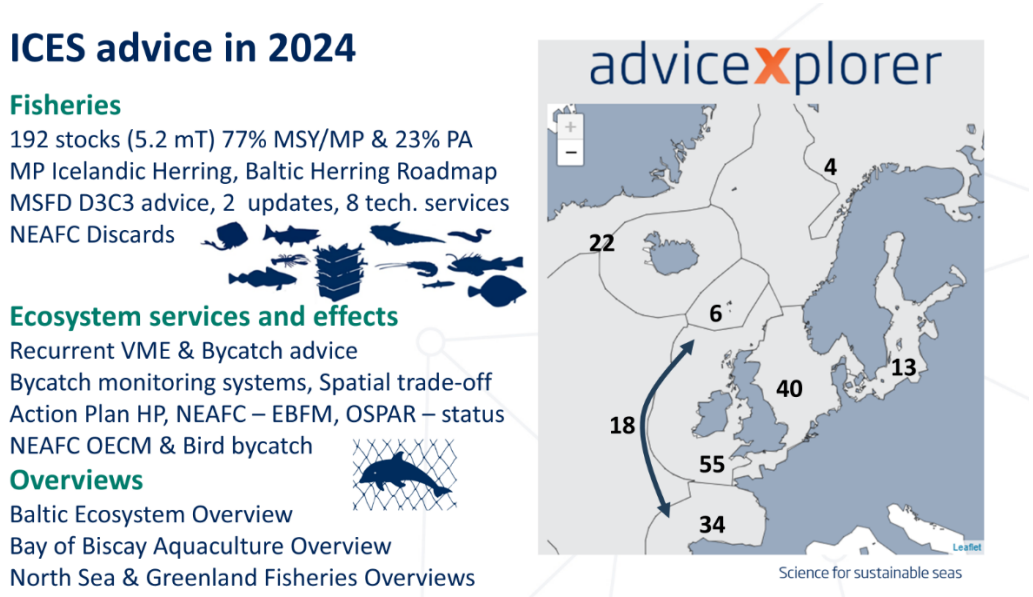
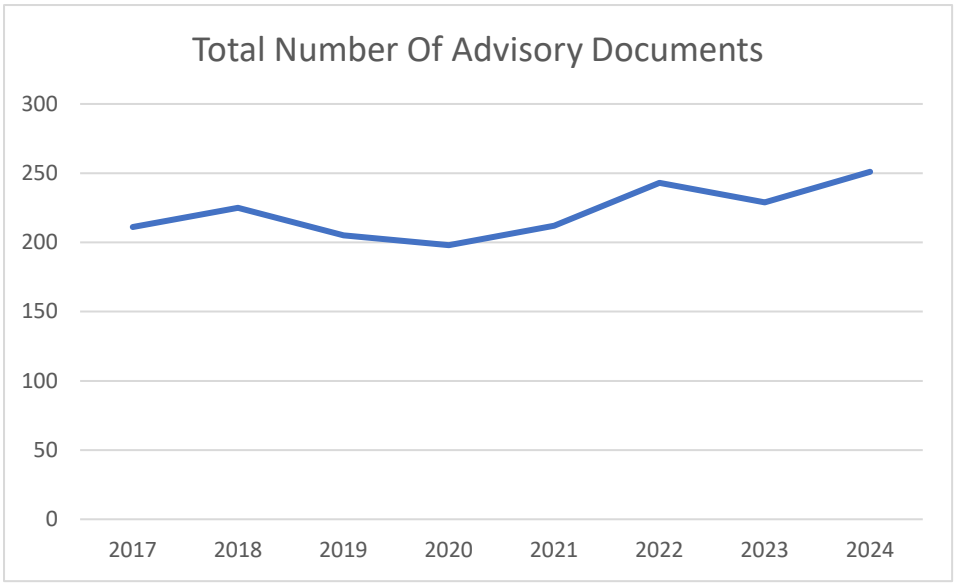
ICES advice activities in 2024

This report documents the outputs and challenges for ICES advice in 2024.

1 2024 advice issued in a nutshell



In 2024 ICES published 251 advisory documents on fishing opportunities, recurrent advice on by-catch and VMEs, special request and Technical Services. Underpinning these advisory products were 100 expert group reports, 23 new stock annexes, 13 data calls, 5 new technical guidelines documents. This represents the highest output from the expert community, ACOM and the advice department to date.



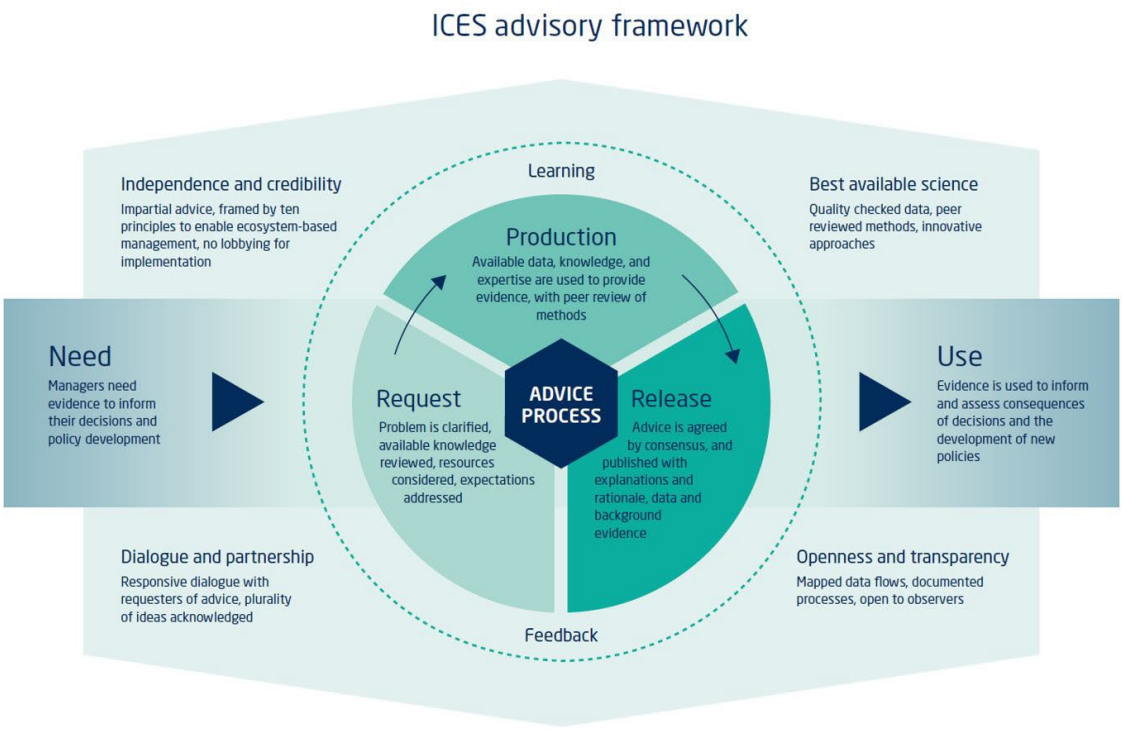
The advice by type issued by ICES from 2014–2024 is as follows:

Advice type\year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Fishing opportunity	252	225	222	206	192	205	183	189	197	198	192
Special requests and (other advice)	19	14	29	31(24)	38 (26)	44 (23)	32 (22)	35(25)	33(23)	17 (6)	16 (23)
Technical services	9	7	4	2	9	5	5	6	9	7	7

*Other advice for 2024 includes recurrent by-catch and VME advice and overview documented below

Advice process and framework

ACOM continues to use its Advisory framework and 10 principles to ensure that there is transparency and consistency across stocks, areas, and topics. These are available https://www.ices.dk/advice/Pages/Latest-Advice.aspx



New development of methods to deliver advice

- AdviceXplorer has been further improved and now includes advice from 2018-2024
- Beta version of a FisheriesXplorer was developed
- The ICES Deep Dive Series on YouTube covered topics such as Elasmobranch Fisheries, VMEs, Climate Change Impacts on Fisheries, Marine Litter, EBM and the Central Arctic Ocean

Strengthening the science network

- Two new Workshops were carried out examining VME sites, fishing activity, and identifying threats and risks. The Workshop on the Occurrence of VMEs (Vulnerable Marine Ecosystems) and Fishing Activities in EU waters of the Outermost Regions (WKOUTVME) and one on the status of vulnerable marine ecosystems in the NEAFC Regulatory Area for 5-year review (WKVMESTAT)
- Two new integrated ecosystem assessment Working groups were established in 2024. These covered the Greenland Sea (WGIEAGS) and Icelandic Waters (WGICE).
- A workshop to develop guidelines on how to approach the ecological, economic and social trade-offs between offshore renewable energy developments (wind farms) and fisheries (WKWIND) set out to review approaches to assess the trade-offs between offshore renewable energy developments (initial focus on offshore wind farms) and the provisions of wild harvest fish by assessing the economic, social and ecological consequences.
- Network participant in ICES expert groups increased in 2024 to over 4000 scientists. Annual Science Conference in Gateshead, UK attracted 773 participants who gave 400 oral presentations and 125 scientific posters. Several of the theme Sessions a covered important topics of relevance to MIACO.
- The Integrated Ecosystem Assessment Steering group (IEASG) was renamed as the Ecosystem Approaches and Methods Steering Group (EAMSG) to reflect the broaden role of science and advice in support of Ecosystem Base Management EBM in ICES.

Translating Science to Advice – ICES Roadmaps & FEISA

- The first ICES Roadmap for Marine Recreational Fisheries (MRF) was published in December
- The second ICES Roadmap for Bycatch on Endangered, Threatened, and Protected (ETP) Species was published in July
- The ICES Framework for Ecosystem-Informed Science and Advice (FEISA) was published in March and will be presented in agenda item 6a

2 Details of advice produced in 2024

2.1 Recurring requests for advice

ICES advice on fishing opportunities covered 192 stocks in 2024

Area	No. of stocks with advice in 2024
North Sea advice	40
Celtic Seas advice	55
Bay of Biscay and Atlantic Iberian Waters	34
Baltic Sea	13
Widely	18
Iceland and Greenland	22
Norweigan & Barents sea	4
Faroes	6

Recurrent Ecosystem services and effects Advice

In addition to the recurrent advice on fishing opportunities ICES has provided advice in response to recurrent requests on ecosystem effects of fisheries to:

EU DGMARE:

- **Areas where Vulnerable Marine Ecosystems (VMEs) are known to occur or are likely to occur in EU waters**
- **Bycatch of endangered, threatened and protected species of marine mammals, seabirds and marine turtles, and selected fish species of bycatch relevance**

NEAFC

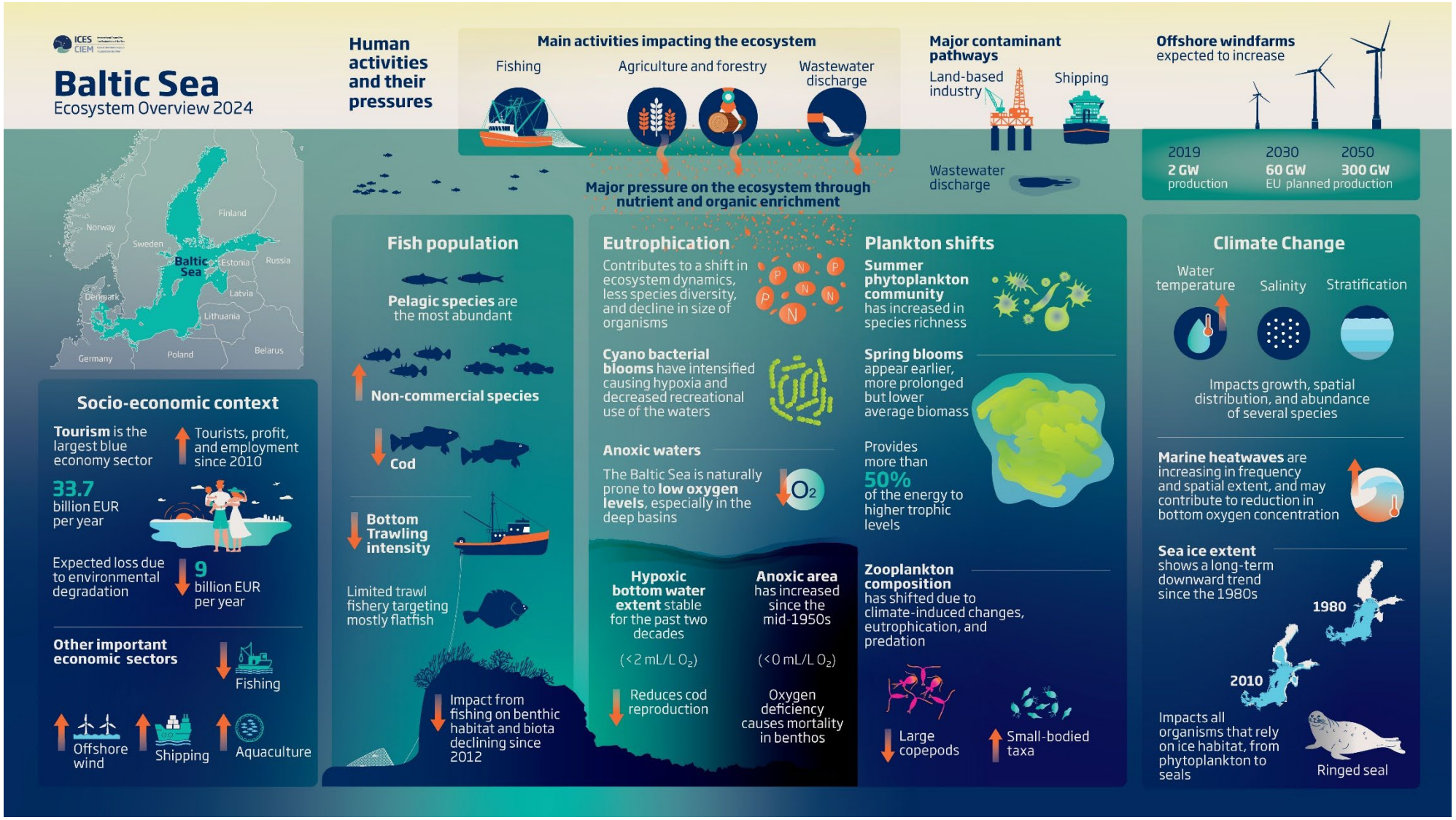
- **New information on vulnerable habitats and fisheries activities in the NEAFC regulatory areas**

Fisheries, Ecosystem and Aquaculture Overviews

Ecosystem, Fisheries and Aquaculture overviews are included in the agreements and MoUs with most major advice requesters. These advice products are developed, update and revised on a phased basis. A summary of the Overview changes in 2024 is provided below.

Ecoregion	Ecosystem Overview	Fisheries Overview	Aquaculture Overview
Azores		Update	
Baltic Sea	Full Revision	Update	
Barents Sea			
Bay of Biscay and the Iberian Coast	Update	Update	First Version
Celtic Seas	Update	Update	
Central Arctic Ocean			
Faroes	Update	Update	
Greater North Sea	Update	Full Revision	
Greenland Sea		Full Revision	
Icelandic Waters		Update	
Norwegian Sea	Update	Update	
Oceanic Northeast Atlantic		Update	

Baltic sea ecosystem overview



2.2 Responses to special requests published

Advice to EU DGMARE:

- EU - Assessing remedial measures in subdivisions 29N and 30 to protect the Atlantic salmon stock from the Ljungan river in Sweden
- EU - Identification of EU-only and Baltic Sea stocks eligible for multiannual advice
- EU - Identifying operational indicators and defining usable threshold values (reference points) for criterion D3C3 under MSFD Decision (EU) 2017/848
- EU - Roadmap for possible conservation measures for central Baltic and Gulf of Bothnia herring

Advice to EU DGENV:

- EU - Appropriate bycatch monitoring systems at Member State level and on regional coordination
- EU - Spatial trade-off analysis between reducing the extent of mobile bottom-contacting gear (MBCG) disturbance to seabed habitats and potential costs to fisheries
- EU - Support for the implementation of the Action Plan – harbour porpoise in the Baltic Sea (Baltic Proper)

Advice to EU/UK

- EU/UK - Updated advice for sole (*Solea solea*) in Division 7.a

Advice to Iceland

- Iceland - Evaluation of harvest control rules for a management plan for Icelandic summer-spawning herring (Division 5.a)

Advice to NEAFC

- NEAFC - Advice on Ecosystem Approaches to Fisheries Management
- NEAFC - Discarding in the NEAFC regulatory areas (RAs)
- NEAFC - Vulnerable marine ecosystems in the NEAFC Regulatory Areas, in relation to the NEAFC 5-year review of Recommendation 19:2014
- NEAFC - Whether ICES advice of 2023, on the long-term biodiversity/ecosystem benefits of NEAFC's restricted bottom fishing areas, also applies to 14 defined polygons in NEAFC Regulatory Area (RA) 1 and RA 2

Advice to OSPAR

- OSPAR request for status assessments for Atlantic cod, orange roughy and Atlantic bluefin tuna

2.3 Technical services published

In addition to the special requests for advice, ICES provided 8 technical services in 2024.

EU/UK

- EU/UK - Mixed fisheries science

EU

- EU - Technical Service - Alternative measures to prevent bycatch of the harbour porpoise (Phocoena phocoena) in the Baltic Sea
- EU - Technical Service - Catch scenarios for zero-TAC stocks 2025: pollack (Pollachius pollachius) in subareas 6–7 (Celtic Seas and the English Channel)
- EU - Technical Service - EU standing request on catch scenarios for zero-TAC stocks 2025: whiting (Merlangius merlangus) in Division 7.a (Irish Sea)
- EU - Technical Service - EU standing request on catch scenarios for zero-TAC stocks 2025: whiting (Merlangius merlangus) in divisions 7.b–c and 7.e–k (southern Celtic Seas and western English Channel).
- EU - Technical Service - EU standing request on catch scenarios for zero TAC stocks 2024: cod (Gadus morhua) in divisions 7.e–k (eastern English Channel and southern Celtic Seas)
- EU - Technical Service - Review the knowledge base and analytical frameworks required to map where VMEs are known or likely to occur as well as on fishing activity of deep-sea fish in all EU outermost regions

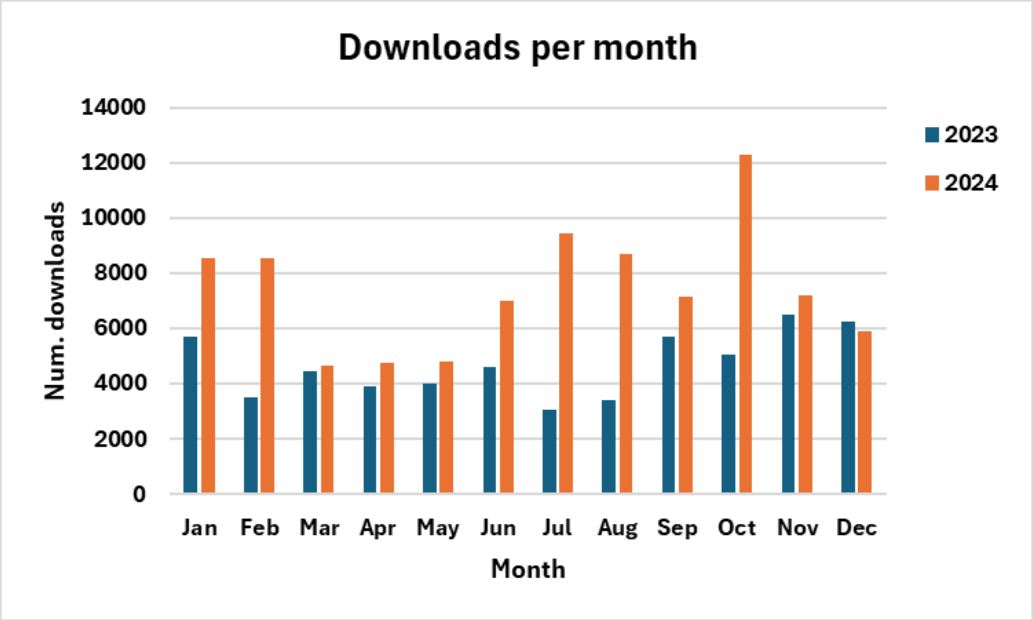
NEAFC

- NEAFC - *Technical Service* - Bycatch risk gears for seabirds in the NEAFC regulatory areas

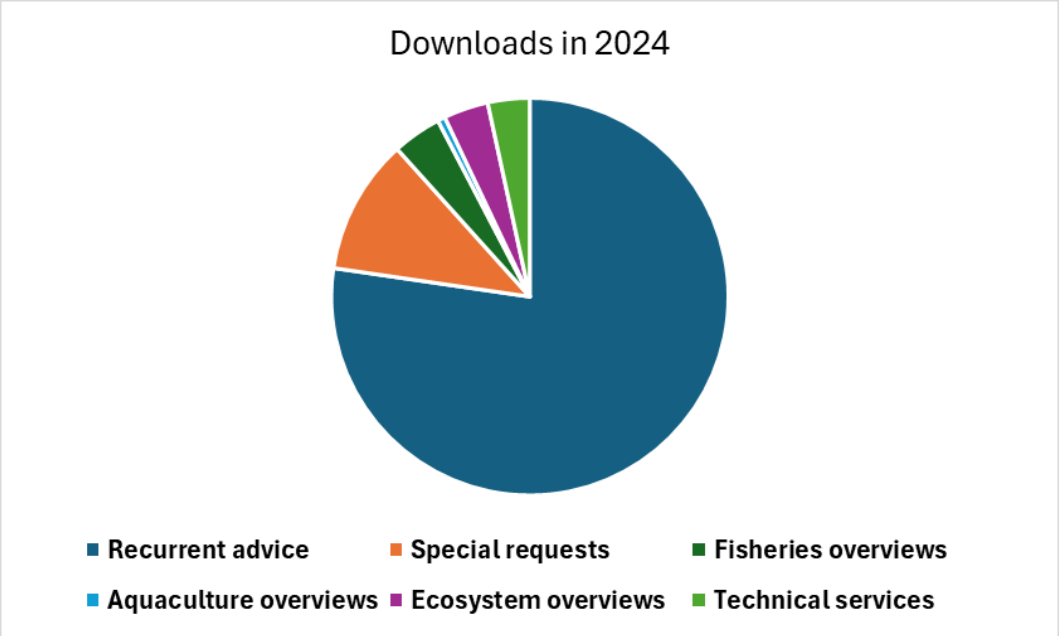
2.4 Advice Impact: Views, downloads & citations

Top downloads and almetric scores for advice published in 2024 (based in doi tracking).

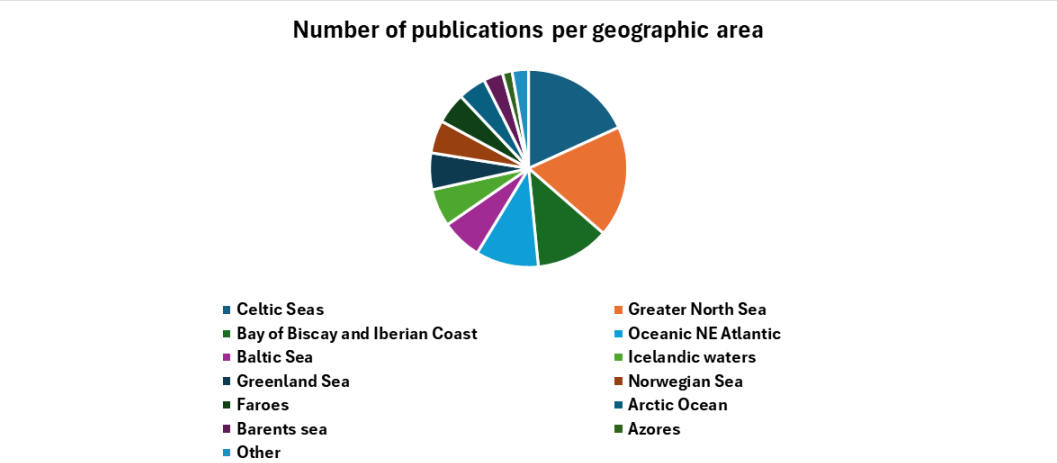
Downloads per month 2023 vs. 2024 are increasing



Number of downloads in 2024 per advice publication type (will include downloads of items published in 2024 and before 2024)



Number of 2024 advice publications for each geographic area



Top 5 publications in terms of Altmetrics score - colour guide (red: news; dark blue: policy documents; yellow: blogs (including newspieces in ICES website); other colours: mainly social media)

Title	Publication year	Altmetric score
European eel (Anguilla anguilla) throughout its natural range. https://doi.org/10.17895/ices.advice.19772374	2022	332
European eel (Anguilla anguilla) throughout its natural range. https://doi.org/10.17895/ices.advice.21907860.v2	2023	151
Mackerel (Scomber scombrus) in subareas 1–8 and 14 and Division 9.a (the Northeast Atlantic and adjacent waters). https://doi.org/10.17895/ices.advice.25019339	2024	134
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). https://doi.org/10.17895/ices.advice.25019270	2024	125
Herring (Clupea harengus) in subareas 1, 2, and 5, and in divisions 4.a and 14.a, Norwegian spring-spawning herring (Northeast Atlantic and Arctic Ocean). https://doi.org/10.17895/ices.advice.19772380	2022	78

Views in 2024 per country for advice publications (data from the US should be treated with caution)

Total activity by country	
COUNTRY ACTIVITY	TOTAL VIEWS
1. **United States - 32%**	107 024
2. **United Kingdom - 14%**	46 947
3. **France - 8%**	24 493
4. **Germany - 7%**	21 306
5. **Denmark - 6%**	16 914
6. **Belgium - 5%**	13 805
7. **Sweden - 4%**	13 308
8. **Netherlands - 3%**	10 101
9. **Spain - 3%**	9 899
10. **Ireland - 3%**	8 969

Top 10 publications for ICES Library (in term of total views), with advice publications marked in red.

Top items	
TITLE	TOTAL VIEWS
1. **European eel (Anguilla anguilla) throughout its natural range**	6 410
2. **Advice on fishing opportunities (2023)**	5 857
3. **European eel (Anguilla anguilla) throughout its natural range**	4 764
4. **Greater North Sea ecoregion – fisheries overview**	4 193
5. **Mackerel (Scomber scombrus) in subareas 1–8 and 14, and in Division 9.a (Northeast Atlantic and adjacent waters)**	3 912
6. **ICES Manual for Seafloor Litter Data Collection and Reporting from Demersal Trawl Samples**	3 853
7. **Advice on fishing opportunities (2022)**	3 796
8. **Advice on areas where Vulnerable Marine Ecosystems (VMEs) are known to occur or are likely to occur in EU waters**	3 563
9. **EU additional request on mitigation measures to reduce bycatches of common dolphin (Delphinus delphis) in the Bay of Biscay and Iberian Coast**	3 453
10. **ICES Survey Protocols – Manual for Nephrops Underwater TV Surveys, coordinated under ICES Working Group on Nephrops Surveys (WGNEPS)**	3 448

3 Cooperation agreements

Two new Memorandum of Agreement (MoU) were signed during 2024 with ASCOBANS and the North Pacific Anadromous Fish Commission (NPAFC).

Existing agreements with the EU DGMARE and UK and were updated and signed.

In addition, an MoU was developed and with ICCAT. This will formalise cooperation between ICES and ICCAT for the first time. The MoU has been approved by the ICCAT annual meeting and will be signed shortly.

A full list of existing agreements can be found here: https://www.ices.dk/about-ICES/global-cooperation/Pages/Cooperation-agreements.aspx

4 Fishing opportunities advice

4.1 MSY and management plan advice

Fishing opportunities advice given in 2024 (by category), number and % of stocks with MSY/Management plan advice in the Advice Scenarios Database (ASD). In 2024, ICES provided advice for 198 of the total 277 stocks in the Stock Information Database (SID).

Number of Stocks by Assessment Category in the Advice Scenarios Database (ASD) in 2024

Year	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Grand Total
2018	94	1	41	7	13	12	168
2019	98	1	61	2	16	12	190
2020	82		44	6	18	15	165
2021	89	6	51	1	13	5	165
2022	103	8	44	5	15	6	181
2023	101	6	43		13	13	176
2024	107	25	38	4	13	11	198

Number of Stocks by Assessment Category with MSY/Management Plan Advice in ASD in 2024

Year	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Grand Total
2018	88	1	3		1	1	94
2019	91	1	1		1	1	95
2020	79		3		4	1	87
2021	86	6	8			1	101
2022	103	8	25		1	1	138
2023	100	6	28			1	135
2024	104	23	21				148

Percentage of Stocks by Assessment Category with MSY/Management Plan Advice in ASD in 2024

Year	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Grand Total
2018	94%	100%	7%		8%	8%	56%
2019	93%	100%	2%		6%	8%	50%
2020	96%		7%		22%	7%	53%
2021	97%	100%	16%			20%	61%
2022	100%	100%	57%		7%	17%	76%
2023	99%	100%	65%			8%	77%
2024	97%	92%	55%				75%

4.2 Number of stock assessments with large retrospective inconsistency between years

The issue of patterns in stock assessment continues to be a major challenge. This was discussed at MIRIA, MIACO and ACOM in 2024. In August 2024 a paper was published in Science entitled "Stock assessment models overstate sustainability of the world's fisheries" (Edgar, et al 2024). There was also an accompanying perspective paper by Froese and Pauly 2024. In addition Rainer Froese made a presentation to a Low Impact Fisheries of Europe event in July 2024 attended by the ACOM chair where he inferred that ICES assessments were overly optimistic and flawed. ACOM discussed these challenges in September and agreed to hold a workshop to address both uncertainties and retrospective patterns in a more systematic way when providing and/or communicating advice.

Retrospective patterns are semi-systematic changes in estimates of population size, fishing mortality, recruitment, or other assessment model-derived quantities, that occur as additional years of data are added to, or removed from, a stock assessment. These patterns are a problem, for managers, scientists and other stakeholders. They can lead to major annual revisions when providing management advice and challenges when implementing very prescriptive management plans.

Mohn's rho is a metric calculated to show the degree of respective inconsistency in a time series. Since 2018, all stock assessment working groups have been asked to provide an analytical performance of category 1 and 2 age-based assessments, reporting the mean Mohn's rho (assessment retrospective analysis) values for R, SSB and F. For long-lived species, a **large** retrospective inconsistency is considered to be a greater than 20%, or less than -15%, average change in SSB over the last 5 years. For short-lived species, a **large** retrospective inconsistency is considered to be a greater than 30%, or less than -22%, average change in SSB over the last 5 years.

ICES works hard to address the challenges associated with retrospective inconsistency and has highlighted that the inconsistencies are caused by a number of issues including changes in catchability of fisheries, surveys, fish distribution, reporting of catches, model misspecification, structural uncertainty. The inconsistencies are not caused by broad generic features, and each case requires careful re-analysis.

This re-analysis can generally only be done through the benchmark process and in 2024, ICES benchmarked the methods for providing advice for **29 fish stocks** plus it plans to benchmark methods for **14 fish stocks** in 2025.

The challenge caused by these retrospective inconsistencies will remain as they are a characteristic (if not a property) of stock assessments. Mechanisms must be found to discuss the risk associated with these retrospective patterns and for fisheries management authorities to account for likely inconsistencies. This issue is not only being discussed in ICES but also in globally. Common solutions need to be explored.

SSB only	2019	%	2020	%	2021	%	2022	%	2023	%	2024	%
Stocks with Mohn's rho values reported	71		54		74		70		73		93	
Stocks **without large** retrospective inconsistency	52	73	37	69	52	70	54	77	53	73	76	82
Stock **with large** retrospective inconsistency	19	27	17	31	22	30	16	23	20	27	17	18

F only	2019	%	2020	%	2021	%	2022	%	2023	%	2024	%
Stocks with Mohn's rho values reported	71		54		74		70		73		93	
Stocks **without large** retrospective inconsistency	53	75	42	78	51	69	53	76	56	77	75	81
Stock **with large** retrospective inconsistency	18	25	12	22	23	31	17	24	17	23	18	19

SSB *or* F	2019	%	2020	%	2021	%	2022	%	2023	%	2024	%
Stocks with Mohn's rho values reported	71		54		74		70		73		93	
Stocks **without large** retrospective inconsistency	47	66	34	63	44	59	46	66	48	66	73	78
Stock **with large** retrospective inconsistency	24	34	20	37	30	41	24	34	25	34	20	22

5 Ecosystem services and effects

ICES continues to develop advice on ecosystem services and effects in 2024. Some of the key points in the 2024 advice are summarised below.

Key points from bycatch advice in 2024

- There is not one single monitoring design that is universally applicable to achieve a precise and accurate bycatch per unit effort (BPUE) estimate of endangered, threatened, and protected (ETP) species. In general, increasing the number of vessels monitored increases accuracy and precision.
- Substantial increase in the current monitoring coverage is required to obtain precise and accurate BPUE for species which are caught rarely. For species with bycatch probability of 0.01, a monitoring coverage of 7% of fishing operations is needed to achieve the previous target coefficient of BPUE estimate variation (*CV*) of 0.3
- In December 2024 Annual bycatch estimates in 2023 were provided for 116 ETP species as part of 316 combinations of species, fishing gear (métier level 4), and ecoregion. Among these ETP species are 12—2 marine

mammals, 3 marine turtles, 1 seabird, and 6 fish—from DG MARE's list of 26 priority species.
- Set gillnets (GNSs) and trammel nets had highest by catches of common dolphin, harbour porpoise and Balearic shearwater in specific areas.
- To improve accuracy and precision in estimates of annual bycatch and multiannual bycatch rates, ICES advises (i) to increase monitoring effort in area/métier combinations identified as high priority for bycatch monitoring and (ii) to prioritize at-sea observers and electronic bycatch monitoring protocols.
- A bycatch risk assessment was used as a proxy to estimate the relative bycatch risk for Baltic Proper harbour porpoise in the Baltic, improved monitoring is needed. The most efficient way of preventing porpoise bycatch is to use fishing gears that pose less risk for porpoises. These include traps and pots, longlines, and seines, which have all shown not to catch porpoises
- The gear types of higher bycatch risk to seabirds that are being deployed in the NEAFC Convention Area include midwater otter trawls and drifting longlines.

Key points from VME advice in 2024

- In the advice on areas where Vulnerable Marine Ecosystems (VMEs) are known to occur or are likely to occur in EU waters there were changes to VME polygons relative to previous advice including additions, expansions, and reductions in the number, size, and shape of VME polygons. These changes are based on new or updated evidence of VME occurrence and/or on new or updated evidence of mobile bottom-contacting gears (MBCG) fishing intensity, resulting in a change in risk of further Significant Adverse Impacts (SAIs) to VMEs where they co-occur with fishing activity.
- No addition to, or extension of, the existing closed areas to protect VMEs in the NEAFC regulatory areas were advised. NEAFC Recommendation 19:2014 has been effective in protecting VMEs in both the NEAFC closed areas and in the NEAFC restricted bottom-fishing areas from SAI.
- A review by ICES of United Nations General Assembly (UNGA) resolutions, as well as other policies and recommendations, demonstrated that changes in scientific understanding that may impact future evidence and advice related to VMEs include (a) the use of modelling, updated indicator lists, and inference to assess where VMEs and associated and dependent species are likely to be present; (b) identification of locations where VMEs may be resilient to climate change and ocean acidification; and (c) improved understanding of connectivity.
- A review by ICES of international science developments found that they have potential to provide a basis for assessing the probability of VME occurrence and assessing the probability and magnitude of bottom-fishing impacts, including risk of SAI.

Other Key points

- ICES advised NEAFC that approaches to implement an Ecosystem Approach to Fisheries Management (EAFM), and methods within approaches, are selected based on available evidence and data, resources to support development and implementation, understanding of stakeholder and management priorities, and strength of links to management actions. Implementation of an EAFM may be incremental, for example through restricting initial scope and expanding to more EAFM issues and/or initially screening many EAFM issues.
- Clarifying the higher-level objectives and creating operational objectives will help identify and prioritize management issues to address.
- Processes for setting operational objectives for an EAFM are generally most successful when they are inclusive, consultative, informed by evidence, and based on shared understanding between managers, scientists, and stakeholders. with less resource-demanding approaches to identify priorities for additional assessment. Operational objectives should be linked to existing and potential management actions.
- Eight state indicators describing recruitment, growth of individuals, and age or length structure, are suitable to track changes in population structure in a wide range of populations. Depending on the population, one or more of these eight indicators may be necessary to capture all aspects of D3C3 "healthy population structure", with the selection of indicators dependent on population characteristics. These indicators primarily require age structured stock assessment data.

6 Changes to advice in 2024

Headline advice

The ACOM policy is to correct errors in advice as soon as possible after they have been detected. In 2024 there were 15 corrections that had an impact on the headline advice, 8 of those pertained to advice given in 2022 or 2023 for 2024 and 7 were for advice given in 2024 for 2025. Some of the corrections were to high profile stocks like North Sea cod and sole and Irish Sea herring which had a negative impact on the credibility of ICES advice.

ACOM leadership and the secretariat worked hard to manage the communications around these corrections and kept requesters informed about timelines where possible. These advice errors caused addition workload and stress for the experts involved and the secretariate. Most of the errors in 2024 can be described as intractable and elusive. That said ICES will redouble its efforts on the Quality Assurance Framework by implementing and action plan in 2025 to restore trust in ICES advice.

Whiting (*Merlangius merlangus*) in Division 3a (Skagerrak and Kattegat) issued for 2024. The expert groups found an error found in the way values were recorded in one of the 3a surveys for whiting. This led to erroneously high whiting biomass values in some hauls in 2020. This resulted in a slight decrease of advice for 2024, under the ICES MSY framework, from 676 t to 650 t.

Greater silver smelt (*Argentina silus*) in Subarea 14 and Division 5.a (East Greenland and Iceland grounds) issued for 2023–2024. An error was found in the forecast, leading to the application of an incorrect F_{MSY} value. This affected the intermediate year in the forecast as well as the advised catch value; changing for 2024, under the ICES MSY framework, from 12 080 t to 10 920 t.

Norway lobster (*Nephrops norvegicus)* in divisions 7.b-c and 7.j-k, Functional Unit 16 (west and southwest of Ireland, Porcupine Bank) issued for 2024. Through the quality control of data uploads, an error was found in the allocation of a sample. This led to changes on the mean weights, numbers landed and harvest rates in year 2022, and subsequently led to an increase of the biomass. The catch advice corresponding to the F ranges in the MAP for 2024 is thus revised from between 3677 to 4560 tonnes to being between 3732 to 4627 tonnes, assuming zero discards.

Greenland halibut (*Reinhardtius hippoglossoides*) in subareas 5, 6, 12, and 14 (Iceland and Faroes grounds, West of Scotland, North of Azores, East of Greenland) issued for 2024. Due to the discovery of an error in the way that mean weight-at-age was calculated in the assessment model, the SSB and fishing mortality time series have been recalculated, leading to revised reference points. This resulted in a decrease of advice for 2024, under the ICES MSY framework, from 21 541 tonnes to 19 703 tonnes.

Herring (*Clupea harengus*) in Division 7.a North of 52°30′N (Irish Sea) (her.27.nirs) issued for 2024. The assessment model being used for this stock was found to be incorrectly configured at the Herring Assessment Working Group (HAWG) in March this year. The new configuration resulted in updated reference points and a change to the absolute perception of the stock. The new model was reviewed by an external reviewer, and as the changes to the original advice sheet were substantial, the advice was re-drafted by the ADGCS at the beginning of June and subsequently approved by ACOM. The revision resulted in a decrease of advised catch for 2024 from 7279 tonnes to 4821 tonnes.

North Sea Herring ICES need to re-issue the advice sheet for the autumn spawning herring in North Sea, Skagerrak and Kattegat, and eastern English Channel issued in May 2024 due to an error found in the intermediate year calculation relating to the uptake of the B-fleet. The consequence of this is a less than 1% change in the headline advice, and some small changes to the projected SSB, with the changes being most prominent in the B fleet. This correction results in a slight reduction in the headline advice from 412 383 tonnes to 410 707 tonnes.

Cod (*Gadus morhua*) in subareas 1 and 2 north of 67°N (Norwegian Sea and Barents Sea), northern Norwegian coastal cod. An issue with how the assessment software handled survey timing was discovered. This affected the fishing mortality and SSB estimates, the intermediate year in the forecast and the advised catch value. The headline advice was changed from 22612 tonnes to 27989 tonnes

Northern Shelf cod ICES had to revise the advice issued for Northern Shelf cod (cod.27.46a7d20) for 2025 due to an error found in the bespoke multi-stock stochastic forecasting model methodology used. This impacted on the catch advice

for 2024 and for 2025 for all three sub stocks. Total catch advice for 2024 was revised from 22 691 tonnes to 15 378 tonnes. Total catch advice for 2025 was revised from 19 321 tonnes to 15 511 tonnes.

North Sea sole ICES had to revise the advice issued for the advice for 2025. An error was detected in the short-term forecast that revealed a lack of fit of the model to historical discards. The error has been corrected and the fit to historical discards has improved. An additional change to the model configuration was suggested during the review process that has been implemented and has led to an improved fit of the model to the abundance indices. Forecast and advice values have been updated in the advice sheet, which resulted in a slight increase in advice catch from 10 196 tonnes to 10 696 tonnes.

Sea bass (*Dicentrarchus labrax*) in divisions 4.b–c, 7.a, and 7.d–h ICES had to revise the advice issued in June 2024. One of the recruitment time series was corrected and this led to minor changes in the SSB, F and age 0 recruits in 2020 and 2021. All these changes are within the boundaries of uncertainty of the model fit, but they do result in a reduction in the headline advice from 2 776 tonnes to 2 620 tonnes.

North Sea Whiting (*Merlangius merlangus*) ICES reissued the advice due to an error in the data fitting procedure of the forecast calculation. These are now corrected and led to the following changes in the headline advice. Advice issued in June 2023: The advice catches in 2024, when the MSY approach is applied, should be no more than 111 953 tonnes (corrected from 128 290 tonnes). Advice issued in June 2024: The advice catches in 2025, when the MSY approach is applied, should be no more than 188 148 tonnes (corrected from 237 008 tonnes).

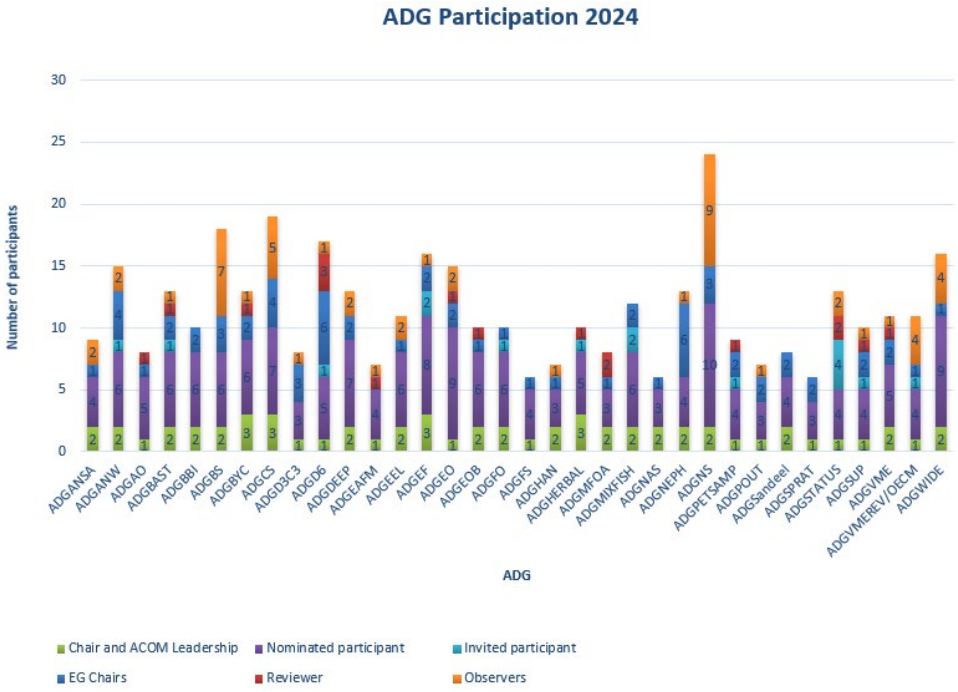
Atlantic salmon (*Salmo salar*) in Subdivision 32. The advice published in May was withdrawn in October due to a lack of consensus in ACOM.

In addition, ICES issued corrections in August to the advice for Blackspot Seabream (*Pagellus bogaraveo*) in Subarea 9 (Atlantic Iberian waters) issued in June where a sentence was added to the headline advice saying "All catches of blackspot seabream taken in the south of Division 9.a (close to the 36oN boundary) should be minimized to ensure that the blackspot seabream stock in the Strait of Gibraltar can rebuild."

The majority of these corrections were caused by input data, model and code errors. It is important to not that such errors are extremely hard to detect as part of existing audit and peer-review systems. That said it is important to minimise errors and protect the integrity of ICES advice. There is a review process to establish the root cause and improve future process to eliminate similar errors in the future (Doc. 4)

7 Advice drafting groups (ADG) participation in 2024

There was a good participation in advice drafting groups in 2024.



8 Presentation of advice in 2024

The MoUs with EU, UK, NEAFC, OSPAR and NASCO ICES include commitments for ICES to present the advice at meetings organized by the commissions. This also includes commitments for the ACOM leadership and ICES secretariat engagement in internal processes of advice requesters. These are costed into the grant agreements, MoUs and other contracts. In addition, the leadership has been requested to give presentations at Coastal State meetings, Trilateral and Bilateral meetings, European Parliament briefings, regional meetings and conferences.

In 2024 there were 55 advice related presentations

Presentations of advice and higher level engagement by ICES in 2024.

Organisation	Meeting Title	Venue	Date
NEAFC	NEAFC/OSPAR Collective Arrangement meeting (21-22 February 2024)	London	21/02
NEAFC	MIRIA subgroup in Rebuilding Scenarios	Online	26/02
MIRIA	Bilateral	Online	27/02
NEAFC	Bilateral	Online	01/03
EU DGMARE	EU-Norway Pandalus meeting	Göteborg	05/03
EU DGMARE	NSAC/EAPO symposium on Innovative Fishing - 7 March 2024	Brussels	07/03
BSAC	BSAC Working Group on Ecosystem Based Management	Online	08/03
NEAFC	PECMAS	Online	12/03
NEAFC	20th Meeting of the Steering Group for the ASCOBANS Recovery Plan for Baltic Harbour Porpoises (Jastarnia Plan)	Zandvoort	14/03
PELAC	NWWAC & PELAC 20th Anniversary	Dublin	15/03
EU DGENV	TGSEABED D6	Brussels	15/03
EU DGENV	Meeting with DGENV	Brussels	20/03
EU DGMARE	Meeting with Charlina Vitcheva	Brussels	20/03
EU DGENV	Bilateral DGENV	Online	22/03
NSAC	Roadmap on Offshore Renewables and Framework for Ecosystem informed science and advice	Online	09/04
EU DGENV	MEG	Online	11/04
BALTFISH	Baltfish technical meeting on harbour porpoise	Online	16/04
Pelagic Fish m	The state of the mackerel and herring stocks in the world	Barcelona	22/04
PELAC	Category 3 methods	Online	23/04
EU DGENV	WGGES	Brussels	15/04
EU DGENV	MSFD Science Priorities	Brussels	16/04
ICCAT	Spatial Assessment Units	Online	24/04
EU DGENV	Eel meeting	Online	24/04
BSAC	BSAC General Assembly/Executive Committee: Recreational Fisheries and Baltic Herring Roadmaps		15/05
UN	ICSP-17 “Sustainable fisheries management in the face of climate change”	New York	15/05
GNSBI	GNSBI Technical meeting	Hamburg	22/05
NFA	Northern Fisheries Alliance	Copenhagen	28/05
NASCO	NASCO Annual meeting	Ireland	03/06
OSPAR	OECMs	Trondheim	05/06
EU DGENV	TG Seabed presentation of D6 advice	Online	07/06
UN	Fourth meeting of the Sustainable Ocean Initiative	Seoul	11/06
BSAC	Baltic sea advice on fishing opportunities	Copenhagen	12/06
EU DGENV	Innovative gears, PETSAM & Trade Off Advice- invitation for the meeting 18 June	Brussels	18/06
EU DGMARE	Aquaculture workshop on environmental performance	Brussels	18/06
NWWAC	King Scallop meeting	Online	20/06
LIFE	Baltic Sea Crisis	Brussels	26/06
NWWAC	presentation advice	Ghent	01/07
PELAC	Advice on fishing opportunities	Online	04/07
NSAC	Advice on fishing opportunities	San Sebastian	09/07
SWWAC	Overviews and Ecosystem advice - VME, Tradeoff, Climate change on Small pelacics	Online	11/07
NEAFC	Like minded Contracting Parties	Gothenburg	02/10
PELAC	Advice on fishing opportunities	The Hauge	02/10
BSAC	BSAC Pelagic WG: Herring 30-31advice	Online	03/10
EU DGENV	TGSEABED D6	Brussels	04/10
Coastal States	Blue Whiting	Online	15/10
Coastal States	NSS Herring	Online	17/10
NWWAC	Advice on skates and rays	Online	17/10
Coastal States	Mackerel	London	21/10
Coastal States	North Sea stocks between UK, EU and Norway	Brussels	05/11
NEAFC	Annual Meeting	London	12/11
OSPAR	Present status assessments advice	Online	26/11
Conference	Mission BANOS Arena 3	Amsterdam	26/11
Fishing Sector	Keynote at PFA mini-symposium 28th of November	Scheveningen	28/11
PELAC	Advice on herring in 6a and Irish herring	Online	02/12
EU Parliament	Committee on Fisheries of the European Parliament	Online	05/12

9 Cyber attack

ICES suffered a serious cyber attack in June and July 2024 which was managed effectively by the IT team, the Secretariat management team, external consultants and excellent support from the ICES community. There are short- and long-term consequences to this, both in the way we operate and in operating costs. Many lessons learned have already being enacted, and there are more measures for ICES to consider to improve its resilience to future attacks and to unforeseen disasters in general.

- ICES experienced connected cyber-attacks in late June 2024 and mid-July 2024
- During the first attack, a bad actor is assumed to have used a virtual private network (VPN) vulnerability to access some of ICES onsite servers and launch a ransomware attack
- During the second attack, a distributed denial of service (DDoS) made ICES website and community portal temporarily inaccessible
- Despite the cyber attack all recurrent advice was released on time in June. Some special requests advice releases were slightly delayed. The advice documents remained available throughout the attack on the library which is hosted by Figshare https://ices-library.figshare.com/
- The majority of critical IT infrastructure was operational (and critically has remained operational) since the 11th July, approximately 20 days after the initial attack – which is better than the industry average of 23 days.
- There was some disruption to expert group meetings during the summer and communication problems particularly with the UK.
- Critically there was almost no loss of expert group work since backups of all SharePoint sites were available from the day before the attack.
- The IT department has enhanced ICES security and safeguarded its data and systems

10 Data Quality Assurance

The ICES Data centre continues to work with data providers and ICES community to ensure that the data underpinning ICES advice is quality assured, best available and fit for purpose. The data centre does this in a number of ways:

- Through Data Life Cycle Accreditation
- Data Policy, schematics and preservation plans
- Data Management Best Practice
- Formal data calls

- Data tools such e.g. Shiny apps and SmartDots
- Transparent Assessment Framework (TAF)
- Regional Database and Estimation System (RDBES)
- Database of Trawl Surveys, Acoustic Surveys, VMEs, Stomach content, eggs and larvae, fecundity & atresia, ocean data, seabirds and cetaceans data etc.

Key developments of note for MIACO include

Embedding TAF in the ICES Quality (assurance) Policy

As of 2024, TAF will be used to document the stock assessment process of the Regional and Species Working Groups, as part of their General Terms of Reference (ToRs). Steps were taken by the TAF team to focus the TAF training workshops on ICES stock assessors, moving away from online training in 2023 to in-person training at member country institutes in 2024, as this form of training functions better as 1:1, hands on and in-person. So far one workshop has been carried out at CEFAS in Lowestoft, United Kingdom in March, where 13 people participated. Two more workshops are scheduled for Autumn 2024, at Wageningen Marine Research (WMR) in the Netherlands and the Institute of Marine Research (IMR) in Norway.

Regional Database and Estimation System (RDBES)

There is no secured funding and insufficient resources for RDBES. The 4-year support to the RDBES development, which Council supported via equity, ended in June 2024. The WGRDBESGOV has identified and requested many key functionalities to be developed. These key functionalities are needed for using the RDBES to support the ICES Expert Groups and the Regional Coordination Groups, RCGs. The current use of the RDBES data is limited, but as this system replaces both InterCatch and the RDB in a phased approach to 2027, it will be the primary tool for commercial catch (disaggregated) data management in the ICES portfolio. The need for support to the countries uploading data, to the users using the RDBES and the RDBES data will only increase. Insufficient resourcing will lead to longer response times, and a reduced response for support of the RDBES (and InterCatch in the coming years). This is a key concern for ICES with potential consequences for the advice in coming years.

11 Looking forward to 2025

11.1 Developing new advice in Offshore Renewable Energy

The ICES expert community is working on two special requests from DGMARE on socio-economic impacts of offshore renewable energy (ORE) on fisheries and methodologies to model (cumulative) impacts and from the GNSBI on cumulative impact assessment. These requests will be further discussed under agenda point 6b

11.2 Benchmark of bycatch methods and various stocks

ICES bycatch experts will continue work on preparations for the benchmark of BEAM approach. The meeting (WKBEAM), planned for the first week of December 2025.

The following benchmark workshops are taking place in 2025.

Benchmark workshop on selected deep-sea fisheries stocks

- aru.27.5a14; Greater silver smelt (*Argentina silus*) in Subarea 14 and Division 5.a (East Greenland and Iceland grounds); WGDEEP
- bli.27.5a14; Blue ling (*Molva dypterygia*) in Subarea 14 and Division 5.a (East Greenland and Iceland grounds); WGDEEP
- bsf.27.nea; Black scabbardfish (*Aphanopus carbo*) in subareas 1, 2, 4-8, 10, and 14, and divisions 3.a, 9.a, and 12.b (Northeast Atlantic and Arctic Ocean); WGDEEP

Benchmark workshop on Mackerel and Norwegian spring-spawning herring (WKBMACNSSH) 24-28 March 2025

- her.27.1-24a514a; 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); WGWIDE
- mac.27.nea; Mackerel (*Scomber scombrus*) in subareas 1-8 and 14 and division 9.a (the Northeast Atlantic and adjacent waters); WGWIDE

Benchmark workshop on selected North Sea and Celtic Sea stocks(WKBNSCS) 3–7 February 2025

- ple.27.7d; Plaice (*Pleuronectes platessa*) in Division 7.d (eastern English Channel); WGNSSK
- turbot.27.4; Turbot (*Scophthalmus maximus*) in Subarea 4 (North Sea); WGNSSK
- whg.27.7a; Whiting (*Merlangius merlangus*) in Division 7.a (Irish Sea); WGCSE

Benchmark on selected sea bass stocks (WKBSEABASS)

- bss.27.4bc7ad-h; 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);
- bss.27.8ab; Seabass (*Dicentrarchus labrax)* in divisions 8.a–b (northern and central Bay of Biscay);

Benchmark workshop on application of Stock Synthesis (SS3) on selected stocks 17–21 February 2025

- ank.27.8c9a; Black-bellied anglerfish (*Lophius budegassa*) in divisions 8.c and 9.a (Cantabrian Sea, Atlantic Iberian waters); WGBIE
- mon.27.8c9a; White anglerfish (*Lophius piscatorius*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters); WGBIE
- pol.27.67; Pollack (*Pollachius pollachius*) in subareas 6-7 (Celtic Seas and the English Channel); WGCSE
- sbr.27.9; Blackspot seabream (*Pagellus bogaraveo*) in Subarea 9 (Atlantic Iberian waters); WGDEEP

11.3 Developing the science around Nature Restoration

ACOM has identified the need to translate the scientific knowledge into advice that will help managers establish targets and address legislation on the recovery of biodiversity (especially marine habitats, species and ecosystems). This will be outlined further under agenda point 6d.

11.4 Icelandic special request on Aquaculture and MPs

ICES has received a special request from Iceland for an evaluation of its Genetic Intrusion Risk Assessment Framework (GIRAF) for salmon aquaculture. This is the first aquaculture related special request since 2017. ICES has an aquaculture steering group and 7 expert groups working on aquaculture related science. In 2024 ACOM leadership and the secretariat highlighted the benefits of ICES science and advice at AQUA2024 in Copenhagen and had dialogue with potential requesters. These discussions will be continued in 2025 and the advice on the GIRAF for Iceland is expected to be delivered in late March.

Iceland has also initiated as special request to review assessments and evaluate HCRs for Icelandic stocks of haddock and saithe. This request should be delivered in late March also.

11.5 Other Special Requests

DGMARE, Norway and the UK have requested Genetic work on Northern Shelf Cod sub-stocks. This will evaluate existing sampling data on genetics for the Northern Shelf cod stock complex and work on standardization and harmonization procedures. Advice release is planned for end of summer 2025.

ICES is working on an evaluation of Eel management plan progress reports for the EU and an evaluation of the Long-term management plan for North Sea herring autumn spawners in North Sea, Skagerrak and Kattegat and Eastern English Channel for the EU, UK and Norway. A number of other special request are underway or in development for the EU, NEAFC and OSPAR.

11.6 TAF & RDBES

Important workshops (planned for January) will improve quality assurance of the ICES advice process using TAF. The first workshop will deal with stock assessment template revisions and development (Workshop on TAF Templates for Stock Assessments (WKTSAT)) and the following on guidelines for code revision from assessment outputs and benchmarks, among others (Workshop on Transparent Assessment Framework Code Publishing (WKTCP)). The Workshop on Transparent Assessment Framework (TAF) National Estimation Templates (WKTNET) will provide training and operationalise the general approach for a national estimation within TAF using templates.

11.7 New Expert Groups

Workshop to Develop an ICES Survey Mitigation Strategy (WKDISM). This WK is intended to develop adaptation approaches for surveys in the face of increasing no survey areas due to MPAs or ORE developments.

NS NETSEA (North Sea Network for surveys towards ecosystem advice) is planned for the spring in 2025. It was postponed from 2024 due to lack of uptake. It will review existing fishery-independent surveys i9n the NS and propose improvements in survey organisation and communication.

A second NETSEA Workshop on reviewing Baltic Surveys to support ecosystem-based management advice (NETSEA BAL) will be carried out in 2 stages. First to evaluate ecosystem monitoring needs for the EBM end users and secondly to explore adaptation of the surveys to recent challenges in the Baltic.

A new working group (WGING on Innovative Fishing Gear) will continue work on the development of innovative fishing gear linked to EBFM and explore issues with uptake of such gears.

A Workshop on fourth generation ecosystem overviews (WKEO4) will be held in the spring 2025. This will help develop the EOs and move towards an operational product.

A follow up workshop WKFISHCARBON2 is proposed for the spring 2025. This is 2 years after the last workshop that reviewed knowledge on the Biological Carbon Pump, Seabed carbon release impacts of fishing, and fuel use/emissions from fishing vessels and the supply chain. This is a fast-moving area, and the WK will add to the previous review and propose a plan for ICES engagement in this area.

11.8 Training courses

Over the next 12 months, the following training is being offered. These events are needed to improve the build expertise within the ICES network.

- **Introduction to Management Strategy Evaluation** 24–28 February, 2025
  ICES Headquarters, Copenhagen, Denmark
- **Social science methods for natural scientists**
  11–14 March 2025, Den Haag, the Netherlands