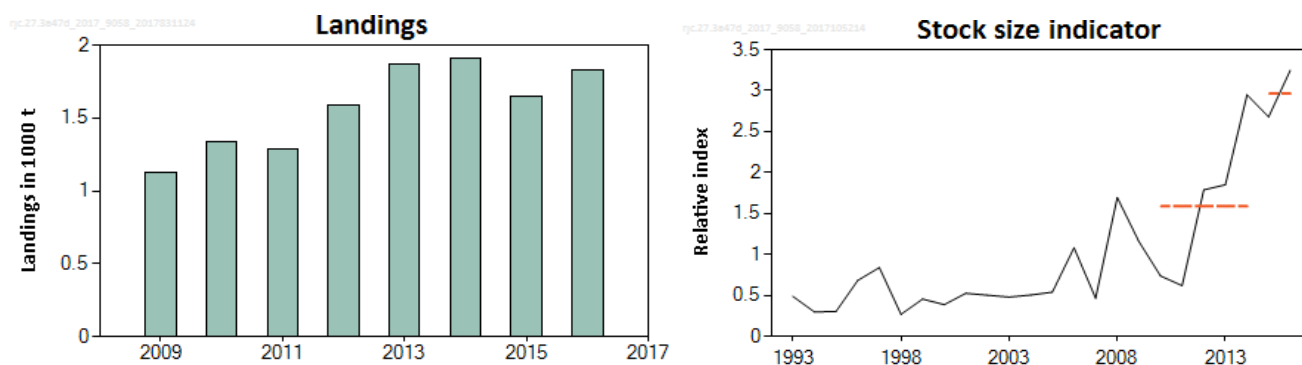## Thornback ray (*Raja clavata*) in Subarea 4 and in divisions 3.a and 7.d (North Sea, Skagerrak, Kattegat, and eastern English Channel)

ICES stock advice

ICES advises that when the precautionary approach is applied, landings should be no more than 2574 tonnes in each of the years 2018 and 2019. ICES cannot quantify the corresponding catches.

Stock development over time

The stock has strongly increased in recent years.

Figure 1   Thornback ray in Subarea 4 and in divisions 3.a and 7.d. Summary of the stock assessment. Left: ICES estimates of species-specific landings of *R. clavata* since 2009. Right: stock size indicator (the annual mean of the four surveys, IBTS-Q1, IBTS-Q3, CGFS-Q4, and BTS-Eng-Q3, after results from each survey had been normalized by their long-term means, and based on individuals of ≥ 50 cm total length). The dotted horizontal lines show the mean stock indicators for 2015–2016 and 2010–2014.

Stock and exploitation status

Table 1   Thornback ray in Subarea 4 and in divisions 3.a and 7.d. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size		
		2014	2015	2016		2014	2015	2016
Maximum sustainable yield	F_{MSY}	?	?	? Undefined	MSY $B_{trigger}$	?	?	? Undefined
Precautionary approach	F_{pa}, F_{lim}	?	?	? Undefined	B_{pa}, B_{lim}	?	?	? Undefined
Management plan	F_{MGT}	-	-	- Not applicable	B_{MGT}	-	-	- Not applicable
Qualitative evaluation	-	?	?	? Unknown	-	↗	↘	↗ Increasing

Catch options

The ICES framework for category 3 stocks was applied (ICES, 2012). Biomass indices derived from four surveys (IBTS-Q1, IBTS-Q3, CGFS-Q4, and BTS-Eng-Q3) were used to provide an overall index of stock development (stock size indicator).The advice is based on a comparison of the two latest index values (index A) with the five preceding values (index B), multiplied by advised landings adjusted for 2016 and 2017 (ICES, 2016a).

The previous advised landings for 2016 and 2017 were originally derived using landings statistics from 2012–2014. In 2016, a review of the landing statistics of elasmobranchs (ICES, 2016a) was conducted. As a result, the basis which was used to provide advice in 2015 for 2016 and 2017 has been adjusted to account for the update in the landing statistics in the period 2012–2014.

The index is estimated to have increased by more than 20% and thus the uncertainty cap was applied to calculate the landings advice. The stock size relative to candidate reference points is unknown. The stock size indicator has increased consistently over the last five years after two decades of stability and, therefore, the precautionary buffer is not applied in 2017. Discarding is known to take place, but ICES cannot quantify the corresponding catches.

Table 2   Thornback ray in Subarea 4 and in divisions 3.a and 7.d. The basis for the catch options.*

Index A (2015–2016)		2.96
Index B (2010–2014)		1.59
Index ratio (A/B)		1.87
Uncertainty cap	Applied	1.2
Advised landings (2016, 2017)		2110 tonnes
Advised landings, adjusted (2016, 2017)** [2110 t × 1.02]		2145 tonnes
Discard rate		Unknown
Precautionary buffer	Not applied	-
Landings advice ***		2574 tonnes

* The figures in the table are rounded. Calculations were done with unrounded inputs and computed values may not match exactly when calculated using the rounded figures in the table.
** Advised landings adjusted for the revision of the landings statistics in 2012–2014 (ICES, 2016a).
*** [advised landings, adjusted (2016, 2017)] × [uncertainty cap].

Basis of the advice

Table 3   Thornback ray in Subarea 4 and in divisions 3.a and 7.d. The basis of the advice.

Advice basis	Precautionary approach.
Management plan	ICES is not aware of any agreed precautionary management plan for thornback ray in this area.

Quality of the assessment

There is insufficient information to present trends in species-specific landings for this stock prior to 2009. Since legal obligations to declare most skates to species level were introduced, a greater proportion of the data have been reported to this level, but data remain incomplete. Thornback ray account for 73–77% of the landings reported to species level in the last three years in this area.

Fishery-independent trawl surveys provide the longest time-series of species-specific information and cover most of the stock area. The CGFS-Q4 has used a larger trawl since 2015 and the results of intercalibration studies have been used to adjust the stock size indicator (ICES, 2017).

Issues relevant for the advice

Thornback ray in Subarea 4 and in divisions 3.a and 7.d is concentrated in the southwestern part of the stock area (divisions 4.c and 7.d), thus straddling two TAC areas (EU waters of Division 2.a and Subarea 4, and Division 7.d).

Available onboard observer data indicate that discarding rates are increasing, due to restrictive quota and increasing stock size (ICES, 2017). Improved estimates of discard rates and discard survival are required.

Thornback ray is a large-bodied coastal species taken in recreational fisheries, but the quantities of retained catches are unknown. The ICES advice refers only to the commercial catches.

Reference points

Reference points are not defined for this stock.

An attempt has been made this year to calculate suitable MSY proxy reference points for this stock, but further investigation is needed (ICES, 2017).

Basis of the assessment

Table 4   Thornback ray in Subarea 4 and in divisions 3.a and 7.d. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2016b).
Assessment type	Survey-based trends (ICES, 2017).
Input data	ICES estimated landings since 2009. IBTS-Q1, IBTS-Q3, CGFS-Q4, and BTS-Eng-Q3.
Discards and bycatch	Unknown.
Indicators	None.
Other information	None.
Working group	Working Group on Elasmobranch Fishes (WGEF)

Information from stakeholders

The observed increase in surveys is consistent with the perception of fishers. As yet unpublished industry data from the Dutch pulse trawl fisheries has shown that in quarter 4 of 2016, 80% of the total catch (in biomass) of thornback ray was discarded (ICES, 2017).

History of the advice, catch, and management

Table 5   Thornback ray in Subarea 4 and in divisions 3.a and 7.d. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted landings corresp. to advice	* ICES species-specific landings: minimum estimate based on reported landings
2006	Zero catch	0	
2007	Zero catch	0	
2008	No new advice, same as 2007	0	
2009	*Status quo* catch		
2010	No new advice, same as 2009		
2011	*Status quo* catch		
2012	No new advice, same as 2011		1536
2013	No TAC, species-specific measures needed, catch could increase by max. 20%	-	1863
2014	No new advice, same as 2013	-	1874
2015	No new advice, same as 2014	-	1645
2016	Precautionary approach	2110	1825
2017	Biennial	2110	
2018	Precautionary approach	≤ 2574	
2019	Precautionary approach (same advice as for 2018)	≤ 2574	

* Data revised in 2016 (ICES, 2016a).

History of the catch and landings

Table 6   Thornback ray in Subarea 4 and in divisions 3.a and 7.d. Landings distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings			Discards
Unknown	Bottom and beam trawls 72%	Bottom nets 18%	Other gears 10%	Unknown
	1825 tonnes			

Table 7   Thornback ray in Subarea 4 and in divisions 3.a and 7.d. ICES estimates of landings by country (in tonnes). Data revised in 2016 (ICES, 2016a).

Year	Belgium	Germany	Denmark	France	UK	Netherlands	Norway	Sweden	Total
2005				196	0.02		0.80		197
2006				108				0.04	108
2007	0.57			155	0.01			0.04	156
2008	214			90	209	197	0.01		710
2009	154			462	335	178			1129
2010	176		1	541	409	203	5.89		1336
2011	164		1	534	485	97	0.47	0.25	1282
2012	154			769	478	186	1.96	0.01	1589
2013	201		2	940	573	149	3.29		1868
2014	206		8	989	571	131	1.22		1905
2015	219		4	814	447	161			1645
2016	196	34	3	890	517	185		0.01	1825

Summary of the assessment

Table 8   Thornback ray in Subarea 4 and in divisions 3.a and 7.d. Assessment summary. Biomass indices from the IBTS-Q1, IBTS-Q3, CGFS-Q4, and BTS-Eng-Q3 surveys (all indices in kg h^{-1}; and based on individuals of ≥ 50 cm total length) and the stock size indicator (annual mean of the four surveys after they had each been normalized by their long-term means).

Year	IBTS-Q1	IBTS-Q3	CGFS-Q4	BTS-Eng-Q3	Stock size indicator
1993	0.452	0.441	0.542	0.516	0.489
1994	0.123	0.056	0.943	0.583	0.298
1995	0.124	0.143	0.796	0.555	0.306
1996	0.293	1.179	0.109	0.675	0.684
1997	0.711	0.435	0.866	1.655	0.840
1998	0	0	1.014	0.716	0.270
1999	0.079	0.355	0.753	1.031	0.457
2000	0.196	0.077	0.926	0.888	0.388
2001	0.254	0.164	0.822	1.399	0.527
2002	0.271	0.531	1.015	0.423	0.503
2003	0.433	0.081	0.752	1.049	0.480
2004	0.129	0.065	0.740	1.757	0.506
2005	0.540	0.070	1.642	0.606	0.541
2006	1.405	0.480	1.207	1.359	1.082
2007	0.253	0.018	1.592	0.868	0.468
2008	2.913	0.507	1.800	1.398	1.695
2009	1.687	0.386	1.560	1.206	1.159
2010	0.417	0.300	1.686	1.368	0.738
2011	0.071	0.457	1.582	1.143	0.620
2012	3.020	0.259	2.247	1.864	1.788
2013	0.759	2.404	4.074	0.896	1.851
2014	1.261	2.741	4.412	4.772	2.948
2015	1.440	2.238	6.328	2.769	2.678
2016	0.598	2.798	9.277	NA*	3.247

* Not available; see ICES, 2017.

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