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Horse mackerel (*Trachurus trachurus*) in divisions 3.a, 4.b–c, and 7.d (Skagerrak and Kattegat, southern and central North Sea, eastern English Channel)

ICES advice on fishing opportunities

ICES advises that when the precautionary approach is applied, catches should be no more than 14 014 tonnes in each of the years 2020 and 2021.

Stock development over time

The combined CGFS–IBTS (Channel Groundfish Survey–North Sea International Bottom Trawl Survey) survey index indicates that the stock continues to be at a low level.
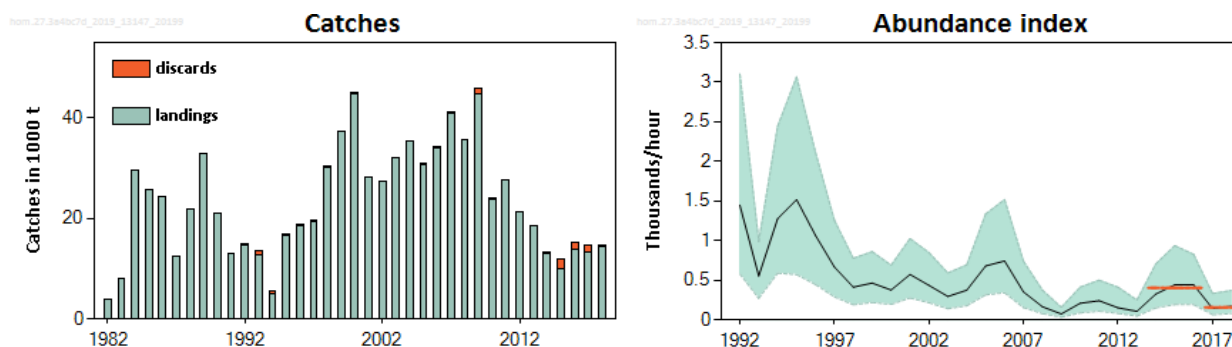

Figure 1   Horse mackerel in divisions 3.a, 4.b–c, and 7.d. Left: Catches in quarters 1 and 2 from divisions 3.a and 4.a, and in all quarters from divisions 4.b–c and 7.d. Discard estimates are only available for some years. Right: Index of abundance of fish > 20 cm length in the stock; data obtained from a combination of the IBTS and CGFS surveys in the North Sea (divisions 4.b–c, Q3) and eastern English Channel (Division 7.d, Q4), respectively. Confidence intervals (95%) are included and the red lines indicate the average values for 2014–2016 and 2017–2018.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is above F_{MSY} proxy; no reference points for stock size have been defined for this stock.

Table 1   Horse mackerel in divisions 3.a, 4.b–c, and 7.d. State of the stock and fishery relative to reference points. The status evaluation is based on reference point proxies (ICES, 2018b, 2019).

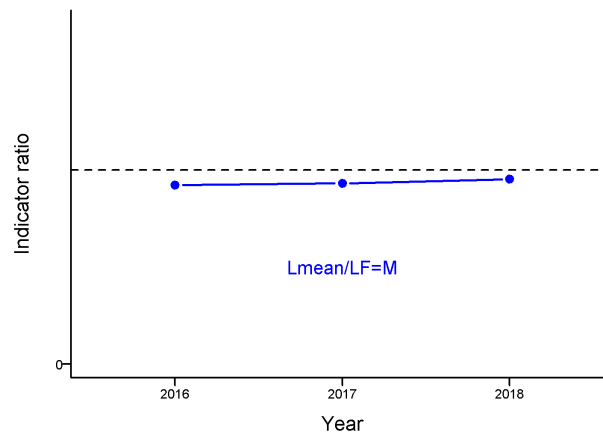|		Fishing pressure					Stock size		
		2016	2017	2018			2016	2017	2018
Maximum sustainable yield	F_{MSY}	✖	✖	✖ Above proxy	MSY $B_{trigger}$		?	?	? Undefined
Precautionary approach	F_{pa}, F_{lim}	?	?	? Unknown	B_{pa}, B_{lim}		?	?	? Undefined
Management plan	F_{MGT}	—	—	— Not applicable	B_{MGT}		—	—	— Not applicable
Qualitative evaluation	-	?	?	? Uknown	-		➡	↘	↗ Increasing

Figure 2   Horse mackerel in divisions 3.a, 4.b–c, and 7.d. The index ratio $L_{mean}/L_{F=M}$ from the length-based indicator (LBI; ICES, 2018a) method is used for the evaluation of the exploitation status. The exploitation status is above the F_{MSY} proxy when the index ratio value is less than 1, which is indicated by the dashed line.

Catch scenarios

The ICES framework for category 3 stocks was applied (ICES, 2012). The index of stock abundance is derived from the combination of two surveys: the Channel Groundfish Survey (CGFS) in September–October and the North Sea International Bottom Trawl Survey (NS-IBTS) in July–September. The combined index is used as the index of stock development over time.

The advice is based on the ratio of the mean of the last two index values (Index A; 2017–2018) and the mean of the three preceding values (Index B; 2014–2016), multiplied by the recent advised catch.

The index is estimated to have decreased by more than 20% and thus the uncertainty cap was applied.

Fishing mortality is above the F_{MSY} proxy (as indicated by a length-based analysis), and stock size relative to reference points is unknown. However, because the last application of the precautionary buffer in 2017 is within a period of three years, the precautionary buffer is not applied in the current advice.

Table 2   Horse mackerel in divisions 3.a, 4.b–c, and 7.d. The basis for the catch scenarios.

Index A (2017, 2018)		158.5 ind. h^{-1}
Index B (2014, 2015, 2016)		403.3 ind. h^{-1}
Ratio (A/B)		0.39
Uncertainty cap	Applied	0.8
Precautionary buffer	Not applied	
Advised catch for 2019		17517 tonnes
Catch advice *		14014 tonnes

The values in the table are rounded. Calculations were done with unrounded inputs and computed values may not match exactly when calculated using the rounded values in the table.
* [Advised catch for 2019] × [uncertainty cap].

The catch advice has been reduced because of the decline in the abundance index.

Basis of the advice

Table 3   Horse mackerel in divisions 3.a, 4.b–c, and 7.d. The basis of the advice.

Advice basis	Precautionary approach.
Management plan	There is no management plan for horse mackerel in this area. ICES evaluated a proposed harvest control rule for a multi-annual plan for horse mackerel in the North Sea (ICES, 2014). None of the options were considered as being in accordance with the precautionary approach.

Quality of the assessment

In 2019, an error was identified in the code that was used to generate the assessment data for this stock in 2017. The error was in the calculation of CPUE from the DATRAS database for the year 2016. The error has now been corrected, which resulted in a substantially lower estimate of abundance in 2016. However, because of the uncertainty cap the error has no effect on the resulting 2017 advice.
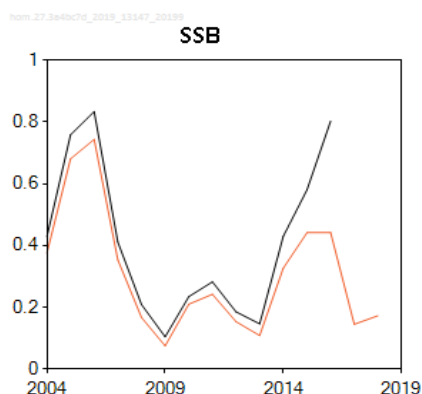

Figure 3   Horse mackerel in divisions 3.a, 4.b–c, and 7.d. Historical assessment results. Black line: abundance index from assessment in 2017; orange line: abundance index from assessment in 2019.

Issues relevant for the advice

Discarding in the target pelagic fisheries is considered negligible. Since 2015, discard information from some bottom-trawl fisheries that do not target horse mackerel, is available and discard estimates range between 2% and 17%. The average discard rate over 2017 and 2018 is 5.1%. Still, discard information is considered to be incomplete, and discard numbers from earlier years have not been submitted to ICES.

Reference points

Table 4   North Sea horse mackerel in divisions 3.a, 4.b–c, and 7.d. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	Not defined		
	$F_{MSY_{proxy}}$	23.4 cm (2018)	Length-based indicator (LBI; ICES, 2018a). Expected mean length of catch above L_c when F = M, assuming M/K = 1.5.	ICES (2019)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not defined		
	F_{mgt}	Not defined		

Basis of the assessment

Table 5   Horse mackerel in divisions 3.a, 4.b–c, and 7.d. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2018b).
Assessment type	Survey trends-based assessment.
Input data	Commercial catch, NS-IBTS and CGFS data.
Discards and bycatch	Included in the advice.
Indicators	Length-based indicators (ICES, 2018a).
Other information	This stock has been benchmarked in 2017 (ICES, 2017).
Working group	Working Group on Widely Distributed Stocks (WGWIDE)

Information from stakeholders

In 2015 the Pelagic Advisory Council and the EAPO Northern Pelagic Working Group, together with University College Dublin (Ireland), initiated a research project on the genetic composition of horse mackerel stocks. Genetic samples have been taken over the entire distribution area of horse mackerel during the years 2015, 2016, and 2017, with a specific focus on the separation between horse mackerel in the western waters and horse mackerel in the North Sea. A full genome sequencing exercise has been initiated to allow for future mixed-sample analyses.

Historical catch rates of the pelagic freezer-trawlers, based on skippers' diaries, have been compiled. The results were presented at the benchmark in 2017, but further work is necessary to develop an index of stock biomass from these data.

In the autumn of 2018, a voluntary move-away scheme to avoid the catch of small horse mackerel in Division 7.d was commenced by the PFA (the Pelagic Freezer-trawler Association). The trigger in the move-away scheme was a catch of more than 25% in a haul consisting of small fish (more than 250 fish in a carton of 23 kg, equating to a mean length around 18 cm). The move-away scheme has been triggered 17 times during the period October–December 2018.

History of the advice, catch, and management

Table 6   Horse mackerel in divisions 3.a, 4.b–c, and 7.d. ICES advice and catch. All weights are in tonnes.

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC *	ICES catch **
1987	Not assessed	-	30000	12336
1988	No advice	-	50000	21806
1989	No advice	-	45000	32788
1990	No advice	-	40000	21023
1991	No advice	-	45000	12913
1992	No advice	-	55000	15043
1993	No advice	-	60000	13617
1994	No advice	-	60000	5629
1995	No advice	-	60000	16756
1996	No advice	-	60000	18843
1997	No advice	-	60000	19540
1998	Develop and implement management plan	-	60000	30500
1999	Develop and implement management plan	-	60000	37224
2000	Develop and implement management plan	-	51000	45133
2001	No increase in catch	-	51000	28331
2002	No increase in catch from 1982–1997 average	< 18000	58000	27264
2003	No increase in catch from 1982–1997 average	< 18000	50000	32028
2004	No increase in catch from 1982–1997	< 18000	42000	35435
2005	No increase in catch from 1982–1997	< 18000	43000	30911
2006	No increase in catch from 1982–1997	< 18000	43000	34318
2007	No increase in catch from 1982–1997	< 18000	43000	41242
2008	No increase in catch from 1982–1997	< 18000	39000	35704
2009	Same advice as last year	< 18000	39000	46919
2010	Same advice as last year	< 18000	47000	24151
2011	No advice	-	40000	27619

Year	ICES advice	Predicted catch corresp. to advice	Agreed TAC *	ICES catch **
2012	Reduce catches	-	44000	21378
2013	Reduce catches by 20%	< 25500	38000	18645
2014	Same advice as last year	< 25500	32000	13388
2015	Significant reduction in catches	< 15200	15200	12002
2016	Same advice value as in 2015	≤ 15200	15200	15341
2017	Precautionary approach	≤ 18247***	18247***	14579
2018	Precautionary approach	≤ 17517***	15179	14773
2019	Precautionary approach (same advice as for 2018)	≤ 17517***	15179	
2020	Precautionary approach	≤ 14014***		
2021	Precautionary approach (same advice as for 2020)	≤ 14014***		

* Until 2010 the TAC is for Division 2.a and Subarea 4 (EU waters only). From 2010 onwards the TAC is for divisions 3.a , 4.b–c, and 7.d (EU waters only).

** ICES catch includes catches from divisions 4.a and 3.a (quarters 1–2 only).

*** Total catch advice takes into account information on discarding from non-directed bottom-trawl fisheries, which first became available in 2016.

History of the catch and landings

Table 7 Horse mackerel in divisions 3.a, 4.b–c, and 7.d. Catch distribution by fleet in 2018 as estimated by ICES.

Catch (2018)	Landings				Discards
	Bottom trawl 2.4%	Pelagic trawl 60.2%	Seine 3.3%	Other (incl. unspecified) 34.1%	
14773 tonnes	14508 tonnes				265 tonnes

Table 8 Horse mackerel in divisions 3.a, 4.b–c, and 7.d. History of commercial catch and landings; ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Year	Division 3.a	Division 4.a	Divisions 4.b–c	Division 7.d	Discards	Total
1982	2788*			1247		4035
1983	4420*			3600		8020
1984	25893*			3585		29478
1985			22897	2715		25612
1986			19496	4756		24252
1987	1138		9477	1721		12336
1988	396		18290	3120		21806
1989	436		25830	6522		32788
1990	2261		17437	1325		21023
1991	913		11400	600		12913
1992			13955	688	400	15043
1993			3895	8792	930	13617
1994			2496	2503	630	5629
1995	112		7948	8666	30	16756
1996	1657		7558	9416	212	18843
1997			14078	5452	10	19540
1998	3693		10530	16194	83	30500
1999			9335	27889		37224
2000		176	25931	19019	4	45130
2001	43	212	6686	21390		28331
2002		639	15303	11323		27264
2003	49	622	10309	21049		32028
2004	303	133	18544	16455		35435
2005		1331	13995	15460	62	30848
2006	185	2192	7996	23789	78	34240
2007	11	2051	9114	29789	139	41103
2008	27	910	2582	32185		35704

Year	Division 3.a	Division 4.a	Divisions 4.b–c	Division 7.d	Discards	Total
2009	21	314	18975	25537	1036	45883
2010		100	1969	22077	2	24149
2011			10435	17184		27619
2012		355	1559	19464		21378
2013		17	1453	17175		18645
2014	1	2	2597	10772	7	13380
2015	3	644	770	8581	2004	12002
2016	2	1628	975	11209	1527	15341
2017		22	2557	10787	1213	14579
2018		1419	1413	11677	265	14773

*Divisions 3.a and 4.b–c combined.

Summary of the assessment

Table 9 Horse mackerel in divisions 3.a, 4.b–c, and 7.d. Abundance index of North Sea horse mackerel (in thousands h^{-1}) obtained from the combination of the NS-IBTS in divisions 4.b–c in Q3 and the CGFS in Division 7.d in Q4. The High and Low columns represent the confidence intervals (95%) of the indices.

Year	Low	Abundance index	High	Landings	Discards
1982				4035	0
1983				8020	0
1984				29478	0
1985				25612	0
1986				24252	0
1987				12336	0
1988				21806	0
1989				32788	0
1990				21023	0
1991				12913	0
1992	0.58	1.449	3.105	14643	400
1993	0.272	0.555	0.987	12687	930
1994	0.59	1.277	2.446	4999	630
1995	0.572	1.518	3.067	16726	30
1996	0.446	1.066	2.116	18631	212
1997	0.29	0.668	1.259	19530	10
1998	0.191	0.413	0.777	30417	83
1999	0.219	0.465	0.862	37224	0
2000	0.196	0.377	0.69	45126	4
2001	0.276	0.574	1.026	28331	0
2002	0.217	0.436	0.851	27264	0
2003	0.141	0.295	0.592	32028	0
2004	0.178	0.375	0.694	35435	0
2005	0.316	0.681	1.337	30786	62
2006	0.343	0.744	1.519	34162	78
2007	0.155	0.354	0.741	40964	139
2008	0.079	0.166	0.377	35704	0
2009	0.034	0.075	0.159	44847	1036
2010	0.088	0.21	0.413	24146	2
2011	0.109	0.242	0.501	27619	0
2012	0.082	0.153	0.413	21378	0
2013	0.048	0.108	0.251	18645	0
2014	0.152	0.327	0.708	13373	7
2015	0.192	0.442	0.937	9998	2004
2016	0.193	0.442	0.827	13814	1527
2017	0.065	0.145	0.333	13366	1213
2018	0.079	0.172	0.371	14508	265

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