

**ECOREGION** North Sea  
**STOCK** Plaice in Subarea IV (North Sea) (updated)

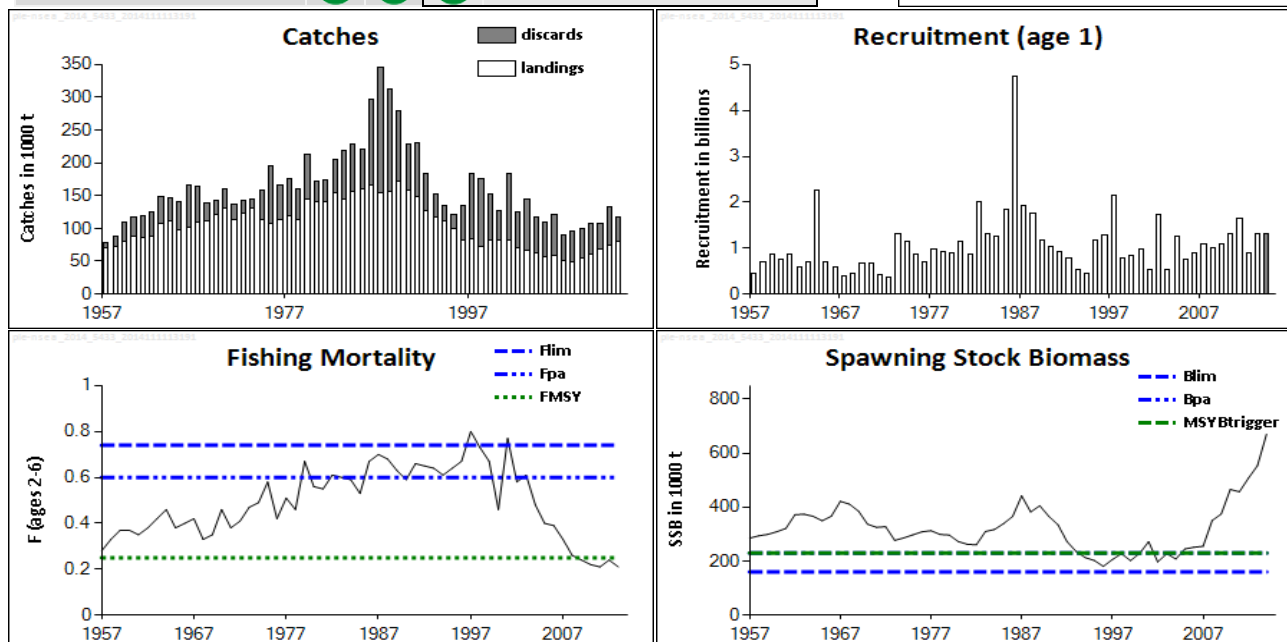
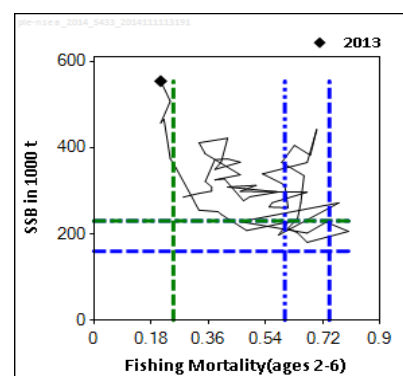
*Please note: The present advice replaces the advice given for this stock in June 2014.*

**Advice for 2015**

ICES advises on the basis of the second stage of the EU management plan (Council Regulation No. 676/2007) that catches should be no more than 185 798 t. If discard rates do not change from the average of the last three years (2011–2013), this implies landings of no more than 128 376 t.

**Stock status**

Fishing pressure			
	2011	2012	2013
MSY ( $F_{MSY}$ )	✓	✓	✓ Appropriate
Precautionary approach ( $F_{pa}$ , $F_{lim}$ )	✓	✓	✓ Harvested sustainably
Management plan ( $F_{MP}$ )	✓	✓	✓ Below target
Stock size			
	2012	2013	2014
MSY ( $B_{trigger}$ )	✓	✓	✓ Above trigger
Precautionary approach ( $B_{pa}$ , $B_{lim}$ )	✓	✓	✓ Full reproductive capacity
Management plan ( $SSB_{MP}$ )	✓	✓	✓ Above target



**Figure 6.3.18.1** Plaice in Subarea IV (North Sea). Summary of stock assessment (weights in thousand tonnes, predicted values are shaded). Top right: SSB and F for the time-series used in the assessment.

The stock is well within precautionary limits, has increased in the past ten years, and reached a record-high level in 2014. Recruitment has been around the long-term average since the mid-2000s. In recent years, fishing mortality has been estimated below  $F_{MSY}$  and below the target specified in the management plan.

**Management plans**

There is a two-stage management plan for North Sea sole and plaice (Council Regulation (EC) No. 676/2007, see Annex 6.3.18). An evaluation of the plan (ICES, 2010) concluded that the management plan is precautionary. The stocks are presently in stage two of the plan (STECF, 2014); implementation of this second stage (as stipulated in article 5 of the EC regulation) is not yet defined.

## Biology

Plaice is a bottom-dwelling species, mainly feeding on annelids and molluscs. In the North Sea they spawn in the first quarter of the year. The major nurseries are situated in the coastal zones and estuaries in the southern North Sea. The growth rate for plaice is highest in summer/autumn on the more dispersed feeding grounds. These feeding grounds are generally located more northerly than the spawning grounds.

## Environmental influence on the stock

Studies suggest that North Sea plaice has shown a shift northward into deeper waters. Juvenile plaice have been observed to be distributed more offshore in recent years. This distribution shift has been attributed to climate change (Engelhard *et al.*, 2011).

## The fisheries

Plaice is predominantly targeted by beam trawlers in the central part of the North Sea with a minimum mesh size of 100–120 mm, depending on the area. In addition, plaice is caught in a mixed fishery which targets sole in the southern North Sea with a minimum mesh size of 80 mm. The catches of this latter fishery include plaice under the minimum landing size of 27 cm, which results in high discard rates. The total fleet discard ratio has gradually decreased since 2000.

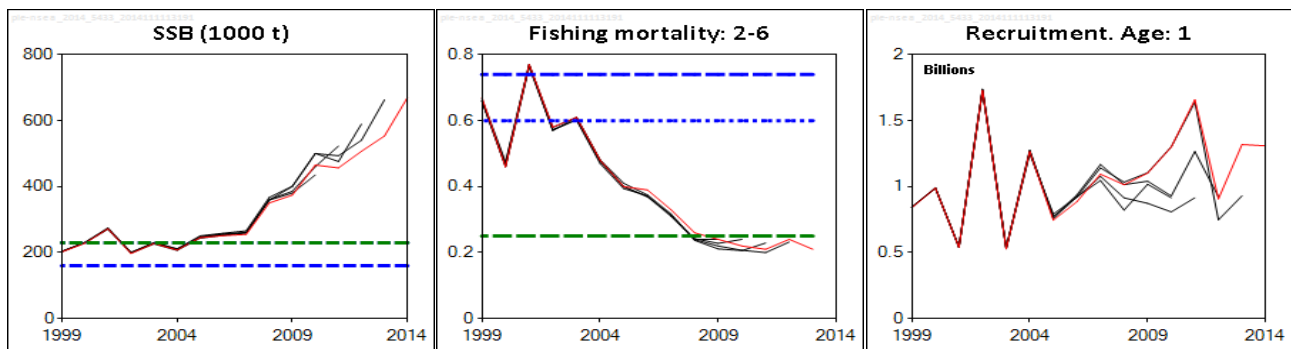
**Catch distribution** Total catch in 2013 was 118 135 t, where 78 905 t were estimated landings (58% beam trawl, 26% otter trawl, and 16% other gears) and 38 700 t were discards.

## Effects of the fisheries on the ecosystem

The mixed plaice and sole fishery is dominated by bottom trawls, with bycatch of both commercial and non-commercial species and a physical impact on the seabed. Bottom trawling impacts biomass, production, and species richness. The trawling impact differs among benthic habitats and is likely to be more important in deeper water with silty sediments than in shallow areas characterized by sandy grounds. High discard rates of small plaice are associated with the small-meshed sole fisheries.

## Quality considerations

The assessment was improved by combining two IBTS indices in 2013, covering different parts of the distribution of plaice, into a single standardized time-series. This has led to a slight upwards revision of the recruitment estimates.



**Figure 6.3.18.2** Plaice in Subarea IV (North Sea). Historical assessment results (final-year recruitment estimates included).

## Scientific basis

<b>Stock data category</b>	1 ( <a href="#">ICES, 2014a</a> ).
<b>Assessment type</b>	Age-based analytical assessment (XSA).
<b>Input data</b>	Commercial catches from landings, ages and length frequencies from port sampling. Three survey indices (combined BTS (BTS-Tridens and BTS-Isis; 1996–2013), BTS-Isis (1985–1995), and the SNS). Maturity-at-age assumed constant; natural mortality-at-age assumed constant at 0.1.
<b>Discards and bycatch</b>	Included in the assessment since 2004, data series from the majority of the fleet (covering 68% of the landings in 2013).
<b>Indicators</b>	None.
<b>Other information</b>	This stock was benchmarked in 2009 (WKFLAT; ICES, 2009) and an inter-benchmark procedure was carried out in 2013 (IBP Plaice; ICES, 2013a). The advice was reopened in November 2014 based on new recruitment information (ages 1 and 2 in 2014) from the Q3 combined BTS survey.
<b>Working group</b>	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak ( <a href="#">WGNSSK</a> ), Working Group on Mixed-Fisheries Advice ( <a href="#">WGMIXFISH-NS</a> ).

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**Reference points**

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
Management plan	SSB <sub>MP</sub>	230 000 t.	Stage one: Article 2.
	F <sub>MP</sub>	0.6 0.3	Stage one: Article 2; Stage two: Article 4.2 – F <sub>MSY</sub> constrained to F ≥ 0.3.
MSY approach	MSY	230 000 t.	Default to value of B <sub>pa</sub> .
	B <sub>trigger</sub> F <sub>MSY</sub>	0.25	Simulation studies and equilibrium analyses, taking into account a number of possible stock–recruitment relationships (range of 0.2–0.3).
Precautionary approach	B <sub>lim</sub>	160 000 t.	B <sub>loss</sub> = 160 000 t, the lowest observed biomass in 1997 as assessed in 2004.
	B <sub>pa</sub>	230 000 t.	Approximately 1.4 B <sub>lim</sub> .
	F <sub>lim</sub>	0.74	F <sub>loss</sub> for ages 2–6.
	F <sub>pa</sub>	0.60	5th percentile of F <sub>loss</sub> (0.6) that implies B <sub>eq</sub> > B <sub>pa</sub> and a 50% probability that SSB <sub>MT</sub> ~ B <sub>pa</sub> .

(Last changed in: 2011)

**Outlook for 2015**

Basis: F (2014) = mean (F 2011–2013) scaled to 2013 = 0.21; SSB (2015) = 747.179; R (2014) = RCT3 = 1309 million; Catches (2014) = 136.511; Landings (2014) = 93.100; Discards (2014) = 43.718.

Rationale	Catch (2015)	Landings (2015) <sup>1)</sup>	Basis	F(2–6) total (2015)	F(2–6) HC (2015)	F(2–3) Disc. (2015)	Disc. (2015)	SSB (2016)	%SSB change <sup>2)</sup>	%TAC change <sup>3)</sup>
Management plan	185.798	128.376	TAC + 15%	0.285	0.15	0.25	57.897	752.727	1	15
MSY approach	165.161	114.033	F <sub>MSY</sub>	0.25	0.13	0.21	51.550	773.246	3	2
Precautionary approach	343.576	238.871	F <sub>pa</sub>	0.6	0.32	0.52	105.578	596.618	–20	114
Zero catch	0	0	F = 0	0	0	0	0	938.107	26	–100
Other options	127.526	87.936	F <sub>2014</sub> × 0.90	0.19	0.1	0.16	39.917	810.714	9	–21
	140.503	96.926	F <sub>2014</sub>	0.21	0.11	0.18	43.936	797.788	7	–13
	153.243	105.761	F <sub>2014</sub> × 1.10	0.23	0.12	0.2	47.874	785.104	5	–5
	161.701	111.631	Stable TAC (= F <sub>2014</sub> × 0.85)	0.24	0.13	0.21	50.483	776.688	4	0
	194.062	134.125	Management plan F-target	0.30	0.16	0.26	60.433	744.517	0	20
	257.499	178.392	F <sub>2014</sub> × 2	0.42	0.22	0.36	79.763	681.607	–9	60
<i>Mixed-fisheries options, not updated in November.</i> □										
Maximum	279.520	199.978	A	0.51	-	-	79.542	608.786	–17	79
Minimum	75.325	53.520	B	0.11	-	-	21.805	812.718	11	–52
Cod_MP	84.667	60.175	C	0.13	-	-	24.492	803.339	10	–46
SQ effort	151.503	107.902	D	0.25	-	-	43.601	736.365	1	–3
Effort_Mgt	118.610	84.387	E	0.19	-	-	34.223	769.298	5	–24

Weights in thousand tonnes.

<sup>1)</sup> Landings of plaice in Subarea IV, calculated as the projected total stock landings less the landings of plaice from Subarea IV in Division VIId. The subtracted value (528 t) is estimated based on the plaice catch advice for Division VIId for 2014, using the recent 3-year average (2011–2013) proportion of the Subarea IV plaice stock in the annual plaice landings in Division VIId. TAC change restrictions of 15% are applied after subtracting the Division VIId catches.

<sup>2)</sup> SSB 2016 relative to SSB 2015.

<sup>3)</sup> Landings 2015 relative to TAC 2014.

Mixed-fisheries assumptions:

- A. Maximum scenario: Fleets stop fishing when the last quota is exhausted.
- B. Minimum scenario: Fleets stop fishing when the first quota is exhausted.
- C. Cod management plan scenario: Fleets stop fishing when the cod quota is exhausted.
- D. SQ effort scenario: Effort in 2014 and 2015 as in 2013.
- E. Effort management scenario: Effort reductions according to cod and flatfish management plans.

## ***Management plan***

The North Sea plaice and sole stocks have both been within safe biological limits in the last three years, which means that the stocks are presently in stage two of the EU multiannual plan (STECF, 2014). Application of stage two of the plan is based on transitional arrangements until an evaluation of the plan has been conducted (as stipulated in article 5 of the EC regulation).

Following the EU multiannual plan stage 2 would imply fishing at the target rate of 0.3, which results in a TAC (landings) increase of more than 15%. Therefore, the maximum TAC increase of 15% is applied, resulting in catches of no more than 185 798 t. If discard rates do not change from the average of the last three years (2011–2013), this implies landings of no more than 128 376 t. This is expected to lead to an SSB of 752 727 t in 2016.

ICES has evaluated this management plan and considers it to be precautionary (ICES, 2010).

## ***MSY approach***

Following the ICES MSY approach implies an increase in fishing mortality to 0.25, resulting in catches of 165 161 t in 2015. If discard rates do not change from the average of the last three years (2011–2013), this implies landings of no more than 113 611 t. This is expected to lead to an SSB of 773 246 t in 2016.

## ***Precautionary approach***

The fishing mortality in 2014 should be no more than  $F_{pa}$  (0.6), corresponding to catches of no more than 343 576 t in 2015. If discard rates do not change from the average of the last three years (2011–2013), this implies landings of no more than 237 998 t. This is expected to keep SSB above  $B_{pa}$  in 2016.

## ***Mixed fisheries***

Mixed-fisheries advice informs managers of the consequences of setting TACs for single species which are exploited in a mixed fishery (ICES, 2014c). In contrast to single-species advice there is no single recommendation because no management objectives have been defined for mixed fisheries. Mixed-fisheries forecasts explore a range of scenarios which provide insight on the overall balance between the various single-species TACs. Major differences between the outcomes of the various scenarios indicate a potential for undershoot or overshoot of the advised landings corresponding to the single-species advice. The results provide indication of which species are globally limiting for the North Sea fisheries as a whole, but may not necessarily reflect the actual constraints on individual fishers.

Assuming fishing patterns and catchability in 2014 and 2015 are unchanged from those in 2013, cod and *Nephrops* in FU 6 are the limiting species (73% and 27%, respectively) for the effort of fleets in the North Sea demersal fisheries in 2015. In all scenarios except the “Maximum”, the Plaice IV management plan catch options could not be fully utilized. The mixed fisheries projections have not been updated in November. The revised advice for haddock, whiting, *Nephrops* in FU6, plaice and sole, based on the new survey information, does not change the general perception of which stocks are more likely to limit the North Sea fisheries in 2015.

## **Additional considerations**

### ***Management considerations***

Both sole and plaice stocks in the North Sea have been within safe biological limits for a number of consecutive years. Therefore ICES considers that the management plan is now in the second stage, which implies that the stocks should be managed on the basis of MSY (article 4.1). The management plan specifies that fishing mortality for plaice in the second stage should not be set below the target of 0.3 (article 4.2); the current advice for plaice is therefore based on this objective. Taking into account the procedures for setting the TAC for plaice (article 7) the TAC advice for 2015 is based on a maximum change of 15%.

ICES has developed a generic approach to evaluate whether new survey information that becomes available in September forms a basis to update the advice. If this is the case, ICES will publish new advice in November 2014.

### ***Stock identity***

The nursery areas on the eastern side of the North Sea (and possibly inside the Skagerrak area) contribute to much of the total recruitment. Sub-populations have strong homing behaviour to specified spawning grounds (Hunter *et al.*, 2003).

ICES evaluated the stock identity of plaice in the Skagerrak and Kattegat (ICES, 2012b, 2012c; Ulrich *et al.*, 2013) for which combined advice was given until 2011. Although work on stock identity is still under development, the collected information on the biology and fishery of plaice in Division IIIa and adjacent waters led to decisions on changes in assessment units as well as in management areas. In 2013, TACs for plaice were established for the Kattegat and the Skagerrak areas separately. Plaice in Skagerrak is now considered to be highly connected to plaice in the North Sea, although these linkages cannot be quantified. The advice for plaice in Skagerrak is therefore linked to the one from the North Sea (ICES, 2014d).

Updates of tagging and genetic studies describing the migratory behaviour of plaice between the North Sea and adjacent waters would improve determining stock units.

Since 2013 part of the catches in Division VIII d in the first quarter are included in the North Sea plaice assessment as it is assumed that North Sea plaice migrates into that area in the season.

### *Management plan*

A multiannual plan for plaice and sole in the North Sea was adopted by the EU Council in 2007 (Council Regulation (EC) No. 676/2007) which describes two stages: a recovery plan during its first stage and a management plan during its second stage. The long-term management plan for plaice and sole in the North Sea specifies two distinct phases. The objective of stage one of the flatfish management plan was to bring both sole and plaice stocks within safe biological limits. This objective has been achieved for both stocks. The management plan foresees a re-evaluation of the biological objectives and introduction of economic and social objectives after stage one is completed. The management plan states that when stage one is completed, the Council shall decide on the basis of a proposal from the Commission on the amendment of Articles 4(2) and 4(3) and the amendment of Articles 7, 8, and 9 that will, in the light of the latest scientific advice from the STECF, permit the exploitation of the stocks at a fishing mortality rate compatible with maximum sustainable yield.

ICES considers that the management plan is presently in stage two but the implementation at this stage has not yet been fully defined.

The current plan prescribes effort limitations (kW-days per metier) to be adjusted in line with changes in fishing mortality. In 2012, ICES evaluated a proposal by the Netherlands for an amended management plan, which could serve as the “stage 2” plan (Coers *et al.*, 2012). The amendments included changing the target  $F$  for sole and to cease reductions of effort when the stocks are within safe biological limits. ICES concluded that the plan – subject to those amendments – is consistent with the precautionary approach and the principle of maximum sustainable yield (ICES, 2012a).

In 2013, the effects of interannual quota flexibility in the management plan for plaice and sole were evaluated (ICES, 2013b). ICES concluded that the multiannual management plan is robust to inclusion of an interannual quota flexibility of 10% in terms of the probability of the stock biomass falling below  $B_{lim}$ , and average yield. This conclusion is conditional on the interannual quota flexibility being suspended when the stock is estimated to be outside safe biological limits.

### *Regulations and their effects*

Effort restrictions in the EU were introduced in 2003 (annexes to the annual TAC regulations) for the protection of the North Sea cod stock. In addition, a long-term plan for the recovery of cod stocks was adopted in 2008 (Council Regulation (EC) No. 1342/2008). In 2009, the effort management programme switched from a days-at-sea to a kW-day system (Council Regulation (EC) No. 43/2009), in which different amounts of kW-days are allocated within each area by Member Country to different groups of vessels, depending on gear and mesh size. Bottom otter trawls (OTB) with a mesh size equal to or larger than 100 mm and included in TR1, have since 2009 been affected by the regulation. The beam trawl fleet (BT2) was affected by this regulation only once in 2009, but not afterwards.

The current sole and plaice long-term management plan (Council Regulation (EC) No. 676/2007) also specifically reduces effort as a management measure, affecting BT2 and occasionally trammelnet (GT1) gears since the implementation of the plan. Effort ceilings are updated annually. However, for 2013 and 2014, the European Council decided upon a roll-over of the effort level in 2012 into 2013 and 2014 for both the cod and the sole/plaice management plan.

Overall nominal effort (kW-days) by EU demersal trawls, seines, beam trawls, gill/trammel nets, and longlines (all mesh sizes included) in the North Sea, Skagerrak, and Eastern Channel had been substantially reduced since the implementation of the two successive effort management plans in 2003 and 2008 (–38% between 2003 and 2013, –17% between 2008 and 2013). Following the introduction of days-at-sea regulations in 2003, there was a substantial switch

from the larger mesh (>100 mm, TR1) gear to the smaller-mesh (70–99 mm, TR2) gear. Subsequently, effort by TR1 has been relatively stable, whereas effort in TR2 and in small-mesh beam trawl (80–120 mm, BT2), has shown a pronounced decline (0%, –52%, and –42%, respectively, between 2004 and 2013). Gill- and trammelnet fisheries have remained stable (ICES, 2014c). Effort in large-meshed beam trawl ( $\geq$ 120 mm, BT1) has increased significantly in 2012 and 2013 after a decade of continuous decline. Nominal effort reported by Norway has increased since 2011 due to the generalization of electronic logbooks.

Technical measures applicable to the mixed flatfish beam-trawl fishery in the southern North Sea affect both sole and plaice. The minimum mesh size of 80 mm selects sole at the minimum landing size. However, this mesh size generates high discards of plaice with a larger minimum landing size than sole. For the overall fleet the discard ratio has gradually decreased since 2003. The use of larger mesh sizes would reduce the catch of undersized plaice and sole, but would also result in loss of marketable sole in the short term (Cardinale and Hjelm, 2012). The introduction of the Omega (mesh size) meter in 2010 has led to a slight increase in the effective mesh size in the fishery.

Technical management measures have caused a shift towards two categories of vessels: 2000 HP (the maximum engine power allowed) and 300 HP. The 300 HP vessels are allowed to fish within the 12-nautical mile coastal zone and in the Plaice Box. The Plaice Box is a partially closed area along the continental coast that was implemented in phases, starting in 1989. The area has been closed to most categories of vessels >300 HP all year round since 1995. The latest evaluation reported the Plaice Box as having very little impact on the plaice stock (Beare *et al.*, 2013).

#### *Changes in fishing technology and fishing patterns*

In the southern North Sea plaice is caught in a mixed fishery with sole. The combination of days-at-sea regulations, the constrained TAC for plaice, and the relatively stable TAC for sole have led to a more southern fishing pattern in the North Sea where sole is more abundant. In addition, high oil prices may have contributed to this change in fishing pattern as well, since sole is a substantially more economically valuable fish than plaice. This concentration of fishing effort in the south has resulted in high discarding of juvenile plaice that are mainly distributed in those areas. In recent years, this process is aggravated by a more offshore distribution of juvenile plaice to the fishing grounds, where they are available to the fishery.

Since 2012 the Dutch beam-trawl fleet shifted towards targeted plaice fisheries in more central parts of the North Sea (e.g. the Doggerbank area) because of lower sole and higher plaice prices, in combination with relatively high catch rates for plaice.

The increased use of new gears such as “SumWing” and electric “pulse trawls” will increasingly affect catchability and selectivity of plaice and sole. ICES considered that pulse trawls experienced lower catch rates ( $\text{kg hr}^{-1}$ ) of undersized sole and higher catch rates of marketable sole, compared to standard beam trawls (ICES, 2006, 2012d). Plaice catch rates decreased for all size classes. Since 2009, Dutch fishers have started using pulse trawls. At the end of 2013, there were 42 derogation licenses available, of which 39 were in use by flatfish vessels. Debate is ongoing in the EU about possible amendments to EU regulations that would permanently legalize the use of pulse gears for the whole fleet.

#### *Impacts of the fisheries on the ecosystem*

Currently the mixed plaice and sole fishery is dominated by beam trawls, with bycatch of both commercial and non-commercial species and a physical impact on the seabed. Bottom trawling can impact biomass, production, and species richness. For the North Sea, an ecosystem model showed that the beam-trawl fleet reduced benthic biomass and production compared with an unfished situation (Hiddink *et al.*, 2006; Hinz *et al.*, 2008). Sustained fishing has caused a shift from communities dominated by relatively sessile, emergent, and high biomass species to communities dominated by infaunal, smaller-bodied fauna (Kaiser *et al.*, 2000).

The introduction of innovative gears such as “SumWing” and electric “pulse trawls” may lead to changes in how the ecosystem is impacted by the plaice and sole targeting fleet. Because of the lighter gear and lower towing speed, pulse vessels generate a lower swept area per hour and reduced bycatch of benthic organisms. The new gears may change fishing patterns as well.

ICES responded to a request by France on the use of the pulse trawl (ICES, 2012d) and concluded that the introduction of electric pulse systems could significantly reduce fishing mortality of target and non-target species, including benthic organisms, assuming there is no corresponding increase in unaccounted (avoidance) mortality. However, not all items (such as delayed mortality and long-term population effects) have been fully studied and ICES therefore considers that the available data are insufficient to recommend large-scale use of electric pulse trawl in fisheries.

#### *Impacts of the environment on the fish stock*

Adult North Sea plaice have an annual migration cycle between spawning and feeding grounds. Feeding grounds are located more northerly than the sole distribution areas. Spawning grounds are located in the (western and eastern) central North Sea, the southern North Sea, and the eastern English Channel, overlapping with the distribution area of sole. Juveniles generally reside in shallow inshore waters and move gradually offshore as they become larger. However, juvenile plaice have been distributed more offshore in recent years (Beare *et al.*, 2013). This could be linked to environmental changes in the productivity or changes in the temperature of the southern North Sea, but these links have not been shown conclusively. A shift in distribution has been observed in the relative contribution of the different spawning grounds to overall recruitment from the east to the west of the central North Sea (Hufnagl *et al.*, 2013). This is likely due to positive and negative effects, respectively, in transport success from spawning grounds to inshore nursery areas, caused by changes in both currents and water temperature.

Investigation of a possible relationship between the current high SSB for plaice and abundance of benthic biomass, which is a predominant food source for plaice (Q1 IBTS data), showed a twofold increase in demersal benthivore biomass over the last 29-year period of the survey, and a change in species composition of the demersal benthivore guild as well. If the biomass of demersal benthivorous fish is approaching its carrying capacity, then growth rates in the dominant species in the guild, in this case plaice, might start to decline.

#### *Information from the fishing industry*

Results of the 2013 North Sea Fishers' stock survey were not available.

#### *Uncertainties in assessment and forecast*

The change in distribution of juvenile plaice further offshore resulted in conflicting estimates of abundance between the SNS survey (mainly inshore) and the Tridens and BTS-Isis surveys (offshore) over the years. This issue was partly resolved in 2013 by combining both BTS indices into a single standardized time-series (ICES, 2013a). The indices were combined applying a gear efficiency correction as recommended by WGBEAM (ICES, 2005). The SNS inshore survey still shows a conflicting trend in abundance of young fish.

Although discards form a substantial part of total plaice catches, for which estimates are less certain than for landings, the assessment at present includes 13 years of discard data obtained from sampling programmes in several countries (covering 68% of the landings in 2013) and is considered to be robust and consistent between years. Discard data are now available from Denmark (beam trawls, otter trawls, Scottish and Danish seines, gillnets, and longliners); the United Kingdom (for beam trawls up to 2007); Germany (beam trawls, otter trawls, and gillnets); Belgium (beam trawls); and the Netherlands (beam trawls, otter trawls, and seines).

Since 2009, estimates of discards by the Netherlands are derived from a self-sampling programme by the industry, coordinated by fishery scientists. Mid-2011 the programme was redesigned, to allow for better comparison between self-sampling and observer estimates through paired measurements. From 2011 onwards, Dutch discard estimates are derived exclusively from the self-sampling programme, while observer estimates are used for validation of the self-sampling data. Preliminary analyses suggest that the self-sampling estimates are as reliable as those from the observer programme. Data from "matched trips" (self-sampling and observer estimates from the same vessel trip) are routinely analysed for comparison.

#### *Comparison of the basis of previous assessment and advice*

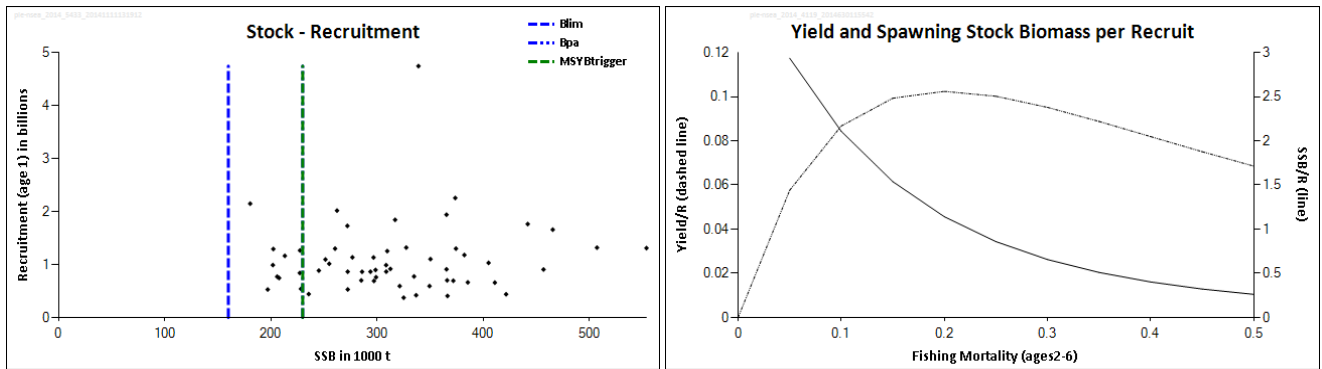
The basis for the assessment has not changed from last year. The 2014 assessment is in very close agreement with that of 2013. ICES advice last year was based on stage one of the management plan. This year's advice is based on stage two of the management plan.

The advice for 2015 was updated in November based on new recruitment information from the combined BTS survey. The November advice is also based on stage two of the management plan.



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**Figure 6.3.18.3** Plaiice in Subarea IV (North Sea). Stock–recruitment plot and yield-per-recruit analysis.

**Table 6.3.18.1** Plaiice in Subarea IV (North Sea). ICES advice, management, and landings. ICES landings have been updated and now include 50% of the Q1 landings of plaiice in Division VIII d (for all years, introduced in 2012).

Year	ICES Advice	Predicted landings corresponding to advice	Agreed TAC	Official landings	ICES landings
1987	F < F(84); TAC	120	150	131	154
1988	70% of F(85); TAC	150	175	138	154
1989	Reduce F; Buffer SSB	< 175	185	152	170
1990	<i>status quo</i> F; TAC	171	180	156	156
1991	No increase in F; TAC	169	175	144	148
1992	No long-term gains in increasing F	- <sup>a)</sup>	175	123	125
1993	No long-term gains in increasing F	170 <sup>a)</sup>	175	115	117
1994	No long-term gains in increasing F	- <sup>a)</sup>	165	110	110
1995	Significant reduction in F	87 <sup>b)</sup>	115	96	98
1996	Reduction in F of 40%	61	81	80	82
1997	Reduction in F of 20%	80	91 <sup>c)</sup>	82	83
1998	Fish at F = 0.3	82	87	70	72
1999	Fish at F = 0.3	106	102	79	81
2000	Fish at F = 0.3	95	97	84	81
2001	Fish at F = 0.26	78	78	80	82
2002	F < F <sub>pa</sub>	< 77	77	70	70
2003	Fish at F = 0.23	60	73	66	67
2004	Recovery plan	-	61	61	61
2005	Rebuild the SSB above B <sub>pa</sub> in 2006	35	59	55	56
2006	Rebuild the SSB above B <sub>pa</sub> in 2007	48	57	56	58
2007	Rebuild the SSB above B <sub>pa</sub> in 2008	< 32	50	49	50
2008	Rebuild the SSB above B <sub>pa</sub> in 2009	< 35	49	48	49
2009	Limit total landings to 55 500 t	< 55.5	55.5	NA	55
2010	Limit total landings to 63 825 t	< 63.8	63.8	51	61
2011	See scenarios	< 64.2	73.4	66	67
2012	Apply first stage of the management plan	< 84.410	84.4	71	74
2013	Apply first stage of the management plan	< 97.070	97.1	79	79
2014	Apply first stage of the management plan	< 111.631	111.6		
2015	(November update) Apply second stage of the management plan	< 128.376			

Weights in thousand tonnes.

<sup>a)</sup> Catch at *status quo* F.

<sup>b)</sup> Catch at 20% reduction in F.

<sup>c)</sup> After revision from 77 000 t.

NA = not available.

Table 6.3.18.2

Plaice in Subarea IV (North Sea). Official landings by country and ICES estimates of landings (tonnes).

YEAR	Belgium	Denmark	France	Germany	Nether-lands	Norway	Sweden	UK	Others	Total	Un-allocated	ICES estimate	TAC
1980	7005	27057	711	4319	39782	15	7	23032		101928	38023	139951	
1981	6346	22026	586	3449	40049	18	3	21519		93996	45701	139697	105000
1982	6755	24532	1046	3626	41208	17	6	20740		97930	56616	154546	140000
1983	9716	18749	1185	2397	51328	15	22	17400		100812	43218	144030	164000
1984	11393	22154	604	2485	61478	16	13	16853		114996	41153	156149	182000
1985	9965	28236	1010	2197	90950	23	18	15912		148311	11527	159838	200000
1986	7232	26332	751	1809	74447	21	16	17294		127902	37445	165347	180000
1987	8554	21597	1580	1794	76612	12	7	20638		130794	22876	153670	150000
1988	11527	20259	1773	2566	77724	21	2	24497	43	138412	16063	154475	175000
1989	10939	23481	2037	5341	84173	321	12	26104		152408	17410	169818	185000
1990	13940	26474	1339	8747	78204	1756	169	25632		156261	-21	156240	180000
1991	14328	24356	508	7926	67945	560	103	27839		143565	4438	148003	175000
1992	12006	20891	537	6818	51064	836	53	31277		123482	1708	125190	175000
1993	10814	16452	603	6895	48552	827	7	31128		115278	1835	117113	175000
1994	7951	17056	407	5697	50289	524	6	27749		109679	713	110392	165000
1995	7093	13358	442	6329	44263	527	3	24395		96410	1946	98356	115000
1996	5765	11776	379	4780	35419	917	5	20992		80033	1640	81673	81000
1997	5223	13940	254	4159	34143	1620	10	22134		81483	1565	83048	91000
1998	5592	10087	489	2773	30541	965	2	19915	1	70365	1169	71534	87000
1999	6160	13468	624	3144	37513	643	4	17061		78617	2045	80662	102000
2000	7260	13408	547	4310	35030	883	3	20710		82151	-1001	81150	97000
2001	6369	13797	429	4739	33290	1926	3	19147		79700	2147	81847	78000
2002	4859	12552	548	3927	29081	1996	2	16740		69705	512	70217	77000
2003	4570	13742	343	3800	27353	1967	2	13892		65669	820	66489	73250
2004	4314	12123	231	3649	23662	1744	1	15284		61008	428	61436	61000
2005	3396	11385	112	3379	22271	1660	0	12705		54908	792	55700	59000
2006	3487	11907	132	3599	22764	1614	0	12429		55933	2010	57943	57441
2007	3866	8128	144	2643	21465	1224	4	11557	-	49031	713	49744	50261
2008	3396	8229	125	3138	20312	1051	20	11411		47682	1193	48875	49000
2009	3474	N/A*	N/A*	2931	29142	1116	1	13143	-	N/A*	-	54973	55500
2010	3699	435	383	3601	26689	1089	5	14765	-	50666	10008	60674	63825
2011	4466	11634	344	3812	29272	1223	3	15169	-	65923	1463	67386	73400
2012	4862	12245	281	3742	32201	1022	5	16888	-	71246	2584	73830	84410
2013	6462	13650	249	4903	33537	843	3	19334	-	78982	-77	78905	97070

\* Official estimates not available.

Table 6.3.18.3

Plaice in Subarea IV (North Sea). Summary of stock assessment.

Year	Recruitment age 1 thousands	SSB tonnes	Catches tonnes	Landings tonnes	Discards tonnes	Mean F ages 2–6 -
1957	461000	285200	78400	70600	7900	0.28
1958	700000	293800	88200	73400	14800	0.33
1959	865000	299100	109200	79300	29900	0.37
1960	761000	308700	117300	87500	29800	0.37
1961	866000	321400	118500	86000	32500	0.35
1962	594000	371900	125400	87500	37900	0.38
1963	695000	373700	148400	107100	41300	0.42
1964	2255000	366000	147600	110500	37000	0.46
1965	702000	349400	140200	97100	43100	0.38
1966	594000	366400	166600	101800	64700	0.40
1967	407000	421500	163400	108800	54500	0.42
1968	439000	411000	139500	111500	28000	0.33
1969	659000	385400	142800	121700	21200	0.35
1970	664000	336800	160000	130300	29600	0.46
1971	420000	325100	136900	113900	23000	0.38
1972	374000	327500	142500	122800	19600	0.41
1973	1320000	276800	143800	130400	13400	0.47
1974	1135000	286000	157500	112500	44900	0.49
1975	864000	297100	195200	108500	86700	0.58
1976	691000	308600	166900	113700	53200	0.42
1977	989000	312600	176700	119200	57500	0.51
1978	917000	298600	159600	114000	45700	0.46
1979	898000	296700	213300	145300	67900	0.67
1980	1133000	272400	171500	140400	31100	0.56
1981	864000	262300	173600	140600	33000	0.55
1982	2017000	260500	204500	155400	49100	0.61
1983	1301000	309600	219400	144900	74500	0.60
1984	1253000	317000	227800	157000	70800	0.59
1985	1844000	339000	221400	160900	60500	0.53
1986	4743000	365400	296500	166500	130000	0.67
1987	1941000	441900	345600	155100	190500	0.70
1988	1763000	382300	312700	156300	156400	0.68
1989	1179000	405100	279100	171300	107800	0.63
1990	1032000	365500	229000	157800	71200	0.59
1991	910000	334900	230300	149300	80900	0.66
1992	775000	272400	183300	126300	57000	0.65
1993	530000	235700	153000	118000	35000	0.64
1994	442000	213200	135200	111400	23800	0.61
1995	1164000	202400	121100	99200	21800	0.64
1996	1292000	180500	134600	82600	52000	0.67
1997	2148000	205900	184300	84200	100100	0.80
1998	772000	227300	176300	72500	103800	0.73
1999	840000	201900	152700	81700	71000	0.67
2000	989000	228400	126800	82500	44300	0.46
2001	541000	272100	183200	82900	100300	0.77
2002	1729000	197100	125800	71400	54400	0.58
2003	529000	227500	145000	67200	77800	0.61
2004	1265000	207800	116500	62100	54500	0.48
2005	746000	245200	110100	56300	53900	0.40
2006	885000	251400	120300	58500	61800	0.39
2007	1095000	254900	89800	50300	39400	0.33
2008	1014000	350300	95300	49400	45900	0.26
2009	1102000	374300	100700	55400	45200	0.24
2010	1300000	465500	107000	61200	45800	0.22
2011	1658000	456800	108500	68000	40600	0.21
2012	907000	507000	132900	73800	59100	0.24
2013	1319000	553600	118100	79400	38700	0.21
2014	1309243 *	670400				
Average	1068316	321293	161638	105782	55846	0.491

\* RCT3 estimate.

## **Annex 6.3.18 EU multiannual management plan for North Sea plaice and sole**

Extract from Council Regulation (EC) No. 676/2007 of 11 June 2007 establishing a multiannual plan for fisheries exploiting stocks of plaice and sole in the North Sea:

### Article 2. Safe biological limits

1. *For the purposes of this Regulation, the stocks of plaice and sole shall be deemed to be within safe biological limits in those years in which, according to the opinion of the Scientific, Technical, and Economic Committee for Fisheries (STECF), all of the following conditions are fulfilled:*
  - (a) *the spawning biomass of the stock of plaice exceeds 230 000 tonnes;*
  - (b) *the average fishing mortality rate on ages two to six years experienced by the stock of plaice is less than 0,6 per year;*
  - (c) *the spawning biomass of the stock of sole exceeds 35 000 tonnes;*
  - (d) *the average fishing mortality rate on ages two to six years experienced by the stock of sole is less than 0,4 per year.*
2. *If the STECF advises that other levels of biomass and fishing mortality should be used to define safe biological limits, the Commission shall propose to amend paragraph 1*

### Article 3. Objectives of the multiannual plan in the first stage

1. *The multiannual plan shall, in its first stage, ensure the return of the stocks of plaice and of sole to within safe biological limits.*
2. *The objective specified in paragraph 1 shall be attained by reducing the fishing mortality rate on plaice and sole by 10 % each year, with a maximum TAC variation of 15 % per year until safe biological limits are reached for both stocks.*

### Article 4. Objectives of the multiannual plan in the second stage

1. *The multiannual plan shall, in its second stage, ensure the exploitation of the stocks of plaice and sole on the basis of maximum sustainable yield.*
2. *The objective specified in paragraph 1 shall be attained while maintaining the fishing mortality on plaice at a rate equal to or no lower than 0,3 on ages two to six years.*
3. *The objective specified in paragraph 1 shall be attained while maintaining the fishing mortality on sole at a rate equal to or no lower than 0,2 on ages two to six years.*

### Article 5. Transitional arrangements

1. *When the stocks of plaice and sole have been found for two years in succession to have returned to within safe biological limits the Council shall decide on the basis of a proposal from the Commission on the amendment of Articles 4(2) and 4(3) and the amendment of Articles 7, 8 and 9 that will, in the light of the latest scientific advice from the STECF, permit the exploitation of the stocks at a fishing mortality rate compatible with maximum sustainable yield.*

### Article 7. Procedure for setting the TAC for plaice

- 1) *The Council shall adopt the TAC for plaice at that level of catches which, according to a scientific evaluation carried out by STECF is the higher of:*
  - a) *that TAC the application of which will result in a 10 % reduction in the fishing mortality rate in its year of application compared to the fishing mortality rate estimated for the preceding year;*
  - b) *that TAC the application of which will result in the level of fishing mortality rate of 0.3 on ages two to six years in its year of application.*
- 2) *Where application of paragraph 1 would result in a TAC which exceeds the TAC of the preceding year by more than 15 %, the Council shall adopt a TAC which is 15 % greater than the TAC of that year.*
- 3) *Where application of paragraph 1 would result in a TAC which is more than 15 % less than the TAC of the preceding year, the Council shall adopt a TAC which is 15 % less than the TAC of that year.*