

## EU standing request on catch scenarios for zero TAC stocks 2021; cod (*Gadus morhua*) in Division 6.a (West of Scotland) 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 2022 are estimated to be between 1319 tonnes and 2362 tonnes, assuming that the fishing mortality on cod changes by the same proportion as the changes advised for saithe or haddock. Under the scenario resulting in lower catch, spawning-stock biomass (SSB) in 2023 is expected to increase by 17% while the higher catch option is expected to result in a decrease in SSB of 25%.
- For whiting in Division 7.a, forecasted bycatch levels in 2022 are 957 tonnes, using a model of whiting bycatch in the *Nephrops* fishery and assuming 7998 tonnes of *Nephrops* catches in 2022. This is expected to result in a 12% increase in SSB in 2023.

### 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 demersal 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. 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 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. Where possible,  $F$  scenarios that give, a stable biomass and increasing biomass (if  $F_{MSY}$  ranges do not) should also be provided.*

*Where possible ICES should provide catch scenarios which include changes in fishing pattern if they considered likely by ICES.*

*For stocks which are typically not caught in mixed fisheries (e.g. herring) but where ICES is advising zero TACs and 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.*

### 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 2022.

## 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 2020, cod constituted 1% of the total catch from this fishery. Catches of cod declined in 2020 and the discard rate was estimated to be 19% (ICES, 2021a).

**Table 1** Cod in Division 6.a. Catch distribution by fleet in 2020 as estimated by ICES.

Catch	Landings				Discards			
1583 tonnes	Demersal finfish trawl 94%	<i>Nephrops</i> fleet < 1%	Gillnet 1%	Other 4%	Demersal finfish trawl 65%	<i>Nephrops</i> fleet 32%	Gillnet 1%	Other 2%
	1273 tonnes				310 tonnes			

ICES advice for the main target species in demersal-trawl fisheries in Division 6.a implies a 31% decrease and a 66% increase in 2022 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 2021). 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 2021 will be reduced by up to 31% or increased by up to 66%, as implied by the F changes advised for saithe and haddock.

Catch scenarios based on the assessment conducted in 2021 (ICES, 2021a) suggest that catches in 2022 corresponding to a *status quo* fishing mortality would be 1729 tonnes. A 31% reduction in fishing, consistent with the advice for saithe, would result in a total catch of 1319 tonnes in 2022 while an increase in fishing mortality consistent with the advice for haddock, would result in a total catch of 2362 tonnes (Table 3). The best available estimate for catches of this stock in 2022 is thus between 1319 tonnes and 2362 tonnes, provided TACs for target stocks are set in line with ICES advice.

**Table 2** Percentage change in fishing mortality, harvest rate, or advised catch between 2021 and 2022, as implied by ICES advice for the main demersal stocks in the West of Scotland.

Species	Corresponding EC TAC area	ICES stock code	F <sub>2021</sub>	Advised F <sub>2022</sub>	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	0.75	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	0.065	0.21	223%
Saithe ( <i>Pollachius virens</i> )	Subarea 6; EU and international waters of Division 5.b and subareas 12 and 14	pok.27.3a46	0.45	0.31	-31%
Haddock ( <i>Melanogrammus aeglefinus</i> )	EU and international waters of divisions 5.b and 6.a	had.27.46a20	0.117	0.194	66%
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	0.44	1	127%

\* % change in fishing mortality (or F/F<sub>MSY</sub> ratio), advised by ICES for 2022 relative to 2021.

**Table 3** Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2022)	Projected landings (2022)	Projected discards (2022)	F <sub>total</sub> (2022)	F <sub>projected</sub> landings (2022)	F <sub>projected</sub> discards (2022)	SSB (2023)	% SSB change *
MSY approach: F = 0	0	0	0	0	0	0	5040	70
F = F <sub>MSY lower</sub>	534	373	161	0.18	0.136	0.044	4404	49
F = F <sub>MSY</sub>	841	584	257	0.3	0.23	0.073	4037	36
F = F <sub>2021</sub>	1729	1177	552	0.75	0.57	0.184	2976	0.44
F = 0.69 × F <sub>2021</sub>	1319	908	411	0.52	0.39	0.127	3466	17
F = 1.66 × F <sub>2021</sub>	2362	1578	784	1.25	0.95	0.31	2213	-25

\* SSB 2023 relative to SSB 2022.

### 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 2018–2020, the mean catch of whiting was 1093 tonnes with landings contributing to 9% of the catch. In 2020, 98% of the discards and 90% of the catch of whiting in Division 7.a originated from the *Nephrops*-directed bottom-trawl fisheries (Table 5).

**Table 5** Whiting in division 7.a. 2020 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
1118 tonnes	94.5%	0.3%	5.2%	98%	3%
	88 tonnes			1030 tonnes	

In 2021, ICES updated the assessment and advice for this stock (ICES, 2021b). 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<sub>lim</sub> since the mid-1990s. There has been a small increase in SSB recently but it remains well below B<sub>lim</sub>. Recruitment has been low since the early 1990s. Fishing mortality (F) remains above F<sub>MSY</sub>. 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, 2021b).

The implications of various catch scenarios are presented in Table 6. These include both stable biomass and increasing biomass options, applying F<sub>MSY lower</sub> and F<sub>MSY</sub>, and catches equal to the 2021 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 2006–2020 was attributed to the *Nephrops* fishery using the observed catch breakdown 2018–2020, 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 7998 tonnes as the average observed in 2018–2020, a recruitment of 119 971 thousand fish, and no change in fishery selectivity through the maintained use of highly selective gears. The method predicts unavoidable bycatch of 957 tonnes in the *Nephrops* fishery. The implication of this catch on the whiting stock in Division 7.a is also shown in Table 6.

Current estimates of F are above F<sub>lim</sub> (0.37). Catch scenarios based on *status quo* (F<sub>sq</sub>) will reduce SSB in 2021. 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 6** Annual catch scenarios. All weights are in tonnes.

ICES advice basis	Total catch (2022)	Projected catch (2022)	Projected discards (2022)	$F_{total}$ (2022)	$F_{wanted}$ (2022)	$F_{unwanted}$ (2022)	SSB (2023)	% SSB change
Fishing basis options								
$F = 0$	0	0	0	0	0	0	2334	76
$F = F_{sq}$	1254	267	987	0.65	0.089	0.56	1240	-6.5
$F = F_{MSY \text{ lower}}$	368	81	288	0.158	0.022	0.136	2000	51
$F = F_{MSY}$	498	109	390	0.22	0.030	0.189	1884	42
TAC basis options								
$TAC_{2021}$	721	155	566	0.33	0.046	0.29	1688	27
Catch = Bycatch estimate	957	205	752	0.46	0.064	0.40	1485	12
SSB basis options								
SSB = Stable 2022	1149	245	904	0.58	0.080	0.50	1326	0.00
SSB = $SSB_{2022} + 20\%$	834	180	654	0.39	0.054	0.34	1591	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. ICES Special Request Advice sr.2018.15, <https://doi.org/10.17895/ices.pub.4531>

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