Published 10 March 2017

EU request on a combined dab and flounder TAC and potential management measures besides catch limits

Advice summary

ICES advises that the risk of having no catch limits for the dab and flounder stocks is currently considered to be low and not inconsistent with the objectives of the Common Fisheries Policy (CFP). The advice is valid as long as dab and flounder remain largely bycatch species, with the main fleets catching dab and flounder continuing to fish the target species (plaice and sole) sustainably within the F_{MSY} ranges provided by ICES.

Request

The EU has implemented a combined TAC for dab and flounder in Union waters of ICES areas 2a and 4. The COM requests ICES to assess the risk to the stock of dab and flounder of having no catch limits for the stock. If ICES assess the risk to the stock of having no catch limits to be inconsistent with the objectives of the CFP, ICES is requested to identify management measures besides catch limits that could remedy this risk.

Elaboration on the advice

The available information was insufficient to do a quantitative evaluation of the risk of having no catch limits for dab and flounder in the North Sea. ICES advice is therefore based on a qualitative evaluation.

ICES defined six questions to evaluate the request:

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?

Since its implementation, the combined TAC for dab and flounder has never been fully utilized (Figure 1). There is no targeted fishery for dab and flounder, and there is also a limited market. Most catches of dab (90% by weight; average 2013–2015) and a substantial amount of flounder (44% by weight; average 2013–2015) are discarded. In the case of dab, this is because catches mainly consist of small fish for which there is a low market demand and which fetch relatively low prices (Miller and Verkempyck, 2016). Similarly, the market demand and price for flounder are low (STECF, 2016a). The TAC (based on landings) was never restrictive for the fisheries mainly catching dab and flounder, which are those targeting plaice and sole (ICES, 2016a). These fisheries are managed under the Common Fisheries Policy (CFP). The management measures taken for the fisheries catching plaice and sole (in terms of TACs) currently have the largest influence on dab and flounder catches, rather than the combined TAC for dab and flounder.

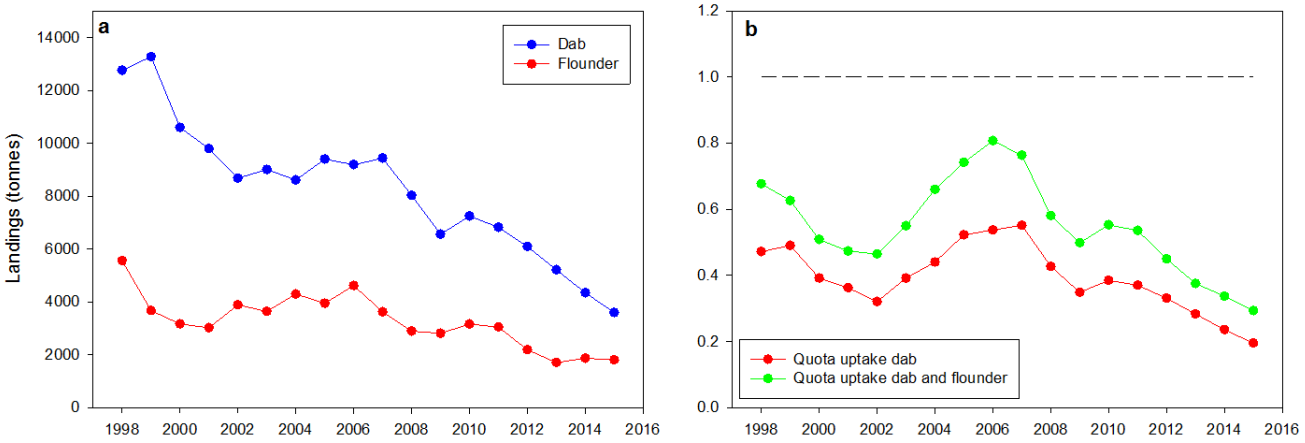

Figure 1 Landings of dab and flounder in Subarea 4 (a) and quota uptake for dab and dab/flounder (b). The dashed line indicates full utilization of the TAC.

Since the mid-2000s the fishing effort of the main fleets targeting plaice and sole and responsible for a significant proportion of the dab and flounder catches has decreased substantially (see *Basis of the advice*). Due to the reduction in effort of these fleets, plaice and sole are currently fished at around F_{MSY}.

Declining trends in the survey indices for dab (BTS-Isis) and flounder (IBTSQ1) were visible until the early 2000s (see *Basis of the advice*). Since the reduction in the effort of the fleets targeting plaice and sole, the survey index for dab has shown an increasing trend and the index for flounder has shown a relatively stable trend.

In 2015 ICES provided advice on F_{MSY} ranges for stocks of North Sea sole and plaice (ICES, 2015a). Fishing at the upper bound of the F_{MSY} range would, assuming unchanged fishing patterns, correspond to an increase in the effort of the main fleet catching dab and flounder of up to 43% compared to the effort observed in 2015. The effort corresponding to fishing at the upper bound of the F_{MSY} range would be below the levels observed when the dab survey index started to increase and the flounder survey index stabilized.

ICES concludes that based on an evaluation of the six questions listed above, the risk to the dab and flounder stocks of having no catch limits is currently considered to be low and not inconsistent with the objectives of the CFP. The conclusions are valid, as long as dab and flounder remain largely bycatch species, with the main fleets catching dab and flounder continuing to fish the target species (plaice and sole) sustainably within the F_{MSY} ranges advised by ICES (ICES, 2015a). With the current management system in place for the North Sea, it is unlikely that the fishing effort in the mixed demersal fisheries in the area will increase to the high levels observed in the early 2000s. In the absence of a TAC for these stocks, a monitoring and assessment system will still be required to evaluate the state of the stocks.

Basis of the advice

General

Dab is one of the most abundant flatfish species in the North Sea (Daan *et al.*, 1990) and is distributed over the whole area to depths of 100 m. The main concentration of dab can be found in the southeastern North Sea, especially the younger age groups (ages 1–2). Older age groups are distributed more in the central parts of the North Sea. Early sexual maturation (age 2) was reported for dab, with peak spawning occurring from February to April. There is no direct target fishery for dab; it is mainly caught as bycatch in the mixed demersal fisheries targeting sole and plaice (ICES, 2016a). Discard rates of dab are high, with up to 90% (average 2013–2015) of the total catch discarded. Dab is assessed by ICES as a single stock unit in Subarea 4 and Division 3.a, but no analytical assessment is available because data are limited (ICES, 2016b). Therefore, dab is assessed as a category 3 stock following ICES guidelines (ICES, 2012), and the advice is based on trends from a survey-based assessment (ICES, 2016b).

Flounder is a euryhaline flatfish species that shows a more coastal distribution than dab. Flounder can live in low salinity waters, but they reproduce in areas of higher salinities. In the North Sea, Skagerrak, and Kattegat, flounder spawn between February and April. During autumn, both mature and immature flounder withdraw from the inshore and estuarine feeding areas. Immature flounder migrate into coastal areas, where they spend the winter. The adults move further offshore to the spawning grounds, which are situated along the coasts of the German Bight and Denmark. Similar to dab, flounder is a typical bycatch species with a comparably low economic value. Most flounder catches come from the métiers targeting plaice and sole (ICES, 2016a). A large part of the catch is discarded (44%, average 2013–2015). Flounder is assessed by ICES as a single stock unit in Subarea 4 and Division 3.a. No analytical assessment is available for flounder and it is also treated as a category 3 stock. The advice for flounder is solely based on survey trends (ICES, 2015b).

Latest advice

The current advice for the two stocks, issued in 2015 and valid for 2016 and 2017, is:

Dab

"ICES advises that when the precautionary approach is applied, catches should be no more than 76075 tonnes for each of the years 2016 and 2017. If discard rates do not change from the average of the last three years (2012–2014), this implies landings of no more than 7608 tonnes.

Management of dab and flounder under a combined species TAC prevents effective control of the single-species exploitation rates and could lead to overexploitation of either species."

Flounder

"ICES advises that when the precautionary approach is applied, catches should be no more than 5228 tonnes in each of the years 2016 and 2017. If discard rates do not change from the average of the last three years (2012–2014), this implies landings of no more than 2876 tonnes.

Management of dab and flounder under a combined species TAC prevents effective control of the single-species exploitation rates and could lead to overexploitation of either species."

Current assessment and stock indicators

Dab

A benchmark assessment for North Sea dab was carried out in 2016 (ICES, 2016b). During this benchmark it was agreed to keep dab as a category 3.2 stock and to use a survey-based assessment model (SURBA; Needle, 2015) as the future basis of the advice. As input for SURBA, Dutch and German beam-trawl survey data were used. Figure 2 shows the latest update of the beam-trawl survey indices and the latest SURBA output (ICES, 2016a). The BTS-Isis beam-trawl survey indicates that high stock numbers occurred during the early years of the time-series, followed by a decline up to 1995 (Figure 2a). Since 2005 the different beam-trawl time-series indicate an increasing trend again. Over the last two years the trend has been decreasing or has remained stable for all three beam-trawl surveys. The IBTS Q1 displays an increasing trend from 1983 until 1991 (Figure 2b). Since 2010 the IBTSQ1 time-series show a steep increase in numbers, which is confirmed by the IBTSQ3. As expected the combined beam-trawl survey index (Figure 2c) shows an increasing trend from 2002 onwards, but the variability is smoothed somewhat. The same trend is visible for the resulting spawning-stock biomass (SSB) from the applied SURBA model (Figure 2d).

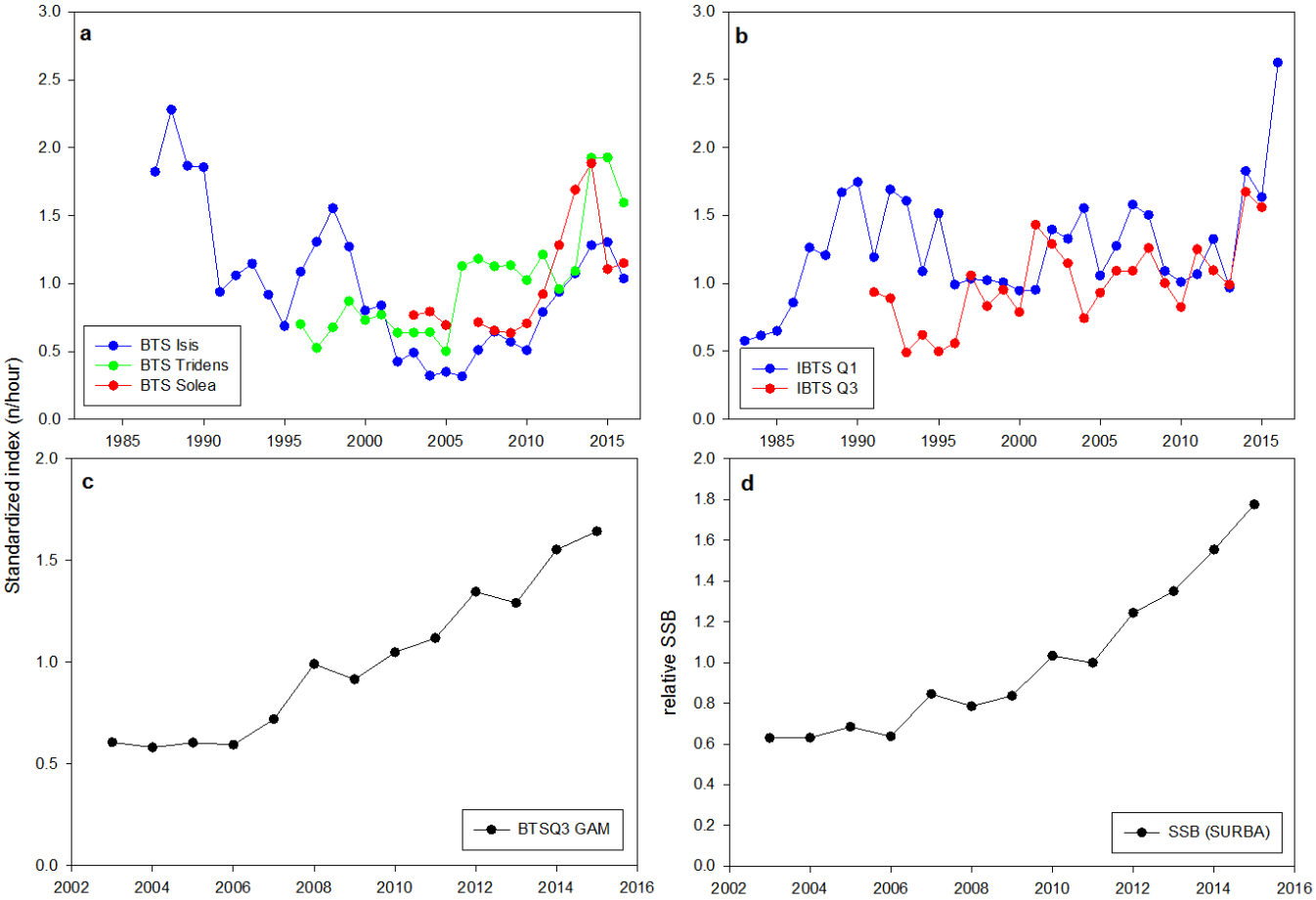

Figure 2 Survey trends and SURBA output for North Sea dab. Panel (a): beam-trawl survey indices (number h^{-1}) of BTS-Isis (Dutch; blue line), BTS-Tridens (Dutch; green line), and BTS-Solea (German; red line). Panel (b): indices from the IBTS 1st quarter (blue line) and 3rd quarter (red line). Panel (c): combined BTS survey index used as input for the SURBA model (sum of all ages). Panel (d): the trend of total stock biomass relative to the mean (SURBA output).

Flounder

Because only official landings and survey data were available for flounder, this stock was also defined as a category 3 stock (ICES, 2013) according to the ICES guidelines (ICES, 2012). Information on total catch including discards is available for the years 2012–2015 only. As basis for the advice, a mature biomass index was used, calculated from IBTSQ1 data (Figure 3). This index indicates higher stock biomass values in the period 1987–1993, with a slight decrease since then. While it was concluded that the IBTSQ1 is probably the best survey time-series for flounder, it should be noted that the catchability of flounder is rather low for this survey, which casts doubt on whether it can reliably represent stock trends for North Sea flounder.

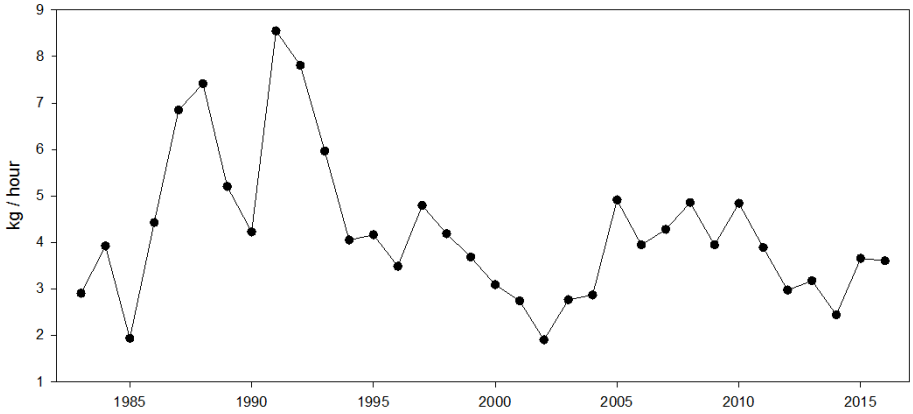

Figure 3 Mature biomass index (IBTS Q1) trend for North Sea flounder (ICES, 2016a, updated).

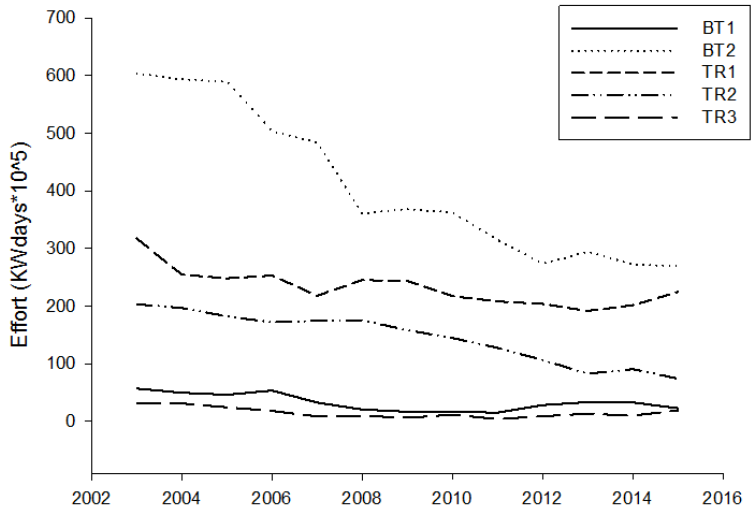

Figure 4 Trends in fishing effort for different regulated fishing gear groups 2003–2015 (STECF, 2016b). TR1: bottom trawl and seines with mesh sizes ≥ 100 mm. TR2: bottom trawl and seines with mesh sizes ≥ 70 mm and < 100 mm. TR3: bottom trawl and seines with mesh sizes ≥ 16 mm and < 32 mm. BT1: beam trawls with mesh sizes ≥ 120 mm. BT2: beam trawls with mesh sizes ≥ 80 mm and < 120 mm.

Fishing mortality

Dab

Most of the dab catches are currently discarded (90% by weight; average 2013–2015). By far the largest part of the total catch, landings, and discards is taken by beam trawlers with 70–99 mm mesh sizes (BT2). For the 70–99 mm mesh size otter trawl métier (TR2) considerable amounts of discards were estimated for the recent years (2002–2015; ICES, 2016b). Otter trawlers and seiners with mesh sizes ≥ 100 mm (TR1) and beam trawlers with mesh sizes ≥ 120 mm (BT1) are also important, but only in terms of landings (ICES, 2016a). A considerable proportion of dab landings (ca. 500 tonnes) was reported as industrial bycatch by the Danish sandeel fishery in 2015 (ICES, 2016a). Since 2002, a large reduction in effort of the BT2 métier was observed (Figure 4), which corresponds to a substantial reduction of fishing mortality for plaice and sole, the main target species of this fleet. In line with these observations, recently estimated (relative) trends of fishing mortality and total mortality for dab also show a decreasing trend from 2002 onwards (Figure 5). These relative trends in mortality for dab were estimated during an ICES benchmark workshop in 2016, applying a survey-based assessment model and length-based methods (ICES, 2016b).

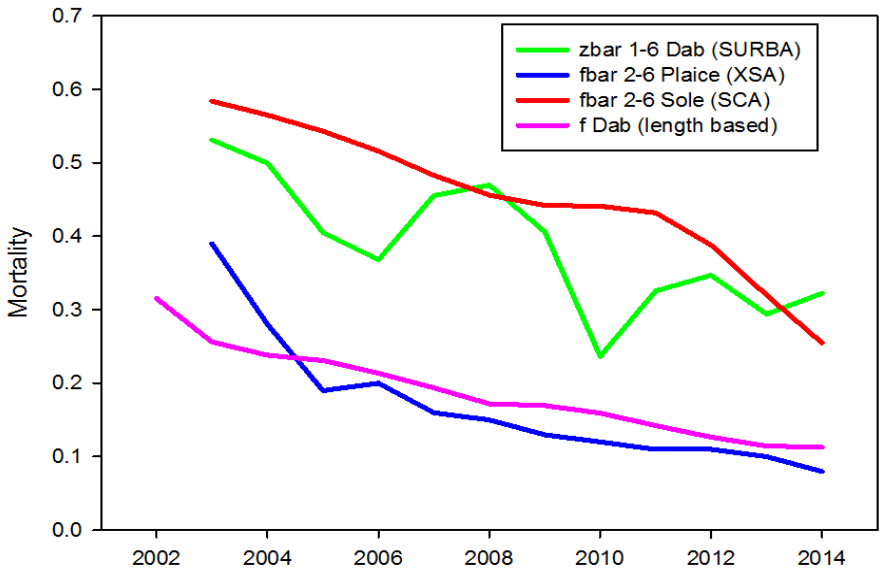

Figure 5 Estimated trend in dab fishing mortality and total mortality (ICES, 2016b) compared to fishing mortality of plaice and sole (ICES, 2015b).

Flounder

The largest flounder catches in the years for which data were available (2012–2015) were reported for the beam trawlers with smaller mesh sizes (BT2; ICES, 2016b). However, in 2015 considerable discards were also reported for otter trawlers (TR1). Overall for flounder, the important fleets are the same as for dab. Fishing mortality of flounder is unknown, but it is assumed that it has decreased, similar to the other flatfish species, because of the substantial effort reductions of the main fleets targeting these species.

Methods

The existing data on effort, official landings, ICES catch estimates, and assessment results were used to evaluate the risk of removing the TAC for dab and flounder. Since there is no analytical assessment and the absolute fishing mortality (F) is not known for these stocks, the request could only be answered in a qualitative manner on the basis of the existing data from the assessment and available ICES and STECF reports (Table 1). To indicate potential future risk levels under the current CFP management regime, the relative stock trends for the North Sea dab stock were related to possible changes in effort of the fleets targeting plaice and sole, which might occur when fishing at the upper bound of the F_{MSY} range provided by ICES in 2015 (ICES 2015a; Table 2). Simple linear relationships between observed plaice and sole fishing mortalities and effort of the main métier catching dab and flounder (BT2) were used in order to estimate the potential increase in effort when fishing at the upper bound of the F_{MSY} range (Figure 6). Therefore, a constant F per unit of effort was assumed. This assumption may not hold true if fishing patterns or selectivity change.

Table 1 Estimated catch (tonnes; ICES 2016a, 2016b), effort (kW days × 10^5; BT2 – main fleet; STECF, 2016b), and catch per unit effort (CPUE) based on total catch and BT2 effort data for dab and flounder in relation to observed F for plaice and sole.

Year	Catch		Effort (STECF area 3b2)	CPUE		F	
	dab	flounder		dab	flounder	plaice (ages 2–6)	sole (ages 2–6)
2002	35219					0.56	0.60
2003	54363		603	90.08		0.60	0.60
2004	42920		594	72.29		0.47	0.58
2005	44828		590	76.03		0.38	0.53
2006	48214		504	95.73		0.37	0.49
2007	43208		484	89.31		0.33	0.46
2008	36024		361	99.88		0.26	0.45
2009	40461		369	109.72		0.23	0.45
2010	50765		363	140.02		0.22	0.43
2011	51882		316	164.32		0.21	0.38
2012	59679	4143	274	218.01	15.13	0.23	0.34
2013	60087	3277	295	203.98	11.12	0.19	0.29
2014	58780	3312	273	215.55	12.15	0.17	0.24
2015	52454	3045	269	194.67	11.30	0.17	0.20

Table 2 Fishing mortalities and different scenarios for F_{MSY} and mixed fisheries options.

	F_{2015} (ages 2–6)*	Current F_{MSY}**	Upper bound of F_{MSY} range**	Highest observed F (ages 2–6)*
Plaice	0.17	0.19	0.27	0.77 (1997)
Sole	0.20	0.20	0.37	0.67 (1997)

* ICES (2016a). WGNSSK report.

** ICES (2015a). ICES Special Request Advice on F_{MSY} ranges.

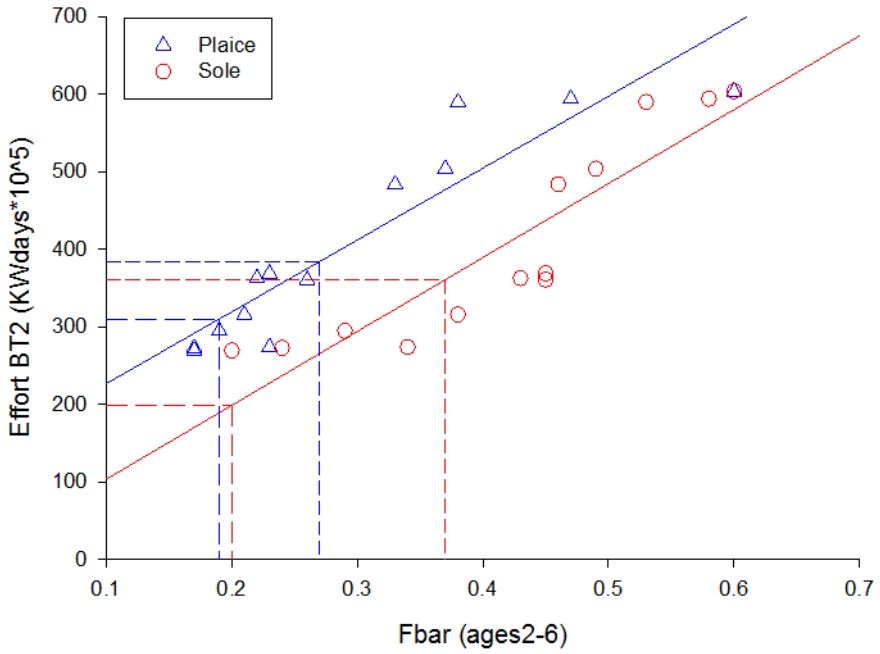

Figure 6 Relation between plaice (blue) and sole (red) fishing mortality (F) and effort (kW days × 10^5; BT2). Solid lines display linear regressions, dashed lines display F_{MSY} and F_{MSY} upper for plaice and sole. Plaice: effort × 10^5 = 134.044 + 926.861 × F (R^2 = 0.87); Sole: effort × 10^5 = 8.232 + 953.205 × F (R^2 = 0.82).

Results

The most important métier catching flatfish in the mixed demersal fisheries in the North Sea is the beam-trawl fleet (gear category BT2). The main target species of this fleet is plaice (taking 65% of the total landings of plaice from the North Sea and the Skagerrak in 2015) and sole (taking 88% of the total landings of sole from the North Sea in 2015). Dab and flounder are bycatch species of this fleet (50% average in 2013–2015 of the total catch of dab, and 44% average in 2013–2015 of the total catch of flounder). Strong positive correlations were found between BT2 effort and fishing mortality of plaice ($R^2 = 0.87$) and sole ($R^2 = 0.82$; Figure 6). Under the assumption of a linear relationship between F and effort, the effort for the F_{MSY} of plaice would be 310 kW days × 10^5 and the effort for the upper range of F_{MSY} advised by ICES in 2015 (ICES, 2015a) would be 384 kW days × 10^5. The effort corresponding to F_{MSY} of sole would be 199 kW days × 10^5 and the effort for the upper range of F_{MSY} would be 361 kW days × 10^5. Fishing at the upper bound of the F_{MSY} range would correspond to an increase in effort of 43% for plaice and 34% for sole compared to the effort in 2015. The effort corresponding to fishing at the upper bound of the F_{MSY} range would be below the levels observed when the dab survey index started to increase and the flounder survey index stabilized.

Sources and references

Daan, N., Bromley, P. J., Hislop, J. R. G., and Nielsen., N. A. 1990 Ecology of North Sea fish. Netherlands Journal of Sea Research, 26: 343–386.

ICES. 2012. ICES Implementation of Advice for Data-limited Stocks in 2012 in its 2012 Advice. ICES CM 2012/ACOM:68. 42 pp.

ICES. 2013. Report of the Working Group on Assessment of New MoU Species (WGNEW), 18–22 March 2013, ICES Headquarters, Denmark. ICES CM 2013/ACOM:21. 189 pp.

ICES. 2015a. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 28 April–7 May, ICES HQ, Copenhagen, Denmark. ICES CM 2015/ACOM:13. 1229 pp.

ICES. 2015b. EU request to ICES to provide F_{MSY} ranges for selected North Sea and Baltic Sea stocks. *In* Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6, Section 6.2.3.1.

ICES. 2017a. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 26 April–5 May 2016, Hamburg, Germany. ICES CM 2016/ ACOM:14. 1096 pp.

ICES. 2017b. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA), 14–18 March 2016, Copenhagen, Denmark. ICES CM 2016/ACOM:37. 698 pp.

Miller, D. C. M., and Verkempynck, R. 2016. Fisheries management controls for dab in the North Sea. Wageningen, IMARES Wageningen UR (University & Research Centre), IMARES report C040/16. 32 pp.

Needle, C. 2015. Using self-testing to validate the SURBAR survey-based assessment model. Fisheries Research, 171: 78–86.

STECF. 2016a. The 2016 Annual Economic Report on the EU Fishing Fleet (STECF-16-11). Publications Office of the European Union, Luxembourg. ISBN 978-92-79-64633-1; doi 10.2788/842673. 472 pp.

STECF. 2016b. Fisheries dependent information. Scientific, Technical and Economic Committee for Fisheries (STECF-16-20). Publications Office of the European Union, Luxembourg. EUR 27758 EN; doi 10.2788/502445.