ICES Special Request Advice
Northeast Atlantic ecoregions
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EU request for ICES to provide advice on a revision of the contribution of TACs to fisheries management and stock conservation

Advice summary

1. ICES advises that removing the EU TACs for the following stocks may generate a high risk of the stocks being exploited unsustainably:

- Blue ling (*Molva dypterygia*) in ICES Subarea 12
- Ling (*Molva molva*) in ICES Division 5.b
- Cod (*Gadus morhua*) in ICES Division 6.b
- Plaice in ICES divisions 7.b and 7.c
- Plaice in ICES divisions 7.h, 7.j, and 7.k
- Pollack (*Pollachius pollachius*) in ICES Subarea 6, Division 5.b, and subareas 12 and 14
- Whiting (*Merlangius merlangus*) in ICES Subarea 6, Division 5.b, and subareas 12 and 14
- Whiting in ICES Division 7.a
- Spurdog (picked dogfish) (*Squalus acanthias*) in subareas 1, 5, 6, 7, 8, 12, and 14
- Pollack in ICES Subarea 8 and Division 9.a
- Blue ling in ICES Division 3.a and Subarea 4
- Ling in ICES Division 3.a and Subarea 4
- Cod in ICES Subdivision 3.a.21
- Turbot (*Scophthalmus maximus*) in ICES Subarea 4
- Brill (*Scophthalmus rhombus*) in ICES Division 3.a, Subarea 4, and divisions 7.d and 7.e
- Witch (*Glyptocephalus cynoglossus*) in ICES Division 3.a, Subarea 4, and Division 7.d
- Skates and rays (*Rajidae*) in Division 7.d
- Skates and rays in divisions 6.a, 6.b, 7.a–c, and 7.e–k
- Skates and rays in subareas 8 and 9
- Skates and rays in Division 2.a and Subarea 4

2. ICES advises that removing the EU TACs for the following stocks would generate a low risk of stocks being exploited unsustainably:

- Plaice in ICES Division 7.a
- Plaice in ICES divisions 7.f and 7.g
- Tusk (*Brosme brosme*) in ICES Division 3.a and Subarea 4
- Plaice in ICES Subdivision 3.a.21
- Lemon sole (*Microstomus kitt*) in ICES Division 3.a, Subarea 4, and Division 7.d
- Cod in ICES Division 5.b
- Haddock in ICES Division 5.b

ICES recommends that the stock status for these the stocks should continue to be monitored and that management measures are put in place if the fishing mortality exceeds sustainable levels.

3. In the cases where ICES recommends that a TAC should be maintained for an area that represents only a part of a stock, a TAC could either be maintained for that part of the stock, joined with a TAC for another part of the stock or alternatively, could be included with a TAC that would cover the entire stock area. ICES therefore advises:

- The EU TAC for ling in ICES Subarea 5 can be merged with that for ling in ICES divisions 3.a and 4.a, and in subareas 6–9, 12, and 14 (lin.27.3a4a6-91214).
- The two separate EU TACs for ling in ICES Division 3.a and ling in EU waters of ICES Subarea 4 are merged into one TAC for ling in ICES Division 3.a and Subarea 4.
- The EU TAC for blue ling in international waters of ICES Subarea 12 can be replaced by expanding the TAC for blue ling in ICES Division 5.b and subareas 6–7 to ICES subdivisions 12.a.2 and 12.b, and with a bycatch limit in ICES Subdivision 12.a.1.

4. ICES furthermore advises that:

- If it is decided to maintain the EU TACs for the two tusk stocks (tusk in ICES Division 3.a and tusk in ICES Subarea 4), merging the two TACs would be a more precautionary alternative.

- Witch in ICES Division 3.a, Subarea 4, and Division 7.d should be managed using a single-species TAC covering the stock distribution area (i.e. ICES Division 3.a, Subarea 4, and Division 7.d).
- Turbot and brill should be managed using single-species TACs covering an area appropriate to the relevant stock distribution (turbot: ICES Subarea 4, brill: ICES Subarea 2, Division 3.a, Subarea 4, and divisions 7.d and 7.e).

Request

ICES is requested to analyse for a list of stocks (as specified below) the role of the Total Allowable Catch instrument. It is asked to assess the risks of removing TAC for each case analysed in light of the requirement to ensure that the stock concerned remains within safe biological limits in the short and middle term. ICES is further requested to assess the potential contribution of the application of other conservation tools in absence of TACs to the requirement that the stock concerned remains within safe biological limits.

In cases where the uses of TAC should be continued, ICES is asked to analyse a possible approach to contribute to inter-annual stability of TACs.

Table 1 Stocks covered in this advice in response to the request.

ICES Stocks	*ICES Stock code*	EU TAC area
North Western waters: ICES subareas 5–7		
1) Blue ling in ICES Subarea 12	*bli.27.5b67*	International waters of 12
2) Ling in ICES Division 5.b	*lin.27.5b*	Union and international waters of 5
3) Haddock in ICES Division 5.b	*had.27.5b*	Union and international waters of 5b and 6a
3) Cod in ICES divisions 5.b and 6.b	*cod.27.5b1, cod.27.5b2, cod.27.6b*	6b; Union and international waters of 5b west of 12° 00' W and of 12 and 14
4) Plaice in ICES Division 7.a	*ple.27.7a*	7a
5) Plaice in ICES divisions 7.b and 7.c	*ple.27.7bc*	7b and 7c
6) Plaice in ICES divisions 7.f and 7.g	*ple.27.7fg*	7f and 7g
7) Plaice in ICES divisions 7.h, 7.j, and 7.k	*ple.27.7h-k*	7h, 7j and 7k
8) Pollack in ICES Subarea 6, Division 5.b, and subareas 12 and 14	*pol.27.67*	6; Union and international waters of 5b; international waters of 12 and 14
9) Whiting in ICES Subarea 6, Division 5.b, and subareas 12 and 14	*whg.27.6a and whg.27.6b*	6; Union and international waters of 5b; international waters of 12 and 14
10) Whiting in ICES Division 7.a	*whg.27.7a*	7a
South Western waters: ICES subareas 8–10 and the CECAF areas		
11) Pollack in ICES Subarea 8 and Division 9.a	*pol.27.89a*	Three TACs: 8a, 8b, 8d and 8e 8c 9 and 10; Union waters of CECAF 34.1.1
North Western waters: ICES subareas 2–4		
12) Blue ling in ICES Division 3.a and Subarea 4	*bli.27.nea*	Union and international waters of 2 and 4
13) Ling in ICES Division 3.a and Subarea 4	*lin.27.3a4a6-91214*	3a
14) Tusk in ICES Division 3.a and Subarea 4	*usk.27.3a45b6a7-912b*	3a
15) Spurdog	*dgs.27.nea*	Union and international waters of 1, 5, 6, 7, 8, 12 and 14
16) Plaice in ICES Subdivision 3.a.21	*ple.27.21-23 and ple.27.24-32*	Kattegat
17) Cod in ICES Subdivision 3.a.21	*cod.27.21*	Kattegat

ICES Stocks	*ICES Stock code*	EU TAC area
18) Lemon sole in ICES Division 3.a, Subarea 4, and Division 7.d and witch in ICES Division 3.a, Subarea 4, and Division 7.d	*lem.27.3a47d and wit.27.3a47d*	Union waters of 2a and 4
19) Turbot in ICES Subarea 4 and brill in ICES Division 3.a, Subarea 4, and divisions 7.d and 7.e	*tur.27.4 and bll.27.3a47de*	Union waters of 2a and 4
20) Skates and rays	*All areas*	
a) Skates and rays	*Eastern English Channel*	Union waters of 7d
b) Skates and rays	*Celtic Seas*	Union waters of 6a, 6b, 7a-c and 7e-k
c) Skates and rays	*Biscay and the Iberian Coast*	Union waters of 8 and 9
d) Skates and rays	*North Sea*	Union waters of 2a and 4

Elaboration and basis of the advice

Background

The establishment of total allowable catches (TACs) on a stock-by-stock basis as a management tool to control the exploitation of fish stocks within sustainable levels is widely used internationally. The various fisheries in northeastern Atlantic waters are currently managed by more than 140 TACs. In the context of the introduction of multiannual plans for demersal mixed fisheries in the Baltic, North Sea, and Western waters, and the challenges posed by the EU landing obligation to the management of these fisheries (e.g. choke species), the EU requested ICES to evaluate the potential risks of removing the TACs for a number of stocks and management units and to determine whether alternative instruments might adequately achieve the same goals.

The current advice relates to all stocks in the request other than the deep-water stocks included in the EU regulation for setting of the fishing opportunities for certain deep-water fish stocks (EU, 2016a). ICES advice for the latter stocks was released on 2 July 2018.

ICES advises on the risk of stocks being exploited unsustainably if TACs are removed. The basis and rationale for the advice are provided below for each stock or group of stocks.

ICES notes that for some stocks there can be two TACs or more, each covering a separate portion of the stock area; ICES was requested to provide advice for some of these. In cases where ICES recommends that a TAC should be maintained for an area that represents only part of a stock, the TAC could either be maintained for that part of the stock, could be merged with a TAC for another part of the stock or could, alternatively, be included in a TAC that covers the entire stock area. An important issue in ensuring sustainable exploitation is that the various TACs relate to portions of the same stock and are set taking into account the advice on fishing opportunities for the entire stock.

ICES was also requested to assess, in the absence of TACs, the potential contribution of the application of other conservation tools to the requirement that the stock in question remains within safe biological limits. The evaluation of potential impacts of technical measures on a stock is in many cases complicated to perform and requires knowledge on the likely reaction to such measures by the fisheries concerned. ICES has not been able to perform systematic analyses of other conservation tolls; therefore, this advice only covers the risk to the stocks from removing the TACs.

The landing obligation may result in changes in the way the fisheries are operating, which could, in turn, lead to changes in the species and size composition of catches. ICES is not able to predict these changes. The assessments of the potential risk of removing the TACs are therefore based on the current fisheries pattern and do not address potential impacts on the fisheries of the implementation of the landing obligation.

A key question in the assessments forming the basis for the advice is whether the TACs have been restrictive. The analyses of TAC utilization have been done on a total catch/landing and management area level. ICES recognizes that although a TAC may not have been restrictive at the level of total catches/landings, the associated quotas allocated to EU Member States, fleet segments, or individual vessels may have been restrictive. This means that catches may increase if the TAC is removed, in some cases where the TAC has not been overshot. ICES does not have the information required to do a systematic analysis of the extent to which a TAC has been restrictive at quota levels; the assessments of the restrictiveness of the TACs are therefore done only at the level of total catches.

Regarding possible approaches to contribute to interannual stability of TACs for stocks where the TAC should be maintained, ICES notes that the advice provided on fishing opportunities for category 1 and 2 stocks does not currently include any interannual stability constraint. For stocks in these categories, stability constraints could be investigated through management strategy evaluations (MSEs). For stocks in categories 3 and 4, the advice rule used by ICES to provide advice on fishing opportunity incorporates a stability constraint. In addition, for most of these stocks as well as those in categories 5 and 6, the advice provided is the same for two or more years.

North Western waters

1) **Blue ling in ICES Subarea 12**

ICES advises that removing the EU TACs for blue ling in Subarea 12 may generate a high risk of the stock being exploited unsustainably and that a TAC for blue ling in international waters of Subarea 12 should be maintained. ICES further advises that the TAC for blue ling in international waters of Subarea 12 can be merged with the TAC for blue ling in Division 5.b, subareas 6–7, Subdivision 12.a.2, and Division 12.b.

Stock status

The blue ling in international waters of Subarea 12 belong to the blue ling stock in subareas 1, 2, 8, 9, and 12, and in divisions 3.a and 4.a. It is a category 5 stock with information on landings trends that suggest a strong decline in Subarea 12 from 2002 onwards. Landings from other areas and inside the NEAFC regulatory area have declined and currently are minor.

While declines in catch in the early part of the time-series reflect depletion of the stock, declines in catch in recent years may be more indicative of a reduction in effort directed towards spawning aggregations.

ICES advised in 2018 that when the precautionary approach is applied, there should be zero catches in each of the years 2018 and 2019. This advice is unlikely to change until the scientific information is sufficient to assess the status of the stock. Closed areas to protect spawning should be maintained.

Fisheries

Blue ling is known to form spawning aggregations. From 1970 to 1990, the bulk of blue ling catches in all the ICES areas was from seasonal fisheries targeting these aggregations which were subject to sequential depletion. Since the 2000s landings mostly resulted from bycatch in the Spanish mixed demersal deep-water bottom trawl fishery on the western Hatton bank (Division 12.b). Some earlier landings may have been caught on the mid-Atlantic Ridge (subdivisions 12.a.1 and 12.a.4). With the limited landings of 10–80 t year^{-1} in 2014–2017, the economic value of the fishery is regarded to be low. Blue ling can only sustain a moderate fishing pressure.

Management measures

Blue ling is a straddling stock; it occurs in several EEZs, but mainly in the northernmost part of the Atlantic. Landings from subareas 8 and 9, reported in the past as blue ling (*Molva dypterygia*), are now considered to be Spanish ling (*Molva macropthalma*). Currently the advice for the blue ling stock is zero catches for 2018 and 2019. There is no management plan for this stock.

Vulnerability

Blue ling is known to form spawning aggregations. From 1970 to 1990, the bulk of blue ling catches in all the ICES areas was from seasonal fisheries targeting these aggregations which were subject to sequential depletion. Blue ling can only sustain a moderate fishing pressure; only one stock was present when a quantitative assessment was undertaken and the F_{MSY} was estimated at 0.12.

Knowledge gaps

Levels of landings in the 1980s and 1990s are uncertain. No standardized abundance estimates are available for blue ling in these areas.

Potential risk to the stock of removing the TAC

What would occur in the absence of regulation is unpredictable. Targeted fisheries for blue ling in this area have currently ceased and it is not known if they could be resumed in the absence of a TAC. Current landings are very small (28 tonnes in

2017). The species price, higher than that of saithe and haddock, is high enough to potentially make target fishing profitable. Therefore, instead of removing the TAC in Subarea 12, appending Subdivision 12.a.2 and Division 12.b to the TAC in Division 5.b and subareas 6 and 7 could be suitable, based on the continuity of bathymetric features.

2) **Ling in ICES Division 5.b**

ICES advises that removing the EU TAC for ling in ICES Division 5.b may generate a high risk of the stocks being exploited unsustainably. ICES furthermore advises that the TAC for ling in EU and international waters of Subarea 5 can be joined to that for ling in subareas 6–9, 12, and 14, and in divisions 3.a and 4.a.

Stock status

ICES recognizes four ling stocks in the Northeast Atlantic and the North Sea:

- Ling in subareas 1 and 2;
- Ling in Division 5.a;
- Ling in Division 5.b; and
- Ling in ICES divisions 3.a and 4.a, and in subareas 6–9, 12, and 14.

The TAC in question covers EU fisheries in Union and international waters of Subarea 5.

Ling in ICES Division 5.b are mainly distributed on the Faroe Plateau and on the bank areas southwest of the Faroe Islands. Very small amounts are caught on the Wyville–Thomson ridge in the southernmost part of the Faroese EEZ. Ling caught in Union and international waters just outside the southernmost border of the Faroese EEZ in Division 5.b is probably more connected to the ling stock in ICES divisions 3.a and 4.a, and in subareas 6–9, 12, and 14 than the stock on the Faroe Plateau in Division 5.b, based on bathymetry features.

ICES advised in 2017 that when the precautionary approach is applied, catches of ling in ICES divisions 3.a and 4.a, and in subareas 6–9, 12, and 14 should be no more than 17 695 tonnes in each of the years 2018 and 2019. If discard rates do not change from the average of the last three years (2014–2016) this implies landings of no more than 16 793 tonnes.

Landings have been stable for the last five years, with an increase in discards in the last three years. A standardized catch per unit effort (CPUE), based on data from the Norwegian longline fleet, shows an increasing trend since 2004.

Fisheries

ICES has limited information on the fisheries in EU and international waters of Subarea 5. Ling in Division 5.b is caught by trawl (37%) and longline (63%) vessels and discarding is considered negligible.

Management measures

The EU TAC in Union and international waters of Subarea 5 is 33 tonnes of ling in 2018, which is around 1% of the quotas for EU–Norway in the Faroese EEZ.

For the Faroese fleets fishing in Division 5.b there is a licensing scheme and effort limitations. In 2019, it is likely that fisheries of ling by Faroese vessels will be managed by a combination of licensing scheme and quotas in the Faroese EEZ.

ICES is not aware of any agreed management plan for this stock.

Vulnerability

Ling in ICES Division 5.b are mainly distributed on the Faroe Plateau and on the bank areas southwest of the Faroe Islands. Very small amounts are caught on the Wyville–Thomson ridge in the southernmost part of the Faroese EEZ. Ling caught in Union and international waters just outside the southernmost border of the Faroese EEZ in Division 5.b is probably more connected to the ling stock in Division 6.a (lin.27.3a4a6-91214) than to the stock on the Faroe Plateau in Division 5.b.

Knowledge gaps

There is no available data for fishing effort on stock level. The exploratory assessment shows that the fishing mortality is slightly decreasing and the spawning stock size is increasing.

Potential risk to the stock of removing the TAC

A targeted fishery for ling in Division 5.b has economic value to the Faroe Islands. The EU TAC in Union and international waters of Subarea 5 is 33 tonnes of ling/blue ling in 2018, which is around 1% of the quotas for EU–Norway in the Faroese EEZ. ICES considers that ling in EU and international waters of ICES Subarea 5 belongs to the ling stock in ICES divisions 3.a and 4.a, and in subareas 6–9, 12, and 14. Therefore, joining the TAC for EU and international waters of Subarea 5 to the TAC for ling in Union and international waters of ICES subareas 6, 7, 8, 9, 10, 12, and 14 into a TAC for Union and international waters of ICES subareas 5–10, 12, and 14 would allow removing the small TAC without any risk to the stock.

3) **Haddock in ICES Division 5.b**

ICES advises that removing a TAC for haddock in EU waters of Division 5.b may generate a low risk of the stock being exploited unsustainably.

Stock status

ICES has no information on this stock in the EU part of Division 5.b. Between 1998 and 2018, 169 hauls were taken on surveys from bottom trawl stations south of 60.2 decimal degrees North. All of these stations were located on the Wyville–Thompson ridge, which is in the Faroese jurisdiction but quite close to EU waters. Across all 169 hauls, two haddock were caught.

Fisheries

ICES has limited information on the fisheries in EU and international waters of Division 5.b, and no information on catches of haddock.

Management measures

The EU TAC covers Union and international waters of divisions 5.b and 6.a. The available information shows no indication of fisheries on haddock in EU waters of Division 5.b. ICES assesses haddock in Division 6.a as a separate stock (Rockall haddock) and ICES provides annual advice on fishing opportunities for this stock.

Potential risk to the stock of removing the TAC

Although the information on haddock in EU waters of Division 5.b is very limited, it can be concluded that the abundance of haddock in EU waters close to the Faroese jurisdiction area is very low. Therefore, having no TAC for haddock in EU waters of Division 5.b may generate a low risk of the stock being exploited unsustainably.

4) **Cod in ICES divisions 5.b and 6.b**

ICES advises that the stock status and exploitation levels for cod in Division 6.b are unknown, but catch data suggest that the stock may be depleted. ICES advises, based on precautionary considerations, that removing the EU TACs for the cod in ICES Division 6.b may generate a high risk of the stock being exploited unsustainably.

ICES advises that removing the TAC for cod in EU waters of Division 5.b may generate a low risk of the stock being exploited unsustainably.

Stock status

ICES assesses cod in ICES Division 6.b as one stock and advised in 2017 that when the precautionary approach is applied, catches should be no more than 14 tonnes in each of the years 2018, 2019, and 2020. ICES cannot quantify the corresponding landings.

Landings were on average over 1000 tonnes for most years in the 1980s and have declined to less than 100 tonnes since 2002. The available information is insufficient to evaluate the stock trends and exploitation (category 6 stock) but suggests that the stock may be depleted.

ICES has no information on cod in the EU part of Division 5.b. Between 1998 and 2018, 169 hauls were taken on surveys from bottom trawl stations south of 60.2 decimal degrees North. All of these stations were located on the Wyville–Thompson ridge, which is in the Faroese jurisdiction but quite close to EU waters. Across all 169 hauls no cod were caught.

Fisheries

There is no targeted fishery for cod in Division 6.b. It is predominantly caught as a wanted, bycatch species in the mixed bottom-trawl fisheries targeting haddock (*Melanogrammus aeglefinus*) and monkfish (*Lophius piscatorius* and *Lophius budegassa*). Landings compositions for these vessels are typically dominated by haddock, monkfish, saithe (*Pollachius virens*), ling (*Molva molva*), squid (*Loligo vulgaris*), witch (*Glyptocephalus cynoglossus*), and megrim (*Lepidorphombus whiffiagonis*), with cod accounting for < 5% (STECF, 2017a). Discard rates remain unknown, due to a combination of very low sampling levels and highly variable estimates. However, ICES estimates that 15% of the catch in 2016 was discarded.

Bottom trawl effort has been more than halved in the period 2008–2016, while fishing efforts using either nets or rod and lines show no clear trend.

ICES has limited information on the fisheries in EU and international waters of Division 5.b, and no information on catches of cod.

Management measures

The TAC in question covers ICES Division 6.b and EU and international waters of Division 5.b west of 12°00'W, as well as subareas 12 and 14.

For assessment and management purposes, Atlantic cod populations inhabiting the west of Scotland have been divided into two stocks: Division 6.a (West of Scotland) and Division 6.b (Rockall). The degree of population exchange between the cod stocks in ICES divisions 6.a and 6.b remains unclear.

Knowledge gap

No analytical assessment is available for this cod stock; a category 6 assessment is applied.

Potential risk to the stock from removing the TAC

Cod in Division 6.b are a minor bycatch in target fisheries for haddock and anglerfish and the TAC does not generally appear to restrict landings. No reliable estimates of total catch are available because of insufficient discard sampling. Given the low stock abundance and distant location it seems unlikely that a target fishery would develop in the absence of a TAC, although fishing for haddock at F_{MSY} may result in a small increase in effort in the target fishery and, hence, a small increase in cod fishing mortality.

ICES advises that the stock status and exploitation levels for cod in Division 6.b are unknown, but landings data suggest that the stock may be depleted. ICES advises, based on precautionary considerations, that removing the EU TACs for cod in Division 6.b may generate a high risk of the stock being exploited unsustainably.

Although there is very limited information on cod in EU waters of Division 5.b, it can be concluded that the abundance of cod in EU waters close to the Faroese jurisdiction area is very low. Therefore, having no TAC for cod in EU waters of Division 5.b may generate a low risk of the stock being exploited unsustainably.

5) **Plaice in ICES Division 7.a (Irish Sea)**

ICES advises that removing the TAC for plaice in ICES Division 7.a would generate a low risk of the stock being exploited unsustainably.

Stock status

The latest catch advice from ICES is that when the MSY approach is applied, catches in 2019 should be no more than 3503 tonnes.

The spawning-stock biomass (SSB) has increased since 2012 and has been well above MSY $B_{trigger}$ since 2013. Fishing mortality has been rapidly decreasing since 1992 and has been below F_{MSY} since 2011.

Fisheries

There is no targeted fishery for plaice in Division 7.a. It is predominantly caught as a bycatch species. The market demand for Division 7.a plaice is poor, and the price is amongst the lowest in EU market. Landings from Irish fleets have increased in recent years in line with the increased biomass.

A substantial amount of plaice (62% by weight and 82% by numbers) is discarded, mainly because catches consist of small fish below the minimum conservation size (MCS) of 27 cm. High levels of discards are known to occur in all fisheries that catch plaice in the Irish Sea. An increase in the mesh size for fleets catching plaice would result in losses of marketable target species (mainly sole).

Most of the catches are taken by beam trawlers, followed by otter trawlers. The effort for both gears has declined substantially over the last 15–20 years, resulting in a reduction of fishing mortality. The fishing effort of beam trawlers in the Irish Sea may increase if their main target species (sole) recovers. However, current fishing mortality on Irish Sea plaice is well below F_{MSY} and such an increase in fishing effort is not expected to result in an unsustainable exploitation of the plaice stock.

Management measures

The TAC for this stock matches the stock assessment area and has generally followed the advice (with an uplift in recent years).

The TAC has not constrained the landings. In the last ten years the uptake was around 50%; before that it was around 70%. However, the Belgian landings have been well in excess of their quota share, indicating that Belgium relies on considerable quota swaps (Figure 1).

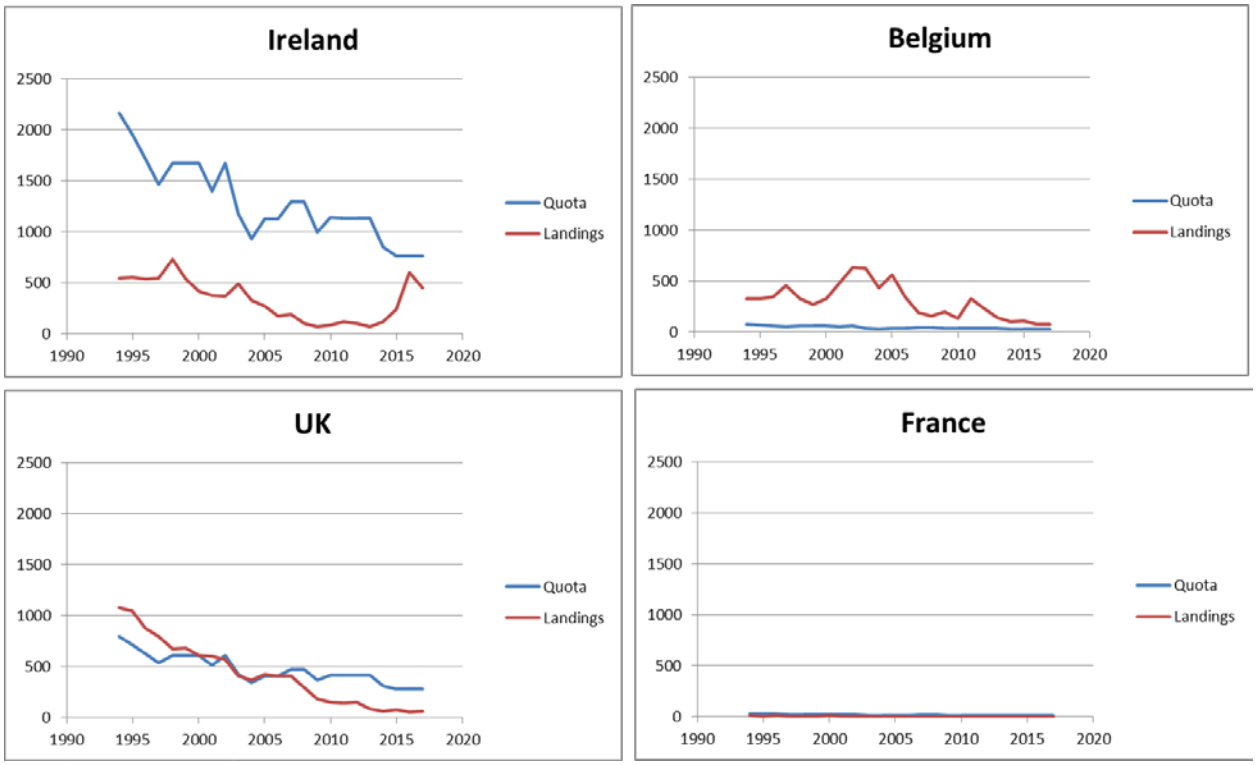

Figure 1 Irish Sea plaice. Quota (blue) and landings (red) by country. Belgium, which only has 2.5% of the quota, takes between 15% and 40% of the landings. Quota were calculated from the 2018 quota shares and TAC time-series from the ICES stock advice.

Potential risk to the stock of removing the TAC

Given the low value of plaice, the low utilization of the TAC and the low fishing mortality, ICES advises that removing the TAC would generate a low risk of the stock being exploited unsustainably.

6) **Plaice in ICES divisions 7.b and 7.c**

The stock status and exploitation levels for plaice in ICES divisions 7.b and 7.c are unknown. ICES is therefore not in a position to advise whether removing the TAC is likely to lead to unsustainable exploitation. ICES advises, based on precautionary considerations, that the TAC should be maintained.

Stock status

ICES advised in 2017 that when the precautionary approach is applied, landings should be no more than 24 tonnes in each of the years 2018, 2019 and 2020. ICES cannot quantify the corresponding total catches.The stock status is unknown and only landings statistics are available. Landings have been low since 2002.

Fisheries

Plaice in this area is caught as a bycatch species within a mixed demersal fishery. Plaice is not a target species of any fishery operating within ICES divisions 7.b and 7.c, which represent a very minor proportion of all retained catch (< 3% of total retained catch).

The market demand for plaice from ICES divisions 7.b and 7.c is poor, and the price is relatively low.

Limited information on discarding patterns suggests that discard levels are around 30% by weight and 50% by numbers, consisting mainly of fish below the minimum conservation size (MCS) of 27 cm.

Historically, most of the catches were from the northern part of Division 7.b, in a fishery that extended into the southern part of Division 6.a. This fishery has now ceased. Currently the majority of the landings come from Irish otter trawlers targeting mixed demersal fish in inshore areas.

Fishing effort of Irish trawlers targeting demersal fish has declined considerably over the last 15 years.

Management measures

The TAC for this stock matches the stock assessment area and has consistently been set above the advised landings.

The TAC has not constrained the catches of this stock.

Knowledge gap

Catches in this area are too low to support the collection of the necessary information for an assessment of stock status. Discard estimates are variable and uncertain.

Potential risk to the stock of removing the TAC

Plaice in this area are a minor bycatch in mixed demersal fisheries and the TAC does not restrict landings. Given the low value of plaice in this area it seems unlikely that a target fishery would develop in the absence of a TAC.

The stock status and exploitation levels for plaice in ICES divisions 7.b and 7.c are unknown. ICES advises, based on precautionary considerations, that removing the EU TAC for plaice in ICES divisions 7.b and 7.c may generate a high risk of the stock being exploited unsustainably.

7) **Plaice in ICES divisions 7.f and 7.g (Celtic Sea)**

ICES advises that removing the TAC for plaice in ICES divisions 7.f and 7.g would generate a low risk of the stock being exploited unsustainably.

Stock status

ICES advised in 2018 that when the precautionary approach is applied, catches in 2019 should be no more than 2160 tonnes.

Fishing mortality has been declining since the late 1990s and is now below $F_{MSYproxy}$. The biomass has been increasing since 2007 and is now above MSY $B_{trigger}$.

Fisheries

Celtic Sea plaice are mostly caught in mixed fisheries with sole, which generates high discards of undersized plaice. Additionally, there has been no incentive for the fishery to cease once the plaice quota were exhausted, resulting in discards of marketable fish.

The market demand for plaice from ICES divisions 7.f and 7.g is poor, and the price is amongst the lowest in EU market.

The fishing effort of the main fleets catching plaice has declined over the past 15–20 years. Fishing effort of these fleets is unlikely to increase if their main target species are managed at F_{MSY}.

Management measures

The TAC for this stock matches the stock assessment area and has generally been set in line with the advised landings.

There is no evidence that the catches have been constrained by the TAC. The landings have been limited by the TAC since 1997, but the catches were well in excess of the TAC (Figure 2) and discards included marketable fish.

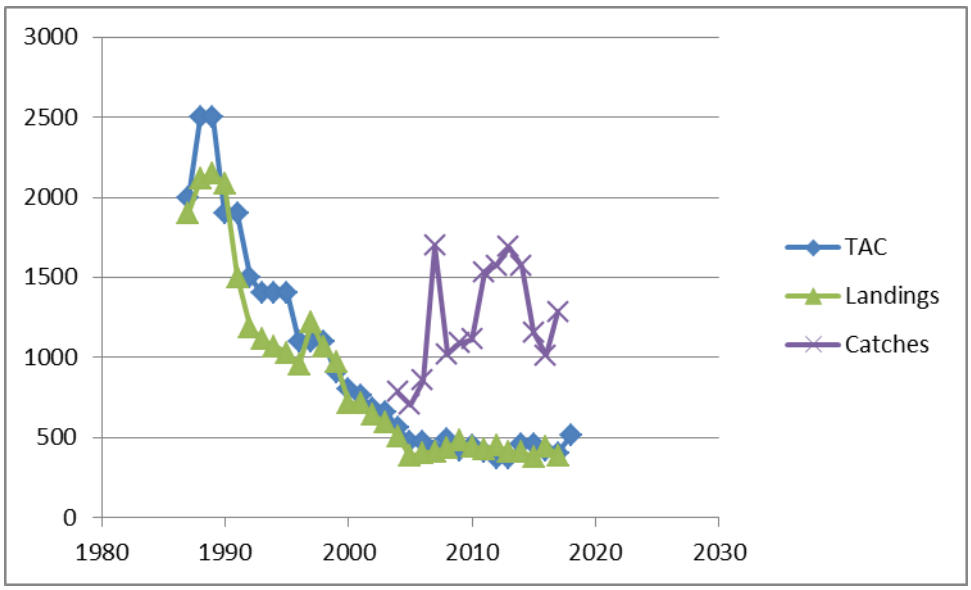

Figure 2 Celtic Sea plaice. TAC (blue), landings (green), and catches (purple). The uptake of the TAC was generally close to 100%, suggesting that the TAC constrained the landings. However, catches have been well in excess of the TAC and did not decrease when the TAC was reduced.

Since 2005, ICES rectangles 30E4, 31E4, and 32E3 (Division 7.f) have been closed during the first quarter with the intention to reduce the fishing mortality of cod. There is evidence that this closure has redistributed effort to other areas. Closures may have decreased fishing mortality on Celtic Sea plaice on spawning grounds, but the degree to which this is effective is unknown.

Potential risk to the stock of removing the TAC

Given the low value of plaice, the ineffective historical TACs, and the low fishing mortality, ICES considers it unlikely that a target fishery will develop in the absence of a TAC. ICES advises that removing the TAC would generate a low risk of the stock being exploited unsustainably.

8) **Plaice in ICES divisions 7.h, 7.j, and 7.k**

ICES advises that removing the EU TAC for plaice in ICES divisions 7.h, 7.j, and 7.k may generate a high risk of the stocks being exploited unsustainably.

Stock status

Spawning-stock biomass (SSB) has decreased significantly since the 1990s and has been below B_{lim} since 2002. Fishing mortality (F) is highly variable and has been above F_{lim} for the entire time-series. Recruitment decreased until 2003 and has been low since then.

ICES advised in 2018 that when the precautionary approach is applied, there should be zero catch in each of the years 2019 and 2020.

Fisheries

Plaice is not a target species of any fishery operating within ICES divisions 7.h–k, representing a very minor proportion of plaice in retained catches.

The market demand for plaice from ICES divisions 7.h, 7.j and 7.k is poor, and the price is relatively low.

Otter trawlers targeting demersal fish are the main fleet catching plaice in divisions 7.h, 7.j, and 7.k. The fishing effort of this fleet appears to have increased in recent years. However, it should be noted that plaice catches are mainly constricted to inshore areas, while most of the otter trawl effort is located along the edge of the continental shelf.

Management measures

The TAC for this stock matches the stock assessment area and has generally been set in excess of the advised landings, except for the period 2014–2016 when the TAC was set in accordance to the advice. Despite the zero catch advice given for 2018, the TAC of 128 tonnes in 2018 was unchanged from the previous year.

There is no evidence that the catches have been constrained by the TAC. The landings have been very close to the TAC since 2010, but discarding has increased as a consequence of limiting quota.

Knowledge gap

The information on the stock status is based on an assessment that excludes Division 7.h even though around half of the catches are taken from Division 7.h.

Discard estimates are imprecise.

Potential risk to the stock of removing the TAC

Spawning-stock biomass has decreased significantly since the 1990s and has been below B_{lim} since 2002. Fishing mortality is highly variable and has been above F_{lim} for the entire time-series. Due to the poor stock status, ICES advises that removing the EU TACs for plaice in ICES divisions 7.h, 7.j, and 7.k may generate a high risk of the stock being exploited unsustainably as no other management measures are currently available.

9) **Pollack in ICES Division 5.b and subareas 6, 12, and 14**

ICES advises that the stock status and exploitation levels for pollack in ICES Division 5.b and subareas 6, 12, and 14 are unknown. ICES advises, based on precautionary considerations, that removing the EU TACs for pollack in ICES Division 5.b and subareas 6, 12, and 14 may generate a high risk of the stock being exploited unsustainably.

Stock status and ICES advice

ICES recognises three pollack stocks in the Northeast Atlantic and the North Sea:

- Pollack in ICES Division 3.a and Subarea 4;
- Pollack in ICES subareas 6 and 7; and
- Pollack in ICES Subarea 8 and Division 9.a.

ICES advised in 2018 that when the precautionary approach is applied, commercial catches of pollack in ICES subareas 6 and 7 should be no more than 3360 tonnes in 2019. ICES advice applies to commercial catches only. ICES cannot quantify the recreational catches.

The available information is insufficient to evaluate the exploitation and the trends of pollack in the Celtic Seas ecoregion. Commercial catches have declined since the late 1980s, and they are in 2017 the lowest in the time-series.

Fisheries

The main fisheries on the pollack stock in ICES subareas 6 and 7 are otter trawling and gillnetting. UK vessels, followed by Irish and French vessels, respectively, are the main fleets operating within this area. Effort data is available only from the Irish fleets and, for those fleets, a declining trend is observed for otter trawls while an increase in effort is observed for gillnets since 2012. Pollack is of economic importance and value in Subarea 7 as this area is the predominant commercial fishery region, accounting for more than 90% of the commercial catches. The species is not of large economic importance in Subarea 6.

ICES cannot quantify the entire recreational catches, but available estimates indicate that they are substantial.

Management measures

The fisheries on pollack stocks in ICES subareas 6 and 7 is managed by two TACs, one covering ICES Division 5.b and subareas 6, 12, and 14, and one covering ICES Subarea 7. Since 2013, when ICES started giving quantitative advice for the stock, the combined TAC for the two management areas has been approximately three times higher than the ICES advice. Commercial catches in ICES subareas 6 and 7 have been at the same order of magnitude as ICES advice, and well below the combined TAC.

Vulnerability

Pollack is a bentho-pelagic species, which is mostly found close to the shore over hard bottoms. It usually occurs between 40 and 100 m depth, but can be found down to 200 meters. Pollack tend to be solitary except during the spawning period, when they form aggregations, which are targeted for fishing. The tendency of this species to remain close to rocky shores, hard bottoms, or wrecks make it difficult to catch with trawls.

Knowledge gap (including the limited data available)?

The available information is insufficient to evaluate the trends over time within this area, as only commercial landings are available. ICES cannot quantify the entire recreational catches, but available estimates indicate that they are substantial. The present stock size is unknown and further information on stock structure and biological parameters are needed. There is no information on SSB or recruitment for this species at present. Effort data is available only from the Irish fleets.

Potential risk to the stock of removal of the TAC

The TAC has not been restrictive in the past but has been set three times higher than the ICES advice. Official international landings have been consistently below the TAC throughout the recent time-series within this area, but for some countries the quotas are limiting. Furthermore, discard rates are assumed to be negligible for this species.

ICES advises that the stock status and exploitation levels for pollack in ICES Division 5.b and subareas 6, 12, and 14 are unknown. ICES advises, based on precautionary considerations, that removing the EU TACs for pollack in ICES Division 5.b and subareas 6, 12, and 14 may generate a high risk of the stock being exploited unsustainably.

10) **Whiting in ICES Division 5.b and subareas 6, 12, and 14**

ICES advises that removing the EU TAC for whiting in ICES Division 5.b and subareas 6, 12, and 14 may generate a high risk of the stocks being exploited unsustainably.

Stock status

The TAC area covers two ICES stocks: whiting in Division 6.a and whiting in Division 6.b.

Whiting in Division 6.a: ICES advised in 2018 that when the precautionary approach is applied, there should be zero catch in each of the years 2019 and 2020. SSB has been increasing since 2010, but remains very low compared to the historical estimates and is currently below B_{lim}. Fishing mortality has declined continuously since around 2000 and is estimated at

well below F_{MSY}. Recruitment is estimated to have been very low since 2002, but is estimated to have increased in recent years.

Whiting in Division 6.b: ICES advised in 2018 that when the precautionary approach is applied, wanted catches should be no more than 9 tonnes in each of the years 2019, 2020, and 2021. ICES cannot quantify the corresponding total catches. The available information is insufficient to evaluate the stock trends and exploitation (category 6 stock). Recent landings of whiting from Division 6.b are negligible. It is likely that whiting in Division 6.b are migrants from Division 6.a, rather than a separate stock.

Fisheries

Whiting are a relatively low value species. There is no targeted fishery for whiting in the two divisions of Subarea 6, and there is also a limited market. Most catches of whiting in Division 6.a (86% by weight; average 2015–2017) and a substantial amount of whiting in Division 6.b (23% by weight; average 2015–2017) are discarded. The high discard rate in Division 6.a is mainly due to the use of *Nephrops* gears. Total landings in Division 6.a have generally been below the TAC, but quotas have in recent years been restrictive in Scotland.

Fishing effort in Subarea 6 by Scottish fishing vessels, responsible for the majority of the whiting fishery in Subarea 6, have been stable over the last ten years.

Management measures

Management of the two stocks is by TAC, set for Subarea 6, Union and international waters of Division 5.b, and international waters of subareas 12 and 14. The stocks do not currently fall under the EU landing obligation, but there is a minimum landing size of 27 cm. There are no management objectives or plan in place for the stocks.

Potential risk to the stock of removing the TAC

ICES advises that removing the EU TAC for whiting in ICES Division 5.b and subareas 6, 12, and 14 may generate a high risk of the stocks being exploited unsustainably. ICES has advised a zero TAC for whiting in ICES Division 6.a since 2006 as the stock is considered outside safe biological limits. To rebuild the whiting stock it is necessary to keep the fishing mortality as low as possible and ICES considers that the TAC is an appropriate measure in this context.

11) **Whiting in ICES Division 7.a**

ICES advises that removing the EU TAC for whiting in ICES Division 7.a generates a high risk of the stocks being exploited unsustainably.

Stock status

ICES advised in 2017 that when the MSY approach is applied, there should be zero catches of the Division 7.a whiting stock in each of the years 2018 and 2019. The present stock size is extremely low. SSB has been declining since the beginning of the time-series (1980) and has been well below B_{lim} since the mid-1990s. Recruitment has been low since the early 1990s. F has been considerably above F_{lim} for the entire time-series. This poor stock status has resulted in a "lowest possible catch" or zero catch advice since 2001.

Fisheries

There has been no targeted whiting fishery in the Irish Sea since the 1980s. The majority of whiting are caught in the *Nephrops* fishery; nearly all of these catches are discarded since they are below the minimum landing size (27 cm). Despite the introduction of several technical measures to reduce finfish catch and discards in the *Nephrops* fishery, the estimated total discards remain high. The main problem is that the *Nephrops* fishery in FU 15 occurs in the same area where many juvenile whiting are distributed. These fish are too small to actively escape from the *Nephrops* trawl gears. Whiting catches are sporadic: a small number of hauls are responsible for the majority of catches of whiting.

In most years, the official international landings have been below the TAC. In recent years total catches have been well above the TAC because the vast majority of the catch has been discarded. The TAC has therefore not restrained the catches (Figure 3).

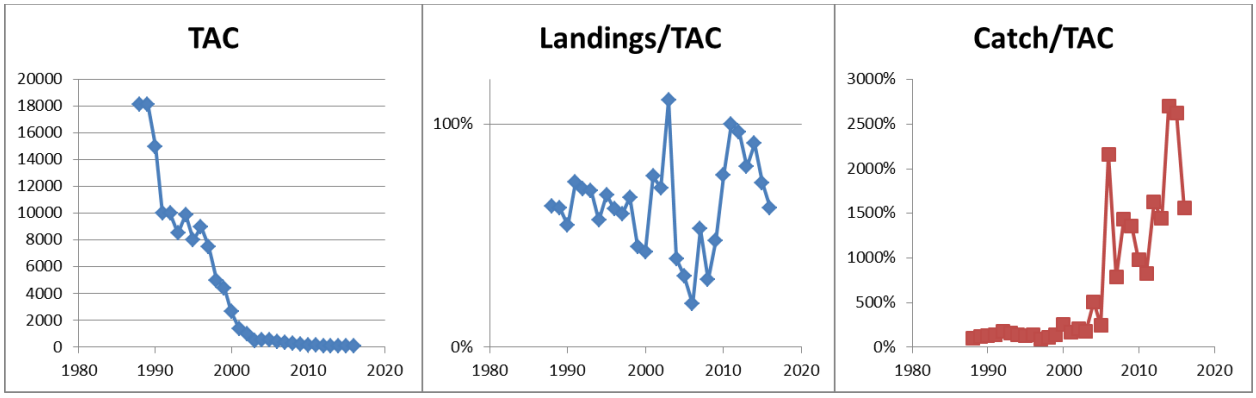

Figure 3 Irish Sea whiting. TAC (left); landings uptake (i.e. landings as percentage of the TAC; middle); and catches as a percentage of the TAC (right). The TAC does not appear to have constrained the landings in most years and in the last 10 years the catches have been 10 to 25 times as large as the TAC.

Management measures

The most important fishery catching whiting in Division 7.a is the *Nephrops* fishery in FU 15 (western Irish Sea), and to a lesser extent in FU 14 (eastern Irish Sea). There is no management plan for whiting in Division 7.a, but several measures have been introduced to reduce discards in the *Nephrops* fishery. Effort limitations were in force within the Irish Sea as a result of the cod long-term management plan (EU, 2008). This was replaced with new measures in 2017 (EU, 2016b). Since 2010 special conditions on the permitted types of gear have been attached to effort authorizations for Irish TR2 vessels fishing in Division 7.a. In 2017, national legislation in Ireland was introduced which increased the minimum mesh size in the Irish Sea *Nephrops* fishery from 70 mm to 80 mm, except for single-rig and < 12 m trawlers. Similar mandatory technical measures are in place in Northern Ireland. To date, these technical measures and effort limitations do not seem to have significantly reduced mortality on whiting.

Potential risk to the stock of removing the TAC

Landings have been below the TAC in recent years while total catches have been well above the TAC, so clearly TAC management is not currently working. The current TAC does not control total catches or F on this stock. Removing the TAC for whiting in Division 7.a is unlikely to result in the development of target fisheries. However, the whiting stock in the Irish Sea remains in very poor condition, with $F > F_{MSY}$ and $SSB << B_{lim}$ (ICES advice has been for zero catches for over 15 years). The stock is unlikely to recover unless the fishing mortality is kept as low as possible; ICES considers that the TAC is an appropriate measure in this context.

South Western waters: ICES subareas 8–10 and the CECAF areas

12) Pollack in ICES Subarea 8 and Division 9.a

ICES advises that removing the EU TAC for pollack in ICES Subarea 8 and Division 9.a may generate a high risk of the stocks being exploited unsustainably.

Stock status and ICES advice

ICES considers pollack in ICES Subarea 8 and Division 9.a to be one stock. In 2017 ICES advised that when the precautionary approach is applied, commercial catches in each of the years 2018 and 2019 should be no more than 1131 tonnes. All commercial catches are assumed to be landed. ICES cannot quantify the corresponding total catches because the recreational catches cannot be quantified.

The commercial landings have been stable for the last 17 years. The information available is insufficient to evaluate stock trends and exploitation status.

Fisheries

There are several fisheries targeting pollack. The main fisheries are French nets, trammelnets, and gillnets, whose average discard rate is estimated at 6% of catch (for the period 2015–2017). Reasons for discarding in this fishery are undersized

fish (< 30 cm), but also the quality of the fish and the lack of quota. For the total TAC area, discards represent 3% of the catch on average. Pollack is an important recreational species. The recreational catches are not regularly estimated, but based on occasional estimates they are thought to be high.

The price of pollack is high compared to other gadoid species.

Management measures.

The fisheries on the pollack stock in ICES Subarea 8 and Division 9.a are managed by three TACs:

- Pollack in ICES divisions 8.a, 8.b, 8.d, and 8.e;
- Pollack in ICES Division 8.c; and
- Pollack in ICES subareas 9 and 10, and in EU waters of CECAF 34.1.1

ICES has provided quantitative advice on fishing opportunities for the stock since 2015. The TAC has in all years been set above ICES advice.

Landings have been below the TAC for 17 of the last 18 years (Figure 4). Nevertheless, the national catch quota has been constraining French fisheries in most years since 2010. Interarea quota flexibility is being used annually to transfer quota from pollack in ICES subareas 6 and 7 to increase fishing opportunities in ICES Subarea 8.

Vulnerability

Pollack is a bentho-pelagic species, which is mostly found close to the shore over hard bottoms. It usually occurs between 40 and 100 m depth, but can be found down to 200 meters. Pollack tend to be solitary except during the spawning period, when they form aggregations, which are targeted for fishing. The tendency of this species to remain close to rocky shores, hard bottoms, or wrecks make it difficult to catch with trawls.

Knowledge gap (including the limited data available)?

No survey information is available. Trawl surveys also appear unsuitable to produce stock indicators for this species and CPUEs from net and longline are often difficult to interpret. Recreational catches are not quantified. The stock is treated as a category 5 assessment with stock developments and status and reference points unknown.

Potential risk to the stock of removing the TAC

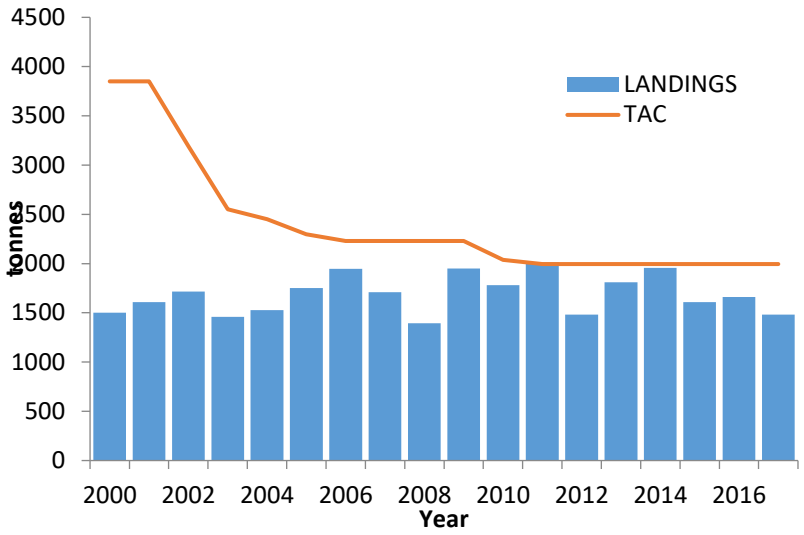

Figure 4 Time-series of TAC and landings of pollack in Subarea 8 and Division 9.a (mostly caught from Division 8.a).

Higher landings before the period managed by the TAC, the targeting by passive gears, the lack of stock size indicator and the high price of the species imply that removing the TAC would not be precautionary. ICES is not in a position to advise on alternative management measures to the TAC.

North Western waters: ICES subareas 2–4

13) **Blue ling in ICES Division 3.a and Subarea 4**

ICES advises that removing the EU TAC for blue ling in ICES Division 3.a and Subarea 4 may generate a high risk of the stocks being exploited unsustainably.

Stock status

Blue ling in ICES Division 3.a and Subarea 4 belong to the blue ling stock in subareas 1, 2, 8, 9, and 12, and divisions 3.a and 4.a. It is a category 5 stock with information on landings trends that suggest a strong decline in Subarea 12 from 2002 onwards. Landings from other areas and inside the NEAFC regulatory area have declined and currently are minor.

While declines in catch in the early part of the time-series reflect depletion of the stock, declines in catch in recent years may be more indicative of a reduction in effort directed towards spawning aggregations.

ICES advised in 2018 that when the precautionary approach is applied, there should be zero catches in each of the years 2018 and 2019. This advice is unlikely to change until the scientific information is sufficient to assess the status of the stock. Closed areas to protect spawning should be maintained.

Fisheries

Blue ling landings from ICES Subarea 2 were significant until the late 1980s–early 1990s, e.g. 3500 t in Subarea 2 and 363 t in Subarea 4 in 1988. In Subarea 4 landings peaked at 600 tonnes and declined thereafter. The contribution of EU countries to landings has been small (10% or less) in Subarea 2 and higher (often >50% until 2012, and less in recent years) in Subarea 4. Norwegian landings, mainly from Division 2.a, reached almost 6000 tonnes in 1980; at that time, and probably earlier, there were target fisheries on spawning aggregations. The stock in Subarea 2 is considered to be depleted.

In Division 3.a landings have been less than 50 tonnes since 1988.

Management measures

EU catches of blue ling in ICES Division 3.a and Subarea 4 is managed by two TACs, one for EU waters of ICES subareas 2 and 4, and one for EU waters of Division 3.a.

Because of the aggregative behavior of this species and high historical catches, TACs are considered suitable measures to allow stock rebuilding, in particular by preventing the targeting of spawning aggregations, which probably provided the bulk of the high historical landings. Although these TACs are small, they might not be problematic to the fisheries as blue ling does not occur on most fishing grounds in subareas 2–4, at least not at the current stock levels.

Vulnerability

This species forms aggregations that are vulnerable to fishing exploitation.

Knowledge gap

There is a lack of accurate data on distribution of stocks and spawning aggregation.

Potential risk to the stock of removing the TAC

TACs may prevent the targeting of spawning aggregations, which probably provided the bulk of the high historical landings. ICES advises that there should be zero catch of this stock. This advice is unlikely to change until the scientific information is sufficient to assess the status of the stock. TAC may be an efficient tool to maintain catches in accordance to advice; thus ICES advises to maintain a TAC.

14) **Ling in ICES Division 3.a and Subarea 4**

ICES advises that removing the EU TAC for ling in ICES Division 3.a and Subarea 4 may generate a high risk of the stocks being exploited unsustainably.

Stock status

ICES presently considers ling in ICES Division 3.a and Subarea 4 to be part of the ling stock unit in ICES divisions 3.a and 4.a and subareas 6–9, 12, and 14. In ICES Subarea 4, ling is predominantly found in deeper waters, corresponding to Division 4.a. Consequently, these two TACs apply to the same ICES stock unit of ling in subareas 6–9, 12, and 14 and divisions 3.a and 4.a. EU vessels also have a TAC in Norwegian waters of Subarea 4. In addition, there are separate EU, Faroese, and Norwegian TACs for subareas 6, 7, 8, 9, 10, 12, and 14. The TAC in EU waters of Subarea 4 was never fully caught and that in Division 3.a was fulfilled in four out of 15 years only, but EU landings in Division 3.a and Subarea 4 have been close to the sum of the TACs (70–100%) in recent years (Figure 5). The TAC in Division 3.a is less than 3% of that in Subarea 4. These TACs may have contributed to species avoidance and area misreporting.

Landings have been stable for the last five years, with an increase in discards in the last three years. The Norwegian longline fleet fishing for ling and tusk has declined from 72 vessels in 2000 to 25 in 2017, which has reduced the total fishing effort by this fleet by about 43%. A standardized catch per unit effort (CPUE) based on data from the Norwegian longline fleet shows an increasing trend since 2004.

ICES advised in 2017 that when the precautionary approach is applied, catches should be no more than 17 695 tonnes in each of the years 2018 and 2019.

Fisheries

Ling is caught mainly by trawl and longline fleets.

Vulnerability

Ling is a relatively long-lived, large-bodied species, estimated only to be able to sustain a moderate fishing mortality, with F_{MSY} being typically ≤ 0.1. Ling is exploited throughout the ICES area, as a bycatch of trawl fisheries and a target of longline fisheries. In Division 3.a and Subarea 4, EU catches are mainly from trawls.

Knowledge gap

This is a category 3 stock. The assessment is based on total catches and CPUE data from the Norwegian longline fishery.

Potential risk of fishery to the removal of TAC

The risk of a fishery developing in EU waters of ICES Division 3.a and Subarea 4 is unknown; however, there is already a target fishery using longlines in Norwegian waters of Subarea 4. In recent years, EU landings in ICES Division 3.a and Subarea 4 combined have accounted for about 25% of the total landings on the stock. If catch opportunities for other species were limited, ICES considers that a targeted fishery in ICES Subarea 4 could develop. Given the importance of the landings in these areas relative to the total landings of the stock, and as ling can only sustain a moderate fishing mortality, ICES advises that a TAC for these areas should be maintained.

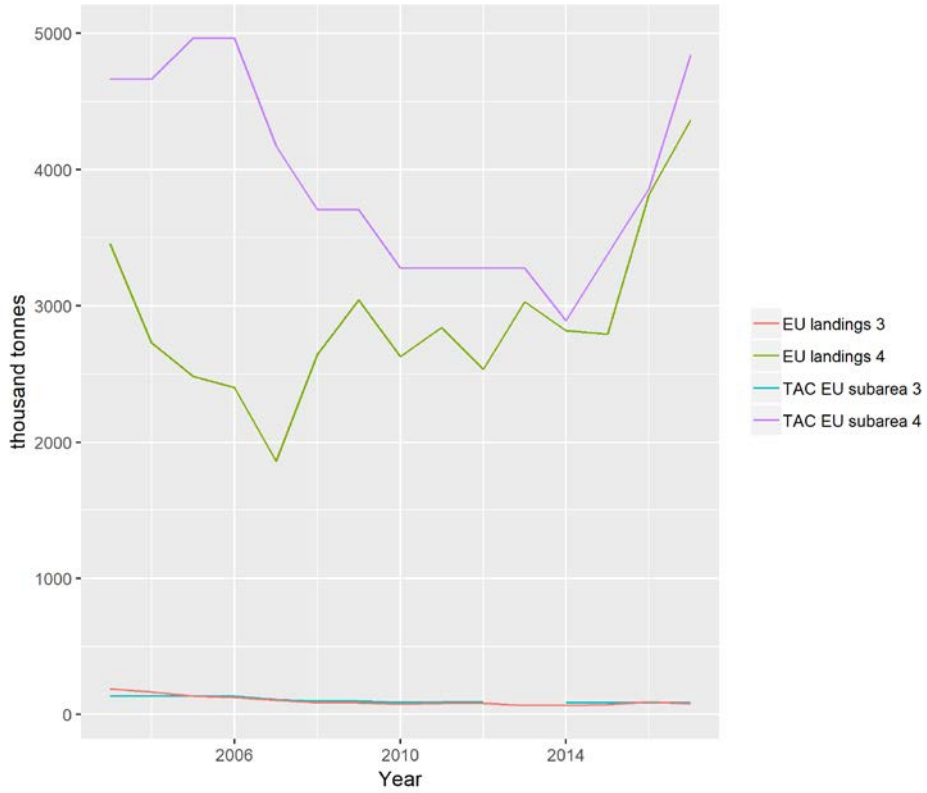

Figure 5 Ling landings and TAC in ICES Division 3.a and Subarea 4 between the years 2003–2017.

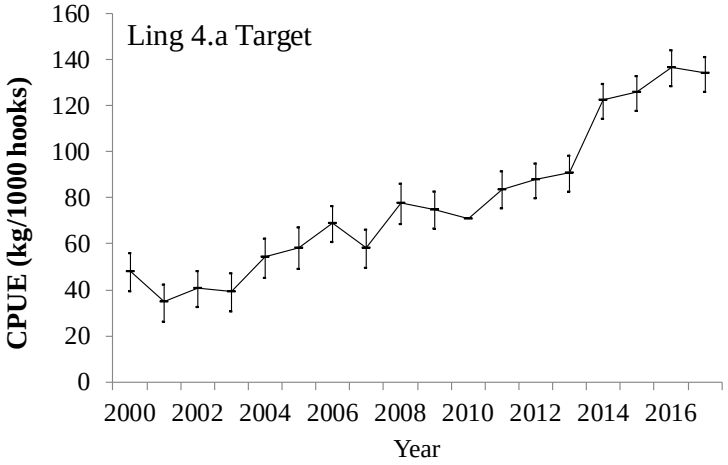

Figure 6 Estimates of CPUE (kg/1000 hooks) of ling based on skipper's logbook data from 2000 to 2017. The bars denote the 95% confidence interval.

15) **Tusk in ICES Division 3.a and Subarea 4**

ICES advises that removing the TAC for tusk in Division 3.a and Subarea 4 would generate a low risk of the stock being exploited unsustainably.

Stock status

Tusk in international waters of Division 3.a and Subarea 4 belong to the tusk stock in subareas 4 and 7–9, and in divisions 3.a, 5.b, 6.a, and 12.b. ICES advised in 2017 that when the precautionary approach is applied, catches should be no more than 8984 tonnes in each of the years 2018 and 2019. Discarding is considered to be negligible.

ICES assesses the stock to be within safe biological limits.

Fisheries

Both EU and Norwegian vessels land tusk. In 2003, the EU brought tusk in Division 3.a and Subarea 4 under TAC management. Since the introduction of the TAC, EU landings of tusk have been lower than the set TAC for both areas, except in 2003 (Subarea 4). More than 80% of the landings for both areas are from Norway. Tusk in Subarea 3 is mainly caught by trawls (52%), with the other half taken by longlines (24%) and gillnets (21%). In Subarea 4, longlines account for 80% of the catch, trawls for 15%, and gillnets 4%. While the Norwegian longline fishery can target tusk, the species is a bycatch for all other gears.

The economic value of the fishery is regarded to be low.

Management measures

Tusk is a straddling stock occurring in more than one EEZ. The TACs in Division 3.a and Subarea 4 cover only a small part of the stock area. There is no management plan for the stock.

The TAC has not been restrictive since it was introduced. It is not clear whether the TAC was introduced to regulate the fishery. One reason for setting this TAC in the early 2000s may have been to prevent species and area misreporting. There is no TAC for this species in Norway.

Vulnerability

EU fisheries in Division 3.a and Subarea 4 are primarily trawl fisheries. Bycatch of tusk in trawl fisheries is limited as tusk prefers rocky substrates with a moderate catchability to trawls. As a result, the vulnerability of tusk to current EU fisheries is expected to be moderate.

Knowledge gaps

This is a category 3 stock. The assessment is based on total catches and CPUE data from the Norwegian longline fishery.

Potential risk to the stock of removing the TAC

In view of the low share in the overall tusk landings from Subarea 4 and Division 3.a, the low take-up of the TAC, the low price of tusk, and the low vulnerability to current EU fisheries, the TACs for both areas could be removed without significantly increasing the risk of unsustainable exploitation. It seems unlikely that new EU fisheries will develop. While CPUE for the targeted longline fishery in Division 4.a has gone down since 2013, this is not the case for the tusk stock as a whole (in subareas 4 and 7–9, and in divisions 3.a, 5.b, 6.a, and 12.b). Any measures aimed at keeping the stock at full reproductive capacity should be part of a joint management plan between the EU and other nations exploiting the stock. If managers decide on maintaining the TACs, ICES advises that these two TACs could be merged, which would relax the potential choke effect generated by the EU landing obligation.

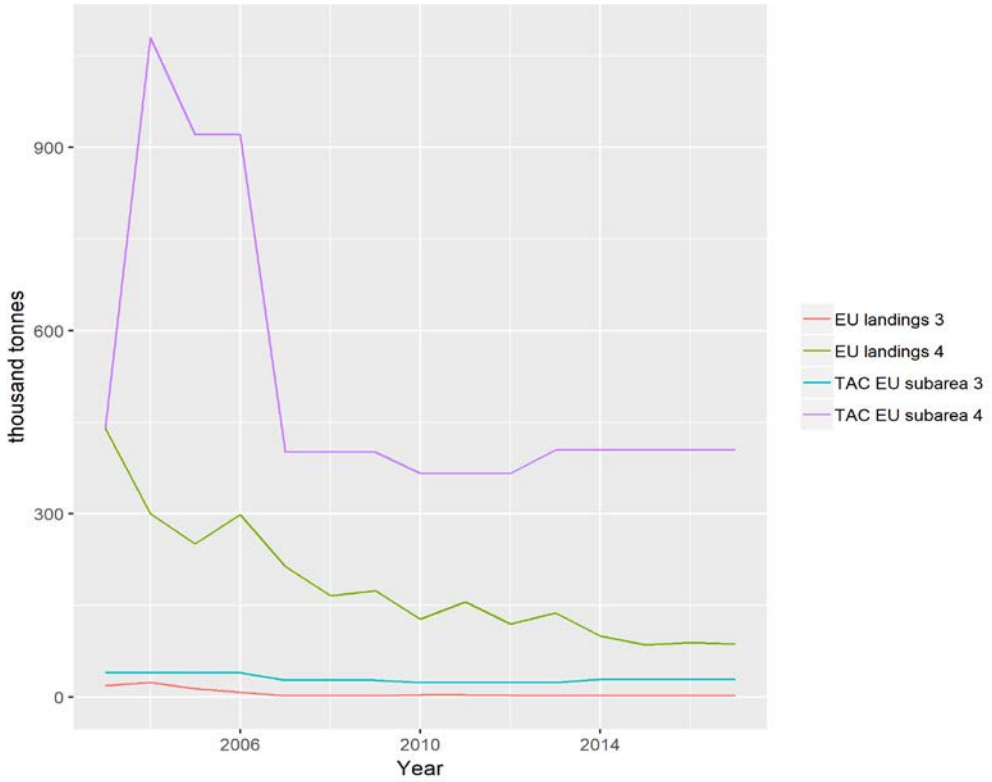

Figure 7 TAC and EU landings of tusk in subareas 3 and 4 from 2003 to 2017.

16) **Spurdog (*Squalus acanthias*) in subareas 1, 5, 6, 7, 8, 12, and 14**

ICES advises that removing the EU TAC for spurdog may generate a high risk of the stocks being exploited unsustainably.

Stock status

ICES advised in 2016 that when the precautionary approach is applied, there should be no targeted fisheries on spurdog in 2017 and 2018. Based on medium-term projections, annual catches at the recent assumed level (2468 tonnes) would allow the stock to increase at a rate close to that estimated with zero catches. Any possible provision for the landing of bycatch should be part of a management plan, including close monitoring of the stock and fisheries.

The spawning biomass and recruitment have declined substantially since the 1960s to the lowest level observed, but appear to have stabilized over the last decade. The harvest rate has declined substantially and is estimated to be well below the MSY level.

Fisheries

Spurdog was traditionally targeted in longline fisheries and, in some areas, gillnet fisheries. In 2011, fishing opportunities where withdrawn and there have been no targeted fisheries for spurdog in EU or Norwegian waters since. As a result, fishing mortality declined. Spurdog remains a bycatch in the mixed demersal and gillnet fisheries, and an unquantified amount of discarding takes place in these fisheries.

The spurdog stock, when subject to target fisheries, was of high economic value to some nations (including UK, Ireland, and Norway) and for some coastal communities. This was traditionally the most valued of the smaller sharks and dogfishes occurring in EU waters.

Management measures

There is no management plan for this stock. Reductions in the TAC reduced both target and bycatch fisheries. Technical measures (bycatch limits and maximum landing length) have further deterred target fisheries. As of 2017, it became prohibited to land spurdog caught in EU waters.

While it is prohibited to land spurdog from EU waters, there is a small allowance (270 t) for vessels engaged in a "bycatch reduction scheme".

Vulnerability

Spurdog is long-lived and has low productivity, meaning that they can only sustain a low level of exploitation. Catchability of spurdog may be high due to sexual and size-based aggregations.

The stock declined during the 1970s and through to the early 2000s and has recently been showing signs of recovery. This is likely due to reduced effort and subsequent cessation of the target fishery. In its most recent advice, ICES pointed out that recovery for this species will be slow (e.g. over 30 years to reach current MSY $B_{trigger}$) and not biologically feasible under short-term management time frames. TAC management alone might mitigate pressure on spurdog, it will not be successful as a sole management measure.

Knowledge gaps

Spurdog occurs over wide areas of the continental shelf, from the Barents Sea to the Bay of Biscay, and from the Skagerrak to Rockall. Whilst it has a high spatial overlap with fisheries, the main areas of overlap can vary seasonally. Spurdog is a highly mobile and migratory species. Their migratory patterns have been suggested to change over time. Furthermore, many of the key areas for spurdog (e.g. where aggregations of gravid females occur, pupping grounds, nursery grounds) are not delineated. Hence, whilst there are theoretical benefits of spatio-temporal management, there are insufficient data to inform on this.

Potential risk to the stock of removing the TAC

A full recovery of the stock is estimated to take another three decades. Lifting restrictions on fishing opportunities may result in the redevelopment of a target fishery. For these reasons, ICES considers that removing the TACs for spurdog might generate a high risk of the stock being exploited unsustainably.

17) **Plaice in ICES Subdivision 3.a.21**

ICES advises that removing the TAC for plaice in Subdivision 21 would generate a low risk of being exploited unsustainably.

Stock status

Plaice in the Kattegat belongs to the plaice stock in subdivisions 21–23. ICES advised in 2018 that when the precautionary approach is applied, catches for this stock in 2019 should be no more than 15 237 tonnes.

The spawning-stock biomass in subdivisions 21–23 has increased significantly from 2009 and has been above MSY $B_{trigger}$ since 2012. Fishing mortality has declined from 2000 to 2014 and has since stabilized. Fishing mortality has been below F_{MSY} since 2013. Recruitment has increased in recent years.

Fisheries

In recent years plaice is mainly caught as bycatch in the *Nephrops* and sole fishery. In general, about 50% (weight) of the plaice catch in Subdivision 21–23 is discarded (2002–2016).

The TAC has not restricted landings in the period from 2001 to present.

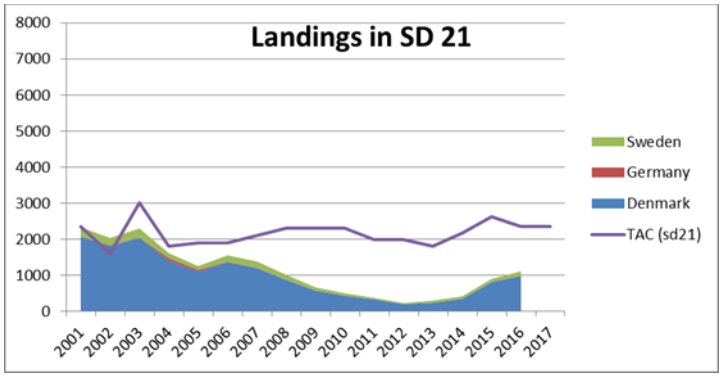

Figure 8 Kattegat plaice landings by country relative to the TAC.

Management measures

Plaice in the Kattegat belongs to the plaice stock in subdivisions 21–23. The TAC set for Kattegat only covers Subdivision 21. In its advice on fishing opportunities, ICES estimates the catch by management areas that corresponds to the advice which is used in setting the TAC.

The EU Multiannual Plan for the Baltic Sea (EU, 2016c) takes bycatch of this species into account. Currently no management plan covers Subdivision 21.

Potential risk to the stock of removing the TAC

Considering the status of the plaice stock in subdivisions 21–23, the low take-up of the TAC and low fishing effort, there is a low risk that removing the TAC for plaice in Subdivision 21 would generate a low risk of being exploited unsustainably.

18) **Kattegat cod in ICES Subdivision 3.a.21**

ICES advises that removing the EU TAC for cod in ICES Subdivision 21 may generate a high risk of the stocks being exploited unsustainably.

Stock status

ICES advised in 2018 that when the precautionary approach is applied, catches in 2019 should be no more than 494 tonnes.

ICES 2018 assessment of cod in Kattegat shows that spawning-stock biomass (SSB) has decreased from historically high levels in 1997. There were some signs of a recovery in 2015, but the SSB levels have declined again and are approachingg historically low in 2018. Fishing mortality has decreased since 2008 to historically low levels.

Fisheries

The fishery in Kattegat is dominated by trawling (mesh sizes at 90–99 mm) targeting Norway lobster. The gear group is responsible for 90 % of the catches of Kattegat cod.

Due to the low abundance of cod and corresponding low TAC there is presently no targeted cod fishery in Kattegat and cod is mainly taken as bycatch in the Norway lobster fishery. This implies that the mortality of the stock is strongly correlated with the uptake of the Norway lobster quota and the effort directed to the Norway lobster fishery.

Discards have been high and in most years exceeded the landings.

Management measures

The Kattegat cod TAC has been set above ICES advice since 1999. Landings have been below the TAC in most years while total catches in general have been well above the TAC (Figure 9), indicating that the TAC has been restrictive in most years since 1999.

To reduce bycatches of cod in the Norway lobster fishery a number of technical measures have been implemented, including improved gear selectivity and closed areas.

Vulnerability

Cod is a medium to high-value species with a relatively high catchability. Kattegat cod has been subject to a target fishery; however, due to the low stock abundance and corresponding low TAC there is currently no target fishery. If the stock recovers a target fishery is likely to develop again.

Knowledge gaps

Historically, unreported catches have been considered to be an issue for this stock and have been estimated as part of the unaccounted removals within the assessment model.

The advice on stock status and fishing opportunities is based on an analytical assessment, using the results as indicative of trends in stock size and fishing mortality. The current absolute level of mortality is still unknown because of a pronounced difference between the catch data (landings plus discards) and the total removals from the stock estimated within the model. These unaccounted mortalities are also partly due to inflow of recruits from the North Sea, and their return migration when they become mature.

Potential risk to the stock of removal of the TAC

If the Kattegat cod stock recovers a target fishery is likely to develop and there will be a need for a TAC or other management measures to ensure that the stock is exploited in accordance with the management objectives.

The quota uptake of the Norway lobster TAC has only been 40% in recent years; hence, there is a potential for a much higher effort to utilize the Norway lobster quota, which may result in an increase in the fishing mortality on cod if the regulation of cod catches is removed.

If the TAC of cod is removed, an incitement for avoiding catching cod in the Norway lobster fishery is removed and the mortality of the cod stock could increase. ICES therefore advises to maintain a TAC for Kattegat cod.

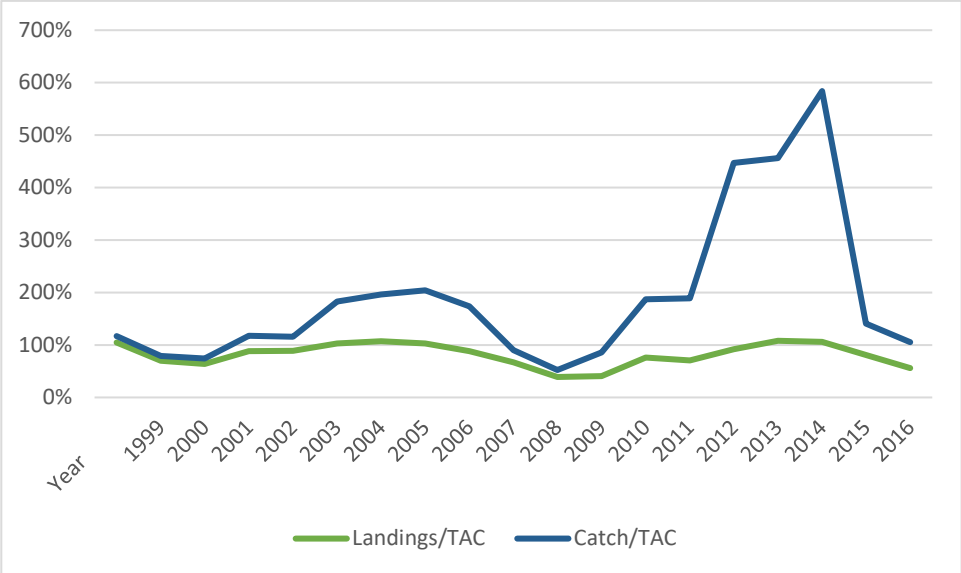

Figure 9 Kattegat cod landings and catches relative to the TAC 1999–2017.

19) **Lemon sole in ICES divisions 3.a and 7.d and Subarea 4, and witch in ICES divisions 3.a and 7.d and Subarea 4**

ICES advises that removing the EU TAC for witch in ICES divisions 3.a and 7.d and Subarea 4 may generate a high risk of the stock being exploited unsustainably.

ICES advises that removing the TAC for lemon sole in ICES divisions 3.a and 7.d and Subarea 4 would generate a low risk of the stock being exploited unsustainably.

Stock status

ICES considers lemon sole in ICES divisions 3.a and 7.d and Subarea, 4 to be one stock and witch in ICES divisions 3.a and 7.d and Subarea 4 to be one stock. ICES provides biennial advice on stock status and fishing opportunities for both stock. The latest advice was issued in 2017.

The joint TAC for lemon sole and witch covers EU waters of ICES Division 2.a and Subarea 4.

Lemon sole

ICES advised in 2017 that when the precautionary approach is applied, catches should be no more than 5484 tonnes in each of the years 2018 and 2019. If discard rates do not change from the average of the last three years (2014–2016), this implies landings of no more than 3924 tonnes in each of the years 2018 and 2019.

ICES assessed in 2017 that the stock was within safe biological limits. The stock has been subject to a benchmark in 2018, and as such the status assessment may change when the stock is reassessed in 2019.

Witch

ICES advised in 2017 that when the precautionary approach is applied, catches should be no more than 2390 tonnes in each of the years 2018 and 2019. If discard rates do not change from the average of the last three years (2014–2016), this implies annual landings of no more than 2079 tonnes.

ICES assessed in 2017 that the stock was within safe biological limits. The stock has been subject to a benchmark in 2018, and as such the status assessment may change when the stock is reassessed in 2019.

Fisheries

Lemon sole

Lemon sole is mainly a bycatch species in mixed demersal fisheries and ICES notes that there is currently little evidence of targeting for lemon sole. In 2016 otter trawlers accounted for 61% and beam trawlers 31% of the landings of lemon sole. Lemon sole is a very small part of the landings (by volume) of these fisheries in Subarea 4 and Division 3.a, and form an even smaller part of the landings for fleets in Division 7.d. Mortality of lemon sole seems to be driven more by effort towards other species in these fisheries.

Discards in weight of lemon sole have been fluctuating between 10% and 38% in most years.

Witch

Witch is mainly a bycatch species in mixed fisheries. In 2016 bottom otter trawlers accounted for 89% of the landings. Witch is a very small part of the landings by these fisheries and there is little evidence of targeting witch in Subarea 4.

In ICES Subdivision 20, the mixed fisheries analysis indicates that witch may be subject to targeted fisheries (ICES, 2017).

Discards in weight of witch have been fluctuating between 8% and 26% in most years.

Management measures

EU catches of lemon sole and witch are managed by a joint TAC covering EU waters of ICES Division 2.a and Subarea 4. EU catches in Norwegian waters of ICES Subarea 4 are managed under the other species TAC. Catches in ICES divisions 3.a and 7.d are not subject to a TAC.

Landings of witch and lemon sole in the areas covered by the TAC have been lower than the TAC in the entire period since the TAC was introduced (Figure 10). The TAC has been set close to the landings corresponding to ICES catch advice for the two stocks and below the advised total catch.

Both witch and lemon sole are medium to high value species, and the causes for the relative high discard rates are unclear.

Vulnerability

Both species are medium to high value species; removing the TAC could lead to an increase in targeting and, thereby, an increase in the exploitation of both species. In Division 3.a, which is at the moment outside the TAC area, there are indications that witch is to some extent targeted.

Knowledge gaps

Lemon sole follows the framework for category 3 stocks. Witch has in 2018 been upgraded from a category 3 to a category 1 stock.

Potential risk to the stock of removing the TAC

ICES notes that the current TAC only covers ICES Division 2.a and Subarea 4, and catches of the two stocks in ICES divisions 3.a and 7.d are not subject to a TAC. This mismatch between TAC area and stock areas is a potential risk to the stocks.

ICES furthermore notes that management of lemon sole and witch under a joint species TAC prevents effective control of the single-species exploitation rates and could potentially lead to overexploitation of either species.

Noting that there are indications of target fisheries for witch, a medium to high value species, ICES advises that the removal of a TAC could generate a high risk of the stock being exploited unsustainably. ICES furthermore advises using a species-specific TAC covering an area appropriate to the distribution of the stock (i.e. ICES divisions 3.a and 7.d and Subarea 4).

For lemon sole there is no indication of a target fishery, and therefore ICES advises that removing the TAC for lemon sole would generate a low risk of the stock being exploited unsustainably.

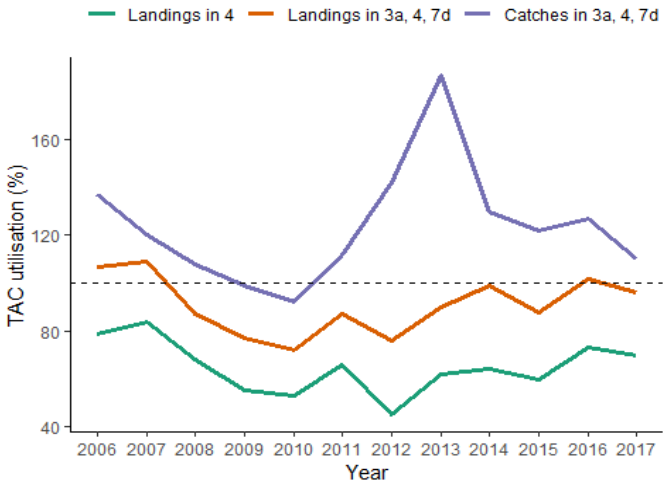

Figure 10 TAC utilization for landings in ICES Subarea 4 (green line), and in Division 3.a, Subarea 4, and Division 7.d (orange line), and total catches in ICES divisions 3.a and 7.d and Subarea, 4 (purple line) for lemon sole and witch combined. The horizontal dashed line shows the full uptake (100%) of the TAC.

20) **Turbot in ICES Subarea 4 and brill in ICES subareas 2 and 4 and divisions 3.a and 7.d–e**

ICES advises that removing the EU TAC for turbot in ICES Subarea 4 may generate a high risk of the stocks being exploited unsustainably.

ICES advises that removing the EU TAC for brill in ICES subareas 2 and 4 and divisions 3.a and 7.d–e may generate a high risk of the stocks being exploited unsustainably.

Stock status

ICES considers turbot in ICES Division 3.a and Subarea 4 as two separate stocks, and brill in ICES subareas 2 and 4 and divisions 3.a and 7.d–e as one stock.

ICES provides biennial advice on stock status and fishing opportunities for the stocks. The latest advice was issued in 2017.

The joint TAC for turbot and brill covers EU waters of ICES Division 2.a and Subarea 4.

Turbot

ICES advised in 2017 that when the precautionary approach is applied, catches should be no more than 4952 tonnes in each of the years 2017, 2018, and 2019. If discard rates do not change from 2016, this implies landings of no more than 4159 tonnes.

Management of turbot and brill under a combined species TAC prevents effective control of the exploitation rates of the individual species and could lead to the overexploitation of either species.

ICES assessed in 2017 the stock to be within safe biological limits.

Discards of turbot were between 3% and 16% of the total catch in the period 2013 to 2016.

Brill

ICES advised in 2017 that when the precautionary approach is applied, catches should be no more than 3170 tonnes in each of the years 2018 and 2019. If discard rates do not change from the average of the last three years (2014–2016), this implies landings of no more than 2943 tonnes.

ICES assessed in 2017 the stock to be within safe biological limits.

Discards of brill were between 4% and 8% of the total catch in the period 2012 to 2016.

Fisheries

Both turbot and brill are high value species.

Turbot

Beam trawls were responsible for 70% of the catches of turbot in 2016, bottom trawls 21%, and other gears 9%.

Turbot is mainly caught in fisheries targeting sole and plaice. Mixed fisheries analysis offers some evidence that targeting behaviour is occurring in Subarea 4 (ICES, 2017).

Brill

Beam trawls were responsible for 65% of the catches in weight of brill in 2016, otter trawls 18%, trammel/gillnets 10%, and other gears 6%.

Brill is mainly caught in fisheries targeting sole and plaice. Mixed fisheries analysis indicate that targeting of brill does occur in ICES divisions 3.a and 7.d–e and that less targeting occurs in ICES Subarea 4 where catches are subject to the TAC (ICES, 2017).

In recent years around 70% of the landings of brill have been from ICES Subarea 4.

Management measures

EU catches of turbot and brill are managed by a joint TAC covering EU waters of ICES Division 2.a and Subarea 4. EU catches in Norwegian waters of ICES Subarea 4 are managed under the other species TAC. Catches of brill in ICES divisions 3.a and 7.d–e are not subject to a TAC.

The joint TAC has been close to the landings, corresponding to ICES catch advice for the two stocks, and taking into account the relative distribution of catches of brill by area.

Landings of turbot and brill in the areas covered by the joint TAC have in some years been higher than the TAC (Figure 11).

Measures (limiting minimum landings size and weekly landing capacity per trip) were in 2016 and 2017 implemented by some of the producer organizations in order not to overshoot their quotas of brill and turbot. Discard rates for turbot increased substantially in 2016 and 2017, likely as a result of the increased pressure on quotas.

Knowledge gaps

Brill follows the framework for category 3 stocks.

Turbot has in 2018 been upgraded to a category 1 stock.

Potential risk to the stock of removing the TAC

Turbot and brill are mainly bycatch species in the fleet targeting plaice and sole. However, there is evidence that targeting occurs for turbot and brill. Targeting of brill occurs to a greater extent in areas not covered by the joint TAC.

The total catch of the two species in the TAC area (ICES Division 2.a and Subarea 4) has been above the TAC, and the joint TAC seems to have been restrictive on the landings.

Both species are high-value species and removing the TAC could lead to an increase in targeting, thereby increasing the exploitation of both species.

ICES advises that removing the EU TAC for turbot in ICES Subarea 4 and for brill in ICES subareas 2 and 4 and divisions 3.a and 7.d–e may generate a high risk of the stocks being exploited unsustainably.

ICES notes that the current TAC only covers EU waters of ICES Division 2.a and Subarea 4, and catches of brill in ICES divisions 3.a and 7.d are not subject to a TAC. This mismatch between TAC area and stock areas is a potential risk to the stock.

ICES furthermore notes that management of turbot and brill under a combined species TAC prevents effective control of the single-species exploitation rates and could potentially lead to overexploitation of either species.

ICES therefore advises that both of these stocks should be managed using single-species TACs that cover an area appropriate to the distribution of the relevant stock.

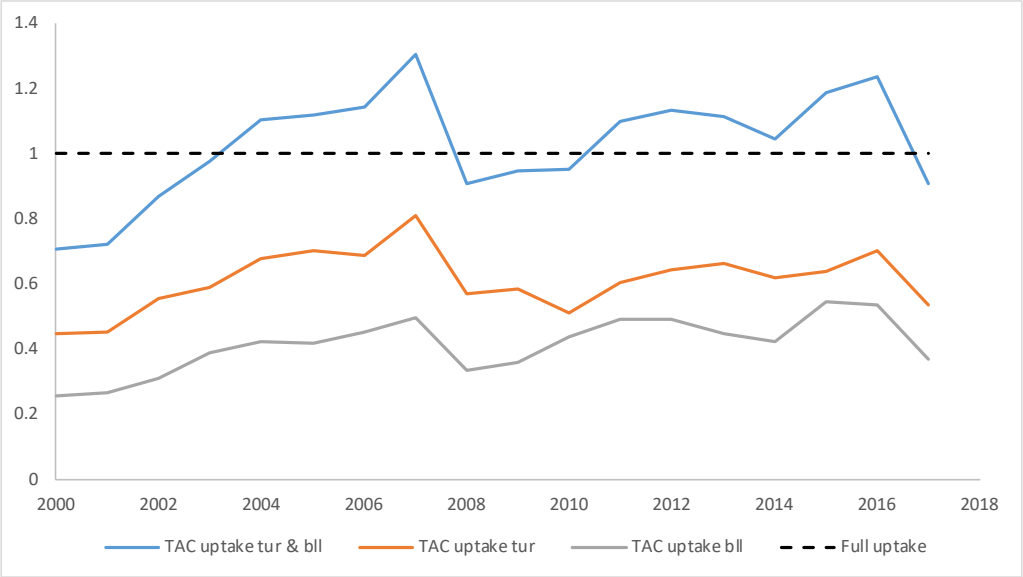

Figure 11 TAC utilization for official landings in Division 3.a, Subarea 4, and Division 7.d–e for brill (grey line), in Subarea 4 for turbot (orange line), and combined for the two stocks in these areas (blue line). The horizontal dashed line shows the full uptake (100%) of the TAC.

21) **Skates and rays (combined basis of the advice)**

The species of Rajidae family are commonly caught by local or offshore fisheries. The economic importance of individual species may vary between different countries. The same species, even when fished at the same location, may be retained by vessels of one nationality but discarded by vessels from another.

In some parts of their distribution range some Rajidae species such as thornback ray (*Raja clavata*), blonde ray (*Raja brachyura*), undulate ray (*Raja undulata*), and small-eyed ray (*Raja microocellata*) may be taken in species-specific targeted inshore fisheries using nets, lines, and trawl.

Trawl and net fisheries operating offshore, along the edge of the continental shelf, have skates as bycatches and these may include cuckoo ray (*Leucoraja naevus*), shagreen ray (*Leucoraja fullonica*), sandy ray (*Leucoraja circularis*), and long-nosed skate (*Dipturus oxyrinchus*).

Vulnerability

Skates and rays can sustain only moderate fishing mortality. This is due to their life history of late maturation and relatively small numbers of offspring. Such biological characteristics make them susceptible to overexploitation. Also, for some species their aggregating behaviour make them vulnerable to capture in fisheries.

Coastal species (e.g. undulate rays, small-eyed rays, and blonde rays) have a high spatial overlap with coastal fisheries targeting other species and may also be taken in species-specific targeted fisheries. The main species on the continental shelf (thornback ray, spotted ray, and cuckoo ray) also have a high spatial overlap with fisheries not targeting skates and rays.

Knowledge gap

For skate stocks, other than those most coastal and patchy distributed stocks (e.g. undulate rays), survey information is considered informative on stock size. Discarding is considered to occur to some extent for all the stocks, but it has not been fully quantified. The survival of discards is also largely unknown.

Potential risk to the stock of removing the TAC

Various skates have a moderate to high price, so it is likely that fishing effort on skates would increase if the TAC is removed, particularly if effort on other stocks becomes limited under the EU landing obligation.

In some coastal fisheries and within the actual group TAC system, skates species may be targeted or taken as bycatch (Table 2).

The TAC system set by region to manage fisheries of skates and rays stocks is not ideal, as there may not be adequate possibilities for protecting stocks for which fishing mortality should be reduced. Ideally, skates and rays should be managed individually at the stock level.

ICES notes that at the STECF Expert Working Group meeting to propose alternatives (STECF, 2017b) it was concluded that there is not yet an alternative to the TAC system as all the management options discussed are still required.

Table 2 Skate and ray stocks designated as "bycatch" or "target". Skate and ray species which have the designation "target" are targeted within the group TAC by certain fleets. ICES does not have a clear definition of bycatch. In making this table ICES Working Group on Elasmobranch Fishes (WGEF) has considered as bycatch stocks that are not directly targeted.

Stock key description	Has TAC ever been applied at stock level?	Target or bycatch in 2018?	Target or bycatch in the past?
Blonde ray (*Raja brachyura*) in Division 7.e (western English Channel)	No	Target	Target
Blonde ray (*Raja brachyura*) in Division 9.a (Atlantic Iberian waters)	No	Bycatch	Target
Blonde ray (*Raja brachyura*) in divisions 4.c and 7.d (southern North Sea and eastern English Channel)	No	Bycatch	Bycatch
Blonde ray (*Raja brachyura*) in divisions 7.a and 7.f–g (Irish Sea, Bristol Channel, and Celtic Sea North)	No	Target	Target
Blonde ray (*Raja brachyura*) in Subarea 6 and Division 4.a (North Sea and West of Scotland)	No	Target	Target
Common skate (*Dipturus batis*-complex flapper skate (*Dipturus cf. Flossada*) and blue skate (*Dipturus cf. intermedia*) in Subarea 6 and divisions 7.a–c and 7.e–k (Celtic Seas and western English Channel)	No	Bycatch	Target
Common skate (*Dipturus batis*-complex) in Subarea 4 and Division 3.a (North Sea, Skagerrak, and Kattegat)	No	Bycatch	Bycatch
Common skate (*Dipturus batis*-complex) in Subarea 8 and Division 9.a (Bay of Biscay and Atlantic Iberian waters)	No	Bycatch	Target
Cuckoo ray (*Leucoraja naevus*) in Division 8.c (Cantabrian Sea)	No	Bycatch	Bycatch

Stock key description	Has TAC ever been applied at stock level?	Target or bycatch in 2018?	Target or bycatch in the past?
Cuckoo ray (*Leucoraja naevus*) in Division 9.a (Atlantic Iberian waters)	No	Bycatch	Bycatch
Cuckoo ray (*Leucoraja naevus*) in Subarea 4 and Division 3.a (North Sea, Skagerrak, and Kattegat)	No	Bycatch	Bycatch
Cuckoo ray (*Leucoraja naevus*) in subareas 6–7 and divisions 8.a–b and 8.d (West of Scotland, southern Celtic Seas, western English Channel, and Bay of Biscay)	No	Bycatch	Bycatch
Rays and skates (Rajidae) in Subarea 4 and in divisions 3.a and 7.d (North Sea, Skagerrak, Kattegat, and eastern English Channel)	NA	NA	NA
Rays and skates (Rajidae) in Subarea 6 and divisions 7.a–c and 7.e–h (Rockall and West of Scotland, southern Celtic Seas, and western English Channel)	NA	NA	NA
Rays and skates (Rajidae) in Subarea 8 and Division 9.a (Bay of Biscay and Atlantic Iberian waters)	NA	NA	NA
Sandy ray (*Leucoraja circularis*) in subareas 6–7 (West of Scotland, southern Celtic Seas, and English Channel)	No	Bycatch	Bycatch
Shagreen ray (*Leucoraja fullonica*) in subareas 6–7 (West of Scotland, southern Celtic Seas, and English Channel)	No	Bycatch	Bycatch
Small-eyed ray (*Raja microocellata*) in divisions 7.d and 7.e (English Channel)	No	Bycatch	Bycatch
Small-eyed ray (*Raja microocellata*) in divisions 7.f and 7.g (Bristol Channel and Celtic Sea North)	Yes	Target	Target
Spotted ray (*Raja montagui*) in Subarea 8 (Bay of Biscay)	No	Bycatch	Bycatch
Spotted ray (*Raja montagui*) in Division 9.a (Atlantic Iberian waters)	No	Bycatch	Bycatch
Spotted ray (*Raja montagui*) in divisions 7.a and 7.e–h (southern Celtic Seas and western English Channel)	No	Bycatch	Bycatch
Spotted ray (*Raja montagui*) in Subarea 4 and divisions 3.a and 7.d (North Sea, Skagerrak, Kattegat, and eastern English Channel)	No	Bycatch	Bycatch
Spotted ray (*Raja montagui*) in Subarea 6 and divisions 7.b and 7.j (West of Scotland, west and southwest of Ireland)	No	Bycatch	Bycatch
Starry ray (*Amblyraja radiata*) in subareas 2 and 4 and Division 3.a (Norwegian Sea, North Sea, Skagerrak, and Kattegat)	No	Bycatch	Bycatch
Thornback ray (*Raja clavata*) in Division 7.e (western English Channel)	No	Target	Target
Thornback ray (*Raja clavata*) in Division 9.a (Atlantic Iberian waters)	No	Bycatch	Bycatch
Thornback ray (*Raja clavata*) in divisions 7.a and 7.f–g (Irish Sea, Bristol Channel, and Celtic Sea North)	No	Target	Target
Thornback ray (*Raja clavata*) in Subarea 4 and in divisions 3.a and 7.d (North Sea, Skagerrak, Kattegat, and eastern English Channel)	No	Target	Target
Thornback ray (*Raja clavata*) in Subarea 6 (West of Scotland)	No	Bycatch	Bycatch
Thornback ray (*Raja clavata*) in Subarea 8 (Bay of Biscay)	No	Target	Target
Undulate ray (*Raja undulata*) in Division 8.c (Cantabrian Sea)	Yes	Bycatch	Target
Undulate ray (*Raja undulata*) in Division 9.a (Atlantic Iberian waters)	Yes	Bycatch	Target
Undulate ray (*Raja undulata*) in divisions 7.b and 7.j (west and southwest of Ireland)	No	Bycatch	Target
Undulate ray (*Raja undulata*) in divisions 7.d and 7.e (English Channel)	Yes	Bycatch	Target
Undulate ray (*Raja undulata*) in divisions 8.a–b (northern and central Bay of Biscay)	Yes	Bycatch	Target
White skate (*Rostroraja alba*) in subareas 1–10, 12, and 14 (the Northeast Atlantic and adjacent waters)	No	Bycatch	Target

a) Skates and rays in the eastern English Channel

ICES advises that removing the EU TAC for skates and rays in ICES division 7.d may generate a high risk of the stocks being exploited unsustainably.

Stock status

ICES provided advice for several species/stocks in the eastern English Channel (ICES divisions 7.d–e) in 2016 as summarized in Table 3 below.

Table 3 Skates and rays in the eastern English Channel.

Stock	Stock code	Assessment category	Advice basis	Advised landings in 2017 and 2018
Small-eyed ray (*Raja microocellata)* English Channel (Divisions 7.d–e)	rje.27.7de	5	Precautionary approach	36 tonnes
Undulate ray (*Raja undulata)* Divisions 7.d–e (English Channel)	rju.27.7de	3	Precautionary approach	65 tonnes

Fisheries

There are target fisheries for thornback ray in the eastern English Channel. Blonde ray and small-eyed ray are also important, marketable bycatch species in some of these fisheries. Furthermore, undulate ray is locally abundant in Division 7.d, where quota restrictions have restricted this species to a bycatch.

Management measures

Quota management is the main management tool at the present time, with some areas having local regulations on minimum landing sizes. There is one general TAC for skates and rays set for Division 7.d.

TAC for skates was first established for 2009. Since then, the TAC has been reduced and in 2018 was decreased by a further 15% (including separate TACs for small-eyed ray and undulate ray).

Thornback ray, blonde ray, and undulate ray have shown increasing catch rates in trawl surveys and there are indications that the TAC has been restrictive. There is the possibility for EU Member States to transfer 5% of their quotas in the Celtic Seas to the eastern English Channel. This has occurred regularly, supporting that the TAC in Division 7.d has been restrictive.

b) Skates and rays in the Celtic Seas (ICES divisions 6.a, 6.b, 7.a–c, and 7.e–k)

ICES advises that removing the EU TAC for skates and rays in ICES divisions 6.a, 6.b, 7.a–c, and 7.e–k may generate a high risk of the stocks being exploited unsustainably.

Stock status

ICES provided advice for several species/stocks in the Celtic Seas in 2016 as summarized in Table 4 below.

Table 4 Skates and rays in Celtic Seas.

Stock	Stock code	Assessment category	Advice basis	Advised landings in 2017 and 2018 (tonnes)
Blonde ray (*Raja brachyura)* Divisions 7.a and 7.f–g	rjh.27.7afg	5.	Precautionary approach	895
Blonde ray (*Raja brachyura)* Division 7.e	rjh.27.7e	5.	Precautionary approach	333
Thornback ray (*Raja clavata)* Subarea 6	rjc.27.6	3	Precautionary approach	145
Thornback ray (*Raja clavata)* Divisions 7.a and 7.f–g	rjc.27.7afg	3	Precautionary approach	1386
Small-eyed ray (*Raja microocellata)* Bristol Channel (Divisions 7.f–g)	rje.27.7fg	3	Precautionary approach	154
Spotted ray (*Raja montagui)* Subarea 6 and divisions 7.b and 7.j	rjm.27.67bj	3	Precautionary approach	67
Spotted ray (*Raja montagui)* Divisions 7.a and 7.e–h	rjm.27.7ae-h	3	Precautionary approach	1197
Cuckoo ray (*Leucoraja naevus)* Subareas 6–7 and divisions 8.a–b and 8.d	rjn.27.678abd	3	Precautionary approach	2734
Sandy ray (*Leucoraja circularis)* Celtic Seas and adjacent areas	rji.27.67	5	Precautionary approach	42

Stock	Stock code	Assessment category	Advice basis	Advised landings in 2017 and 2018 (tonnes)
Shagreen ray (*Leucoraja fullonica)* Celtic Seas and adjacent areas	rjf.27.67	5	Precautionary approach	210
Undulate ray (*Raja undulata)* Divisions 7.b and 7.j	rju.27.7bj	6	Precautionary approach	zero

Fisheries

In Celtic Sea there are target fisheries for rays, in particular for blonde rays. Most other species are retained as important, marketable bycatch in mixed demersal fisheries.

Spotted ray and thornback ray are important bycatch species in both inshore and offshore fisheries. Cuckoo rays in the Irish Sea are targeted by French vessels, but mainly discarded by Irish vessels targeting blonde ray in the same area.

Management measures

Quota management is the main management tool at the present time, with some areas having local regulations on minimum landing sizes. The TAC was set higher than both landings and ICES advice for several years. The TAC became restrictive from 2015 onwards.

c) Skates and rays in Biscay and the Iberian Coast (ICES subareas 8 and 9)

ICES advises that removing the EU TAC for skates and rays in ICES subareas 8 and 9 may generate a high risk of the stocks being exploited unsustainably.

Stock status

ICES provided advice for several species/stocks in Biscay and the Iberian Coast in 2016 as summarized in Table 5 below.

Table 5 Skates and rays in Biscay and the Iberian Coast.

Stock	ICES stock code	Management unit	Advice	Advice 2017 (tonnes)
Raja undulata	rju.27.8ab	8.a,b	No target fishery, manage bycatch	-
Raja undulata	rju.27.8c	8.c	No target fishery, manage bycatch	-
Raja clavata	rjc.27.8	8	Increase landings 20%	434
Leucoraja naevus	rjn.27.8c	8.c	Reduce landings 1%	27
Raja montagui	rjm.27.8	8	Increase landings 20%	115
Raja montagui	rjm.27.9a	9.a	Increase landings 20%	112
Leucoraja naevus	rjn.27.9a	9.a	Increase landings 20%	58
Raja clavata	rjc.27.9a	9.a	Increase landings 19%	1203
Raja undulata	rju.27.9a	9.a	No target fishery, manage bycatch	-
Raja brachyura	rjh.27.9a	9.a	Increase landings 4%	177
Dipturus batis complex	rjb.27.89a	8, 9.a	Zero catches	0
Other skates	raj.27.89a	8, 9.a	ICES cannot provide catch advice	-

Fisheries

In the Bay of Biscay and Iberian waters, skates are caught mainly as a bycatch in mixed demersal fisheries, which target either flatfish (including sole) or gadiforms (e.g. hake). The main fishing gears used are otter trawl, bottom-set gillnets, and trammelnets. Skates are caught mainly as a bycatch in mixed demersal fisheries, including trawl and artisanal fleets (using mainly set nets, although some use longline) which target either flatfish (including sole) or gadiforms (e.g. hake).

There are no target fisheries in Subarea 8, although coastal species are retained when they are caught by the artisanal fleet (gillnetters) in Division 8.c. Trawl fleets operating in divisions 8.a–b and 8.d retain mainly the largest individuals of cuckoo ray and thornback ray.

Management measures

Quota management is the main management tool. However, for some countries there is national legislation specific for rays and skates (e.g. Portuguese measures such as areas closure, minimum landing size, and specific licensing for certain species).

The EU TAC for skates in subareas 8 and 9 was first established in 2009 and it is shared (quota) among five countries. Initially the TAC was set at a much greater level than reported landings. Since then, the TAC has been reduced. The TAC has been restrictive since 2013, and in 2014 and 2015 the reported landings were higher than the TAC.

d) Skates and rays in the North Sea (EU waters of Division 2.a and Subarea 4)

ICES advises that removing the EU TAC for skates and rays in ICES Division 2.a and Subarea 4 may generate a high risk of the stocks being exploited unsustainably.

Stock status

ICES provided stock-specific advice for several species/stocks in the North Sea region in 2017 as summarized in Table 6 below.

The main commercial skate stocks (e.g. thornback ray) have been increasing in this area. Survey catches of the common skate complex have also increased in recent years. Whilst starry ray (*Amblyraja radiata*) has shown a recent decrease in survey catch rates, this is a non-commercial species that is also a prohibited species.

Table 6 Skates and rays in the North Sea.

Stock	Assessment category	Landings advice	Implied landings in 2018 and 2019 (tonnes)
Common skate (*Dipturus batis-complex)* Subarea 4 and Division 3.a	6.3.0	There should be no landings for these stocks and measures should be taken to minimize bycatch.	0
Thornback ray (*Raja clavata)* Subarea 4 and divisions 3.a and 7.d	3.2	Landings should be no more than 2110 tonnes	2574
Blonde ray (*Raja brachyuran)* Subarea 6 and Division 4.a	5.2	Landings should be no more than 6 tonnes	6
Blonde ray (*Raja brachyuran)* Divisions 4.c and 7.d	5.2	Landings should be no more than 162 tonnes	195
Spotted ray (*Raja montagui)* Subarea 4 and divisions 3.a and 7.d	3.2	Landings should be no more than 292 tonnes	291
Cuckoo ray (*Leucoraja naevus)* Subarea 4 and Division 3.a	3.2	Landings should be no more than 128 tonnes	116
Starry ray (*Amblyraja radiate)* Subareas 2 and 4 and Division 3.a	3.1.5	There should not be a targeted fishery for this stock and measures should be taken to reduce bycatch.	0
Other skates and rays Subarea 4 and divisions 3.a and 7.d	6.2.0	ICES cannot provide advice on the status of these stocks due to a lack of reliable survey and catch data. ICES advises that improved collection of species-specific landings data for more skate taxa be introduced, including for larger-bodied skates of *Dipturus spp*., sandy ray *Leucoraja circularis,* and shagreen ray *Leucoraja fullonica,* to help to inform on the status of these stocks.	NA

Fisheries

There are target fisheries for thornback ray in the southern North Sea. Blonde ray is also an important, marketable bycatch in some of these fisheries. Thornback ray is, along with sole, one of the main catches in the demersal trawl fishery (including twin-rig trawl) in this area.

Management measures

Quota management is the main management tool, with some areas having local regulations on minimum landing sizes. There are also bycatch limits for larger vessels in this area. Whilst there are no estimates of fishing effort for target fisheries, the TAC has increased in recent years as stocks have increased.

The North Sea TAC was initially set much greater than landings and was then decreased over time. From 2007/2008, the quota became restrictive for landings of skates and rays from some fisheries.

Methods

To evaluate each stock included in the request, six questions pertaining to the fishery were examined. A similar approach was used to respond to an EU request on a combined dab and flounder TAC and potential management measures besides catch limits in 2017 (ICES, 2017). These were as follows:

1. Was the TAC restrictive in the past?
2. Is there a targeted fishery for the stock or are the species mainly discarded?
3. Is the stock of large economic importance or are the species of high value?
4. How are the most important fisheries for the stock managed?
5. What are the fishing effort and stock trends over time?
6. What maximum effort of the main fleets can be expected under management based on F_{MSY} (ranges) for the target stocks, and has the stock experienced similar levels of fishing effort before?

For some of the stocks evaluated, not all questions could be answered, in particular Questions 5 and 6 could be treated only partly, primarily because in some areas TACs are applied to stocks that are only small bycatch on other fisheries and have very limited information available to base the evaluation upon.

In addition, the overall risk for the stocks have been considered in terms of their biology (aggregating, sex change, long lived, low productivity) and in terms of their catchability (degree of population overlap with key fisheries, presence of refuges, ability to be directly targeted).

Knowledge gaps and current management measures were also considered when evaluating the risk to the stocks of removing the TACs.

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