSY}, $F_{0.1}$, F_{pa} and biomass reference points $B_{trigger}$, B_{pa} and B_{lim}.

B_{lim} The B_{lim} is the spawning stock biomass, below which recruitment is impaired or the dynamics of the stock are unknown.

B_{MSY} Average Spawning Stock Biomass (SSB) that results from fishing at F_{MSY} for a long time.

B_{pa} is the Spawning Stock Biomass (SSB) level above which the stock should be maintained to ensure a low risk to recruitment impairment.

$B_{trigger}$ Biomass reference point that triggers a cautious management response, i.e. to reduce fishing mortality below F_{MSY} in order to allow a stock to rebuild to levels capable of producing MSY. The reduction in fishing mortality is proportional to the ratio between the size of the spawning stock and MSY Btrigger (SSB is estimated at spawning time [in the first year of the forecast).

Bycatch Refers to discarded catch (see Discards) plus incidental catch not purposely targeted by the fishermen.

CECAF Fisheries Committee for the Eastern Central Atlantic – a committee of FAO (see below) and web page http://www.fao.org/fi/body/rfb/cecaf/cecaf_home.htm

CFP / Common Fisheries Policy The instrument of fisheries management within the European community (see https://ec.europa.eu/fisheries/cfp_en)

CPUE /Catch Per Unit of Effort The catch of fish, in numbers or in weight, taken by a defined unit of fishing effort e.g Kg/hour or numbers/hour. CPUE is used as a proxy for stock abundance for some stocks and often an input to assessment models.

Closed areas Various temporal and spatial area closures have been implemented as fisheries management and environmental conservation tools. Normally these involve a prohibition on the use of certain fishing gears for a defined area and/or period.

DAFM / Department of Agriculture Food and the Marine. Irish government department. (see https://www.gov.ie/en/publication/9f58e-seafood/)

Data Rich stocks Stocks for which a quantitative population estimate and forecast is available (e.g ICES Category 1 & 2).

Data limited stocks Stocks for which a quantitative population estimate and forecast are not available, usually due to lack of appropriate data (e.g. ICES categories 3-6).

DECC / Department of the Environment, Climate and Communications Irish government department responsible for communications, Climate Action, Environment, broadcasting, energy, natural resources and postal services. (see http://www.gov.ie/decc/)

DCMAP / DCF / Data Collection Framework EU Commission Regulation 2017/1004 establishes the Data Collection Framework (DCF), a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy (CFP). Under this regulation the European Commission requires Member States to collect data on Biological and Economic aspects of many European fisheries and related fisheries sectors. (see: http://www.dcmap-ireland.ie/)

Demersal Fish such as cod, whiting, haddock, sole, plaice, skates and rays, that normally live on, or close, to the sea floor.

Discards Discards are defined as that part of the catch returned to the sea as a result of economic, legal or other considerations.

DHLGH / Department of Housing, Local Government and Heritage Irish government department responsible for Marine Spatial Planning (MSP), Marine Strategy Framework Directive (MSFD), Marine Protected Area (MPA), biodiversity and nature conservation.

Discard rate The percentage (or proportion) of the total catch which is discarded.

Dominant Species The species with the largest abundance, for example in the landings of a particular fishing trip or fleet

Ecosystems are composed of living animals, plants and non-living structures that exist together and interact with each other. Ecosystems can be very small (the area around a boulder), they can be medium sized (the area around a coral reef) or they can be very large (the Irish Sea or even the eastern Atlantic).

Ecosystem approach fisheries management (EAFM) Management that takes into account the effects of fisheries on the ecosystem and the effects of the ecosystem on the fish stocks.

Elasmobranchs Fish, such as skates, rays, sharks and dogfish, whose skeletons are cartilagenous rather than bony.

EMFF European Maritime and Fisheries Fund. The EMFF was the fund for the EU's maritime and fisheries policies for 2014-2020. https://ec.europa.eu/fisheries/cfp/emff_en

EMFAF European Maritime and Fisheries and Aquaculture Fund. The EMFF is the fund for the EU's maritime and fisheries policies for 2021-2027. https://oceans-and-fisheries.ec.europa.eu/funding/emfaf_en

Exploitation pattern / Selection pattern The distribution of fishing mortality over the age composition of the fish population determined by the type of fishing gear, spatial and seasonal distribution of fishing, and the growth and migration of the fish. The pattern can be changed by modifications to fishing gear, for example, increasing mesh or hook size, or by changing the ratio of harvest by gears exploiting the fish (e.g., gill net, trawl, hook and line, etc.).

Exploitation rate The proportion of a population at the beginning of a given time period that is caught during that time period (usually expressed on a yearly basis). For example, if 720,000 fish were caught during the year from a population of 1 million fish alive at the beginning of the year, the annual exploitation rate would be 0.72.

FEAS / Fisheries Ecosystems Advisory Services – One of six service areas of the Marine Institute, FEAS's mission is to Assess, Research and Advise on the marine fisheries resource in Irish waters – (see: http://www.marine.ie/)

Fishery Group of fishing trips targeting the same (assemblage of) species and/or stocks, using similar gear, during the same period of the year and within the same area (e.g. the Irish flatfish-directed beam trawl fishery in the Irish Sea).

Fishing Effort Generally, defined in terms of the time spent catching or searching for fish and/or the amount of fishing gear used over a given unit of time. Many different measures are in use, e.g.: days-at-sea, time spent trawling, soak time, number of hooks etc. and may include a measure of fishing power of a vessel, e.g. kilowatt days. e.g. a fishing operation, fishing activity, day or fishing trip

Fleet A group of vessels sharing similar characteristics in terms of technical features and/or major activity (e.g. the Irish beam trawler fleet < 300 hp, regardless of which species or species groups they are targeting).

F / Fishing Mortality Deaths in a fish stock caused by fishing, defined as the instantaneous Rate of Fishing Mortality (expressed on an exponential scale: F=0.5 means that 1-EXP(-0.5)=39% are removed).

F_{lim} is the limit fishing mortality. F_{lim} should be avoided with high probability because it is associated with unknown stock dynamics or stock collapse.

F_{max} The fishing mortality for a given exploitation pattern rate of growth and natural mortality, that results in the maximum level of yield-per-recruit.

F_{MP} Fishing mortality reference point as defined in management plans.

F_{MSY} is the estimated fishing mortality that gives the long-term maximum yield with a given selection pattern and current environmental conditions. Fishing mortality in excess of F_{MSY} is not necessarily unsustainable, but is expected to lead to lower long-term yield.

$F_{MSY\ lower}$, $F_{MSY\ lower}$ See: **MSY range**

$F_{0.1}$ The fishing mortality at which the increase in yield-per-recruit in weight for an increase in a unit-of-effort is 10 percent of the yield-per-recruit produced by the first unit of effort on the unexploited stock (i.e., the slope of the yield-per-recruit curve for the $F_{0.1}$ is only one-tenth the slope of the curve at its origin).

F_{pa} is a precautionary reference point designed to ensure that there is a high probability that F_{lim} will be avoided and that spawning stock biomass will remain above the threshold (B_{pa}).

F_{sq} F status-quo is an estimate of recent fishing mortality. A three-year recent average is often used.

FU Functional unit Regions that are used in the assessment, and in some cases, management, of *Nephrops*. See Appendix I.

Gadoids A family of fish that includes cod, haddock, hake, whiting, pollack, saithe, blue whiting and ling.

GES Good Environmental Status. The MSFD defines GES as "the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive".

Gillnets Static nets suspended in the water column to trap fish by the gills.

Groundfish Species of demersal fish such as cod, whiting, haddock, sole, plaice, skates and rays, dwelling on, or close to the sea floor.

Growth overfishing Occurs when fishing mortality exceeds $\mathbf{F_{max}}$.

Harvest Control Rule (HCR) A predefined rule governing the exploitation of fish stock such that management targets are achieved. These vary from the simple to the extremely complex.

Harvest rate (HR) (= harvest ratio) Ratio between landings and total stock abundance (e.g. as estimated from TV surveys for *Nephrops*).

ICCAT International Commission for the Conservation of Atlantic Tuna – **(**see: http://www.iccat.int/en/)

ICES International Council for the Exploration of the Seas ICES provides scientific advice for meeting conservation, management, and sustainability goals.(see: http://www.ices.dk/)

ICES Advice rule Is the harvest control rule used by ICES when giving advice for stocks where there is no agreed precautionary management plan. It entails fishing at F_{MSY} when the stock size is greater the MSY $B_{trigger}$ and scaling down the advised fishing mortality when the stock size is below MSY $B_{trigger}$ by the ratio of the predicted stock size in the advice year divided by the MSY $B_{trigger}$.

IFI / Inland Fisheries Ireland the state agency responsible for the protection, management and conservation of Ireland's inland fisheries and sea angling resources. (see: http://www.fisheriesireland.ie/)

Inshore fisheries There are various definitions of inshore fisheries including those fisheries that are conducted within 12 miles of the shore, including demersal, pelagic, shellfish and sea angling fisheries.

Interbenchmark This is a process through which ICES revises aspects of the input data or assessment method as described in the Stock Annex. Normally inter-benchmarks do not change the stocks assessment model but they can result in changes to reference points.

$I_{trigger}$ Is an Index trigger value where $I_{trigger} = I_{loss} \times 1.4$ used in ICES category 3 rules for data limited stocks.

L_{inf} The predicted mean length of (theoretical) fish of infinite age. This term is generally used in the context of a Von Bertalanffy growth equation.

L_{mat} Generally, the length at which fish have a 50% likelihood of being mature

Landing Obligation The landing obligation requires all catches TAC species on-board to be landed and counted against quota. (see https://ec.europa.eu/fisheries/cfp/fishing_rules/discards_en)

LPUE /Landings Per Unit of Effort The landing of fish in weight taken by a defined unit of fishing effort e.g. kg/hr. Lpue is normally based on landings and effort reported in commercial logbooks. Lpue is used as a proxy for stock abundance for some stocks and often an input to assessment models if fishery-independent indices of stock abundance are not available.

Management Plan is an agreed plan to manage a stock. With defined objectives, implementation measures, review processes and stakeholder agreement and involvement.

Maximum Sustainable Yield (MSY) The largest average catch or yield that can be taken, in the long term, from a stock under existing environmental conditions and a given selection pattern. (For most species the maximum average yield can only be obtained by taking fewer fish in some years than in others due to natural fluctuations in stock size.)

Marine Institute The Marine Institute is Ireland's national agency with the following general functions : "to undertake, to co-ordinate, to promote and to assist in marine research and development and to provide such services related to marine research and development, that in the opinion of the Institute will promote economic development and create employment and protect the environment." Marine Institute Act, 1991 – (see: http://www.marine.ie/)

MCRS Minimum Conservation Reference Size (see: EU 2019/1241)

Metapopulation consists of a group of spatially separated populations of the same species which interact at some level.

Métier Homogeneous Subdivision of a fishery by gear type and target species (e.g. the Irish flatfish-directed beam trawl fishery by vessels < 300 hp in the Irish Sea).

MPA / Marine Protected Area A conservation area in the sea usually designated for the protection and maintenance of biological diversity and natural and cultural resources.

MSE Management Strategy Evaluation

MSY Maximum Sustainable Yield. The largest average catch or yield that can continuously be taken from a stock under existing environmental conditions

MSY $B_{escapement}$ A biomass reference point for short-lived species within the ICES MSY framework (see ICES Advice, Section 1.2) where the target is to leave the reference spawning stock biomass to spawn the next year.

MSY $B_{trigger}$ A biomass reference point that triggers a cautious response within the ICES MSY framework (see ICES Advice, Section 1.2).

$MSY_{Proxies}$ Estimates of MSY reference points that are based on a data-limited assessment.

MSY Range Upper and lower limits to reference points that are derived to deliver no more than a 5% reduction in long-term yield compared with the maximum sustainable yield (MSY).

MSFD Marine Strategy Framework Directive. This directive aims to achieve Good Environmental Status (GES) of the EU's marine waters and to protect the resource base upon which marine-related economic and social activities depend.

Natural Mortality Deaths in a fish stock caused by predation, illness, pollution, old age, etc., but not fishing.

NEAFC / North Eastern Atlantic Fisheries Commission – A commission that manages fisheries off Scandinavia and north-eastern Europe - (see http://www.neafc.org/)

Nominal catch The sum of the catches that are landed (expressed as live weight or equivalents). Nominal catches do not include unreported discards.

OSPAR The Oslo and Paris Commissions, which have the objective of protecting the Northeast Atlantic against pollution. Member countries range from Finland to Portugal and Iceland. (https://www.ospar.org/)

PA buffer A precautionary –reduction in advised catch of 20% applied when the stock status relative to candidate reference points for stock size or exploitation is unknown.

Pelagic Fish that spend most of their life swimming in the water column, as opposed to resting on the bottom, are known as pelagic species.

Precautionary Approach The precautionary approach involves taking evidence based management decisions to ensure that future productivity of stocks and the marine ecosystem is not impaired.

Quota A portion of a total allowable catch (TAC) allocated to an operating unit, such as a Vessel class or size, or a country.

Rebuilding Plan (See Recovery Plan)

Recovered FEAS consider a stock to have recovered when the spawning stock biomass has been above $\mathbf{B_{pa}}$ for three consecutive years

Recovery Plan This is a multi-annual plan to recover a depleted stock. The plans general involve agreed Harvest control Rules, Technical Measures, effort controls and various control and enforcement measures.

Recruitment The amount of fish added to the stock each year, usually due to reproduction. Recruitment can refer to the number of fish in their first year of life but for many stocks data only becomes available after one or more years of growth in which case recruitment can refer to the number of fish in the stock that are aged 1 or 2 or even older. Recruitment can also refer to fish that become available to a fishery due to growth or migration.

Recruitment overfishing The rate of fishing above which the recruitment to the exploitable stock becomes significantly reduced. This is characterised by a greatly reduced spawning stock, a decreasing proportion of older fish in the catch resulting in reduced recruitment.

RFID Radio frequency identification device; these are tags used to identify fish. Data from RFID tags are currently used in the mackerel assessment.

SACs Special Areas of Conservation, sites designated under the European Community Habitats Directive, to protect internationally important natural habitats and species.

Selection pattern See: Exploitation pattern

SFPA / Sea-Fisheries Protection Authority is Ireland's competent authority for seafood safety and sea-fisheries protection (see https://www.sfpa.ie)

Shellfish Fisheries Those fisheries where the target species are either crustaceans (e.g. *Nephrops*, lobsters, crabs and crayfish) or molluscs (Cephalopods, scallops, oysters etc.).

SSB / Spawning Stock Biomass The total weight of all sexually mature fish in the population. The size of SSB for a stock depends on abundance of year classes, the rate of growth and maturation.

SSB_{MP} Spawning stock biomass reference point as defined in management plans.

Spawning stock biomass-per-recruit (SSB/R) The expected lifetime contribution to the spawning stock biomass for a recruit of a specific age (e.g., per age 2 individual). For a given exploitation pattern, rate of growth, and natural mortality, an expected equilibrium value of SSB/R can be calculated for each level of F. A useful reference point is the level of SSB/R that would be realised if there were no fishing. This is a maximum value for SSB/R, and can be compared to levels of SSB/R generated under different rates of fishing.

STECF The Scientific Technical and Economic Committee on Fisheries. Established by the European Commission and comprises fisheries scientists and economists from the member states. The role of STECF is to advise the European Commission on scientific, technical and economic issues related to the management of fisheries resources that are exploited worldwide by members of the European Union. (see https://stecf.jrc.ec.europa.eu/)

Stock A population in a defined area which is more or less isolated reproductively from other stocks of the same species and hence self-sustaining.

TAC / Total Allowable Catch is the total regulated catch from a stock in a given time period, usually a year.

Tangle nets Static nets aimed at trapping fish and shellfish by entanglement in their meshes.

Teleost Type of fish – such as cod, mackerel, plaice and sole - have skeletons made of bone, as opposed to elasmobranches – such as sharks and rays – whose skeleton is composed of cartilage.

TCM / Technical Conservation Measures These measures take the form of closed areas, increased mesh sizes and gear modifications (such as separator panels) and are aimed at protecting specific stocks, or age-classes within that stock, from overfishing (See also Recovery Plans).

Unaccounted mortality/removals Any mortality or removals from the stock that is not accounted for properly in a stock assessment model. Potential causes of unaccounted mortality include illegal or misreported landings; escapement or avoidance mortality that occurs when fish are injured by fishing gear but are not captured; and ghost fishing mortality, caused by lost gear (e.g., traps and gillnets) that continues to catch fish.

Whitefish Term used to describe demersal species such as cod, plaice, ray etc., as opposed to pelagic or salmonid species.

WWMAP Multiannual plan for demersal fish stocks in the Western Waters and adjacent waters (EU 2019/472).

Year class (or cohort) Fish in a stock born in the same year. Occasionally, a stock may produce a very small or very large year class which can be pivotal to stock abundance in later years.

Yield The marketable catch (measured in live weight).

Yield-per-recruit (Y/R) The expected average yield-per-fish of a specific age (e.g., per age 2 individual). For a given exploitation pattern, rate of growth, and natural mortality, an expected equilibrium value of Y/R can be calculated for each level of F.