

EU standing request on catch scenarios for zero TAC stocks 2022; cod (*Gadus morhua*) in Division 6.a (West of Scotland); cod (*Gadus morhua*) in Division 7.a (Irish Sea) and whiting (*Merlangius merlangus*) in Division 7.a (Irish Sea)

Service summary

ICES has provided estimates of the likely catches of several stocks under the assumption that TACs for the target stocks are set in line with ICES advice.

- For cod in Division 6.a, catches in 2023 are estimated to be between 1642 tonnes and 2562 tonnes, 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%.
- For cod in Division 7.a, catches in 2023 are estimated to be around 159 tonnes, assuming that the fishing mortality on cod changes by the same proportion as the changes advised for haddock and *Nephrops* fleets and that the fleets operate in a similar way as in the past 3 years. Under this scenario spawning-stock biomass (SSB) in 2024 is expected to increase by 6.4%* from 2023 to 2024.
- For whiting in Division 7.a, forecasted bycatch levels in 2023 are 1125 tonnes, using a model of whiting bycatch in the *Nephrops* fishery and assuming 8476 tonnes of *Nephrops* catches in 2023. This is expected to result in a 1% increase in SSB in 2024.

Request

EU DGMARE has requested that ICES evaluate the following:

For by-catch and for target stocks where ICES is advising zero TACs but the stock is caught in mixed-fisheries with other species where non-zero catches are advised, where possible ICES will provide the EU with illustrative catch scenarios that are consistent with the advice for the main target species in the fishery.

Where the zero TAC advice is given for a target stock subject to a MAP the catch scenarios for the zero TAC stock should include scenarios consistent the F_{MSY} range in the target stock (e.g. F_{MSY} , $F_{MSY\ Lower}$ and intermediate values) and quantify the corresponding changes in biomass[†] alongside with the maximum probability of SSB being below B_{lim} , in line to what is ICES criterion, i.e., where the maximum (of the annual probabilities) is taken over all years in the plan/strategy (i.e., short and long term), where possible. Scenarios should therefore also be produced that give, as a minimum, a stable biomass and increasing biomass if F_{MSY} ranges do not[‡]. This may involve carrying out mixed fisheries forecast or providing F -multipliers consistent with the advice for the target stocks or where forecasts are not possible the catch scenario should be based the best available scientific information. Where possible ICES should provide catch scenarios which include changes in fishing pattern if they considered likely by ICES.

For stocks where ICES is advising zero TACs but where a monitoring fishery would be useful to monitor stock development, where possible ICES will provide catch scenarios for a monitoring TAC. This should be the minimum level of catches needed to provide sufficient data for ICES to continue providing scientific advice on the state of this stock.

* Version 2: % updated

[†] This is because the safeguards in the MAPs are measured in rebuilding of biomass, not fishing mortality levels

[‡] E.g. Northern Seabass 2020 catch advice (from June 2019) where both F_{MSY} and $F_{MSY\ Lower}$ gave negative biomass for a stock only just above B_{lim}

Basis of the advice

This technical service was completed using the ICES data sources and, where available, the results of single-species assessments as well as forecasts.

No mixed-fisheries forecasts are currently available for divisions 6.a or 7.a. Catch and effort data from the Working Group on Mixed Fisheries Advice (WGMIXFISH) and ICES InterCatch database, together with expert knowledge of technical interactions, were used to determine the target stocks in the main métiers that have bycatches of those stocks. The relative change in fishing mortality (F), advised in the single-species advice for the main target stocks in the area, was used to estimate the amount of bycatch stock likely to be caught for cod in division 6.a. For whiting in 7.a the catch is estimated based on an assumed catch of *Nephrops* in 2023.

Results

Cod in Division 6.a

Cod in Division 6.a is considered a minor bycatch stock of the fisheries targeting Northern shelf haddock, saithe, and anglerfish. The majority of the cod catches are taken by the demersal finfish-trawl fishery (Table 1). In 2021, cod constituted less than 1% of the total catch from this fishery.

Table 1 Cod in Division 6.a. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings			Discards		
1 906 [#] tonnes	Demersal finfish trawl 96%	<i>Nephrops</i> fleet <1%	Other 4%	Demersal finfish trawl 99%	<i>Nephrops</i> fleet # <1%	Other <1%
	1 264 tonnes			642 [#] tonnes		

[#] Underestimate due to lack of discard samples from *Nephrops* fleet (32% of total discards in 2020)

ICES advice for the main target species in demersal-trawl fisheries in Division 6.a implies increases of 1.5% and 116% in 2023 in the fishing mortality of saithe and haddock, respectively (Table 2). These two stocks overlap with, and can be considered the main target stocks for, demersal finfish trawls (along with anglerfish, for which advice will be released in October 2022). The activities of these fisheries and distributions of the stocks also extend into the North Sea. If TACs in Division 6.a are set in line with the advice for haddock and saithe, the most reasonable assumption is that fishing mortality in cod in 2023 will be either similar to the current value or increased by up to 116%, as implied by the F change advised for haddock.

- The most recent advice provided in 2022 suggests that catches in 2023 corresponding to a *status quo* fishing mortality would be 1642 tonnes. A 116% increase in fishing mortality consistent with the advice for haddock, would result in a total catch of 2562 tonnes in 2023 (Table 3). Rolling over the current TAC of 1279 tonnes implies a 28% reduction in fishing mortality for cod. The best available estimate for catches of this stock in 2023 is, therefore, between 1642 tonnes and 2562 tonnes, provided TACs for target stocks are set in line with ICES advice. These catches are expected to result in a decrease in spawning-stock biomass (SSB) in 2024 of 5.6% with the lower catch option and of 44% with the higher.

Table 2 Percentage change in fishing mortality, harvest rate, or advised catch between 2022 and 2023, as implied by ICES advice for the main demersal stocks in the West of Scotland.

Species	Corresponding EC TAC area	ICES stock code	F ₂₀₂₂	Advised F ₂₀₂₃	Change*
Cod (<i>Gadus morhua</i>)	Division 6.a; EU and international waters of Division 5.b East of 12°00'W	cod.27.6a	0.74	0	-100%
Whiting (<i>Merlangius merlangus</i>)	Subarea 6; EU and international waters of Division 5.b; international waters of subareas 12 and 14	whg.27.6a	0.07	0.21	200%
Saithe (<i>Pollachius virens</i>)	Subarea 6; EU and international waters of Division 5.b and subareas 12 and 14	pok.27.3a46	0.34	0.345	1.5%
Haddock (<i>Melanogrammus aeglefinus</i>)	EU and international waters of divisions 5.b and 6.a	had.27.46a20	0.111	0.24	116%
Megrim (<i>Lepidorhombus whiffiagonis</i>)	EU and international waters of Division 5.b; Subarea 6; international waters of subareas 12 and 14	lez.27.4a6a	0.52	1	92%

* % change in fishing mortality (or F/F_{MSY} ratio), advised by ICES for 2023 relative to 2022.

Table 3 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 = 2.16 x F ₂₀₂₂	2 562	1 779	783	1.60	1.23	0.37	1650	-44	100
F = F ₂₀₂₂	1 642	1 181	461	0.74	0.57	0.17	2760	-5.6	28
Catch = TAC(2022)	1 279	929	350	0.53	0.41	0.12	3196	9.3	0.0

* SSB 2024 relative to SSB 2023.

^ Total catch in 2023 relative to the TAC in 2022 (1279 tonnes).

Cod in Division 7.a

Cod in the Irish Sea has been benchmarked in 2022 as a category 1 stock now providing zero catch advice. Cod has been an important bycatch species in the Irish Sea and is caught as part of the whitefish and the *Nephrops* fleet.

The size of the stock in Division 7.a (Irish Sea) is estimated to be extremely low. The spawning-stock biomass (SSB) has declined sharply since the beginning of the time-series. It has been below MSY B_{trigger} since the mid-1990s, getting close to or above B_{lim} occasionally with single strong cohorts passing through. Recruitment has been low since the mid-1990s and ICES acknowledges that the stock is recruitment- rather than fishery controlled. Fishing mortality (F) has been below F_{MSY} since 2010. The current ICES advice is that when the MSY approach is applied, there should be zero catch in 2023 (ICES, 2022).

Catch scenarios are based on the fishing pressure on haddock and *Nephrops* in the Irish Sea. Catch rates of cod differ between the two different TR1 (whitefish) fleet segments (otter trawl based and midwater trawl/seine fishery) as does the fishing pressure of haddock.

Mixed-fishery considerations focus on the unavoidable bycatch of cod within the *Nephrops*- and haddock targeting fisheries. Estimates of likely unavoidable bycatch were derived using basic estimations of cod catches in those fleets. Cod catches were attributed to the *Nephrops* fishery using the observed catch breakdown 2019–2021, with 34% of the catches attributed to *Nephrops* fisheries in Division 7.a in 2021 (Table 4). It is assumed that the *Nephrops* landings average the past 3 years and that the cod to *Nephrops* proportion stays similar. Cod bycatches in the TR1 fleet are estimated by proportions of cod catches to haddock landings in the two segments of the TR1 fleet (otter trawls and midwater trawl/seine fishery) as an average value from 2018–2021 (excluding 2020), and no change in fishery selectivity or fishing behaviour. Haddock TAC uptake is set as 74% (average 2018–2021 excluding 2020), assuming a TAC following the advice. The catches by beam trawls and other gear types are set as those in 2021.

This method follows the same intermediate year assumptions as the cod advice sheet. The method predicts unavoidable bycatch of 159 tonnes.

The implications of the various catch scenarios are presented in Table 5. These include both stable biomass and increasing biomass options, applying $F_{MSY\ lower}$ and F_{MSY} , catches equal to the 2022 TAC and the unavoidable bycatch of 159 tonnes. If the unavoidable bycatch estimates are realized, the SSB is predicted to remain stable and slightly increase from 2023 to 2024. The SSB, however, will remain considerably below B_{lim} even under zero catches.

Table 4 Cod in Division 7.a. Catch distribution by fleet in 2021 as estimated by ICES.

Catch	Landings				
137 tonnes	Otter trawls		Mid-water trawl	Beam trawls	Other gear types
	<i>Nephrops</i> directed 33%	Demersal fish directed 37%	18.7%	9.4%	1%
	133 tonnes				
	Discards				
	Otter trawls		Mid-water trawl	Beam trawls	Other gear types
	<i>Nephrops</i> directed 77%	Demersal fish directed <1%	<1%	22%	1%
	4 tonnes				

Table 5 Annual catch scenarios. All weights are in tonnes.[§]

ICES advice basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	F_{total} (2023)	F_{wanted} (2023)	$F_{unwanted}$ (2023)	SSB (2024)	% SSB change*
Fishing basis options								
$F = 0$	0	0	0	0	0	0	5 930	9.8
$F = F_{sq}$	170	161	9	0.038	0.037	0.00148	5 732	6.15
$F = F_{MSY\ lower}$	704	667	37	0.168	0.162	0.0065	5116	-5.26
$F_{MSY} \times SSB$ (2023)/ $MSY\ B_{trigger}$	448	424	23	0.104	0.100	0.0040	5410	0.19
$F_{MSY\ lower} \times SSB$ (2023) / $MSY\ B_{trigger}$	343	325	18	0.079	0.076	0.0030	5 532	2.44
$F_{ECO} \times SSB$ (2023) / $MSY\ B_{trigger}$	386	366	20	0.089	0.085	0.0034	5 482	1.52
$F = F_{MSY}$	908	861	48	0.22	0.21	0.0086	4882	-9.6
$F = F_{ECO}$	788	747	41	0.19	0.183	0.0074	5019	-7.1
TAC basis options								
TAC_{2022}	206	195	11	0.047	0.045	0.00180	5 690	5.4
Catch = Bycatch estimate	159	151	8	0.036	0.034	0.00138	5 745	6.4
SSB basis options								
$SSB_{2024} = SSB$ 2023	457	433	24	0.106	0.102	0.00148	5400	0

* SSB 2024 relative to SSB 2023.

Whiting in Division 7.a

Catches of whiting in Division 7.a are considered to be primarily bycatch within the *Nephrops* fishery. These catches tend to be below the EU minimum conservation reference size (MCRS). The highly selective gears to reduce finfish catch and discards in the *Nephrops* fishery appear to have reduced catches since their introduction in 2013. However, discard levels have remained high relative to landings. During 2019–2021, the mean catch of whiting was 1347 tonnes with landings

[§] Version 2: Numbers updated

contributing to 9% of the catch. In 2021, 98% of the discards and 93% of the catch of whiting in Division 7.a originated from the *Nephrops*-directed bottom-trawl fisheries (Table 6).

Table 6 Whiting in division 7.a. 2021 catch distribution by fleet.

Catch	Landings			Discards	
	Finfish-directed otter trawls	<i>Nephrops</i> -directed otter trawls	Other gears	<i>Nephrops</i> -directed otter trawls	Other gears
1 662 tonnes	96.5%	0.9%	2.6%	97.6%	2.4%
	91 tonnes			1 571 tonnes	

In 2022, ICES updated the assessment for this stock (ICES, 2022). Advice for this stock is provided biennially and was last provided in 2021 (ICES, 2021). In response to an EC request for advice on the removal of TACs for certain stocks, ICES advises that removing the EU TAC for whiting in ICES Division 7.a may generate a high risk for the unsustainable exploitation of the stock (ICES, 2018). However, ICES notes that the current TAC does not control exploitation.

The size of the whiting (*Merlangius merlangus*) stock in Division 7.a (Irish Sea) is estimated to be extremely low. The spawning-stock biomass (SSB) has declined very significantly relative to the beginning of the time-series and has been below B_{lim} since the mid-1990s. There has been a small increase in SSB recently but it remains well below B_{lim} . Recruitment has been low since the early 1990s. Fishing mortality (F) remains above F_{MSY} . The current ICES advice is that when the MSY approach is applied, there should be zero catch in each of the years 2022 and 2023 (ICES, 2021).

The implications of various catch scenarios are presented in Table 7. These include both stable biomass and increasing biomass options, applying $F_{MSY\ lower}$ and F_{MSY} , and catches equal to the 2022 TAC.

Mixed-fishery considerations are focused on the unavoidable bycatch of whiting within the *Nephrops*-targeted fishery. Estimates of likely unavoidable bycatch were derived using a linear model of whiting catch in the *Nephrops* fishery. Whiting catch in 2006–2021 was attributed to the *Nephrops* fishery using the observed catch breakdown 2019–2021, with 98% of the catches attributed to *Nephrops* fisheries in Division 7.a. The discard estimates were explored by calculating catch ratios of whiting to *Nephrops*, with outliers removed. This method incorporates assumptions of ‘Technical measures’ changes, relating to the mandatory introduction of highly selective gears in 2012 in the main bycatch fishery, and a recruitment estimate of whiting in the intermediate year. The method assumes a *Nephrops* catch of 8476 tonnes as the average observed in 2019–2021, a recruitment of 119 242 thousand fish, and no change in fishery selectivity through the maintained use of highly selective gears. The method predicts unavoidable bycatch of 1125 tonnes in the *Nephrops* fishery. The implication of this catch on the whiting stock in Division 7.a is also shown in Table 7.

Current estimates of F are above F_{lim} (0.37). Catch scenarios based on *status quo* (F_{sq}) will reduce SSB in 2022. If the unavoidable bycatch estimates are realized, the SSB is predicted to decline. All catch options to achieve stable or increasing SSB require a reduction in fishing pressure. The forecast shows that a reduction of fishing pressure to F_{MSY} would result in an increase in SSB, as would a rollover TAC.

Table 7 Annual catch scenarios. All weights are in tonnes.

ICES advice basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	F _{total} (2023)	F _{wanted} (2023)	F _{unwanted} (2023)	SSB (2024)	% SSB change
Fishing basis options								
F = 0	0	0	0	0	0	0	2 211	80
F = F _{sq}	1 393	257	1136	0.78	0.119	0.66	1 031	-15.7
F = F _{MSY lower}	355	68	287	0.158	0.024	0.134	1 893	54.78
F = F _{MSY}	481	92	389	0.22	0.034	0.185	1 783	45.79
TAC basis options								
TAC ₂₀₂₂	721	136	585	0.35	0.053	0.29	1 573	28.62
Catch = Bycatch estimate	1 125	210	916	0.59	0.091	0.5	1 237	1.15
SSB basis options								
SSB = Stable 2023	1149	214	935	0.6	0.092	0.51	1 223	0.00
SSB = SSB ₂₀₂₃ + 20%	834	157	677	0.42	0.064	0.35	1 468	20.0

Sources and references

ICES. 2018. EU request for ICES to provide advice on a revision of the contribution of TACs to fisheries management and stock conservation. In Report of the ICES Advisory Committee, 2018. ICES Advice 2018. 35 pp.

<https://doi.org/10.17895/ices.pub.4531>

ICES. 2021a. Working Group for the Celtic Seas Ecoregion (WGCSE). Draft report. ICES Scientific Reports. 3:56. 1082 pp. <http://doi.org/10.17895/ices.pub.8139>. Publication of the full report is expected at the end of October 2021.

ICES. 2021. Whiting (*Merlangius merlangus*) in Division 7.a (Irish Sea). In Report of the ICES Advisory Committee, 2021. ICES Advice 2021, whg.27.7a, <https://doi.org/10.17895/ices.advice.7887>

ICES. 2022. Working Group for the Celtic Seas Ecoregion (WGCSE). Draft report. ICES Scientific Reports. [10.17895/ices.pub.19863796](https://doi.org/10.17895/ices.pub.19863796). Publication of the full report is expected at the end of 2022.

Recommended citation: ICES. 2022. EU standing request on catch scenarios for zero TAC stocks 2022; cod (*Gadus morhua*) in Division 6.a (West of Scotland); cod (*Gadus morhua*) in Division 7.a (Irish Sea) and whiting (*Merlangius merlangus*) in Division 7.a (Irish Sea) In Report of the ICES Advisory Committee, 2022. ICES Advice 2022, sr.2022.09c. <https://doi.org/10.17895/ices.advice.20170970>.