

## EU standing request on catch scenarios for zero TAC stocks 2020; cod (*Gadus morhua*) and whiting (*Merlangius merlangus*) in Division 6.a (West of Scotland), and whiting 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 2021 are estimated to be between 1625 tonnes and 1914 tonnes, based on the fishing mortality reductions advised for saithe and based on the current fishing mortality. Under these scenarios, spawning-stock biomass (SSB) in 2022 is expected to increase by 17–30%.
- For whiting in Division 6.a, it is not possible to forecast catches in 2021 or stock development. Catches in 2019 were estimated at 1444 tonnes.
- For whiting in Division 7.a, forecasted bycatch levels in 2021 are 930 tonnes, using a model of whiting bycatch in the *Nephrops* fishery and assuming 7300 tonnes of *Nephrops* catches in 2021. This is expected to result in a 7% increase in SSB in 2022.

### Request

EU DGMARE has requested ICES to 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\*. 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.*

### 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.

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\* 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  $F_{MSY\ lower}$  yielded negative biomass for a stock slightly above  $B_{lim}$ .

## 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 2019, cod constituted 1% of the total catch from this fishery. Catches of cod declined in 2019 and the discard rate was estimated to be 9% (ICES, 2020a).

**Table 1** Cod in Division 6.a. Catch distribution by fleet in 2019 as estimated by ICES.

Catch	Landings				Discards		
	Demersal finfish trawl	<i>Nephrops</i> fleet	Gillnet	Other	Demersal finfish trawl	<i>Nephrops</i> fleet	Other
2264 tonnes	92%	< 1%	2%	6%	51%	45%	4%
	2060 tonnes				204 tonnes		

ICES advice for the main target species in demersal-trawl fisheries in Division 6.a implies a 21% and 1.52% decrease in 2021 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). The activities of these fisheries 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 2020 will be either similar to the current value or reduced by up to 21%, as implied by the F reduction advised for saithe.

The most recent advice provided in 2020 suggests that catches in 2021 corresponding to a *status quo* fishing mortality would be 1914 tonnes. A 21% reduction in fishing, consistent with the advice for saithe, would result in a total catch of 1625 tonnes in 2021 (Table 3). Rolling over the current TAC of 1279 tonnes implies a 42% reduction in fishing mortality for cod. The best available estimate for catches of this stock in 2021 is thus between 1625 tonnes and 1914 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 2020 and 2021, as implied by ICES advice for the main demersal stocks in the West of Scotland and Rockall.

Species	Corresponding EC TAC area	ICES stock code	F <sub>2020</sub>	Advised F <sub>2021</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	1.00	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%
Saithe ( <i>Pollachius virens</i> )	Subarea 6; EU and international waters of Division 5.b and subareas 12 and 14	pok.27.3a46	0.46	0.363	-21%
Haddock ( <i>Melanogrammus aeglefinus</i> )	EU and international waters of divisions 5.b and 6.a	had.27.46a20	0.197	0.194	-1.52%
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	0.39	1	156%

\* % change in fishing mortality (or F/F<sub>MSY</sub> ratio), advised by ICES for 2021 relative to 2020.

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

Basis	Total catch (2021)	Projected landings (2021)	Projected discards (2021)	F <sub>total</sub> (2021)	F <sub>projected</sub> landings (2021)	F <sub>projected</sub> discards (2021)	SSB (2022)	% SSB change *	% TAC change ^
ICES advice basis									
MSY approach: F = 0	0	0	0	0	0	0	6070	101	-100
Other scenarios									
F = F <sub>2019</sub>	1914	1258	657	1.00	0.8	0.198	3538	17.0	50
F = 0.79 × F <sub>2019</sub>	1625	1078	547	0.79	0.63	0.157	3934	30	27
Catch = TAC(2020)	1279	857	422	0.58	0.46	0.114	4389	45	0.00

\* SSB 2022 relative to SSB 2021.

^ Total catch in 2021 relative to the TAC in 2020 (1279 tonnes).

### Whiting in Division 6.a

As with cod in this area, whiting in Division 6.a is considered a minor bycatch in the fisheries targeting Northern shelf haddock, saithe, and anglerfish. Considerable catches of whiting in Division 6.a are also taken by the *Nephrops*-directed otter trawl fishery; in 2019, whiting constituted 1.3% of the total catch from this fishery (ICES, 2020c). The discard rate for whiting in 2019 (including the 0-group) was 66% (Table 4). Whiting is a relatively low-value species, and a targeted fishery for whiting has not taken place in Division 6.a since the early 2000s.

**Table 4** Whiting in Division 6.a. Catch distribution by fleet in 2019 as estimated by ICES.

Catch	Landings			Discards *		
	Finfish-directed otter trawl	<i>Nephrops</i> -directed otter trawl	Other gear	Finfish-directed otter trawl	<i>Nephrops</i> -directed otter trawl	Other gear
1444 tonnes	92%	0%	8%	39%	58%	3%
	484 tonnes			960 tonnes		

\* All discards, including the 0-group.

As a category 5 stock, whiting in Division 6.a does not have a full analytical assessment. The stock has no quantitative method for the forecast and currently no accepted method exists for producing forecasts. At the WGMIXFISH-Methods meeting in 2018, it was concluded that the methodology for such forecasts, specifically for stocks with only trends-based advice, needs further testing before it can be used for advice (ICES, 2019a).

ICES advice for the two target species in demersal trawl fisheries in Division 6.a indicates a 21% and 1.52% decrease in the fishing mortality of saithe and haddock, respectively, in 2021 (Table 2, in the section for cod in Division 6.a).<sup>‡</sup> The advice for anglerfish and *Nephrops*, two other target stocks in this area, will be released in October. All of these stocks overlap in the fisheries, with bycatches of whiting as well as of cod. Providing TACs in Division 6.a are set in line with the advice for haddock and saithe, the most reasonable assumption is that fishing mortality for whiting in 2021 will be similar to current values. Consequently, catches from last year (1444 tonnes) are the best available estimate of catches of this stock in 2021.

### 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 appears to have reduced catches since the introduction in 2013. However, discard levels have remained high relative to landings. During 2017–2019, the mean catch of whiting was 954.7 tonnes (s.d = 283), with landings contributing to 8% of the catch. In 2019, 97% of the discards and 84% of the catch of whiting in Division 7.a originated from the *Nephrops*-directed bottom-trawl fisheries (Table 5).

<sup>‡</sup> Version 2: sentence updated

**Table 5** Whiting in division 7.a. 2019 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
1261 tonnes	96%	< 1%	3%	97%	4%
	172 tonnes			1089 tonnes	

This stock was benchmarked in 2017 (ICES, 2017) and is assessed by a category 1 method (analytical assessment and forecast). The advice for this stock is biennial, with the latest advice issued in 2019. In 2020, the Working Group for the Celtic Seas Ecoregion (WGCSE) updated the assessment with the 2019 data (ICES, 2020b). 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. 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 been declining since the beginning of the time-series, with a recent small increase, and has remained well below  $B_{lim}$  since the mid-1990s. Recruitment has been low since the early 1990s. Fishing mortality (F) has declined since 2015, but 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 2020 and 2021 (ICES, 2019b).

The implications of various catch scenarios are presented in Table 6. These include both stable biomass and increasing biomass options, applying  $F_{MSY\ lower}$  and  $F_{MSY}$ , and a rollover of the current TAC to 2021.

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 2005–2018 was attributed to the *Nephrops* fishery using the observed catch breakdown 2016–2018, with 89% 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 7300 tonnes as observed in 2018, a recruitment of 118 276 thousand fish, and no change in fishery selectivity through the maintained use of highly selective gears. The method predicts unavoidable bycatch of 930 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  $F_{lim}$  (0.37). Catch scenarios based on *status quo* ( $F_{sq}$ ) will reduce SSB in 2020. 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 (2021)	Projected catch (2021)	Projected discards (2021)	$F_{total}$ (2021)	$F_{wanted}$ (2021)	$F_{unwanted}$ (2021)	SSB (2022)	% SSB change
<b>Fishing basis options</b>								
F = 0	0	0	0	0.00	0.000	0.00	3357	43
F = $F_{sq}$	1392	193	1199	0.47	0.031	0.44	2102	-11
F = $F_{MSY\ lower}$	531	75	456	0.16	0.010	0.15	2867	22
F = $F_{MSY}$	717	101	616	0.22	0.014	0.20	2698	15
<b>TAC basis options</b>								
TAC <sub>2020</sub>	721	101	619	0.22	0.014	0.21	2695	15
Catch = Bycatch estimate	930	130	800	0.29	0.019	0.27	2507	7
<b>SSB basis options</b>								
SSB = Stable 2021	1105	154	951	0.36	0.023	0.33	2352	0
SSB = SSB <sub>2021</sub> + 20%	580	82	498	0.17	0.011	0.16	2822	20

## Sources and references

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